FINAL RCRA FACILITY INVESTIGATION REPORT

Former Bethlehem Steel Corporation Facility
Lackawanna, New York

PART III - ECOLOGICAL RISK ASSESSMENT REPORT

VOLUME III - ATTACHMENT I THROUGH ATTACHMENT X

October 2004

Submitted by:
TECUMSEH REDEVELOPMENT, INC.
4020 Kinross Lakes Parkway
Richfield, Ohio 44286-9000

RECEIVED
DEC 15 2004
NYSDEC REG 9
FOIL
__REL __UNREL

ATTACHMENT I

NORTH RETURN WATER TRENCH ANALYTICAL RESULTS

BETHLEHEM STEEL CORPORATION

LACKAWANNA, NEW YORK

Table I-1
Analtyical Results for the North Return Water Trench Surface Water - Volatile Organic Compounds (VOCs)
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID: Lab ID: Date Sampled: Sample Depth: Matrix:	Federal Ambient Water Quality Criteria (1)		SW-3 BSC-SW-3-392 03/17/92 Water	NRW-1 NRW-1 11/23/94 Surface Water	NRW-1 DUP NRW-3 11/23/94 Surface Water
VOCs (ug/L)	CMC(2)	CCC(3)			
Acrylonitrile	7550	2600	10 U	0.5 U	0.5 U
Benzene	5300	NC	5 U	0.2 J	0.2 J
Bromochloromethane	NC	NC	5 U	NR	NR
Bromodichloromethane	11000	NC	5 U	0.5 U	0.5 U
Bromoform	NC	NC	5 U	R	R
Bromomethane	NC	NC	10 U	0.5 U	0.5 U
Carbon disulfide	NC	NC	NR	0.5 U	0.5 U
Carbon tetrachloride	35200	NC	5 U	0.5 U	0.5 U
Chlorobenzene	250	50	5 U	0.5 U	0.5 U
Chloroethane	NC	NC	10 U	0.5 U	0.5 U
2-Chloroethyl vinyl ether	NC	NC	10 U	0.5 U	0.5 U
Chloroform	NC	NC	5 U	0.5 U	0.5 U
Chloromethane	NC	NC	10 U	0.5 U	0.5 U
Dibromochloromethane	11000	NC	5 U	0.5 U	0.5 U
Dichlorodifluoromethane	11000	NC	5 U	0.5 U	0.5 U
1,1-Dichloroethane	NC	NC	5 U	0.5 U	0.5 U
1,2-Dichloroethane	118000	2000	5 U	0.5 UJ	0.5 UJ
1,1-Dichloroethene	NC	NC	5 U	0.5 U	0.5 U
trans-1,2-Dichloroethene	11600	NC	5 U	0.5 U	0.5 U
1,2-Dichloropropane	NC	NC	5 U	0.5 U	0.5 U
cis-1,3-Dichloropropene	6060	244	5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene			5 U	0.5 U	0.5 U
Ethylbenzene	32000	NC	5 U	0.5 U	0.5 U
Methyl ethyl ketone	NC	NC	NR	0.5 U	0.5 U
Methylene chloride	NC	NC	10 U	0.8	0.9
1,1,1,2-Tetrachloroethane	9320	2400	5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	9320	NC	5 U	0.5 U	0.5 U
Tetrachloroethene	NC	NC	5 U	0.5 U	0.5 U
Toluene	17500	NC	5 U	0.5 U	0.5 U
1,1,1-Trichloroethane	18000	NC	5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	18000	9400	5 U	0.5 U	0.5 U
Trichlorofluoromethane	NC	NC	5 U	0.5 U	0.5 U
Trichloroethene	45000	21900	5 U	0.5 U	0.5 U
Vinyl chloride	NC	NC	10 U	0.5 U	0.5 U
Xylenes, total	NC	NC	5 U	0.5 U	0.5 U

NOTES:
BOLD - Above USEPA Criteria Maximum Concentration.
Italic - Above USEPA Criteria Continuous Concentration.
U = Not detected at the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
NR = No analysis performed.
J = The concentration was detected at a value below the MDL.
R = The sample results were rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte could not be determined.
NC = No criteria.

(1) Values are Federal Ambient Water Quality Criteria for the protection of aquatic life in freshwater in ug/L.
(2) Criteria Maximum Concentration - (acute).
(3) Criteria Continuous Concentration - (chronic).

Table I-1
Analtyical Results for the North Return Water Trench Surface Water - Semi-Volatile Organic Compounds (SVOCs)
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID: Lab ID: Date Sampled: Sample Depth: Matrix:	Federal Ambient Water Quality Criteria (1)		SW-3 BSC-SW-3-392 03/17/92 Water	NRW-1 NRW-1 11/23/94 Surface Water	NRW-1 DUP NRW-3 11/23/94 Surface Water
SVOCs (ug/L)	CMC(2)	CCC(3)			
Acenapthene	1700	520	NR	10 U	10 U
Acenaphthylene	NC	NC	10 U	10 U	10 U
Anthracene	NC	NC	10 U	10 U	10 U
Benzo (a) anthracene	NC	NC	10 U	10 U	10 U
Benzo (a) pyrene	NC	NC	10 U	10 U	10 U
Benzo (b) fluoranthene	NC	NC	NR	10 U	10 U
Benzo (ghi) perylene	NC	NC	NR	10 U	10 U
Benzo (k) fluoranthene	NC	NC	NR	10 U	10 U
bis (2-Chloroethyl) ether	NC	NC	10 U	10 U	10 U
bis (2-Ethylhexyl) phthalate	400	360	10 U	10 U	10 U
Butyl benzyl phthalate	940	3	10 U	10 U	10 U
4-Chloro-3-methylphenol	NC	NC	10 U	10 U	10 U
2-Chloronaphthalene	1600	NC	10 U	10 U	10 U
Chrysene	NC	NC	10 U	10 U	10 U
Di-n-butyl phthalate	940	3	10 U	10 U	10 U
1,2-Dichlorobenzene	NC	NC	10 U	10 U	10 U
1,3-Dichlorobenzene	NC	NC	10 U	10 U	10 U
1,4-Dichlorobenzene	NC	NC	10 U	10 U	10 U
2.4-Dichlorophenol	2020	365	10 U	10 U	10 U
Diethyl phthalate	940	3	10 U	10 U	10 U
2,4-Dimethylphenol	2120	NC	10 U	10 U	10 U
Dimethyl phthalate	940	3	10 U	10 U	10 U
Di-n-octyl phthalate	940	3	10 U	10 U	10 U
Dibenz (a,h) anthracene	NC	NC	NR	10 U	10 U
2,4-Dinitrotoluene	330	230	10 U	10 U	10 U
2,6-Dinitrotoluene	NC	NC	10 U	10 U	10 U
Fluoranthene	3980	NC	10 U	10 U	10 U
Fluorene	NC	NC	10 U	10 U	10 U
Hexachlorobenzene	6	3.68	10 U	10 U	10 U
Hexachlorobutadiene	90	9.3	NR	10 U	10 U
Hexachlorocyclobutadiene	NC	NC	10 U	NR	NR
Hexachlorocyclopentadiene	7	5.2	10 U	10 U	10 U
Hexachloroethane	980	540	10 U	10 U	10 U
Indeno (1,2,3-cd) pyrene	NC	NC	NR	10 U	10 U
Isophorone	117000	NC	10 U	10 U	10 U
2-Methylphenol	NC	NC	10 U	10 U	10 U
Naphthalene	2300	620	10 U	10 U	10 U
Pentachlorophenol	20	13	50 U	50 U	50 U
Phenanthrene	30	6.3	10 U	10 U	10 U
Phenol	10200	2560	10 U	10 U	10 U
Pyrene	NC	NC	10 U	10 U	10 U
Pyridine	NC	NC	10 U	10 U	10 U
2,3,4,6-Tetrachlorophenol	NC	NC	50 U	10 U	10 U
1,2,4-Trichlorobenzene	250	50	10 U	10 U	10 U
2,4,5-Trichlorophenol	100	63	50 U	10 U	10 U
2,4,6-Trichlorophenol	NC	970	10 U	10 U	10 U
3-Methylphenol	NC	NC	10 U	10 U	10 U
4-Methylphenol	NC	NC	10 U	10 U	10 U
2-Methyl-4,6-dinitrophenol	NC	NC	50 U	50 U	50 U

NOTES:
BOLD - Above USEPA Criteria Maximum Concentration.
Italic - Above USEPA Criteria Continuous Concentration.
U = Not detected at the MDL.
NR = No analysis performed.
NC = No criteria.
(1) Values are Federal Ambient Water Quality Criteria for the protection of aquatic life in freshwater in ug/L.
(2) Criteria Maximum Concentration - (acute).
(3) Criteria Continuous Concentration - (chronic).

Table I-1
Analytical Results for the North Return Water Trench Surface Water -TAL Metals, Cyanide and General Chemistry
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID: Lab ID: Date Sampled: Sample Depth: Matrix:	Federal Ambient Water Quality Criteria [1]		SW-3 BSC-SW-3-392 03/17/92 Water	NRW-1 NRW-1 11/23/94 Surface Water	NRW-1 DUP NRW-3 11/23/94 Surface Water
Metals (ug/L)	CMC[2]	CCC[3]			
Antimony	88	30	60 U	60 U	60 U
Arsenic	360	190	10 U	10 U	10 U
Barium	NC	NC	200 U	200 U	200 U
Cadmium[4,5]	3.8	2.1	5 U	5 U	5 U
Calcium	NC*		NR	32800 J	31200 J
Chromium	16	11	*12.4*	10 U	10 U
Lead [6,7]	58	2.3	*3.2*	*6.2*	*5*
Mercury	2.4	0.01	0.2 U	0.2 U	0.2 U
Nickel [8,9]	426	47	40 U	40 U	40 U
Potassium	NC*		NR	5000 U	5000 U
Selenium	20	5	5 U	5 U	5 U
Silver [10]	3	0.12	10 U	10 U	10 U
Sodium	NC*		NR	16300 J	15500 J
Thallium	1400	40	NR	10 U	10 U
Cyanide	22	5.2	10 U	NR	NR
General Analytical					
Alkalinity (total)(mg/L)	NC	NC	NR	85.9	95.2
CNFREE(ug/L)	NC	NC	NR	10 U	10 U
Conductivity (umhos/cm)	NC	NC	NR	317	317
DICNFREE (ug/L)	NC	NC	NR	10 U	10 U
PHLIQ (su)	NC	NC	NR	8.1	8.1
TOC (mg/L)	NC	NC	NR	3	2.9
Chloride (mg/L)	860[11]	230[11]	NR	30.3	29.4
TOX (ug/L)	NC	NC	NR	98	50 U
Phenolics (ug/L)	NC	NC	NR	5 U	5 U
Total Solids (mg/L)	NC	NC	NR	229	5 U
Total Suspended Solids (mg/L)	NC	NC	NR	17	17
Sulfate (mg/L)	NC	NC	NR	29.6	29.1

NOTES:
BOLD - Above USEPA Criteria Maximum Concentration.
Italic - Above USEPA Criteria Continuous Concentration.
U = Not detected at the MDL.
NR = No analysis performed.
J = The concentration was detected at a value below the MDL.
NC = No criteria.
* = The analyte is an essential nutrient.
(1) Values are Federal Ambient Water Quality Criteria for the protection of aquatic life in freshwater in ug/L.
(2) Criteria Maximum Concentration - (acute).
(3) Criteria Continuous Concentration - (chronic).
(4) CMC criterion is hardness dependent using the following formula: CMC = exp{1.128{ln(hardness)}+(-3.6867}*(1.136672-[ln(hardness)*0.041838]
Total alkalinity concentrations were averaged to determine hardness = 90.6 mg/L.
(5) CCC criterion is hardness dependent using the following formula: CCC = exp{0.7852{ln(hardness)}+(-2.715}*(1.101672-[ln(hardness)*0.041838]
Total alkalinity concentrations were averaged to determine hardness = 90.6 mg/L.
(6) CMC criterion is hardness dependent using the following formula: CMC = exp{1.273{ln(hardness)}+(-1.46}*(1.46203-[ln(hardness)*0.145712]
Total alkalinity concentrations were averaged to determine hardness = 90.6 mg/L.
(7) CCC criterion is hardness dependent using the following formula: CCC = exp{1.273{ln(hardness)}+(-4.705}*(1.46203-[ln(hardness)*0.145712]
Total alkalinity concentrations were averaged to determine hardness = 90.6 mg/L.
(8) CMC criterion is hardness dependent using the following formula: CMC = exp{0.846{ln(hardness)}+2.255}*0.998
Total alkalinity concentrations were averaged to determine hardness = 90.6 mg/L.
(9) CCC criterion is hardness dependent using the following formula: CCC = exp{0.846{ln(hardness)}+0.0584*0.997
Total alkalinity concentrations were averaged to determine hardness = 90.6 mg/L.
(10) CMC criterion is hardness dependent using the following formula: CMC = exp{1.72{ln(hardness)}+(-6.52)}*0.85
Total alkalinity concentrations were averaged to determine hardness = 90.6 mg/L.
(11) Value based on the National Recommended Water Quality Criteria (EPA, 1999d)

Table I-2
Analytical Results for the North Return Water Trench Sediment - Volatile Organic Compounds (VOCs)
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID:	NOAA	NRS-2	NRS-3
Lab ID:	Screening Quick	NRS-2	NRS-3
Date Sampled:	Reference Tables	11/23/94	11/23/94
Sample Depth:	(SQRT's)	0-6"	0-6"
Matrix:	(1999)	Sediment	Sediment
VOCs (ug/kg)	AET		
Acrylonitrile	NC	88 U	82 U
Benzene	NC	8.8 U	8.2 U
Bromodichloromethane	NC	8.8 U	8.2 U
Bromoform	NC	8.8 U	8.2 U
Bromomethane	NC	18 U	16 U
Carbon disulfide	NC	8.8 U	8.2 U
Carbon tetrachloride	NC	8.8 U	8.2 U
Chlorobenzene	NC	8.8 U	8.2 U
Chloroethane	NC	18 U	16 U
2-Chloroethyl vinyl ether	NC	R	R
Chloroform	NC	8.8 U	8.2 U
Chloromethane	NC	18 UJ	16 UJ
Dibromochloromethane	NC	8.8 U	8.2 U
Dichlorodifluoromethane	NC	18 UJ	16 UJ
1,1-Dichloroethane	NC	8.8 U	8.2 U
1,2-Dichloroethane	NC	8.8 U	8.2 U
1,1-Dichloroethene	NC	8.8 U	8.2 U
trans-1,2-Dichloroethene	NC	8.8 U	8.2 U
1,2-Dichloropropane	NC	8.8 U	8.2 U
cis-1,3-Dichloropropene	NC	8.8 U	8.2 U
trans-1,3-Dichloropropene	NC	8.8 UJ	8.2 UJ
Methyl ethyl ketone	NC	88 U	82 U
Ethylbenzene	NC	8.8 U	8.2 U
Methylene chloride	NC	18 U	16 U
1,1,1,2-Tetrachloroethane	NC	8.8 UJ	8.2 UJ
1,1,2,2-Tetrachloroethane	NC	8.8 U	8.2 U
Tetrachloroethene	NC	8.8 U	8.2 U
Toluene	NC	8.8 U	8.2 U
1,1,1-Trichloroethane	NC	8.8 U	8.2 U
1,1,2-Trichloroethane	NC	8.8 U	8.2 U
Trichlorofluoromethane	NC	8.8 UJ	8.2 UJ
Trichloroethene	41[(a)]	8.8 U	8.2 U
Vinyl chloride	NC	18 U	16 U
Xylenes, total	NC	5.5 J	8.2 U

NOTES:
BOLD - Above NOAA SQRT AET Criteria.
U = Not detected at the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
J = The concentration was detected at a value below the MDL.
R = The sample results were rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte could not be determined.
NC = No criteria.
(a) - Value based on marine sediment *Neanthes* bioassays.
AET - Apparent Effects Threshold.

Table 1-2
Analytical Results for the North Return Water Trench Sediment - Semi-Volatile Organic Compounds (SVOCs)
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID: Lab ID: Date Sampled: Sample Depth: Matrix:	Sediment Screening Criteria		NRS-2 NRS-2 11/23/94 0-6" Sediment	NRS-3 NRS-3 11/23/94 0-6" Sediment
SVOCs (ug/kg)	ER-M/SEL	ER-L/LEL		
Acenapthene	650[a]	150[a]	*14000* J	*11000* U
Acenaphthylene	640[b]	44[b]	*57000* J	*11000* U
Anthracene	960[a]	85[a]	*150000*	*11000*
Benzo (a) anthrncene	1600[a]	230[a]	*160000*	*21000*
Benzo (a) pyrene	2500[a]	400[a]	*120000*	*16000*
Benzo (b) fluoranthene	NC	NC	140000	19000
Benzo (ghi) perylene	7680[c]	408[c]	*59000*	*6900* J
Benzo (k) fluoranthene	32160[c]	576[c]	*60000*	*8600* J
bis (2-Chloroethyl) ether	NC	NC	58000 U	11000 U
bis (2-Ethylhexyl) phthalate	NC	750[d]	58000 U	11000 U
Butyl benzyl phthalate	NC	NC	58000 U	11000 U
4-Chloro-3-methylphenol	NC	NC	58000 U	11000 U
2-Chloronaphthalene	NC	NC	58000 U	11000 U
Chrysene	2800[a]	400[a]	*140000*	*20000*
Di-n-butyl phthalate	NC	NC	58000 U	11000 U
1,2-Dichlorobenzene	NC	NC	58000 U	11000 U
1,3-Dichlorobenzene	NC	NC	58000 U	11000 U
1,4-Dichlorobenzene	NC	NC	58000 U	11000 U
2,4-Dichlorophenol	NC	NC	58000 U	11000 U
Diethyl phthalate	NC	NC	58000 U	11000 U
2,4-Dimethylphenol	NC	NC	58000 U	11000 U
Dimethyl phthalate	NC	NC	58000 U	11000 U
Di-n-octyl phthalate	NC	NC	58000 U	11000 U
Dibenz (a,h) anthrncene	260[a]	60[a]	*19000* J	*2500* J
2,4-Dinitrotoluene	NC	NC	58000 U	11000 U
2,6-Dinitrotoluene	NC	NC	58000 U	11000 U
Fluoranthene	3600[a]	600[a]	*390000*	*44000*
Fluorene	640[a]	35[a]	*180000*	*4800* J
Hexachlorobenzene	576[c]	48[c]	58000 UJ	11000 U
Hexachlorobutadiene	NC	NC	58000 U	11000 U
Hexachlorocyclopentadiene	NC	NC	58000 U	11000 U
Hexachloroethane	NC	NC	58000 U	11000 U
Indeno (1,2,3-cd) pyrene	7680[c]	480[c]	*68000*	*7900* J
Isophorone	NC	NC	58000 U	11000 U
2-Methylphenol	NC	NC	58000 U	11000 U
Naphthalene	2100[a]	340[a]	*85000*	11000 U
Pentachlorophenol	NC	NC	280000 U	52000 U
Phenanthrene	1380[a]	225[a]	*550000*	*31000*
Phenol	NC	NC	58000 U	11000 U
Pyrene	2200[a]	350[a]	*340000*	*29000*
Pyridine	NC	NC	58000 U	11000 U
2,3,4,6-Tetrachlorophenol	NC	NC	58000 U	11000 U
1,2,4-Trichlorobenzene	NC	NC	58000 U	11000 U
2,4,5-Trichlorophenol	NC	NC	58000 U	11000 U
2,4,6-Trichlorophenol	NC	NC	58000 U	11000 U
3-Methylphenol	NC	NC	58000 U	11000 U
4-Methylphenol	NC	NC	58000 U	11000 U
2-Methyl-4,6-dinitrophenol	NC	NC	280000 U	52000 U

NOTES:
BOLD - Above the ER-M/SEL Sediment Screening Criteria.
Italic - Above the ER-L/LEL Sediment Screening Criteria.
U = Not detected at the MDL.
J = The concentration was detected at a value below the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
NC = No criteria.
(a) - Effects Range Low (ER-L) and Effects Range Median (ER-M) - Long and Morgan (1990).
(b) - Effects Range Low (ER-L) and Effects Range Median (ER-M) - Long *et al.*, (1995).
(c) - Lowest Effects Level (LEL) and Severe Effects Level (SEL) - Jaagumagi (1992;1994).
(d) - Upper Effects Threshold (UET) - NOAA Screening Quick Reference Table (1999).

Table I-2
Analytical Results for the North Return Water Trench Sediment - TAL Metals, Cyanide, and General Chemistry
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID: **Lab ID:** **Date Sampled:** **Sample Depth:** **Matrix:**	**Sediment Screening Criteria**		**NRS-2** **NRS-2** **11/23/94** **0-6"** **Sediment**	**NRS-3** **NRS-3** **11/23/94** **0-6"** **Sediment**
Metals (mg/kg)	ER-M[a]	ER-L[a]		
Antimony	25	2	10.6 UJ	9.8 UJ
Arsenic	85	33	6.7	13.7
Barium	NC	48[b]	41.7	*60.3*
Cadmium	9	5	0.88 UJ	0.82 UJ
Chromium	145	80	21.2 J	24.2 J
Lead	110	35	*74.7* J	*99.6* J
Mercury	1.3	0.15	***1.8***	*0.58*
Nickel	50	30	10.7 J	13.1 J
Selenium	NC	1[b]	0.88 U	0.82 U
Silver	2.2	1	1.8 U	1.6 U
Thallium	NC	NC	1.8 U	1.6 U
General Analytical				
CNFREE (mg/kg)	NC	NC	0.88 U	0.82 U
TOC (mg/kg)	NC	NC	13900	8930

NOTES:
BOLD - Above the ER-M Sediment Screening Criteria.
Italic - Above the ER-L Sediment Screening Criteria.
U = Not detected at the MDL .
J = The concentration was detected at a value below the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
NC = No criteria.

(a) - Effects Range Low (ER-L) and Effects Range Median (ER-M) - Long and Morgan (1990).
(b) - Apparent Effects Threshold (AET) for marine sediment from the NOAA Screening Quick Reference Tables (1999).

ATTACHMENT J

SHIP CANAL ANALYTICAL RESULTS

BETHLEHEM STEEL CORPORATION

LACKAWANNA, NEW YORK

Table J-1
Analytical Results for the Ship Canal Surface Water - Volatile Organic Compounds (VOCs)
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID: / Lab ID: / Date Sampled: / Sample Depth: / Matrix:	Federal Ambient Water Quality Criteria [1]		SS-5 SS-5 06/27/91 Water	SS-6 SS-6 06/27/91 Water	SS-7 SS-7 06/27/91 Water	SS-8(SS-7DUP) SS-8 06/27/91 Water	GM-1 GM-1 11/16/94 Mid-Depth Water	GM-2 GM-2 11/16/94 Mid-Depth Water	GM-3 GM-3 11/16/94 Mid-Depth Water	GM-3 DUP GM-6 11/16/94 Mid-Depth Water	GM-4 GM-4 11/16/94 0-6" Water	GM-5 GM-5 11/16/94 0-6" Water
VOCs (ug/L)	CMC[2]	CCC[3]										
Acrylonitrile	7550	2600	50 U	50 U	50 U	50 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Benzene	5300	NC	5 U	5 U	5 U	5 U	0.7	1	0.5 U	0.5 U	0.5 U	0.5 U
Bromodichloromethane	11000	NC	5 U	5 U	5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromoform	NC	NC	5 U	5 U	5 U	5 U	R	R	R	R	R	R
Bromomethane	NC	NC	10 U	10 U	10 U	10 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon disulfide	NC	NC	NR	NR	NR	NR	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon tetrachloride	35200	NC	5 U	5 U	5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene	250	50	5 U	5 U	5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroethane	NC	NC	10 U	10 U	10 U	10 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Chloroethyl vinyl ether	NC	NC	5 U	5 U	5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	NC	NC	5 U	5 U	5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloromethane	NC	NC	10 U	10 U	10 U	10 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	11000	NC	5 U	5 U	5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dichlorodifluoromethane	11000	NC	5 U	5 U	5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	NC	NC	5 U	5 U	5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethane	118000	2000	10 U	10 U	10 U	10 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	NC	NC	5 U	5 U	5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,2-Dichloroethene	11600	NC	5 U	5 U	5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	NC	NC	5 U	5 U	5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
cis-1,3-Dichloropropene	6060	244	5 U	5 U	5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene			5 U	5 U	5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Ethylbenzene	32000	NC	5 U	5 U	5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methyl ethyl ketone	NC	NC	NR	NR	NR	NR	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene chloride	NC	NC	10 U	10 U	10 U	10 U	0.5 U	0.5 U	0.3 UJ	0.5 U	1 U	0.5 U
1,1,1,2-Tetrachloroethane	9320	2400	5 U	5 U	5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	9320	NC	5 U	5 U	5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Tetrachloroethene	NC	NC	5 U	5 U	5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	17500	NC	5 U	5 U	5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,1-Trichloroethane	18000	NC	5 U	5 U	5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	18000	9400	5 U	5 U	5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichlorofluoromethane	NC	NC	5 U	5 U	5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene	45000	21900	5 U	5 U	5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Vinyl chloride	NC	NC	10 U	10 U	10 U	10 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Xylenes, total	NC	NC	5 U	5 U	5 U	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

NOTES:
BOLD - Above USEPA Criteria Maximum Concentration.
Italic - Above USEPA Criteria Continuous Concentration.
U = Not detected at the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
NR = No analysis performed.
R = The sample results were rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte could not be determined.
NC = No criteria.

(1) Values are Federal Ambient Water Quality Criteria for the protection of aquatic life in freshwater in ug/L.
(2) Criteria Maximum Concentration - (acute).
(3) Criteria Continuous Concentration - (chronic).

Table J-1
Analytical Results for the Ship Canal Surface Water - Volatile Organic Compounds (VOCs)
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID: Lab ID: Date Sampled: Sample Depth: Matrix:	Federal Ambient Water Quality Criteria [1]		GM-1AE 30149 07/24/95 15.9' BGS Water	GM-1AV.5 29974 07/21/95 15' BWS Water	GM-1AV.25 29975 07/21/95 7.5' BWS Water	GM-1AV.75 29976 07/21/95 22.5' BWS Water	GM-1AW 30150 07/24/95 15' BGS Water	GM-1E 30147 07/24/95 14' BGS Water	GM-1W 30148 07/24/95 13.4' BGS Water	GM-2E 29970 07/21/95 Mid-Depth Water	GM-2V.5 29977 07/21/95 14.75' BWS Water	GM-2V.25 29978 07/21/95 7.4' BWS Water	GM-2V.75 29979 07/21/95 22.12' BWS Water
VOCs (ug/L)	CMC[2]	CCC[3]											
Acrylonitrile	7550	2600	R	R	R	R	R	R	R	R	R	R	R
Benzene	5300	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromodichloromethane	11000	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromoform	NC	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromomethane	NC	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon disulfide	NC	NC	0.5 U	0.5 U	0.5 U	R	0.5 U	0.5 U	0.5 U	0.5 U	R	R	R
Carbon tetrachloride	35200	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene	250	50	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroethane	NC	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Chloroethyl vinyl ether	NC	NC	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	NC	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloromethane	NC	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	11000	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dichlorodifluoromethane	11000	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	NC	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethane	118000	2000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	NC	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,2-Dichloroethene	11600	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	NC	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
cis-1,3-Dichloropropene	6060	244	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene			0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Ethylbenzene	32000	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methyl ethyl ketone	NC	NC	R	R	R	R	R	R	R	R	R	R	R
Methylene chloride	NC	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,1,2-Tetrachloroethane	9320	2400	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	9320	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Tetrachloroethene	NC	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	17500	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,1-Trichloroethane	18000	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	18000	9400	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichlorofluoromethane	NC	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene	45000	21900	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Vinyl chloride	NC	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Xylenes, total	NC	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

NOTES:
BOLD - Above USEPA Criteria Maximum Concentration.
Italic - Above USEPA Criteria Continuous Concentration.
U = Not detected at the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
NR = No analysis performed.
R = The sample results were rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte could not be determined.
NC = No criteria.

(1) Values are Federal Ambient Water Quality Criteria for the protection of aquatic life in freshwater in ug/L.
(2) Criteria Maximum Concentration - (acute).
(3) Criteria Continuous Concentration - (chronic).

Table J-1
Analytical Results for the Ship Canal Surface Water - Volatile Organic Compounds (VOCs)
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID: / Lab ID: / Date Sampled: / Sample Depth: / Matrix:	Federal Ambient Water Quality Criteria [1]		GM-2W 29971 07/21/95 Mid-Depth Water	GM-3E 30509 07/28/95 14.9' BWS Water	GM-3W 30510 07/28/95 14.4' BWS Water	GM-4E 29774 07/19/95 15.5' BWS Water	GM-4 0.25 30511 07/28/95 7.75' BWS Water	GM-4 0.50 30512 07/28/95 15.5' BWS Water	GM-4 0.75 30513 07/28/95 23.25' BWS Water	GM-4W 29775 07/19/95 15.5' BWS Water	GM-5E 29776 07/19/95 15' BWS Water	GM-5W 29777 07/19/95 15.5' BWS Water
VOCs (ug/L)	CMC[2]	CCC[3]										
Acrylonitrile	7550	2600	R	R	10 U	R	R	R	R	R	R	R
Benzene	5300	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromodichloromethane	11000	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromoform	NC	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromomethane	NC	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon disulfide	NC	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon tetrachloride	35200	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene	250	50	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroethane	NC	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Chloroethyl vinyl ether	NC	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	NC	NC	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloromethane	NC	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	11000	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dichlorodifluoromethane	11000	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	NC	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethane	118000	2000	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	NC	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,2-Dichloroethene	11600	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	NC	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
cis-1,3-Dichloropropene	6060	244	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene	32000	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Ethylbenzene	NC	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methyl ethyl ketone	NC	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene chloride	9320	2400	R	R	5 U	R	R	R	R	R	R	R
1,1,1,2-Tetrachloroethane	9320	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	NC	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Tetrachloroethene	17500	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	18000	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,1-Trichloroethane	18000	9400	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	NC	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichlorofluoromethane	45000	21900	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene	NC	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Vinyl chloride	NC	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Xylenes, total	NC	NC	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

NOTES:
BOLD - Above USEPA Criteria Maximum Concentration.
Italic - Above USEPA Criteria Continuous Concentration.
U = Not detected at the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
NR = No analysis performed.
R = The sample results were rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte could not be determined.
NC = No criteria.

(1) Values are Federal Ambient Water Quality Criteria for the protection of aquatic life in freshwater in ug/L.
(2) Criteria Maximum Concentration - (acute).
(3) Criteria Continuous Concentration - (chronic).

Table J-1
Analytical Results for the Ship Canal Surface Water - Semi-Volatile Organic Compounds (SVOCs)
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID:	Federal Ambient Water Quality Criteria [1]		SS-5	SS-6	SS-7	SS-8(SS-7DUP)	GM-1	GM-2	GM-3	GM-3 DUP	GM-4	GM-5	GM-1AE	GM-1AV-COMP	GM-1AW
Lab ID:			SS-5	SS-6	SS-7	SS-8	GM-1	GM-2	GM-3	GM-6	GM-4	GM-5	30149	29972	30150
Date Sampled:			06/27/91	06/27/91	06/27/91	06/27/91	11/16/94	11/16/94	11/16/94	11/16/94	11/16/94	11/16/94	07/24/95	07/21/95	07/24/95
Sample Depth:							Mid-Depth	Mid-Depth	Mid-Depth	Mid-Depth	0-6"	0-6"	15.9' BGS		15' BGS
Matrix:			Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
SVOCs (ug/L)	CMC[2]	CCC[3]													
Acenapthene	1700	520	NR	NR	NR	NR	10 U	10 U	10 U	10 U	10 U	10 U	0.2 U	0.2 U	0.2 UJ
Acenaphthylene	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.2 U	0.2 U	0.2 UJ
Anthracene	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.2 U	0.2 U	0.2 U
Benzo (a) anthracene	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.2 U	0.2 U	0.2 U
Benzo (a) pyrene	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.2 U	0.2 U	0.2 U
Benzo (b) fluoranthene	NC	NC	NR	NR	NR	NR	10 U	10 U	10 U	10 U	10 U	10 U	0.2 UJ	0.2 UJ	0.2 UJ
Benzo (ghi) perylene	NC	NC	NR	NR	NR	NR	10 U	10 U	10 U	10 U	10 U	10 UJ	0.2 U	0.2 U	0.2 U
Benzo (k) fluoranthene	NC	NC	NR	NR	NR	NR	10 U	10 U	10 U	10 U	10 U	10 U	0.2 U	0.2 U	0.2 U
bis (2-Chloroethyl) ether	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	R	1 UJ	R
bis (2-Ethylhexyl) phthalate	400	360	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5 U	0.4 UJ	3.2 U
Butyl benzyl phthalate	940	3	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	1 U	1 U
4-Chloro-3-methylphenol	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5 UJ	5 U	R
2-Chloronaphthalene	1600	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	0.2 U	0.2 U	0.2 UJ
Chrysene	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.2 U	0.2 U	0.2 U
Di-n-butyl phthalate	940	3	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5 U	5 U	0.2 J
1,2-Dichlorobenzene	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	R	1 UJ	R
1,3-Dichlorobenzene	NC	NC	5 U	5 U	5 U	5 U	10 U	10 U	10 U	10 U	10 U	10 U	R	1 UJ	R
1,4-Dichlorobenzene	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	R	1 UJ	R
2,4-Dichlorophenol	2020	365	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5 UJ	5 U	R
Diethyl phthalate	940	3	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5 U	5 U	5 UJ
2,4-Dimethylphenol	2120	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5 U	5 U	R
Dimethyl phthalate	940	3	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5 UJ	5 U	5 UJ
Di-n-octyl phthalate	940	3	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.2 J	5 U	5 U
Dibenz (a,h) anthracene	NC	NC	NR	NR	NR	NR	10 U	10 U	10 U	10 U	10 U	10 UJ	0.2 UJ	0.2 U	0.2 UJ
2,4-Dinitrotoluene	330	230	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	1 U	1 U	1 UJ
2,6-Dinitrotoluene	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	1 U	1 U	1 UJ
Fluoranthene	3980	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.2 U	0.2 U	0.2 U
Fluorene	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.2 U	0.2 U	0.2 UJ
Hexachlorobenzene	6	3.68	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5 U	1 U	1 U
Hexachlorocyclobutadiene	NC	NC	10 U	10 U	10 U	10 U	NR	NR	NR	NR	NR	NR	NR	NR	NR
Hexachlorobutadiene	90	9.3	NR	NR	NR	NR	10 U	10 U	10 U	10 U	10 U	10 U	5 UJ	5 U	R
Hexachlorocyclopentadiene	7	5.2	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	2 U	2 U	2 UJ
Hexachloroethane	980	540	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	R	1 UJ	R
Indeno (1,2,3-cd) pyrene	NC	NC	NR	NR	NR	NR	10 U	10 U	10 U	10 U	10 U	10 UJ	0.2 U	0.2 U	0.2 U
Isophorone	117000	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	1 UJ	1 U	R
2-Methylphenol	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	R	5 UJ	R
Naphthalene	2300	620	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.6 J	0.2 U	R
Pentachlorophenol	20	13	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	20 U	2.5 U	2.5 U
Phenanthrene	30	6.3	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.2 U	0.2 U	0.2 U
Phenol	10200	2560	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	R	5 UJ	R
Pyrene	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.2 U	0.2 U	0.2 U
Pyridine	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	1 U	1 U	1 U
2,3,4,6-Tetrachlorophenol	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5 U	5 U	5 U
1,2,4-Trichlorobenzene	250	50	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	1 UJ	1 U	R
2,4,5-Trichlorophenol	100	63	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	5 U	5 U	5 UJ
2,4,6-Trichlorophenol	NC	970	50 U	50 U	50 U	50 U	10 U	10 U	10 U	10 U	10 U	10 U	5 U	5 U	5 UJ
3-Methylphenol	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5 U	5 U	5 U
4-Methylphenol	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	R	5 UJ	R
2-Methyl-4,6-dinitrophenol	NC	NC	50 U	50 U	50 U	50 U	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	50 UJ	5 U	5 U	5 U

NOTES:
BOLD - Above USEPA Criteria Maximum Concentration.
Italic - Above USEPA Criteria Continuous Concentration.
U = Not detected at the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
B = Result between MDL and RL
NR = No analysis performed.
J = The concentration was detected at a value below the MDL.
R = The sample results were rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte could not be determined.
NC = No criteria.

(1) Values are Federal Ambient Water Quality Criteria for the protection of aquatic life in freshwater in ug/L.
(2) Criteria Maximum Concentration - (acute).
(3) Criteria Continuous Concentration - (chronic).

Table J-1
Analytical Results for the Ship Canal Surface Water - Semi-Volatile Organic Compounds (SVOCs)
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID: / Lab ID: / Date Sampled: / Sample Depth: / Matrix:	Federal Ambient Water Quality Criteria [1]		GM-1E 30147 07/24/95 14' BGS Water	GM-1W 30148 07/24/95 13.4' BGS Water	GM-2E 29970 07/21/95 Mid-Depth Water	GM-2 COMP 29973 07/21/95 Water	GM-2W 29971 07/21/95 Mid-Depth Water	GM-3E 30509 07/28/95 14.9' BWS Water	GM-3W 30510 07/28/95 14.4' BWS Water	GM-4E 31748 08/22/95 15.5' BWS Water	GM-4 COMP 30508 07/28/95 7.75'+15.5'+23 Water	GM-4W 31749 08/22/95 15.5' BWS Water	GM-5E 31750 08/22/95 15' BWS Water	GM-5W 31751 08/22/95 15.5' BWS Water
SVOCs (ug/L)	CMC[2]	CCC[3]												
Acenapthene	1700	520	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Acenaphthylene	NC	NC	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Anthracene	NC	NC	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Benzo (a) anthracene	NC	NC	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Benzo (a) pyrene	NC	NC	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Benzo (b) fluoranthene	NC	NC	0.2 UJ	0.2 UJ	0.2 UJ	0.2 UJ	0.2 UJ	0.2 UJ	0.2 UJ	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U
Benzo (ghi) perylene	NC	NC	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 UJ	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U
Benzo (k) fluoranthene	NC	NC	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
bis (2-Chloroethyl) ether	NC	NC	1 UJ	R	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U	1 U	1 U	1 UJ
bis (2-Ethylhexyl) phthalate	400	360	10 U	20 B	2.4 J	0.5 UJ	1.7 UJ	5 U	0.6 U	1.5 J	5 U	0.6 J	0.7 J	0.4 J
Butyl benzyl phthalate	940	3	5 U	5 U	1 U	0.2 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
4-Chloro-3-methylphenol	NC	NC	5 UJ	5 UJ	5 U	5 U	5 U	5 U	5 U	5 U	5 UJ	5 U	5 U	5 U
2-Chloronnphthalene	1600	NC	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Chrysene	NC	NC	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Di-n-butyl phthalate	940	3	5 U	5 U	0.1 J	0.2 J	5 U	0.2 U	0.1 U	5 U	0.2 U	5 U	5 U	5 U
1,2-Dichlorobenzene	NC	NC	1 UJ	R	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 UJ	1 U	1 U	1 UJ
1,3-Dichlorobenzene	NC	NC	1 UJ	R	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 UJ	1 U	1 U	1 UJ
1,4-Dichlorobenzene	NC	NC	1 UJ	R	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 UJ	1 U	1 U	1 UJ
2,4-Dichlorophenol	2020	365	5 UJ	5 UJ	5 U	5 U	5 U	5 U	5 U	5 U	5 UJ	5 U	5 U	5 U
Diethyl phthalate	940	3	10 U	10 UJ	0.2 J	0.4 J	5 U	0.1 J	0.1 J	5 U	5 U	5 U	5 U	5 U
2,4-Dimethylphenol	2120	NC	5 UJ	5 UJ	5 U	5 U	5 U	5 U	5 U	5 U	5 UJ	5 U	5 U	5 U
Dimethyl phthalate	940	3	5 U	5 UJ	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Di-n-octyl phthalate	940	3	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Dibenz (a,h) anthracene	NC	NC	0.2 UJ	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 UJ	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U
2,4-Dinitrotoluene	330	230	1 U	1 UJ	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2,6-Dinitrotoluene	NC	NC	1 U	1 UJ	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Fluoranthene	3980	NC	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Fluorene	NC	NC	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Hexachlorobenzene	6	3.68	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Hexachlorocyclobutadiene	NC	NC	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Hexachlorobutadiene	90	9.3	5 UJ	5 UJ	5 U	5 U	5 U	5 U	5 U	5 U	5 UJ	5 U	5 U	5 U
Hexachlorocyclopentadiene	7	5.2	5 U	5 UJ	2 U	2 U	2 U	2 U	2 U	2 UJ	2 U	2 UJ	2 UJ	2 UJ
Hexachloroethane	980	540	1 UJ	R	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 UJ	1 U	1 U	1 UJ
Indeno (1,2,3-cd) pyrene	NC	NC	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 UJ	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U
Isophorone	117000	NC	1 UJ	1 UJ	1 U	1 U	1 U	1 U	1 U	1 U	1 UJ	1 U	1 U	1 U
2-Methylphenol	NC	NC	5 UJ	R	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 U	5 UJ	5 U	5 U	5 UJ
Naphthalene	2300	620	0.4 J	0.5 J	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U
Pentachlorophenol	20	13	20 U	20 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 UJ	2.5 U	2.5 UJ	2.5 UJ	2.5 UJ
Phenanthrene	30	6.3	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Phenol	10200	2560	5 UJ	R	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 U	5 U	5 U	5 U	5 UJ
Pyrene	NC	NC	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Pyridine	NC	NC	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2,3,4,6-Tetrachlorophenol	NC	NC	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,2,4-Trichlorobenzene	250	50	1 UJ	1 UJ	1 U	1 U	1 U	1 U	1 U	1 U	1 UJ	1 U	1 U	1 U
2,4,5-Trichlorophenol	100	63	5 U	5 UJ	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2,4,6-Trichlorophenol	NC	970	5 U	5 UJ	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
3-Methylphenol	NC	NC	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
4-Methylphenol	NC	NC	5 U	R	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 U	5 UJ	5 U	5 U	5 UJ
2-Methyl-4,6-dinitrophenol	NC	NC	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 UJ	5 U	5 UJ	5 UJ	5 UJ

NOTES:
BOLD - Above USEPA Criteria Maximum Concentration.
Italic - Above USEPA Criteria Continuous Concentration.
U = Not detected at the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
B = Result between MDL and RL
NR = No analysis performed.
J = The concentration was detected at a value below the MDL.
R = The sample results were rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte could not be determined.
NC = No criteria.

(1) Values are Federal Ambient Water Quality Criteria for the protection of aquatic life in freshwater in ug/L.
(2) Criteria Maximum Concentration - (acute).
(3) Criteria Continuous Concentration - (chronic).

Table J-1
Analtyical Results for the Ship Canal Surface Water - TAL Metals, Cyanide and General Chemistry
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID: / Lab ID: / Date Sampled: / Sample Depth: / Matrix:	Federal Ambient Water Quality Criteria [1]		SS-5 SS-5 06/27/91 Water	SS-6 SS-6 06/27/91 Water	SS-7 SS-7 06/27/91 Water	SS-8(SS-7DUP) SS-8 06/27/91 Water	GM-1 GM-1 11/16/94 Mid-Depth Water	GM-2 GM-2 11/16/94 Mid-Depth Water	GM-3 GM-3 11/16/94 Mid-Depth Water	GM-3 DUP GM-6 11/16/94 Mid-Depth Water	GM-4 GM-4 11/16/94 0-6" Water	GM-5 GM-5 11/16/94 0-6" Water	GM-1AE 30149 07/24/95 15.9' BGS Water	GM-1AW 30150 07/24/95 15' BGS Water
Metals (ug/L)	CMC[2]	CCC[3]												
Antimony	88	30	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U	2.2 U	2.2 U
Arsenic	360	190	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	6.3 B	5.9 B
Barium	NC	NC	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U	20.7 B	24.3 B
Cadmium[4,5]	3.7	2.0	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.8 U	2.8 U
Calcium	NC*		36000	35000	35000	35000	29900	31000	28300	29700	27500	26500 J	32600	33200
Chromium	16	11	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.7 U	5.7 U
Lead [6,7]	55	2.2	3 UJ	*3.1*	*3.2*	*3.1*	3 U	3 U	3 U	3 U	3 U	3 U	1 U	1 U
Mercury	2.4	0.01	0.2 UJ	0.2 UJ	*1.1* J	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Nickel [8,9]	411	46	40 U	40 U	40 U	40 U	40 U	40 U	40 U	40 U	40 U	40 U	10.2 U	10.2 U
Potassium	NC*		5000 U	5000 U	5000 U	5000 U	5000 U	5000 U	5000 U	5000 U	5000 U	5000 U	1360 B	1300 B
Selenium	20	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	3 UJ	3 UJ
Silver [10]	3	0.12	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	8.3 U	8.3 U
Sodium	NC*		18000	21000	14000	14000	12600 J	12200 J	10100 J	9840 J	10000 J	9390 J	9180 J	9460 J
Thallium	1400	40	10 UJ	10 U	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	4.3 U	4.3 U
Cyanide	22	5.2	10 U	10 U	10 U	10 U	NR	NR	NR	NR	NR	NR	10 U	10 U
General Analytical														
Lab ID: (if different from above)													30153	30154
Alkalinity ($CaCO_3$)(mg/L)	NC	20[11]	0 U	0 U	*24*	18	NR	NR	NR	NR	NR	NR	NR	NR
Alkalinity (total)(mg/L)	NC	NC	100	96	100	97	85.8	85.8	85.8	85.8	85.8	86.9	89	87
CNFREE(ug/L)	NC	NC	NR	NR	NR	NR	10 U	10 U	10 U	10 U	10 U	10 U	NR	NR
Conductivity (umhos/cm)	NC	NC	NR	NR	NR	NR	288	279	268	267	267	266	NR	NR
DICNFREE (ug/L)	NC	NC	NR	NR	NR	NR	10 U	10 U	10 U	10 U	10 U	10 U	NR	NR
PHLIQ (su)	NC	NC	NR	NR	NR	NR	8 J	8 J	8 J	8 J	8.1 J	8.1 J	NR	NR
TOC (mg/L)	NC	NC	2.2	2.5	2.5	2.3	2.2	2.3	2.4	2.6	2.4	3.7	2.8	2.9
Chloride (mg/L)	860[11]	230[11]	34	41	26	25	33.3 J	25.4 J	23.5 J	29.4 J	22.5 J	20.6 J	17	17
TOX (ug/L)	NC	NC	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	9.6	12
Phenolics (ug/L)	NC	NC	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Total Solids (mg/L)	NC	NC	NR	NR	NR	NR	188	184	179	157	178	186	NR	NR
Total Suspended Solids (mg/L)	NC	NC	NR	NR	NR	NR	5 U	5 U	5 U	5 U	5 U	5 U	NR	NR
Total Dissolved Solids (mg/L)	NC	NC	220	240	200	220	NR	NR	NR	NR	NR	NR	140	150
Sulfate (mg/L)	NC	NC	20	22	21	21	22.8	21.9	22.3	22.6	22	22.4	22	21

NOTES:
BOLD - Above USEPA Criteria Maximum Concentration.
Italic - Above USEPA Criteria Continuous Concentration.
U = Not detected at the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R = The sample results were rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte could not be determined.
NR = No analysis performed.
B = Result between MDL and RL
J = The concentration was detected at a value below the MDL.
NC = No criteria.
* = The analyte is an essential nutrient.

(1) Values are Federal Ambient Water Quality Criteria for the protection of aquatic life in freshwater in ug/L.
(2) Criteria Maximum Concentration - (acute).
(3) Criteria Continuous Concentration - (chronic).
(4) CMC criterion is hardness dependent using the following formula: CMC = exp{1.128{ln(hardness)}+(-3.6867)}*(1.136672-[ln(hardness)*0.041838]
Total alkalinity concentrations were averaged to determine hardness = 86.7 mg/L.
(5) CCC criterion is hardness dependent using the following formula: CCC = exp{0.7852{ln(hardness)}+(-2.715)}*(1.101672-[ln(hardness)*0.041838]
Total alkalinity concentrations were averaged to determine hardness = 86.7 mg/L.
(6) CMC criterion is hardness dependent using the following formula: CMC = exp{1.273{ln(hardness)}+(-1.46)}*(1.46203-[ln(hardness)*0.145712]
Total alkalinity concentrations were averaged to determine hardness = 86.7 mg/L.
(7) CCC criterion is hardness dependent using the following formula: CCC = exp{1.273{ln(hardness)}+(-4.705)}*(1.46203-[ln(hardness)*0.145712]
Total alkalinity concentrations were averaged to determine hardness = 86.7 mg/L.
(8) CMC criterion is hardness dependent using the following formula: CMC = exp{0.846{ln(hardness)}+2.255}*0.998
Total alkalinity concentrations were averaged to determine hardness = 86.7 mg/L.
(9) CCC criterion is hardness dependent using the following formula: CCC = exp{0.846{ln(hardness)}+0.0584*0.997
Total alkalinity concentrations were averaged to determine hardness = 86.7 mg/L.
(10) CMC criterion is hardness dependent using the following formula: CMC = exp{1.72{ln(hardness)}+(-6.52)}*0.85
Total alkalinity concentrations were averaged to determine hardness = 86.7 mg/L.
(11) Value based on the National Recommended Water Quality Criteria (EPA, 1999d)

Table J-1
Analtyical Results for the Ship Canal Surface Water - TAL Metals, Cyanide and General Chemistry
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID:	Federal Ambient Water Quality Criteria [1]		GM-1E	GM-1W	GM-2E	GM-2W	GM-3E	GM-3W	GM-4E	GM-4W	GM-5E	GM-5W
Lab ID:			30147	30148	29970	29971	30509	30510	29774	29775	29776	29777
Date Sampled:			07/24/95	07/24/95	07/21/95	07/21/95	07/28/95	07/28/95	07/19/95	07/19/95	07/19/95	07/19/95
Sample Depth:			14' BGS	13.4' BGS	Mid-Depth	Mid-Depth	14.9' BWS	14.4' BWS	15.5' BWS	15.5' BWS	15' BWS	15.5' BWS
Matrix:			Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Metals (ug/L)	CMC[2]	CCC[3]										
Antimony	88	30	2.2 U	2.2 U	2.2 U	2.2 U	2.8 J	2.2 U	2.2 U	2.2 U	2.2 U	52.5 U
Arsenic	360	190	4.6 U	4.6 U	5 B	5.4 B	4.6 U	5 B	4.6 U	4.6 U	4.6 U	4.6 U
Barium	NC	NC	22.6 B	22.7 B	25.6 B	23.6 B	22.4 B	22.3 B	19.9 B	21.8 B	19.6 B	18.6 B
Cadmium[4,5]	3.7	2.0	2.8 U	2.8 U	2.8 U	*3.3* B	2.8 U	2.8 U	2.8 U	*3.3* B	2.8 U	2.8 U
Calcium	NC*		32500	32800	32200	32300	32200	31800	31600	33600	32300	31800
Chromium	16	11	5.7 U	5.7 U	*20.8*	*40.4*	5.7 U	5.7 U	5.7 U	5.7 U	5.7 U	5.7 U
Lead [6,7]	55	2.2	1 U	1 U	1 U	1 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U
Mercury	2.4	0.01	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	R	0.2 U
Nickel [8,9]	411	46	10.2 U	10.2 U	14	22 B	10.2 U	10.2 U	10.2 U	10.2 U	10.2 U	10.2 U
Potassium	NC*		1380 B	1390 B	1570 B	1170 J	1400 B	1260 B	1210 B	1520 B	1250 J	1300 B
Selenium	20	5	3 UJ	3 UJ	3 U	3 U	2 UJ	2 UJ	2 U	2 U	2 U	2 U
Silver [10]	3	0.12	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U
Sodium	NC*		9460 J	9570 J	11500	9790	10100	9140	8140	9050	8910	8640
Thallium	1400	40	4.3 U	4.3 U	4.3 U	4.3 U	5 UJ	5 UJ	1 UJ	1 UJ	1 U	1 UJ
Cyanide	22	5.2	10 U	10 U	10 U	10 U	NR	NR	10 U	10 U	10 U	10 U
General Analytical												
Lab ID: (if different from above)			30151	30152	29980	29981	30515	30516	29778	29779	29780	29781
Alkalinity ($CaCO_3$)(mg/L)	NC	20[11]	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Alkalinity (total)(mg/L)	NC	NC	84	87	85	82	84	84	76	83	77	80
CNFREE(ug/L)	NC	NC	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Conductivity (umhos/cm)	NC	NC	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
DICNFREE (ug/L)	NC	NC	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
PHLIQ (su)	NC	NC	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
TOC (mg/L)	NC	NC	3	2.5	9.8	3.2	2.8	2.5	1.8	1.7	2.4	2.5
Chloride (mg/L)	860[11]	230[11]	18	18	23	19	18	18	17	17	17	17
TOX (ug/L)	NC	NC	14	31	5 U	36	17	12	8.9	5 U	5 U	50 U
Phenolics (ug/L)	NC	NC	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Total Solids (mg/L)	NC	NC	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Total Suspended Solids (mg/L)	NC	NC	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Total Dissolved Solids (mg/L)	NC	NC	190	140	180	170	120	130	140	180	170	130
Sulfate (mg/L)	NC	NC	22	25	26	24	22	23	25	24	24	24

NOTES:
BOLD - Above USEPA Criteria Maximum Concentration.
Italic - Above USEPA Criteria Continuous Concentration.
U = Not detected at the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R = The sample results were rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte could not be determined.
NR = No analysis performed.
B = Result between MDL and RL
J = The concentration was detected at a value below the MDL.
NC = No criteria.
* = The analyte is an essential nutrient.

(1) Values are Federal Ambient Water Quality Criteria for the protection of aquatic life in freshwater in ug/L.
(2) Criteria Maximum Concentration - (acute).
(3) Criteria Continuous Concentration - (chronic).
(4) CMC criterion is hardness dependent using the following formula: CMC = exp{1.128{ln(hardness)}+(-3.6867)*(1.136672-[ln(hardness)*0.041838]
Total alkalinity concentrations were averaged to determine hardness = 86.7 mg/L.
(5) CCC criterion is hardness dependent using the following formula: CCC = exp{0.7852{ln(hardness)}+(-2.715)*(1.101672-[ln(hardness)*0.041838]
Total alkalinity concentrations were averaged to determine hardness = 86.7 mg/L.
(6) CMC criterion is hardness dependent using the following formula: CMC = exp{1.273{ln(hardness)}+(-1.46}*(1.46203-[ln(hardness)*0.145712]
Total alkalinity concentrations were averaged to determine hardness = 86.7 mg/L.
(7) CCC criterion is hardness dependent using the following formula: CCC = exp{1.273{ln(hardness)}+(-4.705}*(1.46203-[ln(hardness)*0.145712]
Total alkalinity concentrations were averaged to determine hardness = 86.7 mg/L.
(8) CMC criterion is hardness dependent using the following formula: CMC = exp{0.846{ln(hardness)}+2.255}*0.998
Total alkalinity concentrations were averaged to determine hardness = 86.7 mg/L.
(9) CCC criterion is hardness dependent using the following formula: CCC = exp{0.846{ln(hardness)}+0.0584*0.997
Total alkalinity concentrations were averaged to determine hardness = 86.7 mg/L.
(10) CMC criterion is hardness dependent using the following formula: CMC = exp{1.72{ln(hardness)}+(-6.52)}*0.85
Total alkalinity concentrations were averaged to determine hardness = 86.7 mg/L.
(11) Value based on the National Recommended Water Quality Criteria (EPA, 1999d)

Table J-2
Analytical Results for the Ship Canal Sediment - Volatile Organic Compounds (VOCs)
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID: Lab ID: Date Sampled: Sample Depth: Matrix:	NOAA Screening Quick Reference Tables (SQRT's) (1999)	GMS-1 C4K190007-001 11/17/94 0-6" Sediment	GMS-1 DUP C4K190007-004 11/17/94 0-6" Sediment	GMS-2 C4K190007-002 11/17/94 0-6" Sediment	GMS-3 C4K190007-003 11/17/94 0-6" Sediment	GM-4 C4L060025-001 12/05/94 0-6" Sediment	GM-5 C4L060025-002 12/05/94 0-6" Sediment	GM-1ASE 30159 07/24/95 0-6" Sediment	GM-1ASW 30160 07/24/95 0-6" Sediment	GM-1SE 30157 07/24/95 0-6" Sediment
VOCs (ug/kg)	AET									
Acrylonitrile	NC	110 U	110 U	110 U	100 U	R	99 UJ	200 U	200 UJ	200 U
Benzene	NC	11 U	11 U	11 U	10 U	R	7.7 J	10 U	10 U	10 U
Bromodichloromethane	NC	11 U	11 U	11 U	10 U	R	9.9 U	10 U	10 U	10 U
Bromoform	NC	11 U	11 U	11 U	10 U	R	9.9 UJ	10 UJ	10 U	10 UJ
Bromomethane	NC	23 UJ	23 UJ	21 UJ	21 UJ	R	20 U	10 UJ	10 U	10 UJ
Carbon disulfide	NC	11 U	11 U	11 U	10 U	R	9.9 U	10 U	10 U	10 U
Carbon tetrachloride	NC	11 UJ	11 UJ	11 UJ	10 UJ	R	9.9 U	10 U	10 U	10 U
Chlorobenzene	NC	11 U	11 U	11 U	10 U	R	9.9 U	10 U	10 U	10 U
Chloroethane	NC	23 U	23 U	21 U	21 U	R	20 UJ	20 UJ	20 U	20 UJ
2-Chloroethyl vinyl ether	NC	R	R	R	R	R	R	40 U	41 U	40 U
Chloroform	NC	11 U	11 U	11 U	10 U	R	9.9 U	10 U	10 U	10 U
Chloromethane	NC	23 UJ	23 UJ	21 UJ	21 UJ	R	20 UJ	20 U	20 U	20 U
Dibromochloromethane	NC	11 U	11 U	11 U	10 U	R	9.9 U	10 U	10 U	10 U
Dichlorodifluoromethane	NC	23 U	23 U	21 U	21 U	R	20 U	10 U	10 U	10 U
1,1-Dichloroethane	NC	11 U	11 U	11 U	10 U	R	9.9 U	10 U	10 U	10 U
1,2-Dichloroethane	NC	11 U	11 U	11 U	10 U	R	9.9 U	10 U	10 U	10 U
1,1-Dichloroethene	NC	11 U	11 U	11 U	10 U	R	9.9 U	10 U	10 U	10 U
trans-1,2-Dichloroethene	NC	11 U	11 U	11 U	10 U	R	9.9 U	10 U	10 U	10 U
1,2-Dichloropropane	NC	11 U	11 U	11 U	10 U	R	9.9 U	10 U	10 U	10 U
cis-1,3-Dichloropropene	NC	11 U	11 U	11 U	10 U	R	9.9 U	10 U	10 U	10 U
trans-1,3-Dichloropropene	NC	11 U	11 U	11 U	10 U	R	9.9 U	10 U	10 U	10 U
Methyl ethyl ketone	NC	110 U	110 U	110 U	100 U	R	99 UJ	11 J	21 J	9 J
Ethylbenzene	NC	11 U	11 U	11 U	10 U	R	9.9 U	10 U	10 U	10 U
Methylene chloride	NC	23 U	23 U	21 U	21 U	R	20 U	4 UJ	3 UJ	3 UJ
1,1,1,2-Tetrachloroethane	NC	11 U	11 U	11 U	10 U	R	9.9 U	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	NC	11 U	11 U	11 U	10 U	R	9.9 U	10 U	10 U	10 U
Tetrachloroethene	NC	11 U	11 U	11 U	10 U	R	9.9 U	10 U	10 U	10 U
Toluene	NC	11 U	11 U	11 U	10 U	R	9.9 U	10 U	10 U	10 U
1,1,1-Trichloroethane	NC	11 U	11 U	11 U	10 U	R	9.9 U	10 U	10 U	10 U
1,1,2-Trichloroethane	NC	11 U	11 U	11 U	10 U	R	9.9 U	10 U	10 U	10 U
Trichlorofluoromethane	NC	11 UJ	11 UJ	11 UJ	10 UJ	R	9.9 UJ	10 U	10 U	10 U
Trichloroethene	41[a]	11 U	11 U	11 U	10 U	R	9.9 U	10 U	10 U	10 U
Vinyl chloride	NC	23 U	23 U	21 U	21 U	R	20 U	20 U	20 U	20 U
Xylenes, total	NC	11 U	11 U	11 U	10 U	R	15	10 U	10 U	10 U

NOTES:
BOLD - Above NOAA SQRT AET Criteria.
U = Not detected at the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
J = The concentration was detected at a value below the MDL.
R = The sample results were rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte could not be determined.
NC = No criteria.

(a) - Value based on marine sediment *Neanthes* bioassays.
AET - Apparent Effects Threshold.

Table J-2
Analytical Results for the Ship Canal Sediment - Volatile Organic Compounds (VOCs)
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID:	NOAA	GM-1SW	GM-2SE	GM-2SW	GM-3SE	GM-3SW	GM-4SE	GM-4SW	GM-5SE	GM-5SW
Lab ID:	Screening Quick	30158	29982	29983	30517	30518	29782	29783	29785	29784
Date Sampled:	Reference Tables	07/24/95	07/21/95	07/21/95	07/28/95	07/28/95	07/19/95	07/19/95	07/19/95	07/19/95
Sample Depth:	(SQRT's)	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"
Matrix:	(1999)	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
VOCs (ug/kg)	AET									
Acrylonitrile	NC	190 U	230 U	220 U	200 U	260 U	150 U	230 U	170 U	210 U
Benzene	NC	10 U	12 U	11 U	10 U	13 U	7 U	10 U	9 U	11 U
Bromodichloromethane	NC	10 U	12 U	11 U	10 U	13 U	7 U	10 U	9 U	11 U
Bromoform	NC	10 UJ	12 U	11 U	10 U	13 U	7 U	10 U	9 U	11 U
Bromomethane	NC	10 UJ	12 U	11 U	10 U	13 U	7 U	10 U	9 U	11 U
Carbon disulfide	NC	10 U	12 U	11 U	10 U	13 U	2 J	10 U	9 U	2 J
Carbon tetrachloride	NC	10 U	12 U	11 U	10 U	13 U	7 U	10 U	9 U	11 U
Chlorobenzene	NC	10 U	12 U	11 U	10 U	13 U	7 U	10 U	9 U	11 UJ
Chloroethane	NC	19 UJ	23 U	23 U	20 U	26 U	15 U	23 U	18 U	21 U
2-Chloroethyl vinyl ether	NC	39 U	47 U	45 U	40 UJ	53 UJ	30 UJ	45 UJ	35 UJ	43 UJ
Chloroform	NC	10 U	12 U	11 U	10 U	13 U	7 U	10 U	9 U	11 U
Chloromethane	NC	19 U	23 U	23 U	20 UJ	26 UJ	15 U	23 U	18 U	21 U
Dibromochloromethane	NC	10 U	12 U	11 U	10 U	13 U	7 U	10 U	9 U	11 U
Dichlorodifluoromethane	NC	10 U	12 U	11 U	10 U	13 U	7 U	10 U	9 U	11 U
1,1-Dichloroethane	NC	10 U	12 U	11 U	10 U	13 U	7 U	10 U	9 U	11 U
1,2-Dichloroethane	NC	10 U	12 U	11 U	10 U	13 U	7 U	10 U	9 U	11 U
1,1-Dichloroethene	NC	10 U	12 U	11 U	10 U	13 U	7 U	10 U	9 U	11 U
trans-1,2-Dichloroethene	NC	10 U	12 U	11 U	10 U	13 U	7 U	10 U	9 U	11 U
1,2-Dichloropropane	NC	10 U	12 U	11 U	10 UJ	13 UJ	7 U	10 U	9 U	11 U
cis-1,3-Dichloropropene	NC	10 U	12 U	11 U	10 UJ	13 UJ	7 U	10 U	9 U	11 U
trans-1,3-Dichloropropene	NC	10 U	12 U	11 U	10 UJ	13 UJ	7 U	10 U	9 U	11 U
Methyl ethyl ketone	NC	19 U	9 J	23 U	20 UJ	26 UJ	10 J	31 J	24 J	120 J
Ethylbenzene	NC	10 U	12 U	11 U	9 J	13 U	7 U	10 U	9 U	11 UJ
Methylene chloride	NC	4 UJ	3 UJ	3 J	10 U	13 U	4 UJ	8 UJ	3 UJ	6 UJ
1,1,1,2-Tetrachloroethane	NC	10 U	12 U	11 U	10 UJ	13 UJ	7 U	10 U	9 U	11 U
1,1,2,2-Tetrachloroethane	NC	10 U	12 U	11 U	10 U	13 U	7 U	10 U	9 U	11 UJ
Tetrachloroethene	NC	10 U	12 U	11 U	10 U	13 U	7 U	10 U	9 U	11 UJ
Toluene	NC	10 U	2 J	11 U	13	13 U	7 U	10 U	9 U	11 UJ
1,1,1-Trichloroethane	NC	10 U	12 U	11 U	10 U	13 U	7 U	10 U	9 U	11 U
1,1,2-Trichloroethane	NC	10 U	12 U	11 U	10 U	13 U	7 U	10 U	9 U	11 U
Trichlorofluoromethane	NC	10 U	12 U	11 U	10 UJ	13 UJ	7 U	10 U	9 U	11 U
Trichloroethene	41[(a)]	10 U	12 U	11 U	10 U	13 U	7 U	10 U	9 U	11 U
Vinyl chloride	NC	19 U	23 U	23 U	20 U	26 U	15 U	23 U	18 U	21 U
Xylenes, total	NC	10 U	12 U	11 U	12	13 U	7 U	10 U	9 U	11 UJ

NOTES:
BOLD - Above NOAA SQRT AET Criteria.
U = Not detected at the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
J = The concentration was detected at a value below the MDL.
R = The sample results were rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte could not be determined.
NC = No criteria.

(a) - Value based on marine sediment *Neanthes* bioassays.
AET - Apparent Effects Threshold.

Table J-2
Analytical Results for the Ship Canal Sediment - Semi-Volatile Organic Compounds (SVOCs)
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID: / Lab ID: / Date Sampled: / Sample Depth: / Matrix:	Sediment Screening Criteria		GMS-1 C4K190007-001 11/17/94 0-6" Sediment	GMS-1 DUP C4K190007-004 11/17/94 0-6" Sediment	GMS-2 C4K190007-002 11/17/94 0-6" Sediment	GMS-3 C4K190007-003 11/17/94 0-6" Sediment	GM-4 C4L060025-001 12/05/94 0-6" Sediment	GM-5 C4L060025-002 12/05/94 0-6" Sediment	GM-1ASE 30159 07/24/95 0-6" Sediment	GM-1ASW 30160 07/24/95 0-6" Sediment	GM-1SE 30157 07/24/95 0-6" Sediment
SVOCs (ug/kg)	ER-M/SEL	ER-L/LEL									
Acenapthene	650[a]	150[a]	3000 U	3000 U	*830 J*	*2800*	810 U	650 U	*270 J*	*430 J*	*460 J*
Acenaphthylene	640[b]	44[b]	3000 U	3000 U	*600 J*	*1500 J*	810 U	650 U	*140 J*	*210 J*	*440 J*
Anthracene	960[a]	85[a]	*1500 J*	*1200 J*	*2000 J*	*6500*	810 U	*450 J*	*560 J*	*740*	*700 J*
Benzo (a) anthracene	1600[a]	230[a]	*2500 J*	*2600 J*	*4200*	*12000*	*340 J*	*1000*	*1500 J*	*1800 J*	*3200 J*
Benzo (a) pyrene	2500[a]	400[a]	*2400 J*	3000 U	*4400*	*12000*	810 U	*830*	*1400 J*	*2100 J*	*2100 J*
Benzo (b) fluoranthene	NC	NC	2800 J	2400 J	4300	12000	210 J	1100	2400 J	3300 J	3700 J
Benzo (ghi) perylene	7680[c]	408[c]	*2000 J*	*1800 J*	*3300*	*8800*	810 U	300 J	*980 J*	*1200 J*	*1100 J*
Benzo (k) fluoranthene	32160[c]	576[c]	3000 U	*1100 J*	*2100 J*	*4400*	810 U	400 J	R	R	R
bis (2-Chloroethyl) ether	NC	NC	3000 U	3000 U	2800 U	2700 U	810 U	650 U	700 U	670 U	1300 U
bis (2-Ethylhexyl) phthalate	NC	750[d]	640 J	3000 U	2800 U	550 J	810 U	650 U	330 J	230 J	260 J
Butyl benzyl phthalate	NC	NC	3000 U	3000 U	2800 U	2700 U	810 U	650 U	R	85 J	R
4-Chloro-3-methylphenol	NC	NC	3000 U	3000 U	2800 U	2700 U	810 U	650 U	700 U	670 U	1300 U
2-Chloronaphthalene	NC	NC	3000 U	3000 U	2800 U	2700 U	810 U	650 U	700 U	670 U	1300 U
Chrysene	2800[a]	400[a]	*2900 J*	*2800 J*	*4700*	*13000*	350 J	*1100*	*1300 J*	*1900 J*	*3100 J*
Di-n-butyl phthalate	NC	NC	3000 U	3000 U	2800 U	2700 U	810 U	650 U	700 UJ	670 UJ	1300 UJ
1,2-Dichlorobenzene	NC	NC	3000 U	3000 U	2800 U	2700 U	810 U	650 U	700 U	670 U	1300 U
1,3-Dichlorobenzene	NC	NC	3000 U	3000 U	2800 U	2700 U	810 U	650 U	700 U	670 U	1300 U
1,4-Dichlorobenzene	NC	NC	3000 U	3000 U	2800 U	2700 U	810 U	650 U	700 U	670 U	1300 U
2,4-Dichlorophenol	NC	NC	3000 U	3000 U	2800 U	2700 U	810 U	650 U	700 U	670 U	1300 U
Diethyl phthalate	NC	NC	3000 U	3000 U	2800 U	2700 U	810 U	650 U	700 U	670 U	1300 U
2,4-Dimethylphenol	NC	NC	3000 U	3000 U	2800 U	2700 U	810 U	650 U	700 U	670 U	1300 U
Dimethyl phthalate	NC	NC	3000 U	3000 U	2800 U	2700 U	810 U	650 U	700 U	670 U	1300 U
Di-n-octyl phthalate	NC	NC	3000 U	3000 U	2800 U	2700 U	810 U	650 U	R	R	R
Dibenz (a,h) anthracene	260[a]	60[a]	3000 U	3000 U	*630 J*	*1700 J*	810 U	650 U	*340 J*	*530 J*	*520 J*
2,4-Dinitrotoluene	NC	NC	3000 U	3000 U	2800 U	2700 U	810 U	650 U	700 U	670 U	1300 U
2,6-Dinitrotoluene	NC	NC	3000 U	3000 U	2800 U	2700 U	810 U	650 U	700 U	670 U	1300 U
Fluoranthene	3600[a]	600[a]	*6100*	*5300*	*8400*	*22000*	570 J	*1600*	*1700*	*2100*	*5500 J*
Fluorene	640[a]	35[a]	*1000 J*	*970 J*	*1100 J*	*3300*	810 U	650 U	*280 J*	*420 J*	*940 J*
Hexachlorobenzene	576[c]	48[c]	3000 U	3000 U	2800 U	2700 U	810 U	650 U	700 U	670 U	1300 UJ
Hexachlorobutadiene	NC	NC	3000 U	3000 U	2800 U	2700 U	810 U	650 U	700 U	670 U	1300 U
Hexachlorocyclopentadiene	NC	NC	3000 U	3000 U	2800 U	2700 U	810 U	650 U	700 U	670 U	1300 U
Hexachloroethane	NC	NC	3000 U	3000 U	2800 U	2700 U	810 U	650 U	700 U	670 U	1300 U
Indeno (1,2,3-cd) pyrene	7680[c]	480[c]	*2100 J*	*2000 J*	*4100*	*11000*	810 U	360 J	*850 J*	*990 J*	*1400 J*
Isophorone	NC	NC	3000 U	3000 U	2800 U	2700 U	810 U	650 U	700 U	670 U	1300 U
2-Methylphenol	NC	NC	3000 UJ	3000 UJ	2800 UJ	2700 UJ	810 U	650 U	700 U	670 U	1300 U
Naphthalene	2100[a]	340[a]	*5400*	*4400*	*5700*	*13000*	250 J	*430 J*	*1600 J*	*2100 J*	*2400 J*
Pentachlorophenol	NC	NC	15000 U	14000 U	14000 U	13000 U	4000 UJ	3200 UJ	3500 UJ	3400 UJ	6600 UJ
Phenanthrene	1380[a]	225[a]	*4400*	*3700*	*3800*	*12000*	*370 J*	*850*	*1100*	*1400*	*2600 J*
Phenol	NC	NC	3000 U	660 J	2800 U	2700 U	810 U	650 U	700 U	670 U	1300 U
Pyrene	2200[a]	350[a]	*4400*	*4500*	*6300*	*18000*	*480 J*	*1300*	*3100 J*	*4200 J*	*6500 J*
Pyridine	NC	NC	3000 U	3000 U	2800 U	2700 U	810 U	650 U	700 U	R	R
2,3,4,6-Tetrachlorophenol	NC	NC	3000 U	3000 U	2800 U	2700 U	810 U	650 U	R	R	R
1,2,4-Trichlorobenzene	NC	NC	3000 U	3000 U	2800 U	2700 U	810 U	650 U	700 U	670 U	1300 U
2,4,5-Trichlorophenol	NC	NC	3000 U	3000 U	2800 U	2700 U	810 U	650 U	700 U	670 U	1300 U
2,4,6-Trichlorophenol	NC	NC	3000 U	3000 U	2800 U	2700 U	810 U	650 U	700 U	670 U	1300 U
3-Methylphenol	NC	NC	1800 J	1900 J	2800 U	2700 U	810 U	650 U	R	R	R
4-Methylphenol	NC	NC	1800 J	1900 J	2800 U	2700 U	810 U	650 U	99 J	140 J	1000 J
2-Methyl-4,6-dinitrophenol	NC	NC	15000 U	14000 U	14000 U	13000 U	4000 U	3200 U	3500 U	3400 U	6600 UJ

NOTES:
BOLD - Above the ER-M/SEL Sediment Screening Criteria.
Italic - Above the ER-L/LEL Sediment Screening Criteria.
U = Not detected at the MDL.
J = The concentration was detected at a value below the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R = The sample results were rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte could not be determined.
NC = No criteria.
(a) - Effects Range Low (ER-L) and Effects Range Median (ER-M) - Long and Morgan (1990).
(b) - Effects Range Low (ER-L) and Effects Range Median (ER-M) - Long *et al.*, (1995).
(c) - Lowest Effects Level (LEL) and Severe Effects Level (SEL) - Jaagumagi (1992;1994).
(d) - Upper Effects Threshold (UET) - NOAA Screening Quick Reference Table (1999).

Table J-2
Analytical Results for the Ship Canal Sediment - Semi-Volatile Organic Compounds (SVOCs)
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID: / Lab ID: / Date Sampled: / Sample Depth: / Matrix:	Sediment Screening Criteria		GM-1SW 30158 07/24/95 0-6" Sediment	GM-2SE 29982 07/21/95 0-6" Sediment	GM-2SW 29983 07/21/95 0-6" Sediment	GM-3SE 30517 07/28/95 0-6" Sediment	GM-3SW 30518 07/28/95 0-6" Sediment	GM-4SE 29782 07/19/95 0-6" Sediment	GM-4SW 29783 07/19/95 0-6" Sediment	GM-5SE 29785 07/19/95 0-6" Sediment	GM-5SW 29784 07/19/95 0-6" Sediment
SVOCs (ug/kg)	ER-M/SEL	ER-L/LEL									
Acenapthene	650[a]	150[a]	*220 J*	*1100 J*	*390 J*	*2800 J*	*200 J*	*470 J*	*980 J*	*1100*	*1000*
Acenaphthylene	640[b]	44[b]	*140 J*	*580 J*	*200 J*	*530 J*	870 U	*71 J*	*320 J*	*570 J*	*420 J*
Anthracene	960[a]	85[a]	*400 J*	*2700*	*840 J*	*5400*	*260 J*	*520 J*	*1500*	*3200*	*1700*
Benzo (a) anthracene	1600[a]	230[a]	*1400 J*	*6300*	*2400*	*9400*	*430 J*	*660 J*	*2600*	*7200*	*4600*
Benzo (a) pyrene	2500[a]	400[a]	*1200 J*	*5800*	*2200*	*9500*	*410 J*	*600 J*	*2600*	*6100 J*	*4000*
Benzo (b) fluoranthene	NC	NC	1900 J	8700	3500	14000	600 J	520 J	4200	8900	6800
Benzo (ghi) perylene	7680[c]	408[c]	*950 J*	*4200*	*1300 J*	*6700*	280 J	390 J	*1800*	*3600*	*2800*
Benzo (k) fluoranthene	32160[c]	576[c]	R	1700 U	1600 U	3400 U	870 U	480 J	1500 U	*1300*	*990*
bis (2-Chloroethyl) ether	NC	NC	690 U	1700 U	1600 U	3400 U	870 U	980 U	1500 U	580 U	690 U
bis (2-Ethylhexyl) phthalate	NC	750[d]	450 J	310 J	250 J	3400 U	300 J	980 U	420 J	320 J	360 J
Butyl benzyl phthalate	NC	NC	R	1700 U	1600 U	3400 U	870 U	980 U	1500 U	580 U	690 U
4-Chloro-3-methylphenol	NC	NC	690 U	1700 U	1600 U	3400 U	870 U	980 U	1500 U	580 U	690 U
2-Chloronaphthalene	NC	NC	690 U	1700 U	1600 U	3400 U	870 U	980 U	1500 U	580 U	690 U
Chrysene	2800[a]	400[a]	*1500 J*	*5600*	*2100*	*8600*	*430 J*	*630 J*	*2600*	*6000 J*	*3400*
Di-n-butyl phthalate	NC	NC	690 UJ	1700 U	1600 U	3400 U	130 J	980 U	1500 U	75 J	690 U
1,2-Dichlorobenzene	NC	NC	690 U	1700 U	1600 U	3400 U	870 U	980 U	1500 U	580 U	690 U
1,3-Dichlorobenzene	NC	NC	690 U	1700 U	1600 U	3400 U	870 U	980 U	1500 U	580 U	690 U
1,4-Dichlorobenzene	NC	NC	690 U	1700 U	1600 U	3400 U	870 U	980 U	1500 U	580 U	690 U
2,4-Dichlorophenol	NC	NC	690 U	1700 U	1600 U	3400 U	870 U	980 U	1500 U	580 U	690 U
Diethyl phthalate	NC	NC	690 U	1700 U	1600 U	3400 U	870 U	980 U	1500 U	580 U	690 U
2,4-Dimethylphenol	NC	NC	690 U	1700 U	1600 U	3400 U	870 U	980 U	1500 U	580 U	690 U
Dimethyl phthalate	NC	NC	690 U	1700 U	1600 U	3400 U	870 U	980 U	1500 U	580 U	690 U
Di-n-octyl phthalate	NC	NC	R	1700 U	1600 U	3400 U	870 U	980 U	1500 U	580 U	690 U
Dibenz (a,h) anthracene	260[a]	60[a]	*180 J*	*1600 J*	*670 J*	*2400 J*	*100 J*	*130 J*	*700 J*	*1400*	*1200*
2,4-Dinitrotoluene	NC	NC	690 U	1700 U	1600 U	3400 U	870 U	980 UJ	1500 UJ	580 U	690 U
2,6-Dinitrotoluene	NC	NC	690 U	1700 U	1600 U	3400 U	870 U	980 U	1500 U	580 U	690 U
Fluoranthene	3600[a]	600[a]	*2300 J*	*9200*	*3600*	*18000*	*840 J*	*1600*	*4400*	*8100*	*5800*
Fluorene	640[a]	35[a]	*360 J*	*1300 J*	*470 J*	*2400 J*	*160 J*	*390 J*	*790 J*	*1200*	*970*
Hexachlorobenzene	576[c]	48[c]	690 UJ	1700 U	1600 U	3400 U	870 U	980 U	1500 U	580 U	690 U
Hexachlorobutadiene	NC	NC	690 U	1700 U	1600 U	3400 U	870 U	980 U	1500 U	580 U	690 U
Hexachlorocyclopentadiene	NC	NC	690 U	1700 U	1600 U	3400 UJ	870 U	980 U	1500 U	580 U	690 U
Hexachloroethane	NC	NC	690 U	1700 U	1600 U	3400 U	870 U	980 U	1500 U	580 U	690 U
Indeno (1,2,3-cd) pyrene	7680[c]	480[c]	*840 J*	*3900*	*1600*	*5900*	260 J	360 J	*1700*	*3300*	*2400*
Isophorone	NC	NC	690 U	1700 U	1600 U	3400 U	870 U	980 U	1500 U	580 U	690 U
2-Methylphenol	NC	NC	690 U	1700 U	1600 U	3400 U	870 U	980 U	1500 U	580 U	690 U
Naphthalene	2100[a]	340[a]	*2100 J*	*4100*	*1500 J*	*3700*	*510 J*	*1000*	*4000*	*2400*	*3200*
Pentachlorophenol	NC	NC	3400 UJ	8700 UJ	8000 UJ	17000 UJ	4300 U	4900 U	7300 U	2900 U	3400 U
Phenanthrene	1380[a]	225[a]	*1100 J*	*5700*	*2000*	*12000*	*660 J*	*1200*	*3600*	*6600*	*4800*
Phenol	NC	NC	690 U	1700 U	1600 U	3400 U	870 U	980 U	1500 U	580 U	690 U
Pyrene	2200[a]	350[a]	*2700 J*	*9900*	*3200*	*15000*	*850 J*	*1100*	*4600*	*8300*	*6200*
Pyridine	NC	NC	R	1700 U	1600 U	3400 U	870 U	980 U	1500 U	580 U	690 U
2,3,4,6-Tetrachlorophenol	NC	NC	R	8700 U	8000 U	17000 U	4300 U	4900 U	7300 U	2900 U	3400 U
1,2,4-Trichlorobenzene	NC	NC	690 U	1700 U	1600 U	3400 U	870 U	980 U	1500 U	580 U	690 U
2,4,5-Trichlorophenol	NC	NC	690 U	1700 U	1600 U	3400 U	870 U	980 U	1500 U	580 U	690 U
2,4,6-Trichlorophenol	NC	NC	690 U	1700 U	1600 U	3400 U	870 U	980 U	1500 U	580 U	690 U
3-Methylphenol	NC	NC	R	1700 U	1600 U	3400 U	870 U	980 U	1500 U	580 U	690 U
4-Methylphenol	NC	NC	180 J	1700 U	1600 U	3400 U	870 U	980 U	1500 U	100 J	130 J
2-Methyl-4,6-dinitrophenol	NC	NC	3400 UJ	8700 U	8000 U	17000 U	4300 U	4900 U	7300 U	2900 U	3400 U

NOTES:
BOLD - Above the ER-M/SEL Sediment Screening Criteria.
Italic - Above the ER-L/LEL Sediment Screening Criteria.
U = Not detected at the MDL.
J = The concentration was detected at a value below the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R = The sample results were rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte could not be determined.
NC = No criteria.
(a) - Effects Range Low (ER-L) and Effects Range Median (ER-M) - Long and Morgan (1990).
(b) - Effects Range Low (ER-L) and Effects Range Median (ER-M) - Long *et al*., (1995).
(c) - Lowest Effects Level (LEL) and Severe Effects Level (SEL) - Jaagumagi (1992;1994).
(d) - Upper Effects Threshold (UET) - NOAA Screening Quick Reference Table (1999).

Table J-2
Analytical Results for the Ship Canal Sediment - TAL Metals, Cyanide, and General Chemistry
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID: Lab ID: Date Sampled: Sample Depth: Matrix:	Sediment Screening Criteria		GMS-1 C4K190007-001 11/17/94 0-6" Sediment	GMS-1 DUP C4K190007-004 11/17/94 0-6" Sediment	GMS-2 C4K190007-002 11/17/94 0-6" Sediment	GMS-3 C4K190007-003 11/17/94 0-6" Sediment	GM-4 C4L060025-001 12/05/94 0-6" Sediment	GM-5 C4L060025-002 12/05/94 0-6" Sediment	GM-1ASE 30159 07/24/95 0-6" Sediment	GM-1ASW 30160 07/24/95 0-6" Sediment	GM-1SE 30157 07/24/95 0-6" Sediment
Metals (mg/kg)	ER-M[a]	ER-L[a]									
Antimony	25	2	13.6 UJ	13.6 UJ	12.8 UJ	12.4 UJ	14.8 UJ	*13.9* J	0.94 U	0.91 UJ	0.89 U
Arsenic	85	33	11.2 J	14.5 J	8.4 J	8.2 J	9.5	7.6	7.8	7.8	13.2
Barium	NC	48[b]	*60.5*	*74.7*	*49.1*	*60.1*	*66.4*	*48.7*	*55.9* B	45.8 B	*64.2* B
Cadmium	9	5	2	3.2	1.1 U	1 U	1.2 U	0.99 U	1.2 U	1.2 U	1.1 U
Chromium	145	80	44.5	48.9	43.8	49.4	48.1	37.9	49.9	37.2	42.5
Lead	110	35	***583***	***842***	***113***	*75.8*	*44.4*	*72.8*	***123***	***116***	***522***
Mercury	1.3	0.15	*3.6*	*3*	*0.61*	*0.91*	*0.45*	*0.44*	*1.9*	*0.87*	*7.3*
Nickel	50	30	26.1	27.6	26.9	29.1	26.9 J	20.3 J	*41.7*	*34.2*	*46.6*
Selenium	NC	1[b]	*1.7*	*1.4*	*1.8*	1 U	1.2 U	0.99 U	1.3 U	1.2 UJ	1.2 UJ
Silver	2.2	1	2.3 U	2.3 U	2.1 U	2.1 U	2.5 U	2 U	3.6 U	3.4 U	*4.9*
Thallium	NC	NC	2.3 U	2.8 J	2.1 U	2.1 U	2.5 U	2 U	1.8 U	1.8 U	1.7 U
Cyanide, total	NC	NC	NR	NR	NR	NR	NR	NR	2	1 U	5.9
General Analytical											
CNFREE (mg/kg)	NC	NC	1.1 U	1.1 U	1.1 U	1 U	1.2 U	0.99 U	NR	NR	NR
TOC (ug/kg)	NC	NC	28.1	25.8	26.9	28.2	17.3	13	NR	NR	NR
Total Solids (%)	NC	NC	44	44.2	46.8	48.4	40.5	50.7	NR	NR	NR

NOTES:
BOLD - Above the ER-M Sediment Screening Criteria.
Italic - Above the ER-L Sediment Screening Criteria.
U = Not detected at the MDL .
J = The concentration was detected at a value below the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R = The sample results were rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte could not be determined.
B = Result between MDL and RL.
NC = No criteria.
NR = No analysis performed.

(a) - Effects Range Low (ER-L) and Effects Range Median (ER-M) - Long and Morgan (1990).
(b) - Apparent Effects Threshold (AET) for marine sediment from the NOAA Screening Quick Reference Tables (1999).

Table J-2
Analytical Results for the Ship Canal Sediment - TAL Metals, Cyanide, and General Chemistry
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID: / Lab ID: / Date Sampled: / Sample Depth: / Matrix:	Sediment Screening Criteria		GM-1SW 30158 07/24/95 0-6" Sediment	GM-2SE 29982 07/21/95 0-6" Sediment	GM-2SW 29983 07/21/95 0-6" Sediment	GM-3SE 30517 07/28/95 0-6" Sediment	GM-3SW 30518 07/28/95 0-6" Sediment	GM-4SE 29782 07/19/95 0-6" Sediment	GM-4SW 29783 07/19/95 0-6" Sediment	GM-5SE 29785 07/19/95 0-6" Sediment	GM-5SW 29784 07/19/95 0-6" Sediment
Metals (mg/kg)	ER-M[a]	ER-L[a]									
Antimony	25	2	0.92 U	1.1 UJ	1.1 U	0.92 UJ	1.2 UJ	1.0 J	1.3 UJ	1.3 J	22 U
Arsenic	85	33	11.2	11.2	15.9	13.8	13.1	7	9.8	8.4	12.1
Barium	NC	48[b]	*61.8* B	*71* B	*103* J	*65.1* B	*86.9* B	*120*	*120*	*59* B	*79.9* B
Cadmium	9	5	1.2 U	1.5 UJ	1.4 UJ	1.2 U	1.5 U	0.83 U	1.2 U	1.1 B	1.6 B
Chromium	145	80	51.9	46.9	68.3	45.7	56.8	22.8 J	50.9 J	36.6 J	54.8
Lead	110	35	*245*	*122*	*125*	*76.6*	*72.1*	29.9	*44.3*	*41.3*	*64.2*
Mercury	1.3	0.15	*3.5*	*0.83*	*0.77*	*0.93* J	*0.4* J	0.15 UJ	0.22 UJ	*0.35* J	0.21 UJ
Nickel	50	30	*41*	*41.1* J	*65* J	*38.5*	*49.3*	*34.9*	*44.6*	28.5	*48.8*
Selenium	NC	1[b]	1.3 UJ	1.6 UJ	1.5 UJ	0.83 U	*1.3* J	0.6 UJ	*1.2* J	0.7 UJ	0.84 UJ
Silver	2.2	1	3.5 U	*6.5*	*6.1*	3.5 U	4.4 U	2.5 U	*5.1*	2.9 U	*5.3*
Thallium	NC	NC	1.8 U	2.2 U	2.1 U	0.42 UJ	0.53 UJ	0.3 U	0.45 UJ	0.35 UJ	0.42 UJ
Cyanide, total	NC	NC	1 U	1.3 U	1.2 U	R	R	0.74 U	1.1 U	0.88 U	1 U
General Analytical											
CNFREE (mg/kg)	NC	NC	NR	NR	NR	NR	NR	NR	NR	NR	NR
TOC (ug/kg)	NC	NC	NR	NR	NR	NR	NR	NR	NR	NR	NR
Total Solids (%)	NC	NC	NR	NR	NR	NR	NR	NR	NR	NR	NR

NOTES:
BOLD - Above the ER-M Sediment Screening Criteria.
Italic - Above the ER-L Sediment Screening Criteria.
U = Not detected at the MDL .
J = The concentration was detected at a value below the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R = The sample results were rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte could not be determined.
B = Result between MDL and RL.
NC = No criteria.
NR = No analysis performed.

(a) - Effects Range Low (ER-L) and Effects Range Median (ER-M) - Long and Morgan (1990).
(b) - Apparent Effects Threshold (AET) for marine sediment from the NOAA Screening Quick Reference Tables (1999).

ATTACHMENT K

RESULTS OF ACUTE TOXICITY TESTS ON BETHLEHEM STEEL CORPORATION SPDES DISCHARGES TO SMOKES CREEK, 1992-1993

BETHLEHEM STEEL CORPORATION

LACKAWANNA, NEW YORK

RESULTS OF ACUTE TOXICITY TESTS WITH *Daphnia magna* AND *Pimephales promelas* ON SAMPLES FROM BETHLEHEM STEEL CORPORATION LACKAWANNA GALVANIZE PRODUCTS DIVISION (LGPD)

Prepared for:

Bethlehem Steel Corporation

Prepared by:

EA Mid-Atlantic Regional Operations
EA Engineering, Science, and Technology, Inc.
15 Loveton Circle
Sparks, Maryland 21152

September 1992

EA Project 70003.10

Report Number 1140

EA Project 70003.10

RESULTS OF ACUTE TOXICITY TESTS WITH *Daphnia magna* AND *Pimephales promelas* ON SAMPLES FROM BETHLEHEM STEEL CORPORATION LACKAWANNA GALVANIZE PRODUCTS DIVISION (LGPD)

Prepared for:

Bethlehem Steel Corporation

Prepared by:

EA Mid-Atlantic Regional Operations
EA Engineering, Science, and Technology, Inc.
15 Loveton Circle
Sparks, Maryland 21152

William L. Goodfellow, Jr. — 4 Sept. 1992
Project Manager — Date

Jeffrey A. Black, Ph.D. — 4 September 1992
Manager, Aquatic Toxicology Laboratory — Date

September 1992

1. INTRODUCTION

At the request of Bethlehem Steel Corporation, EA Engineering, Science, and Technology performed 48-hour daily renewal acute toxicity tests on samples from the Lackawanna Galvanize Products Division (LGPD). *Daphnia magna* (water flea) and *Pimephales promelas* (fathead minnow) were used as the test species. The tests were conducted on 24-hour composite samples from 1) Outfall 223 and 2) Outfalls 216 and 217. The Outfalls 216/217 sample was a flow proportioned composite that was prepared by Empire Soils Investigations, Inc. Both species were exposed to 100, 50, 25, 12.5, and 6.25 percent of each effluent sample diluted with upstream creek water, and a dilution water control. The objective of the study was to determine the acute toxicity of the effluent samples expressed as the 48-hour median lethal concentration (LC50).

Sample collection and receipt data, together with initial water quality taken on the effluent samples, are reported in the summary of sample/test information. The summary of information, which includes time of test initiation and termination, test organism source and age, test results, water quality and reference toxicant data, is found on pages 3 through 10. Sample collection and initial water quality data are reported in Table 1. Test protocols, copies of raw data sheets, and the Report Quality Assurance Record are included in Attachments I, II, and III, respectively.

RESULTS

The results of the acute toxicity tests performed for Bethlehem Steel Corporation indicate that the samples from the Lackawanna Galvanize Products Division (LGPD) were not acutely toxic to either test species. After 48 hours of exposure to all effluent concentrations, there was 100 percent survival of *D. magna* and a minimum of 95 percent survival of *P. promelas*. Control survival was 100 percent in all tests. The 48-hour LC50 values for the sample from Outfall 223, and for the composite of Outfalls 216 and 217, were >100 percent effluent for both *D. magna* and *P. promelas*.

SUMMARY OF SAMPLE/TEST INFORMATION

Test: 48-hour *Daphnia magna* daily renewal acute test

Client Name: **Bethlehem Steel Corporation**
Lackawanna Galvanize Products Division

Test Procedure: EA Protocol ATS-SAI-DS-04
Acute 48-hour LC50 assay with *Daphnia* sp.

Sample Description: **Outfall 223**
EA Accession Numbers: **AT2-702, AT2-704**

EA QC Test Number: **SR-08-20-92-898**
Test initiation time and date: 1625, 20 August 1992
Test completion time and date: 1607, 22 August 1992

Dilution Water Description: **Upstream creek water**
EA Accession Numbers: **AT2-701, AT2-706**

Organism Lot Information

Lot Number: NA
Source: EA's Culture Facility
Age: <24 hours

Reference Toxicant (SDS) Test Information

Reference Toxicant: Sodium dodecyl sulfate
EA QC Test Number: RT-08-03-92-828
Dilution Water: Dechlorinated tap water

Results:
24-hour LC50: 34.1 mg/L
Laboratory control chart acceptability range for 24-hour LC50:
18.7 - 56.1 mg/L

SUMMARY OF SELECTED TEST DATA (Cont.)

Test Organism: ***D. magna***
EA QC Test Number: **SR-08-20-92-898**
Sample Description: **Outfall 223**
Sample Numbers: **AT2-702, AT2-704**
Dilution Water Description: **Upstream creek water**
Sample Numbers: **AT2-701, AT2-706**

Test Concentration (percent effluent)	Percent Survival at 48 Hours
Dilution Water Control	100
6.25	100
12.5	100
25	100
50	100
100	100
48-hour LC50 value: (percent effluent)	> 100

Selected Water Quality	Range
Temperature (C)	19.0 - 21.0
pH	7.8 - 8.3
Dissolved oxygen (mg/L)	8.3 - 9.3
Conductivity (μS°)	252 - 355

SUMMARY OF SAMPLE/TEST INFORMATION

Test: 48-hour *Pimephales promelas* daily renewal acute test

Client Name: **Bethlehem Steel Corporation**
Lackawanna Galvanize Products Division

Test Procedure: EA Protocol ATS-SAF-FM-04
Acute assay with fathead minnows (*Pimephales promelas*)

Sample Description: Outfall 223
EA Accession Numbers: AT2-702, AT2-704

EA QC Test Number: SR-08-20-92-897
Test initiation time and date: 1640, 20 August 1992
Test completion time and date: 1605, 22 August 1992

Dilution Water Description: Upstream creek water
EA Accession Numbers: AT2-701, AT2-706

Organism Lot Information

Lot Number: FH 2-8/9-10
Source: EA's Culture Facility, Sparks, Maryland
Age: 10-11 days

Reference Toxicant (SDS) Test Information

Reference Toxicant: Sodium dodecyl sulfate
EA QC Test Number: RT-08-13-92-874
Dilution Water: Dechlorinated tap water

Results:
24-hour LC50: 28.3 mg/L
Laboratory control chart acceptability range for 24-hour LC50:
22.1 - 37.2 mg/L

SUMMARY OF SELECTED TEST DATA (Cont.)

Test Organism: *P. promelas*
EA QC Test Number: **SR-08-20-92-897**
Sample Description: **Outfall 223**
Sample Numbers: **AT2-702, AT2-704**
Dilution Water Description: **Upstream creek water**
Sample Numbers: **AT2-701, AT2-706**

Test Concentration (percent effluent)	Percent Survival at 48 Hours
Diltion Water Control	100
6.25	100
12.5	95
25	95
50	100
100	100
48-Hour LC50 value: (percent effluent)	> 100

Selected Water Quality	Range
Temperature (C)	19.0 - 21.0
pH	7.8 - 8.2
Dissolved oxygen (mg/L)	8.3 - 9.3
Conductivity (μS°)	252 - 355

SUMMARY OF SAMPLE/TEST INFORMATION

Test: 48-hour *Daphnia magna* daily renewal acute test

Client Name: **Bethlehem Steel Corporation**
Lackawanna Galvanize Products Division

Test Procedure: EA Protocol ATS-SAI-DS-04
Acute 48-hour LC50 assay with *Daphnia* sp.

Sample Description: Outfall 216/217 composited
EA Accession Numbers: AT2-703, AT2-705

EA QC Test Number: SR-08-20-92-900
Test initiation time and date: 1630, 20 August 1992
Test completion time and date: 1617, 22 August 1992

Dilution Water Description: Upstream creek water
EA Accession Numbers: AT2-701, AT2-706

Organism Lot Information

Lot Number: NA
Source: EA's Culture Facility, Sparks, Maryland
Age: <24 hours

Reference Toxicant (SDS) Test Information

Reference Toxicant: Sodium dodecyl sulfate
EA QC Test Number: RT-08-03-92-828
Dilution Water: Dechlorinated tap water

Results:
24-hour LC50: 34.1 mg/L
Laboratory control chart acceptability range for 24-hour LC50:
18.7 - 56.1 mg/L

SUMMARY OF SELECTED TEST DATA (Cont.)

Test Organism: *D. magna*
EA QC Test Number: **SR-08-20-92-900**
Sample Description: **Outfalls 216/217 composited**
Sample Numbers: **AT2-703, AT2-705**
Dilution Water Description: **Upstream creek water**
Sample Numbers: **AT2-701, AT2-706**

Test Concentration (percent effluent)	Percent Survival at 48 Hours
Diltion Water Control	100
6.25	100
12.5	100
25	100
50	100
100	100
48-Hour LC50 value: (percent effluent)	> 100

Selected Water Quality	Range
Temperature (C)	19.4 - 20.9
pH	7.8 - 8.3
Dissolved oxygen (mg/L)	8.2 - 9.3
Conductivity (μS°)	341 - 447

SUMMARY OF SAMPLE/TEST INFORMATION

Test: 48-hour *Pimephales promelas* daily renewal acute test

Client Name: **Bethlehem Steel Corporation**
Lackawanna Galvanize Products Division

Test Procedure: EA Protocol ATS-SAF-FM-04
Acute assay with fathead minnows (*Pimephales promelas*)

Sample Description: Outfall 216/217 composited
EA Accession Numbers: AT2-703, AT2-705

EA QC Test Number: **SR-08-20-92-899**
Test initiation time and date: 1642, 20 August 1992
Test completion time and date: 1600, 25 August 1992

Dilution Water Description: Upstream creek water
EA Accession Numbers: AT2-701, AT2-706

Organism Lot Information

Lot Number: FH 2-8/9-10
Source: EA's Culture Facility, Sparks, Maryland
Age: 10-11 days

Reference Toxicant (SDS) Test Information

Reference Toxicant: Sodium dodecyl sulfate
EA QC Test Number: RT-08-13-92-874
Dilution Water: Dechlorinated tap water

Results:
24-hour LC50: 28.3 mg/L
Laboratory control chart acceptability range for 24-hour LC50:
22.1 - 37.2 mg/L

SUMMARY OF SELECTED TEST DATA (Cont.)

Test Organism: ***P. promelas***
EA QC Test Number: **SR-08-20-92-899**
Sample Description: **Outfall 216/217 composited**
Sample Numbers: **AT2-703, AT2-705**
Dilution Water Description: **Upstream creek water**
Sample Numbers: **AT2-701, AT2-706**

Test Concentration (percent effluent)	Percent Survival at 48 Hours
Diltion Water Control	100
6.25	100
12.5	100
25	100
50	100
100	100
48-Hour LC50 value: (percent effluent)	> 100

Selected Water Quality	Range
Temperature (C)	19.2 - 20.9
pH	7.8 - 8.2
Dissolved oxygen (mg/L)	8.2 - 9.3
Conductivity (μS°)	341 - 447

TABLE 1 SAMPLES COLLECTION AND INITIAL WATER QUALITY DATA FOR SAMPLES FROM BETHLEHEM STEEL'S LACKAWANNA FACILITY

EA Accession Number	Sample Collection	Sample Receipt	Alkalinity (mg/L $CaCO_3$)	Hardness (mg/L $CaCO_3$)	Conductivity (μS^o)
UPSTREAM CREEK WATER:					
AT2-701	1730, 19 AUG 92	1015, 20 AUG 92	122 mg/L	152 mg/L	379μS
AT2-706	1620, 20 AUG 92	0940, 21 AUG 92	108 mg/L	160 mg/L	398μS
OUTFALL 223:					
AT2-702	1705, 19 AUG 92	1015, 20 AUG 92	100 mg/L	124 mg/L	276μS
AT2-704	1735, 20 AUG 92	0940, 21 AUG 92	98 mg/L	128 mg/L	276μS
OUTFALL 216/217 - COMPOSITED:					
AT2-703	1635, 19 AUG 92	1015, 20 AUG 92	88 mg/L	196 mg/L	482μS
AT2-705	1708, 20 AUG 92	0940, 21 AUG 92	90 mg/L	184 mg/L	479μS

ATTACHMENT I

PROTOCOLS

3. ACUTE 48-HOUR LC50 ASSAY WITH *Daphnia* sp.

1. TEST OBJECTIVE

To assess the toxicity of a test material to *Daphnia* and determine the LC50 or EC50 using mortality or immobilization, respectively, as the test end points.

2. TEST ARTICLE

2.1 Description/Identification

Unless otherwise specified, the test material is supplied by the client. Adequate chemical specifications with special reference to hazardous properties and storage conditions is also supplied by the client.

2.2 Methods of Synthesis

In most cases the test article is an effluent sample. Information on the methods of synthesis, stability, and composition or other characteristics which define the test article are on file with the client.

3. EXPERIMENTAL DESIGN

3.1 Test Organisms

A species of *Daphnia* (water fleas), as determined by project needs, is the test organism.

3.2 Source

Daphnia used for acute toxicity tests are obtained from stock cultures maintained in EA's Aquatic Toxicology Culturing Facility.

3.3 Culturing and Holding Conditions

Daphnia cultures are maintained at 20±2 C and a 16-hour light, 8-hour dark photoperiod cycle in an environmentally controlled laboratory. Cultures are maintained in 18.9-L all glass aquaria or other appropriate container and are fed algae (*Selenastrum capricornutum*) and a trout chow/yeast/cereal leaves suspension in the manner described in Peltier and Weber (1985). New cultures are initiated on a routine basis to ensure healthy, productive populations. Organisms from cultures producing ephippia are not used for toxicity tests.

3.4 Age of Test Organisms at Test Initiation

Neonates of known age (i.e., less than 24-hours old) are obtained for testing by segregating adult females from the mass cultures on the day before a test is initiated. On the day of the test, neonates are segregated from the parent organisms.

3.5 Dilution Water

The source of dilution water is the City of Baltimore Municipal Water System. Upon entry to the laboratory, the water is passed through a high-capacity, activated-carbon filtration system to remove chlorine and other possible contaminants such as detergents, and hexane-soluble organic materials. This water source has proven safe for aquatic organism toxicity testing as evidenced by maintenance of the multigeneration *Daphnia* and *Pimephales promelas* cultures, with no evident loss of fecundity. If requested, reconstituted fresh water or an appropriate receiving water can be used as the dilution water.

3.6 Test Concentration Series

The test concentration series consists of a minimum of five dilutions and may be determined from a prior screening of the test material (e.g., 1, 3, 10, 30, and 100 percent effluent; or 6.25, 12.5, 25, 50, and 100 percent effluent plus a control).

3.7 Test Concentration Preparation

Test concentrations are prepared with Class A glassware.

3.8 Test Vessels and Test Volume

Test vessels are 400-ml glass beakers or 10-cm culture bowls; the final test volume of each replicate is 200 ml. Depending on the study requirements, other test vessels and test volumes may be used.

3.9 Test Organism Number

Tests are conducted using two replicates per concentration, with ten organisms per container. Neonates are randomly assigned to each replicate test container. More replicates can be added, if appropriate.

3.10 Test Environment

The test vessels are maintained at 20±2 C in an environmentally controlled laboratory with a 16-hour light, 8-hour dark photoperiod.

3.11 Analysis of Test Concentrations for Test Article

If required, test solutions may be analyzed for analytical verification of chemical concentrations. The analytical method and number of analyses are determined after consultation with the client. When chemical analyses are necessary, both nominal and actual measured test solution concentrations are reported.

3.12 Test Observations

Each test day, test organisms are observed to record the number of surviving organisms. The study terminates after completion of the 2-day observation period. The study may be extended, however, at the request of the client.

Each sample and receiving water are analyzed for temperature, conductivity, alkalinity, and hardness. Measurements of water quality taken at test initiation, 24-hours, and test termination include dissolved oxygen, pH, temperature and conductivity from a minimum of one replicate of the control, low, medium, and high dilutions. Aliquots of effluent and receiving water and test solutions may be gently aerated, if necessary (dissolved oxygen less than 40% or greater than 105% saturation). Analytical determinations are conducted according to APHA et al. (1989) and EPA (1979).

3.13 Solution Renewal (When Applicable)

When static-renewal testing is required, the test solutions are renewed at 24-hours. New test solutions are prepared on the day of renewal and dispensed according to Section 3.7. After the new solutions have reached test temperature, the test organisms are transferred from the old test vessels to the new test vessels using a wide bore pipet or glass tube. The number of live organisms is recorded. Caution is given not to stress the test organisms during transfer. After water quality measurements (temperature, pH, dissolved oxygen, and conductivity) are completed, the old solution is discarded.

3.14 Data Analysis

The LC50 or EC50 values and associated statistics are calculated using the probit, moving average, and binomial methods as described by Stephan (1977). Depending on the nature of the data, other methods may be used, including the Trimmed Spearman-Karber method, the probit approximation method of Litchfield and Wilcoxon (1949), SAS probit analysis (SAS Institute 1979) or graphical interpolation using the log concentration vs. percent mortality as described by APHA et al. (1989). The methods used are specified in the final report.

4. FINAL REPORT

The final report is prepared to contain at a minimum the following information:

- Objectives and procedures stated in the approved protocol, including any changes made to the original protocol
- Identity of the test article(s) by name or code number and the strength (i.e., quality/purity and a description of any pretreatment)
- Source of the dilution water, its chemical characteristics, and a description of any pretreatment
- Test concentration series used and duration of the assay
- Water quality characteristics of dilution water and selected test concentrations during testing (pH, dissolved oxygen, temperature, etc.)
- Any unforeseen circumstances that may have affected the quality or integrity of the study
- Signature of the project manager, senior technical reviewer, and quality control officer, authorizing release of the report
- Location of all archived data and the original copy of the final report at EA

Items of data to be included in the report consist of experimental design and test performance; effects on general appearance of test organisms (if applicable); morbidity and mortality; tabular presentation and appropriate statistical evaluation of water quality characteristics; and survival data.

5. QUALITY ASSURANCE

5.1 Amendments to Protocol

Amendments to the authorized protocol established by EA or by the client are made only after proper authorization. Such authorization is achieved by completion of the Amendment to Protocol Form by EA after consultation with the client.

5.2 Standard Operating Procedures

Unless otherwise specified, all procedures specified in the protocol are subject to detailed Standard Operating Procedures (SOPs) which are contained in the SOP manuals of the participating departments. These SOPs and protocols follow the U.S. EPA's Good Laboratory Practice Standards (GLPs) (EPA 1989).

5.3 Reference Toxicant

A reference toxicant test, utilizing sodium dodecyl sulfate (SDS), cadmium chloride, or another appropriate chemical is used as an internal quality check of the sensitivity of the test organisms. Testing is conducted at least once monthly on organisms which are cultured in-house. The results of each test are compared with historical, species-specific toxicological information from reference toxicant tests performed at EA, to determine if the results are within acceptable limits. Limits are established using the control charts outlined in Peltier and Weber (1985).

5.4 Quality Assurance Evaluation

Studies conducted under this protocol may be subject to internal audit by EA's Quality Assurance Unit. A quality control officer is responsible for monitoring each study to assure the client that the facilities, equipment, personnel, methods, practices, records, and controls are in conformance with EA's QC program and, if applicable, EPA's GLPs.

5.5 Inspection by Regulatory Authorities

In the event of an inspection of EA by an outside authority during the course of the study, the client whose study is being inspected will be consulted before examiners are permitted access to any of the project records or the experimental areas.

5.6 Archives

Copies of project-specific records shall be transferred to the client promptly after the project is completed or as negotiated and budgeted. Original primary data will be retained at EA for 5 years. Primary data include chain-of-custody records, laboratory data sheets, records, memoranda, notes, photographs, microfilm, and computer printouts that are a result of the original observations and activities of the study and which are necessary for the reconstruction and evaluation of the study report.

5.7 Location

Studies are conducted at the Aquatic Toxicology Laboratory of EA Engineering, Science, and Technology, Inc. at the Mid-Atlantic Regional Offices, Sparks, Maryland.

6. SPECIFICATIONS OF THE Daphnia ACUTE TOXICITY TEST

6.1 Basic References

American Public Health Association (APHA). 1989. Standard Methods for Examination of Water and Wastewater, 17th edition or an updated edition. APHA, AWWA, and WPCF. Washington, D.C.

EA Manual ATS-102. 1981. Aquatic Toxicology Studies, Quality Control and Standard Operating Procedures Manual. Revision 2 - August 1991. (Internal document prepared by Aquatic Toxicology Services, EA Engineering, Science, and Technology, Inc.)

Peltier, W.H. and C.I. Weber. 1985. Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms. EPA-600/4-85-013. U.S. Environmental Protection Agency, Cincinnati, Ohio.

Weber, C.I., et al. 1989. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. Second Edition. EPA/600/4-89/001. U.S. Environmental Protection Agency, Cincinnati, Ohio.

U.S. EPA. 1989. Toxic Substances Control Act (TSCA); Good Laboratory Practice Standards. Title 40 CFR Part 792. Fed. Regist. 54(158):34034-34074.

6.2 Test Specifications

Test organism:	Daphnia magna or D. pulex; species to be specified in the study plan and final report
Age:	Less than 24 hours old
Temperature:	20±2 C
Light quality:	Wide-spectrum fluorescent light
Light intensity:	50-100 f.c.

Photoperiod:	16-hour light, 8-hour dark
Aeration:	None, unless dissolved oxygen falls below 40 percent saturation
Dilution water:	Dechlorinated municipal water, reconstituted water, or appropriate receiving water
Test container:	400-ml Pyrex beaker or 10-cm culture bowl
Test volume:	200 ml per replicate
No. of concentrations:	Minimum of five test concentrations and a control
No. of replicates:	Two
No. of animals per replicate:	Ten
Feeding regime:	Animals will not be fed during test
Test type and duration:	Rangefinding—24 to 48 hours Definitive—48 hours
Endpoints:	Mortality or immobilization
	Immobilization—defined as cessation of movement except for minor activity of appendages
	Mortality—defined as cessation of all movement for a period of at least 5 seconds even when the test container is tapped or rotated, or the organism is gently prodded with glass rod
Test acceptability:	90% or greater survival in the control solution.

11. ACUTE ASSAY WITH FATHEAD MINNOWS (Pimephales promelas)

1. TEST OBJECTIVE

To assess the toxicity of a test material to Pimephales promelas and determine the LC50 or EC50 using mortality and/or immobilization, respectively, as the test endpoint(s).

2. TEST ARTICLE

2.1 Description/Identification

Unless otherwise specified, the test material is supplied by the client. Adequate chemical specifications with special reference to hazardous properties and storage conditions are also supplied by the client.

2.2 Methods of Synthesis

In most cases the test article is an effluent sample. Information on the methods of synthesis, stability, and composition or other characteristics which define the test article are on file with the client.

3. EXPERIMENTAL DESIGN

3.1 Test Organisms

The test species is the fathead minnow, Pimephales promelas.

3.2 Source

P. promelas used for toxicity tests are usually obtained from stock cultures maintained at EA's Aquatic Toxicology Culturing Facility. However, organisms may be obtained from a scientific organism vendor, if necessary.

3.3 Culturing and Holding Conditions

P. promelas stock are maintained at 20±2 C and a 16-hour light, 8-hour dark photoperiod cycle in an environmentally controlled laboratory. Test organisms are maintained in 18.9-L or 30-L all glass aquaria in a recirculating system of dechlorinated municipal tap water. If organisms are obtained from a scientific vendor, the fish, upon receipt, are transferred to static recirculating holding tanks of an appropriate size
containing dechlorinated tap water at the temperature (±2 C) of the water

in which the organisms were shipped. All fish stocks are examined regularly. Dead fish, or those displaying abnormal swimming behavior, discoloration, or pronounced lethargy are removed as observed, and recorded on appropriate log sheets. Fish stocks are fed a commercial fish food a minimum of once daily.

3.4 Age of Test Organisms at Test Initiation

The age of the test organisms is dependent on the objectives of the study and the specific guidelines being followed, but in general, fathead minnows used for acute toxicity testing are <90 days upon test initiation.

3.5 Dilution Water

The source of dilution water is the City of Baltimore Municipal Water System. Upon entry to the laboratory, the water is passed through a high-capacity, activated-carbon filtration system to remove chlorine and other possible contaminants such as detergents and hexane-soluble organic materials. This water source has proven safe for aquatic organism toxicity testing, as evidenced by maintenance of the multigeneration Daphnia and fathead minnow cultures, with no evident loss of fecundity. If requested, reconstituted fresh water or other dilution water may be used.

3.6 Test Concentration Series

The test concentration series consists of a minimum of five dilutions and may be determined from a prior screening of the test material (e.g., 1, 3, 10, 30, and 100 percent effluent; or 6.25, 12.5, 25, 50, and 100 percent effluent plus a control).

3.7 Test Concentration Preparation

Test concentrations are prepared with Class A glassware.

3.8 Test Vessels and Test Volume

Test vessels are 8-in. glass culture bowls; the final test volume is 1 L. Other test vessels may be used depending on the study's requirements.

3.9 Test Organism Number

Tests are conducted using 2 replicates per concentration, with 10 organisms per container. Fish are randomly assigned to each replicate test container. More replicates can be added, if appropriate.

3.10 Test Environment

The test vessels are maintained at 20±2 C (unless a different project-specific temperature is required) in an environmentally controlled laboratory with a 16-hour light, 8-hour dark photoperiod. Temperature within the environmental room is monitored continuously using temperature recorders.

3.11 Analysis of Test Concentrations for Test Article

If required, test solutions may be analyzed for verification of chemical concentrations. The analytical method and number of analyses are determined after consultation with the client. When chemical analyses are necessary, both nominal and actual measured test concentrations are reported.

3.12 Test Observations

Each test day, test organisms are observed to record the number of surviving organisms. Dead organisms are removed when observed. The study terminates after completion of the observation period (24 to 96 hours). The study may be extended, however, at the request of the client.

Each sample received is analyzed for temperature, conductivity, alkalinity, and hardness. Measurements of water quality taken at test initiation and termination include dissolved oxygen, pH, temperature, and conductivity from a minimum of one replicate of the control, low, medium, and high dilutions. Aliquots of effluent and receiving water, and test solutions may be gently aerated, if necessary (dissolved oxygen less than 40% or greater than 105% saturation). Analytical determinations are conducted according to APHA (1989) and EPA (1979).

At the end of the test period, a minimum of 30 surviving fish are removed from the test vessels, placed in labeled containers, and frozen for later measurements. The fish are subsequently thawed, measured to the nearest mm (standard length), patted dry, and weighed to the nearest 0.01 g. The average length and weight of the test fish are reported, along with their respective ranges and standard deviations.

3.13 Solution Renewal (When Applicable)

When static-renewal testing is required, the test solution is renewed daily. New solutions are prepared on the day of renewal and dispensed

according to Section 3.8. After the new solutions have reached test temperature and water quality measurements (temperature, pH, dissolved oxygen, and conductivity) are completed, the solution renewal may be performed by transferring the organisms from one test chamber to another or by replacing the test solution. If the test solution replacement method is used, caution must be given not to stress the test organisms while the test chamber is siphoned. Usually 75 percent of the old solution is removed and replaced; however, the amount is dependent on the size of the test organisms.

3.14 Data Analysis

The LC50 and/or EC50 values and associated statistics are calculated using the probit, moving average, and binomial methods as described by Stephan (1977). Depending on the nature of the data, other methods may be used including the Trimmed Spearman-Karber Method, the probit approximation method of Litchfield and Wilcoxon (1949), SAS probit analysis (SAS Institute 1979), or graphical interpolation using the log concentration vs. percent mortality and/or percent affected as described by APHA (1989). The methods used are specified in the final report.

4. FINAL REPORT

The final report is prepared to contain, at a minimum, the following information:

- Objectives and procedures stated in the approved protocol, including any changes made to the original protocol
- Identity of the test article(s) by name or code number and their strength (i.e., quality/purity), and a description of any pretreatment
- Source of the dilution water, its chemical characteristics, and a description of any pretreatment
- Test concentration series used and duration of the assay
- Mean standard lengths and wet weights of test fish, the respective standard deviations, and approximate biomass loadings (g fish/L of test solution)
- Water quality characteristics (pH, dissolved oxygen, temperature, etc.) of dilution water and selected test concentrations during testing.

- Any unforeseen circumstances that may have affected the quality or integrity of the study
- Signature of the project manager, senior technical reviewer, and quality control officer authorizing release of the report
- Location of all archived data and the original copy of the final report at EA

Items of data to be included in the report consist of experimental design and test performance; effects on general appearance of test organisms (if applicable); morbidity and mortality; tabular presentation and appropriate statistical evaluation of water quality characteristics, and survival data.

5. QUALITY ASSURANCE

5.1 Amendments to Protocol

Amendments to the authorized protocol established by EA or by the client are made only after proper authorization. Such authorization is achieved by completion of the Amendment to Protocol Form by EA after consultation with the client.

5.2 Standard Operating Procedures

Unless otherwise specified, all procedures given in the protocol are subject to detailed Standard Operating Procedures (SOPs) which are contained in the SOP manuals of the participating departments. These SOPs and protocols follow the U.S. EPA's Good Laboratory Practice Standards (GLPs) (EPA 1989).

5.3 Reference Toxicant

A reference toxicant test, utilizing sodium dodecyl sulfate (SDS), cadmium chloride, or another appropriate chemical is used as an internal quality check of the sensitivity of the test organisms. Testing is conducted at least once monthly on organisms that are cultured in-house. The results of each test are compared with historical, species-specific toxicological information from reference toxicant tests performed at EA, to determine if the results are within acceptable limits. Limits are established using the control charts outlined in Peltier and Weber (1985).

5.4 Quality Assurance Evaluation

Studies conducted under this protocol may be subject to internal audit by EA's Quality Assurance Unit. A quality control officer is responsible for monitoring each study to assure the client that the facilities, equipment, personnel, methods, practices, records, and controls are in conformance with EA's QC program and, if applicable, EPA's GLPs.

5.5 Inspection by Regulatory Authorities

In the event of an inspection of EA by an outside authority during the course of the study, the client whose study is being inspected will be consulted before examiners are permitted access to any of the project records or the experimental areas.

5.6 Archives

Copies of project-specific records shall be transferred to the client promptly after the project is completed or as negotiated and budgeted. Original primary data will be retained at EA for 5 years. Primary data include chain-of-custody records, laboratory data sheets, records, memoranda, notes, photographs, microfilm, and computer printouts that are a result of the original observations and activities of the study and which are necessary for the reconstruction and evaluation of the study report.

5.7 Location

Studies are conducted at the Aquatic Toxicology Laboratory of EA Engineering, Science, and Technology, Inc. at the Mid-Atlantic Regional Offices, Sparks, Maryland.

6. SPECIFICATIONS OF THE FATHEAD MINNOW ACUTE TOXICITY TEST

6.1 Basic References

American Public Health Association (APHA). 1989. Standard Methods for Examination of Water and Wastewater, 17th or updated edition. APHA, AWWA, and WPCF. Washington, D.C.

American Society for Testing and Materials (ASTM). 1980. Standard Practice for Conducting Acute Tests with Fishes, Macroinvertebrates, and Amphibians. ASTM Designation: E729-80. Philadelphia, Pa. pp. 285-309.

EA Manual ATS-102. 1981. Aquatic Toxicology Studies. Quality Control and Standard Operating Procedures Manual. Revision 2-August 1991. (Internal document prepared by Aquatic Toxicology Services. EA Engineering. Science. and Technology. Inc.)

Peltier. W.H. and C.I. Weber. 1985. Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms. EPA-600/4-85-013. U.S. Environmental Protection Agency. Cincinnati. Ohio.

U.S. EPA. 1989. Toxic Substances Control Act (TSCA); Good Laboratory Practice Standards. Title 40 CFR Part 792. Fed. Regist. 54(158): 34034-34074.

6.2 Test Specifications

Test organism:	Fathead minnow (Pimephales promelas)
Temperature:	20±2 C
Fish age:	Dependent on test guidelines being followed. but in general. <90 days old
Fish length:	The largest fish is not more than 50 percent longer than the smallest fish
Loading ratio:	In general. test containers may not contain greater than 0.8 g/L biomass
Aeration:	None. unless dissolved oxygen falls below 60 percent saturation in first 48 hours of the test or below 40 percent saturation thereafter
Light quality:	Wide-spectrum fluorescent light
Light intensity:	50-100 f.c.
Photoperiod:	16-hour light. 8-hour dark
Dilution water:	Dechlorinated municipal tap water. reconstituted fresh water. or appropriate receiving water
Test containers:	20-cm glass culture bowl

Test volume:	1 L/replicate
No. of concentrations:	Minimum of five test concentrations and a control
No. of replicates:	2
Test animals per container:	10 (if loading is exceeded, more replicates or larger test containers may be used)
Feeding regime:	Animals are not fed during tests unless fish are too small to survive 96 hours without feeding. Feeding is terminated 48 hours before test initiation in the lot from which organisms are obtained
Test type and duration:	Rangefinding—24-96 hours Definitive—24-96 hours
Endpoints:	Mortality and/or Immobilization Immobilization—defined as cessation of movement except for minor activity of appendages Mortality—defined as cessation of opercular movement and inability to respond to external stimuli (gentle prodding with glass rod)
Test acceptability:	90 percent or greater survival in the control solution

ATTACHMENT II

DATA SHEETS

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No.: 70003.10
Test Article: ~~Effluent #009~~ RK
Client: Lackawanna
QC Test No.: SA 08-2092-898
Sample No.: NA
Dilution No.: Dechlor

TEST: Static, Flow-through, Renewal
Test Container: 4" cutting bowl
Test Volume: 200 mls
Test Duration: 48 hrs

TEST ORGANISM:
Common Name: Water flea
Scientific Name: D. magna
Lot No.: NA
Source: EA
Acclimation: NA or Age 24 ~~days~~

Beginning Date: 8 20 92 Time: 1625
Ending Date: 8.22.92 Time: 1607

DECO SOLUTIONS

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppt) NA 0	24	48	72	96	OTHER 0	24	48	72	96
Lab Control	A	10	10	10			19.6	19.7				8.1	8.9				7.7	7.6				221	213									
	B	10	~~10~~	10																												
			10																													
Instrument Number							90	97				2	2				10	97				90	97									
Correction Factor							+.2	NA				K15	8.6				7.68	7.40				0 / 1.48	7.41									
Time		1629	1710	1607			1600	1545				8.8 1545					1600	1545				1554	1515									
Investigator		KC	CW	CH			CAG	KK				CAG	KK				CAG	KK				CAG	KK									

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No.: 76003.10
Test Article: Effluent #223
Client: Lackawanna
QC Test No.: SR 08-20 92-898
Sample No.: A12-702
Dilution No.: A12-701

TEST: Static, Flow-through, (Renewal)
Test Container: 4" culture bowl
Test Volume: 200 mls
Test Duration: 48 hrs

TEST ORGANISM:
Common Name: Water flea
Scientific Name: D. magna
Lot No.: NA
Source: EA
Acclimation: NA or Age <24 hours

Beginning Date: 8/20/92 Time: 1625
Ending Date: 8/22/92 Time: 1607

DECO SOLUTIONS

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppt) NA 0	24	48	72	96	OTHER 0	24	48	72	96
Control	A	10	10	10			21.0	19.3				8.3	9.3				8.1	7.8				351	355								
	B	10	10	10																											
6.25	A	10	10	10			20.9	19.2				8.3	9.3				8.2	7.9				343	318								
	B	10	10	10																											
12.5	A	10	10	10			21.0	19.3				8.3	9.3				8.2	7.9				340	342								
	B	10	10	10																											
25	A	10	10	10			20.8	19.3				8.3	9.2				8.2	7.9				331	329								
	B	10	10	10																											
50	A	10	10	10			20.8	19.4				8.4	9.2				8.2	7.9				342	304								
	B	10	10	10																											
100	A	10	10	10			19.7	19.5				8.8	9.2				8.2	8.0				262	252								
	B	10	10	10																											
Instrument Number							10	97				2	2				10	97				10	97								
Correction Factor							1.3	NA				1.15	1.10				7/10	7/10				9/9.5	9/9.5								
Time		1639	1110	1607			1610	1525				8.8	1525				1600	1525				1553	1530								
Investigator		KC	JK	CH			CAL	KL				CAL	KL				CAL	KL				CAL	KL								

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No.: 70023.10
Test Article: NA
Client: Lackawanna
QC Test No.: 92-08-20-92-898
Sample No.: NA
Dilution No.: Dechlor

TEST: Static, Flow-through (Renewal)
Test Container: 1" culture bowl
Test Volume: 200 mls
Test Duration: 48 hrs

TEST ORGANISM:
Common Name: Water flea
Scientific Name: D. magna
Lot No.: NA
Source: EPA
Acclimation: NA or Age 24-~~days~~ hrs

Beginning Date: 8.20.92 Time: 1625
Ending Date: 8.22.92 Time: 1607

OLD SOLUTIONS

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppt) .0	24	48	72	96	OTHER 0	24	48	72	96
lab control	A							19.9	19.4				8.3					8.2	8.0				230	220							
	B													8.7																	
Instrument Number								90	97				2	2				90	97				90	97							
Correction Factor								NA	NA				8.6	8.6				7/10	7/10				9/1013	9/1013							
Time								1715	1558				175	1610				1715	1555				1720	1600							
Investigator								RJH KK	KW				RJH KK	CH				RJH KK	KW				KK	KW							

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No.: 7000 3.10
Test Article: Effluent # 223
Client: Lackawanna
QC Test No.: SR-08-20-92-898
Sample No.: A12-702
Dilution No.: A12-701

TEST: Static, Flow-through, (Renewal)
Test Container: 4" culture bowl
Test Volume: 200 mls
Test Duration: 48 hrs

TEST ORGANISM:
Common Name: Water flea
Scientific Name: Daphnia
Lot No.: NA
Source: EA
Acclimation: MA or Age 24 Hours old

Beginning Date: 8.20.92 Time: 1625
Ending Date: 8.22.92 Time: 1607

OLD SOLUTIONS

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppl) 0	24	48	72	96	OTHER 0	24	48	72	96
Control	A							19.8	19.8			8.3		8.5				8.3	8.2				343	344							
	B																														
6.25	A							19.9	19.9			8.3		8.5				8.3	8.2				341	349							
	B																														
12.5	A							19.2				8.3		8.6				8.3	8.2				325	352							
	B																														
25	A							19.1	19.4			8.3		8.7				8.3	8.2				325	337							
	B																														
50	A							19.5				8.3		8.6				8.3	8.3				311							
	B																														
100	A							19.9	19.6			8.3		8.6				8.3	8.3				267	264							
	B																														
Instrument Number								90	97			2		2				90	97				90	97							
Correction Factor								NA	NA			8.6		8.6				7.0	7.0				7.43	7.43							
Time								1715	1555			1725		1610				1725	1555				1720	1600							
Investigator																															

AQUATIC TOXICOLOGY LABORATORY BENCH SHEET

Project No.: 70003.10
Client: Lackawanna
Test No.: SP-08-20-92-898

TEST SET-UP

TEST INITIATION

Date/Time	Initials	Activity
1520	CRG	Dilutions made
↓	EAC	Test Vessels Filled
1625	LS	Transferred Organisms
1639	KC	Head Counts

TEST CONCENTRATION SERIES

Test Conc. (% or mg/l)	Volume Test Material (ml)	Final Volume
LabControl	0 mls	400 mls
Control	0 mls	400 mls
6.25	25	↓
12.5	50	
25	100	
50	200	
100	400 ↓	↓

Comments:

INTERMEDIATE DILUTION PREPARATION AND FEEDING

DILUTION PREPARATION

Day	Time	Initials	Sample/Diluent
0	8-20-92 1520	CRG	AT2-702 / AT2-701
1	1515	KK	8-21-92 AT2-704 / AT2-706
2	NA		
3	↓		
4			
5			
6			

FEEDING

Food: NA

Day	Time Initials	Time Initials	Time Initials	Amt.	Amt.	Amt.
0	NA					
1	↓					
2						
3						
4						
5						
6	↓					

AQUATIC TOXICOLOGY BENCH SHEET

Project No.: 70003.10
Client: Lackawanna
QC Test No.: 92-08-20-92-898

Date/Time	Activity	Investigator
8/20/92 1625	Organisms are getting entangled in debris of River effluent in Control replicates. (also in other replicates, except Lab controls)	

9/15/92 -- Discussions with investigator indicated that the debris was from the river water sample, used as the dilution water. The only treatments that did not contain debris was 100% effluent treatment and lab controls. No mortality or other inhibitory effects were observed due to the effluent or dilution water. Organisms were able to move through the debris.
WLG

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No.: 70DD3.110 TEST: Static, Flow-through, (Renewal) TEST ORGANISM: Beginning Date: 8-20-92 Time: 1600

Test Article: NA Test Container: 8" culture bowl Common Name: fathead minnow Ending Date: 8-22-92 Time: 1605

Client: Lackawanna Test Volume: 500 mls Scientific Name: P. promelas

QC Test No.: SP-08-20-92-897 Test Duration: 48 hrs Lot No.: LH 2-4-12

Sample No.: NA Source: EA culture

Dilution No.: Dechlor Acclimation: 11 or Age 11 days

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppt) NA 0	24	48	72	96	OTHER 0	24	48	72	96
lab control	A	10	10	10			19.6	19.7				8.7	8.9				7.7	7.6				221	213								
	B	10	10	10																											
Instrument Number							90	97				2	2				90	97				90	97								
Correction Factor							+.3	NA				8.8	8.6				7/10	7/10				0/143	7/143								
Time		1654	1615	1605			1600	1545				1615	1545				1600	1545				1555	1545								
Investigator		LL	BH	CH			CAC	KK				CAC	KK				CAC	KK				CAC	KK								

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No.: 70003.10 TEST: Static, Flow-through, Renewal
Test Article: Effluent + 223 Test Container: 8" Culture bowl
Client: Lackawanna Test Volume: 500 mls
QC Test No.: SR-08-20-92-897 Test Duration: 48 hrs
Sample No.: AT2-702
Dilution No.: AT2-701

TEST ORGANISM:
Common Name: Fathead Minnow
Scientific Name: P. promelas
Lot No.: FH 2-6/1-10
Source: EA Culture
Acclimation: 11 or Age 11 days

Beginning Date: 8-20-92 Time: 1610
Ending Date: 8-2292 Time: 1605

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) —Salinity (ppt)— NA 0	24	48	72	96	OTHER 0	24	48	72	96
Control	A	10	10	10			19.9	19.3				8.3	9.3				8.1	7.8				351	355								
	B	10	10	10																											
6.25	A	10	10	10			20.9	19.2				8.3	9.3				8.2	7.9				343	348								
~~12.5~~ KR	B	10	10	10																											
12.5	A	10	9	9			21.0	19.3				8.3	9.3				8.2	7.9				340	342								
	B	10	10	10																											
25	A	10	10	9			20.8	19.3				8.3	9.2				8.2	7.9				331	329								
	B	10	10	10																											
50	A	10	10	10			20.8	19.4				8.4	9.2				8.2	7.9				302	304								
	B	10	10	10																											
100	A	10	10	10			19.7	19.5				8.8	9.2				8.2	8.0				262	252								
	B	10	10	10																											
Instrument Number							10	97				2	2				90	97				90	97								
Correction Factor							+3	NA				K.15	8.6				7/0	7/0				9/413	9/413								
Time		1605	1615	1605			1600	1535				1500	1535				1600	1525				1555	1530								
Investigator		KC	RSH	CH			CH	KK				CH	KK				CH	KK				KC	KK								

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No.: 70003.10
Test Article: NA
Client: Lackawanna
QC Test No.: 9R 08-20-92-897
Sample No.: NA
Dilution No.: Dechlor

TEST: Static, Flow-through, (Renewal)
Test Container: 8" culture bowl
Test Volume: 500 mls
Test Duration: 48 hrs

TEST ORGANISM:
Common Name: Fathead Minnow
Scientific Name: P. promelas
Lot No.: FA-2788/9-10
Source: EA
Acclimation: 11 or Age 11 days

Beginning Date: 8-20-92 Time: 1640
Ending Date: 8-22-92 Time: 1605

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppt) 0	24	48	72	96	OTHER 0	24	48	72	96
lab control	A							19.9	19.7				8.7	8.6				7.5	7.9				221	222							
	B																														
Instrument Number								97	97				2	2				97	97				97	97							
Correction Factor								NA	NA				8.6	8.6				7.10	7.0				9/443	9/443							
Time								1605	1545				1605	1519				1605	1545				1610	1547							
Investigator								CC	KK				KK	KK				KK	KK				KK	KK							

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No.: 70003.10
Test Article: Effluent 223
Client: Lackawanna
QC Test No.: SR-08-2092-892
Sample No.: AT2-702
Dilution No.: AT2-701

TEST: Static, Flow-through, (Renewal)
Test Container: 8" Culture bowl
Test Volume: 500 mls
Test Duration: 48 hrs

TEST ORGANISM:
Common Name: Fathead Minnows
Scientific Name: P. promelas
Lot No.: FH-2-8/9-10
Source: EA
Acclimation: 11 or Age 11 days

Beginning Date: 8-20-92 Time: 1640
Ending Date: 8-22-92 Time: 1605

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppt) 0	24	48	72	96	OTHER 0	24	48	72	96
Control	A							19.9	19.6				8.4	8.5				7.8	8.1				333	350							
	B																														
6.25	A							19.6	19.6				8.5	8.5				7.9	8.2				331	354							
	B																														
12.5	A							19.8	19.2				8.4	8.6				7.9	8.2				323	314							
	B																														
25	A							19.6	19.4				8.5	8.5				7.9	8.2				314	345							
	B																														
50	A							19.6	19.3				8.6	8.6				7.9	8.2				292	334							
	B																														
100	A							19.4	19.0				8.6	8.8				7.9	8.2				252	266							
	B																														
Instrument Number								97	97				8	8				97	97				97	97							
Correction Factor								NA	NA				8.6	8.6				7.10	7.10				9/413	9/413							
Time								1605	1545				1605	1549				1605	1545				1610	1547							
Investigator								KK	KK				KK	KK				KK	KK				KK	KK							

AQUATIC TOXICOLOGY LABORATORY BENCH SHEET

Project No.: 70003.10
Client: Lackawanna
Test No.: ~~82820-92-897~~

TEST SET-UP

TEST INITIATION

Date/Time	Initials	Activity
1520	CRL	Dilutions made / Test Vessels Filled
1640	CRL	Transferred Organisms
1650	KC	Head Counts

TEST CONCENTRATION SERIES

Test Conc. (% or mg/l)	Volume Test Material (ml)	Final Volume
Lab control	0 ml	1000 ml
Control	0 ml	1000 ml
6.25	625	↓
12.5	125	
25	250	
50	500	
100	1000	

Comments:

INTERMEDIATE DILUTION PREPARATION AND FEEDING

DILUTION PREPARATION

Day	Time	Initials	Sample/Diluent
0	1520	CRL	AT2-702 / AT2-701
1	1515-92	KK 8-21-92	AT2-704 / AT2-706
2	NA		
3	↓		
4			
5			
6			

FEEDING

Food: NA

Day	Time Initials	Time Initials	Time Initials	Amt.	Amt.	Amt.
0	NA					
1	↓					
2						
3						
4						
5						
6						

AQUATIC TOXICOLOGY BENCH SHEET

Project No.: 70003.10
Client: Lackawanna
QC Test No.: SR-08-20-92-897

Date/Time	Activity	Investigator
8-21-92 /	AT2-705 DOi 9.5	DOf 9.2 (102%)
	AT2-706 11.6	9.2 (102%)

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No.: 70003.10 TEST: Static, Flow-through, Renewal TEST ORGANISM:
Test Article: NA Test Container: 4" culture box Common Name: Water flea
Client: Lackawanna Test Volume: 200 mls Scientific Name: D. magna
QC Test No.: 3R-08-2092-FF Test Duration: 48 hrs Lot No.: NA
Sample No.: NA Source: EA Pax Lab
Dilution No.: DECHLOR Acclimation: NA or Age 24 hrs NEW SOLUTIONS

Beginning Date: 8-20-92 Time: 1630
Ending Date: 8-22-92 Time: 1617

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppt) N/A 0	24	48	72	96	OTHER 0	24	48	72	96
lab control	A	10	10	10			19.6	19.7				8.7	8.9				7.8	7.6				221	213								
	B	10	10	10																											
Instrument Number							90	97				2	2				90	97				90	97								
Correction Factor							1.3	NA				8.8	8.4				7.80	7.0				9/443	9/413								
Time		1639	1639	1617			1609	1515				1613	1515				1609	1515				1609	1515								
Investigator		LS	KK	KK			ALC	KK				ALC	KK				ALC	KK				ALC	KK								

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No.: 76003.10 TEST: Static, Flow-through, Renewal TEST ORGANISM:
Test Article: Effluents #216/217 Test Container: 4" culture bowl Common Name: water flea
Client: Lackawanna Test Volume: 200 mls Scientific Name: D. magna
QC Test No.: SR-08-20-92-1900 Test Duration: 48 hrs Lot No.: NA
Sample No.: AT2-703 Source: TM Tox Lab
Dilution No.: AT2-701 Acclimation: NA or Age 24 hours NEW SOLUTIONS.

Beginning Date: 8-20-92 Time: 1630
Ending Date: 8-22-92 Time: 1617

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) –Salinity (ppt)– NA 0	24	48	72	96	OTHER 0	24	48	72	96
Control	A	10	10	10			20.9	19.5				8.2	9.3				6.1	7.9				344	351								
	B	10	10	10																											
6.25	A	10	10	10			20.9	19.4				8.0	9.3				6.1	7.9				354	356								
	B	10	10	10																											
12.5	A	10	10	10			20.9	19.4				8.3	9.2				6.1	7.9				361	361								
	B	10	10	10																											
25	A	10	10	10			20.7	19.4				8.3	9.2				6.1	7.9				372	381								
	B	10	10	10																											
50	A	10	10	10			20.4	19.4				8.3	9.1				6.1	7.9				392	382								
	B	10	10	10																											
100	A	10	10	10			20.0	19.4				8.7	9.2				6.2	7.8				417	413								
	B	10	10	10																											
Instrument Number							90	97				2	2				90	97				90	97								
Correction Factor							+.3	NA				8.8	8.6				7.0	7.0				4/413	4/413								
Time		1639	1640	1647			1529	1525				1617	1535				1617	1535				1530	1530								
Investigator		CS	KK	CH			CLC	KK				CLC	KK				CLC	KK				CLC	KK								

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No.: 70003.10 TEST: Static, Flow-through, (Renewal) TEST ORGANISM:
Test Article: NA Test Container: 4" Culture bowl Common Name: Water flea
Client: Lackawanna Test Volume: 200 mls Scientific Name: D. magna
QC Test No.: SR-08-20-92-0900 Test Duration: 48 hrs Lot No.: NA
Sample No.: NA Source: RA
Dilution No.: Deckbor Acclimation: NA or Age 4-24 days

Beginning Date: 8-20-92 Time: 1630
Ending Date: 8-22-92 Time: 1617

OLD SOLUTIONS

Con. or %	Test Container No.	Number of Live Organisms					ALL TESTS: Temperature (C)					ALL TESTS: Dissolved Oxygen (mg/liter)					ALL TESTS: pH					ALL TESTS: Conductivity (µS°) Salinity (ppt)					OTHER				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Lab	A							20.3	19.9				8.2					8.0	7.9				263	215							
	B													8.5																	
Instrument Number								90	97				2	2				90	97			90	90	97							
Correction Factor								NA	NA				8.6	8.6				7.0	7.0				1.143	1.413							
Time								1715	1603				1715	1628				1715	1603				1720	1605							
Investigator								PSH KK	KK				PSH KK	CH				PSH KK	KK				PSH KK	KK							

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No.: 70003.10
Test Article: Effluents
Client: Lackawanna
QC Test No.: 92-08-20 92-902
Sample No.: AI2-703
Dilution No.: AI2-701

TEST: Static, Flow-through, (Renewal)
Test Container: 4" culture bowls
Test Volume: 200 mls
Test Duration: 48 hrs

TEST ORGANISM:
Common Name: Water Fleas
Scientific Name: D. magna
Lot No.: NA EA
Source:
Acclimation: NA or Age 24 hrs days

Beginning Date: 8.20.92 Time: 1630
Ending Date: 8.22.92 Time: 1617

OLD SOLUTIONS

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppt) 0	24	48	72	96	OTHER 0	24	48	72	96
Control	A							20.4	19.8			8.2						8.3	8.1			3/1	343								
	B												8.4																		
6.25	A							20.4	19.9			8.2						8.3	8.2			353	366								
	B												8.4																		
12.5	A								19.9										8.2				362								
	B												8.4																		
25	A							19.9	19.8			8.2						8.3	8.2			365	378								
	B												8.4																		
50	A								19.9										8.2				392								
	B												8.5																		
100	A							19.9	19.6			8.3						8.2	8.2			439	424								
	B												8.5																		
Instrument Number								90	97			0	2					90	97			90	97								
Correction Factor								NA	NA			8.6	8.6					1/10	1/10			1/413	1/413								
Time								1715	1603			1715	1620					1715	1603			1720	1605								
Investigator								KK PSH	KK			PSH KK	CH					PSH KK	KK			KK PSH	KK								

AQUATIC TOXICOLOGY LABORATORY BENCH SHEET

Project No.: 70003.10
Client: Lackawanna
Test No.: SR-08-20-92-900

TEST SET-UP

TEST INITIATION

Date/Time	Initials	Activity
8-20-92 1550	CRG	Dilutions made
		Test Vessels Filled
8/20/92 1630	KC	Transferred Organisms
8/20/92 1639	LS	Head Counts

TEST CONCENTRATION SERIES

Test Conc. (% or mg/l)	Volume Test Material (ml)	Final Volume
Lab Control	0 mls	400 mls
Control	0 mls	400 mls
6.25	25	
12.5	50	
25	100	
50	200	
100	400	

Comments:

INTERMEDIATE DILUTION PREPARATION AND FEEDING

DILUTION PREPARATION

Day	Time	Initials	Sample/Diluent
0	8/20/92 1550	CRG	AT2-703 / AT2-701
1	KK 8-21-92	1515	AT2-705 / AT2-706
2			NA
3			
4			
5			
6			

FEEDING

Food: NA

Day	Time Initials	Time Initials	Time Initials	Amt.	Amt.	Amt.
0	NA					
1						
2						
3						
4						
5						
6						

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No.: 70003.10 TEST: Static, Flow-through, (Renewal) TEST ORGANISM: Beginning Date: 8.20.92 Time: 1642

Test Article: ~~Effluent~~ Stream Water Test Container: 8" culture bowl Common Name: Fathead Minnow Ending Date: 8.22.92 Time: 1600

Client: Lackawanna Test Volume: 500 mls Scientific Name: Pimephales

QC Test No.: 92-08-20-92-899 Test Duration: 48 hrs Lot No.: FH 0-8 8/10

Sample No.: NA Source: EA Culture

Dilution No.: Dechlor Acclimation: 11 or Age 11 days

							ALL TESTS																				OTHER				
		Number of Live Organisms					Temperature (C)					Dissolved Oxygen (mg/liter)					pH					Conductivity (µS°) ~~Salinity (ppt)~~ NM									
Con. or %	Test Container No.	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Lab Control	A	10	10	10			19.6	19.7	19.			8.1	8.9				7.9	7.6				271	213								
	B	10	10	10																											
Instrument Number							90	97				2	2				90	97				90	97								
Correction Factor							+3	NA				8.8	8.6				7/0	7/0				0/NA	7/NA								
Time		1650	1640	1600			1609	1545				1613	1545				1609	1545				1607	1545								
Investigator		DG	BSK	CH			CAL	KK				CAL	KK				CAL	BSK				CAL	KK								

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No.: 70003.10 TEST: Static, Flow-through, (Renewal) TEST ORGANISM: Beginning Date: 8-20-92 Time: 1642
Test Article: Effluents * 2nd 2/7 Test Container: 8" culture bowl Common Name: fathead minnow Ending Date: 8-22-92 Time: 1600
Client: Lackawanna Test Volume: 500 mls Scientific Name: Pimephales
QC Test No.: SR-08-20-92-899 Test Duration: 48 hrs Lot No.: FH 2-16 4-10
Sample No.: A12-703 Source: RA Culture
Dilution No.: A12-701 Acclimation: 11 or Age 11 days

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) ~~Salinity (ppt)~~ NM 0	24	48	72	96	OTHER 0	24	48	72	96
Control	A	10	10	10			20.9	19.5				8.3	9.3				8.1	7.9				346	351								
	B	10	10	10																											
6.25	A	10	10	10			20.9	19.4				8.2	9.3				8.1	7.9				354	350								
	B	10	10	10																											
12.5	A	10	10	10			20.8	19.4				8.3	9.2				8.1	7.9				361	361								
	B	10	10	10																											
25	A	10	10	10			20.7	19.4				8.3	9.2				8.1	7.9				372	371								
	B	10	10	10																											
50	A	10	10	10			20.4	19.4				8.3	9.1				8.1	7.9				390	388								
	B	10	10	10																											
100	A	10	10	10			20.5	19.4				8.7	9.2				8.2	7.8				447	423								
	B	10	10	10																											
Instrument Number							10	97				22	2				10	97				90	97								
Correction Factor							+.3	NA				~~8.8~~	8.6				7/10	7/10				9/1423	9/1413								
Time		KS	KM	1600			1649	1535				1642	1535				1609	1535				1601	1530								
Investigator		DC	RSH	CH			CAC	KK				DAC	KK				CAC	KK				CAC	KK								

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No.: 70003.10
Test Article: NA
Client: Lackawanna
QC Test No.: SR-08-20-92-899
Sample No.: NA
Dilution No.: Dechlor

TEST: Static, Flow-through, (Renewal)
Test Container: 8" culture bowl
Test Volume: 500 mls
Test Duration: 48 hrs

TEST ORGANISM:
Common Name: Fathead minnow
Scientific Name: P. promelas
Lot No.: FM 2-8/9-16
Source: EA
Acclimation: 11 or Age 11 days

Beginning Date: 8-20-92 Time: 1642
Ending Date: 8-22-92 Time: 1600

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppt) 0	24	48	72	96	OTHER 0	24	48	72	96
lab control	4							19.5	19.3				8.5	8.8				7.6	7.9				266	241							
	3																														
Instrument Number								97	97				2	2				97	97				97	97							
Correction Factor								NM	NM				8.6	8.6				7.10	7.10				9/413	9/413							
Time								1555	1557				1600	1600				1595	1531				1557	1540							
Investigator								KK	KK				KK	KK				KK	KK				KK	KK							

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No.: 70003.10 TEST: Static, Flow-through, Renewal TEST ORGANISM: Beginning Date: 8.20.92 Time: 1642
Test Article: Effluents #216/217 Test Container: 8" culture bowl Common Name: Fathead Minnow Ending Date: 8.22.92 Time: 1600
Client: Lackawanna Test Volume: 500 mls Scientific Name: Pimephales
QC Test No.: SR-08-20-92-899 Test Duration: 48 hrs Lot No.: FM-2-8/9-10
Sample No.: AT2-703 Source: EA
Dilution No.: RT ~~Beaker~~ AT2-701 Acclimation: 11 or Age 11 days

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) – Salinity (ppt) 0	24	48	72	96	OTHER 0	24	48	72	96
(Control)	A							19.7	19.5				8.5	8.6				7.8	7.8				374	384							
	B																														
6.25	A							19.4	19.2				8.5	8.7				7.9	8.2				341	364							
	B																														
12.5	A							19.8	19.2				8.3	8.6				7.9	8.2				347	370							
	B																														
25	A							19.8	19.5				8.4	8.6				7.9	8.2				356	377							
	B																														
50	A							19.5	19.4				8.4	8.7				7.9	8.2				313	397							
	B																														
100	A							19.6	19.5				8.5	8.4				7.8	8.1				426	439							
	B																														
Instrument Number								97	97				2					97	97				97	97							
Correction Factor								NA	NA				8.6	8.6				7.10	7.10				1.413	1.413							
Time								1535	1537				1600	1558				1535	1537				1557	1540							
Investigator								KK	KK				KK	KK				KK	KK				KK	KK							

AQUATIC TOXICOLOGY LABORATORY BENCH SHEET

Project No.: 7003.10
Client: Lackawanna
Test No.: SP-08-20-92-899

TEST SET-UP

TEST INITIATION

Date/Time	Initials	Activity
8-20-92 1550	CL	Dilutions made / Test Vessels Filled
1642	CL	Transferred Organisms
1652	DG	Head Counts

TEST CONCENTRATION SERIES

Test Conc. (% or mg/l)	Volume Test Material (ml)	Final Volume
Lab Control	0 ml	1000 mls
Control	0 ml	1000 mls
6.25	62.5	↓
12.5	125	
25	250	
50	500	
100	1000	↓

Comments:

INTERMEDIATE DILUTION PREPARATION AND FEEDING

DILUTION PREPARATION

Day	Time	Initials	Sample/Diluent
0	1550	CL	AT2-703 / AT2-701
1	1515	KK	8-21-92 AT2-705 / AT2-706
2		NA	
3			
4			
5			
6			

FEEDING

Food: NA

Day	Time Initials	Time Initials	Time Initials	Amt.	Amt.	Amt.
0	NA					
1	↓					
2						
3						
4						
5	↓					
6						

HUNTINGDON ANALYTICAL SERVICES - CHAIN-OF-CUSTODY RECORD AND ANALYTICAL REQUEST FORM

Page 1 of 1

Client Name: Empire Soils Investigations, Inc.
Address: 5-5167 South Park Avenue, Hamburg, New York 14075
Client Contact: Jeff Contino
Phone: (716)649-8110
HAS Quote #:
P.O. #:

Project No.: BTA-89-12B
Project/Site Name: BCC-Tox. Test.
HAS Ref. #:
Samplers (Signature): Jeff Contino

Sample I.D.	Date	Time	Comp.	Grab	Sample Location	HAS Seq. #	Matrix	# of Containers	Container Size & Type: ½ Gallon	5 Gallon Carboy	½ Gallon	Analysis Requested/ Remarks: ½ Gallon	5 Gallon Carboy
216/217	8-14-92	1635	X		Composite of 216/217 water		W	2	XX		AT2-703	Acute Tox Test.	—
223	"	1705	X		Composite of 223 water		W	2	XX		AT2-702	" " "	—
Control Water	"	1730		X	Wolfram Creek water		W	1		X	AT2-701	—	Acute Tox. Test.

Thanks
Jeff Contino

Note - Cooler #1 = Composites
Cooler #2 = Control Water

Jeff Contino

Relinquished by:	Date/Time:	Received by:	Relinquished by:	Date/Time:	Received by:
Jeff Contino	8-19-92 1809	[illegible]			
Relinquished by:	Date/Time:	Received by:	Relinquished by:	Date/Time:	Received by:
Relinquished by:	Date/Time:	Received for Lab by: Richard J. Hart II	Date/Time: 8/20/92 1015	Remarks:	

HUNTINGDON ANALYTICAL SERVICES - CHAIN-OF-CUSTODY RECORD AND ANALYTICAL REQUEST FORM — Page 1 of —

Client Name: Empire Soils Investigations, Inc.
Address: 5-5167 South Park Avenue, Hamburg, New York 14075
Client Contact: Jeff Contino
Phone: (716)649-8110
HAS Quote #:
P.O. #:

Project No.: BTA-89-[redacted]
Project/Site Name: BSC-Tox. Test.
HAS Ref. #01-
Samplers (Signature): Jeff Contino

Sample I.D.	Date	Time	Comp.	Grab	Sample Location	HAS Seq. #	Matrix	# of Containers	½ Gallon Amber Glass	1 Gallon Cubitainer	Analysis Requested / Remarks: ½ Gallon	Analysis Requested / Remarks: 1 Gallon
216/217	8-20-92	1708	X		Comp of 216/217 Water		W	2	XX		ATD-705	Acute Tox. Test.
223	"	1735	X		Comp of 223 Water		W	2	XX		ATD-709	" " "
Control Water	"	1620		X	Upstream Creek Water		W	1		X	ATD-706	— / Acute Tox. Test.
						Total # 5						

Note: Cooler #1 - Contains Composite Samples
Cooler #2 - Contains Control Water

Relinquished by:	Date/Time:	Received by:	Relinquished by:	Date/Time:	Received by:
	8-26-92 1815				
Relinquished by:	Date/Time:	Received by:	Relinquished by:	Date/Time:	Received by:
Relinquished by:	Date/Time:	Received for Lab by:	Date/Time: 8-21-92 0940	Remarks:	

ATTACHMENT III

REPORT QUALITY ASSURANCE RECORD

REPORT QUALITY ASSURANCE RECORD

CLIENT Bethlehem Steel Corp. EA REPORT NO. 1140

PROJECT NUMBER 20003.10 TYPE ANALYSIS Acute

AUTHOR Virginia A. Sohn TEST ORGANISMS D. magna & P. promelas

---

REPORT CHECKLIST

QA/QC ITEM	REVIEWER	DATE
1. Samples collected, transported, and received according to study plan requirements.	Virginia A. Sohn	9/3/92
2. Samples prepared and processed according to study plan requirements.	Virginia A. Sohn	9/3/92
3. Data collected using calibrated equipment.	Virginia A. Sohn	9/3/92
4. Calculations checked: - Hand calculations checked	Virginia A. Sohn	9/3/92
- Documented and verified statistical procedure used.	Not applicable	9/3/92
5. Data input/statistical analyses complete and correct.	Richard A. Connelly	9/4/92
6. Reported results and facts checked against original sources.	Richard A. Connelly	9/4/92
7. Data presented in figures and tables correct and in agreement with text.	Richard A. Connelly	9/4/92
8. Results revieved for compliance with study plan requirements.	William J. McAuliffe	9/4/92

	AUTHOR	DATE
9. Commentary reviewed and resolved.	Virginia A. Sohn	4 September 19

10. All study plan and quality assurance/control requirements have been met and the report is approved:

William J. McAuliffe / PROJECT MANAGER — 9 Sept 92 / DATE

Richard A. Connelly / Q.C. OFFICER — 4 September 1992 / DATE

[illegible] / SENIOR TECHNICAL REVIEWER — 4 September 1992 / DATE

RESULTS OF ACUTE TOXICITY TESTS WITH *Daphnia magna* AND *Pimephales promelas* ON SAMPLES FROM BETHLEHEM STEEL CORPORATION LACKAWANNA GALVANIZE PRODUCTS DIVISION (LGPD)

Prepared for:

Bethlehem Steel Corporation

Prepared by:

EA Mid-Atlantic Regional Operations
EA Engineering, Science, and Technology, Inc.
15 Loveton Circle
Sparks, Maryland 21152

November 1992

EA Project 70003.10

Report Number 1182

EA Project 70003.10

RESULTS OF ACUTE TOXICITY TESTS WITH *Daphnia magna* AND *Pimephales promelas* ON SAMPLES FROM BETHLEHEM STEEL CORPORATION LACKAWANNA GALVANIZE PRODUCTS DIVISION (LGPD)

Prepared for:

Bethlehem Steel Corporation

Prepared by:

EA Mid-Atlantic Regional Operations
EA Engineering, Science, and Technology, Inc.
15 Loveton Circle
Sparks, Maryland 21152

William L. Goodfellow, Jr. — Date
Project Manager

Mary A.D. Kotulak — 11 November 1992
Mary A.D. Kotulak — Date
Associate Scientist

November 1992

1. INTRODUCTION

At the request of Bethlehem Steel Corporation, EA Engineering, Science, and Technology performed 48-hour daily renewal acute toxicity tests on samples from the Lackawanna Galvanize Products Division (LGPD). *Daphnia magna* (water flea) and *Pimephales promelas* (fathead minnow) were used as the test species. The tests were conducted on 24-hour composite samples from 1) Outfall 223 and 2) Outfalls 216 and 217. The Outfalls 216/217 sample was a flow proportioned composite that was prepared by Empire Soils Investigations, Inc. Both species were exposed to 100, 50, 25, 12.5, and 6.25 percent of each effluent sample diluted with upstream creek water, and a dilution water control. The objective of the study was to determine the acute toxicity of the effluent samples expressed as the 48-hour median lethal concentration (LC50).

Sample collection and receipt data, together with initial water quality taken on the effluent samples, are reported in the summary of sample/test information. The summary of information, which includes time of test initiation and termination, test organism source and age, test results, water quality and reference toxicant data, are found on pages 3 through 10. Sample collection and initial water quality data are reported in Table 1. Test protocols, copies of raw data sheets, and the Report Quality Assurance Record are included in Attachments I, II, and III, respectively.

RESULTS

The results of the acute toxicity tests performed for Bethlehem Steel Corporation indicate that the samples from the Lackawanna Galvanize Products Division (LGPD) were not acutely toxic to either test species. After 48 hours of exposure to all effluent concentrations, there was 100 percent survival of *D. magna* and a minimum of 95 percent survival of *P. promelas*. Control survival was 100 percent in all tests. The 48-hour LC50 values for the sample from Outfall 223, and for the composite of Outfalls 216 and 217, were > 100 percent effluent for both *D. magna* and *P. promelas*.

SUMMARY OF SAMPLE/TEST INFORMATION

Test: 48-hour *Daphnia magna* daily renewal acute test

Client Name: **Bethlehem Steel Corporation**
Lackawanna Galvanize Products Division

Test Procedure: EA Protocol ATS-SAI-DS-04
Acute 48-hour LC50 assay with *Daphnia* sp.

Sample Description: **Outfall 223**
EA Accession Numbers: **AT2-877, AT2-883**

EA QC Test Number: **SR-10-29-92-1125**
Test initiation time and date: 1650, 29 October 1992
Test completion time and date: 1640, 31 October 1992

Dilution Water Description: **Upstream creek water**
EA Accession Numbers: **AT2-878, AT2-884**

Organism Lot Information

Lot Number: NA
Source: EA's Culture Facility, Sparks, Maryland
Age: <24 hours

Reference Toxicant (SDS) Test Information

Reference Toxicant: Sodium dodecyl sulfate
EA QC Test Number: RT-10-05-92-1046
Dilution Water: Dechlorinated tap water

Results:
24-hour LC50: 30.4 mg/L
Laboratory control chart acceptability range for 24-hour LC50:
19.4 - 55.5 mg/L

SUMMARY OF SELECTED TEST DATA (Cont.)

Test Organism: *D. magna*
EA QC Test Number: **SR-10-29-92-1125**
Sample Description: **Outfall 223**
Sample Numbers: **AT2-877, AT2-883**
Dilution Water Description: **Upstream creek water**
Sample Numbers: **AT2-878, AT2-884**

Test Concentration (percent effluent)	Percent Survival at 48 Hours
Dilution Water Control	100
6.25	100
12.5	100
25	100
50	100
100	100
48-hour LC50 value: (percent effluent)	> 100

Selected Water Quality	Range
Temperature (C)	19.1 - 20.9
pH	8.0 - 8.3
Dissolved oxygen (mg/L)	8.2 - 9.1
Conductivity (μS°)	246 - 441

SUMMARY OF SAMPLE/TEST INFORMATION

Test: 48-hour *Pimephales promelas* daily renewal acute test

Client Name: **Bethlehem Steel Corporation**
Lackawanna Galvanize Products Division

Test Procedure: EA Protocol ATS-SAF-FM-04
Acute assay with fathead minnows (*Pimephales promelas*)

Sample Description: **Outfall 223**
EA Accession Numbers: **AT2-877, AT2-883**

EA QC Test Number: **SR-10-29-92-1126**
Test initiation time and date: 1845, 29 October 1992
Test completion time and date: 1727, 31 October 1992

Dilution Water Description: **Upstream creek water**
EA Accession Numbers: **AT2-878, AT2-884**

Organism Lot Information

Lot Number: FH 2-10/15-16
Source: EA's Culture Facility, Sparks, Maryland
Age: 13-14 days (hatched within a 24-hour window)

Reference Toxicant (SDS) Test Information

Reference Toxicant: Sodium dodecyl sulfate
EA QC Test Number: RT-10-13-92-1065
Dilution Water: Dechlorinated tap water

Results:
24-hour LC50: 28.3 mg/L
Laboratory control chart acceptability range for 24-hour LC50:
21.8 - 38.4 mg/L

SUMMARY OF SELECTED TEST DATA (Cont.)

Test Organism: *P. promelas*
EA QC Test Number: **SR-10-29-92-1126**
Sample Description: **Outfall 223**
Sample Numbers: **AT2-877, AT2-883**
Dilution Water Description: **Upstream creek water**
Sample Numbers: **AT2-878, AT2-884**

Test Concentration (percent effluent)	Percent Survival at 48 Hours
Diltion Water Control	100
6.25	100
12.5	95
25	95
50	100
100	100
48-Hour LC50 value: (percent effluent)	> 100

Selected Water Quality	Range
Temperature (C)	19.2 - 20.6
pH	8.1 - 8.4
Dissolved oxygen (mg/L)	8.4 - 9.2
Conductivity (μS°)	298 - 458

SUMMARY OF SAMPLE/TEST INFORMATION

Test: 48-hour *Daphnia magna* daily renewal acute test

Client Name: **Bethlehem Steel Corporation**
Lackawanna Galvanize Products Division

Test Procedure: EA Protocol ATS-SAI-DS-04
Acute 48-hour LC50 assay with *Daphnia* sp.

Sample Description: **Outfall 216/217 composited**
EA Accession Numbers: **AT2-876, AT2-882**

EA QC Test Number: **SR-10-29-92-1123**
Test initiation time and date: 1640, 29 October 1992
Test completion time and date: 1640, 31 October 1992

Dilution Water Description: **Upstream creek water**
EA Accession Numbers: **AT2-878, AT2-884**

Organism Lot Information

Lot Number: NA
Source: EA's Culture Facility, Sparks, Maryland
Age: <24 hours

Reference Toxicant (SDS) Test Information

Reference Toxicant: Sodium dodecyl sulfate
EA QC Test Number: RT-10-05-92-1046
Dilution Water: Dechlorinated tap water

Results:
24-hour LC50: 30.4 mg/L
Laboratory control chart acceptability range for 24-hour LC50:
19.4 - 55.5 mg/L

SUMMARY OF SELECTED TEST DATA (Cont.)

Test Organism: *D. magna*
EA QC Test Number: **SR-10-29-92-1123**
Sample Description: **Outfalls 216/217 composited**
Sample Numbers: **AT2-876, AT2-882**
Dilution Water Description: **Upstream creek water**
Sample Numbers: **AT2-878, AT2-884**

Test Concentration (percent effluent)	Percent Survival at 48 Hours
Dilution Water Control	100
6.25	100
12.5	100
25	100
50	100
100	100
48-Hour LC50 value: (percent effluent)	>100

Selected Water Quality	Range
Temperature (C)	19.2 - 21.4[a]
pH	8.0 - 8.3
Dissolved oxygen (mg/L)	8.5 - 9.0
Conductivity (μS°)	395 - 470

(a) Temperature was greater than the target range of 20±1 C at 24 hours.

SUMMARY OF SAMPLE/TEST INFORMATION

Test: 48-hour *Pimephales promelas* daily renewal acute test

Client Name: **Bethlehem Steel Corporation**
Lackawanna Galvanize Products Division

Test Procedure: EA Protocol ATS-SAF-FM-04
Acute assay with fathead minnows (*Pimephales promelas*)

Sample Description: **Outfall 216/217 composited**
EA Accession Numbers: **AT2-876, AT2-882**

EA QC Test Number: **SR-10-29-92-1124**
Test initiation time and date: 1830, 29 October 1992
Test completion time and date: 1728, 31 October 1992

Dilution Water Description: **Upstream creek water**
EA Accession Numbers: **AT2-878, AT2-884**

Organism Lot Information

Lot Number: FH 2-10/15-16
Source: EA's Culture Facility, Sparks, Maryland
Age: 13-14 days (hatched within a 24-hour window)

Reference Toxicant (SDS) Test Information

Reference Toxicant: Sodium dodecyl sulfate
EA QC Test Number: RT-10-13-92-1065
Dilution Water: Dechlorinated tap water

Results:
24-hour LC50: 28.3 mg/L
Laboratory control chart acceptability range for 24-hour LC50:
21.8 - 38.4 mg/L

SUMMARY OF SELECTED TEST DATA (Cont.)

Test Organism: ***P. promelas***
EA QC Test Number: **SR-10-29-92-1124**
Sample Description: **Outfall 216/217 composited**
Sample Numbers: **AT2-876, AT2-882**
Dilution Water Description: **Upstream creek water**
Sample Numbers: **AT2-878, AT2-884**

Test Concentration (percent effluent)	Percent Survival at 48 Hours
Dilution Water Control	100
6.25	100
12.5	100
25	95
50	100
100	100
48-Hour LC50 value: (percent effluent)	>100

Selected Water Quality	Range
Temperature (C)	19.1 - 21.0
pH	7.8 - 8.4
Dissolved oxygen (mg/L)	8.2 - 9.2
Conductivity (μS°)	348 - 503

TABLE 1 SAMPLE COLLECTION AND INITIAL WATER QUALITY DATA FOR SAMPLES FROM BETHLEHEM STEEL'S LACKAWANNA FACILITY

EA Accession Number	Sample Collection	Sample Receipt	Alkalinity (mg/L $CaCO_3$)	Hardness (mg/L $CaCO_3$)
UPSTREAM CREEK WATER:				
AT2-878	0958, 28 OCT 92	1030, 29 OCT 92	106	184
AT2-884	1314, 29 OCT 92	1040, 30 OCT 92	110	180
OUTFALL 223:				
AT2-877	1010, 27 OCT 92 to 1142, 28 OCT 92	1030, 29 OCT 92	92	128
AT2-883	1128, 28 OCT 92 to 1258, 29 OCT	1040, 30 OCT 92	90	120
OUTFALL 216/217 - COMPOSITED:				
AT2-876	1010, 27 OCT 92 to 1107, 28 OCT 92	1030, 29 OCT 92	78	192
AT2-882	1117, 28 OCT 92 to 1200, 29 OCT 92	1040, 30 OCT 92	86	164

ATTACHMENT I

PROTOCOLS

3. ACUTE 48-HOUR LC50 ASSAY WITH *Daphnia* sp.

1. TEST OBJECTIVE

To assess the toxicity of a test material to *Daphnia* and determine the LC50 or EC50 using mortality or immobilization, respectively, as the test end points.

2. TEST ARTICLE

2.1 Description/Identification

Unless otherwise specified, the test material is supplied by the client. Adequate chemical specifications with special reference to hazardous properties and storage conditions is also supplied by the client.

2.2 Methods of Synthesis

In most cases the test article is an effluent sample. Information on the methods of synthesis, stability, and composition or other characteristics which define the test article are on file with the client.

3. EXPERIMENTAL DESIGN

3.1 Test Organisms

A species of *Daphnia* (water fleas), as determined by project needs, is the test organism.

3.2 Source

Daphnia used for acute toxicity tests are obtained from stock cultures maintained in EA's Aquatic Toxicology Culturing Facility.

3.3 Culturing and Holding Conditions

Daphnia cultures are maintained at 20±2 C and a 16-hour light, 8-hour dark photoperiod cycle in an environmentally controlled laboratory. Cultures are maintained in 18.9-L all glass aquaria or other appropriate container and are fed algae (*Selenastrum capricornutum*) and a trout chow/yeast/cereal leaves suspension in the manner described in Peltier and Weber (1985). New cultures are initiated on a routine basis to ensure healthy, productive populations. Organisms from cultures producing ephippia are not used for toxicity tests.

3.4 Age of Test Organisms at Test Initiation

Neonates of known age (i.e., less than 24-hours old) are obtained for testing by segregating adult females from the mass cultures on the day before a test is initiated. On the day of the test, neonates are segregated from the parent organisms.

3.5 Dilution Water

The source of dilution water is the City of Baltimore Municipal Water System. Upon entry to the laboratory, the water is passed through a high-capacity, activated-carbon filtration system to remove chlorine and other possible contaminants such as detergents, and hexane-soluble organic materials. This water source has proven safe for aquatic organism toxicity testing as evidenced by maintenance of the multigeneration *Daphnia* and *Pimephales promelas* cultures, with no evident loss of fecundity. If requested, reconstituted fresh water or an appropriate receiving water can be used as the dilution water.

3.6 Test Concentration Series

The test concentration series consists of a minimum of five dilutions and may be determined from a prior screening of the test material (e.g., 1, 3, 10, 30, and 100 percent effluent; or 6.25, 12.5, 25, 50, and 100 percent effluent plus a control).

3.7 Test Concentration Preparation

Test concentrations are prepared with Class A glassware.

3.8 Test Vessels and Test Volume

Test vessels are 400-ml glass beakers or 10-cm culture bowls; the final test volume of each replicate is 200 ml. Depending on the study requirements, other test vessels and test volumes may be used.

3.9 Test Organism Number

Tests are conducted using two replicates per concentration, with ten organisms per container. Neonates are randomly assigned to each replicate test container. More replicates can be added, if appropriate.

3.10 Test Environment

The test vessels are maintained at 20±2 C in an environmentally controlled laboratory with a 16-hour light, 8-hour dark photoperiod.

3.11 Analysis of Test Concentrations for Test Article

If required, test solutions may be analyzed for analytical verification of chemical concentrations. The analytical method and number of analyses are determined after consultation with the client. When chemical analyses are necessary, both nominal and actual measured test solution concentrations are reported.

3.12 Test Observations

Each test day, test organisms are observed to record the number of surviving organisms. The study terminates after completion of the 2-day observation period. The study may be extended, however, at the request of the client.

Each sample and receiving water are analyzed for temperature, conductivity, alkalinity, and hardness. Measurements of water quality taken at test initiation, 24-hours, and test termination include dissolved oxygen, pH, temperature and conductivity from a minimum of one replicate of the control, low, medium, and high dilutions. Aliquots of effluent and receiving water and test solutions may be gently aerated, if necessary (dissolved oxygen less than 40% or greater than 105% saturation). Analytical determinations are conducted according to APHA et al. (1989) and EPA (1979).

3.13 Solution Renewal (When Applicable)

When static-renewal testing is required, the test solutions are renewed at 24-hours. New test solutions are prepared on the day of renewal and dispensed according to Section 3.7. After the new solutions have reached test temperature, the test organisms are transferred from the old test vessels to the new test vessels using a wide bore pipet or glass tube. The number of live organisms is recorded. Caution is given not to stress the test organisms during transfer. After water quality measurements (temperature, pH, dissolved oxygen, and conductivity) are completed, the old solution is discarded.

3.14 Data Analysis

The LC50 or EC50 values and associated statistics are calculated using the probit, moving average, and binomial methods as described by Stephan (1977). Depending on the nature of the data, other methods may be used, including the Trimmed Spearman-Karber method, the probit approximation method of Litchfield and Wilcoxon (1949), SAS probit analysis (SAS Institute 1979) or graphical interpolation using the log concentration vs. percent mortality as described by APHA et al. (1989). The methods used are specified in the final report.

4. FINAL REPORT

The final report is prepared to contain at a minimum the following information:

- Objectives and procedures stated in the approved protocol, including any changes made to the original protocol
- Identity of the test article(s) by name or code number and the strength (i.e., quality/purity and a description of any pretreatment)
- Source of the dilution water, its chemical characteristics, and a description of any pretreatment
- Test concentration series used and duration of the assay
- Water quality characteristics of dilution water and selected test concentrations during testing (pH, dissolved oxygen, temperature, etc.)
- Any unforeseen circumstances that may have affected the quality or integrity of the study
- Signature of the project manager, senior technical reviewer, and quality control officer, authorizing release of the report
- Location of all archived data and the original copy of the final report at EA

Items of data to be included in the report consist of experimental design and test performance; effects on general appearance of test organisms (if applicable); morbidity and mortality; tabular presentation and appropriate statistical evaluation of water quality characteristics; and survival data.

5. QUALITY ASSURANCE

5.1 Amendments to Protocol

Amendments to the authorized protocol established by EA or by the client are made only after proper authorization. Such authorization is achieved by completion of the Amendment to Protocol Form by EA after consultation with the client.

5.2 Standard Operating Procedures

Unless otherwise specified, all procedures specified in the protocol are subject to detailed Standard Operating Procedures (SOPs) which are contained in the SOP manuals of the participating departments. These SOPs and protocols follow the U.S. EPA's Good Laboratory Practice Standards (GLPs) (EPA 1989).

5.3 Reference Toxicant

A reference toxicant test, utilizing sodium dodecyl sulfate (SDS), cadmium chloride, or another appropriate chemical is used as an internal quality check of the sensitivity of the test organisms. Testing is conducted at least once monthly on organisms which are cultured in-house. The results of each test are compared with historical, species-specific toxicological information from reference toxicant tests performed at EA, to determine if the results are within acceptable limits. Limits are established using the control charts outlined in Peltier and Weber (1985).

5.4 Quality Assurance Evaluation

Studies conducted under this protocol may be subject to internal audit by EA's Quality Assurance Unit. A quality control officer is responsible for monitoring each study to assure the client that the facilities, equipment, personnel, methods, practices, records, and controls are in conformance with EA's QC program and, if applicable, EPA's GLPs.

5.5 Inspection by Regulatory Authorities

In the event of an inspection of EA by an outside authority during the course of the study, the client whose study is being inspected will be consulted before examiners are permitted access to any of the project records or the experimental areas.

5.6 Archives

Copies of project-specific records shall be transferred to the client promptly after the project is completed or as negotiated and budgeted. Original primary data will be retained at EA for 5 years. Primary data include chain-of-custody records, laboratory data sheets, records, memoranda, notes, photographs, microfilm, and computer printouts that are a result of the original observations and activities of the study and which are necessary for the reconstruction and evaluation of the study report.

5.7 Location

Studies are conducted at the Aquatic Toxicology Laboratory of EA Engineering, Science, and Technology, Inc. at the Mid-Atlantic Regional Offices, Sparks, Maryland.

6. SPECIFICATIONS OF THE Daphnia ACUTE TOXICITY TEST

6.1 Basic References

American Public Health Association (APHA). 1989. Standard Methods for Examination of Water and Wastewater, 17th edition or an updated edition. APHA, AWWA, and WPCF. Washington, D.C.

EA Manual ATS-102. 1981. Aquatic Toxicology Studies, Quality Control and Standard Operating Procedures Manual. Revision 2 - August 1991. (Internal document prepared by Aquatic Toxicology Services, EA Engineering, Science, and Technology, Inc.)

Peltier, W.H. and C.I. Weber. 1985. Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms. EPA-600/4-85 -013.
U.S. Environmental Protection Agency, Cincinnati, Ohio.

Weber, C.I., et al. 1989. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. Second Edition. EPA/600/4-89/001. U.S. Environmental Protection Agency, Cincinnati, Ohio.

U.S. EPA. 1989. Toxic Substances Control Act (TSCA); Good Laboratory Practice Standards. Title 40 CFR Part 792. Fed. Regist. 54(158):34034-34074.

6.2 Test Specifications

Test organism:	Daphnia magna or D. pulex; species to be specified in the study plan and final report
Age:	Less than 24 hours old
Temperature:	20±2 C
Light quality:	Wide-spectrum fluorescent light
Light intensity:	50-100 f.c.

Photoperiod:	16-hour light, 8-hour dark
Aeration:	None, unless dissolved oxygen falls below 40 percent saturation
Dilution water:	Dechlorinated municipal water, reconstituted water, or appropriate receiving water
Test container:	400-ml Pyrex beaker or 10-cm culture bowl
Test volume:	200 ml per replicate
No. of concentrations:	Minimum of five test concentrations and a control
No. of replicates:	Two
No. of animals per replicate:	Ten
Feeding regime:	Animals will not be fed during test
Test type and duration:	Rangefinding—24 to 48 hours Definitive—48 hours
Endpoints:	Mortality or immobilization
	Immobilization—defined as cessation of movement except for minor activity of appendages
	Mortality—defined as cessation of all movement for a period of at least 5 seconds even when the test container is tapped or rotated, or the organism is gently prodded with glass rod
Test acceptability:	90% or greater survival in the control solution.

11. ACUTE ASSAY WITH FATHEAD MINNOWS (*Pimephales promelas*)

1. TEST OBJECTIVE

To assess the toxicity of a test material to *Pimephales promelas* and determine the LC50 or EC50 using mortality and/or immobilization, respectively, as the test endpoint(s).

2. TEST ARTICLE

2.1 Description/Identification

Unless otherwise specified, the test material is supplied by the client. Adequate chemical specifications with special reference to hazardous properties and storage conditions are also supplied by the client.

2.2 Methods of Synthesis

In most cases the test article is an effluent sample. Information on the methods of synthesis, stability, and composition or other characteristics which define the test article are on file with the client.

3. EXPERIMENTAL DESIGN

3.1 Test Organisms

The test species is the fathead minnow, *Pimephales promelas*.

3.2 Source

P. promelas used for toxicity tests are usually obtained from stock cultures maintained at EA's Aquatic Toxicology Culturing Facility. However, organisms may be obtained from a scientific organism vendor, if necessary.

3.3 Culturing and Holding Conditions

P. promelas stock are maintained at 20±2 C and a 16-hour light, 8-hour dark photoperiod cycle in an environmentally controlled laboratory. Test organisms are maintained in 18.9-L or 30-L all glass aquaria in a recirculating system of dechlorinated municipal tap water. If organisms are obtained from a scientific vendor, the fish, upon receipt, are transferred to static recirculating holding tanks of an appropriate size containing dechlorinated tap water at the temperature (±2 C) of the water in which the organisms were shipped. All fish stocks are examined regularly. Dead fish, or those displaying abnormal swimming behavior, discoloration, or pronounced lethargy are removed as observed, and recorded on appropriate log sheets. Fish stocks are fed a commercial fish food or *Artemia* nauplii a minimum of once daily.

3.4 Age of Test Organisms at Test Initiation

The age of the test organisms is dependent on the objectives of the study and the specific guidelines being followed, but in general, fathead minnows used for acute toxicity testing are 1-14 days old (with a 24-hour range in age) upon test initiation.

3.5 Dilution Water

The source of dilution water is the City of Baltimore Municipal Water System. Upon entry to the laboratory, the water is passed through a high-capacity, activated-carbon filtration system to remove chlorine and other possible contaminants such as detergents and hexane-soluble organic materials. This water source has proven safe for aquatic organism toxicity testing, as evidenced by maintenance of the multigeneration *Daphnia* and fathead minnow cultures, with no evident loss of fecundity. If requested, reconstituted fresh water or other dilution water may be used.

3.6 Test Concentration Series

The test concentration series consists of a minimum of five dilutions and may be determined from a prior screening of the test material (e.g., 1, 3, 10, 30, and 100 percent effluent; or 6.25, 12.5, 25, 50, and 100 percent effluent plus a control).

3.7 Test Concentration Preparation

Test concentrations are prepared with Class A glassware.

3.8 Test Vessels and Test Volume

Test vessels are 2 L glass culture bowls; the final test volume is 1 L. Other test vessels may be used depending on the study's requirements.

3.9 Test Organism Number

Tests are conducted using 2 replicates per concentration, with 10 organisms per container. Fish are randomly assigned to each replicate test container. More replicates can be added, if appropriate.

3.10 Test Environment

The test vessels are maintained at 20 ± 1 C or 25 ± 1 C (unless a different project-specific temperature is required) in an environmentally controlled laboratory with a 16-hour light, 8-hour dark photoperiod. Temperature within the environmental room is monitored continuously using temperature recorders.

3.11 Analysis of Test Concentrations for Test Article

If required, test solutions may be analyzed for verification of chemical concentrations. The analytical method and number of analyses are determined after consultation with the client.

When chemical analyses are necessary, both nominal and actual measured test concentrations are reported.

3.12 Test Observations

Each test day, test organisms are observed to record the number of surviving organisms. Dead organisms are removed when observed. The study terminates after completion of the observation period (24 to 96 hours). The study may be extended, however, at the request of the client.

Each sample received is analyzed for temperature, conductivity, alkalinity, and hardness. Measurements of water quality taken daily include dissolved oxygen, pH, temperature, and conductivity from a minimum of one replicate of every concentration. Aliquots of effluent and receiving water may be gently aerated (100 bubbles/min) if dissolved oxygen is less than 4 mg/L or greater than 105% saturation. After test initiation, if the dissolved oxygen in any test chamber is less than 4 mg/L, all test chambers are gently aerated or other corrective action is taken. Analytical determinations are conducted according to APHA et al. (1989) and EPA (1979).

At the end of the test period, a minimum of 30 surviving fish are removed from the test vessels, placed in labeled containers, and frozen for later measurements. The fish are subsequently thawed, measured to the nearest mm (standard length), patted dry, and weighed to the nearest 0.01 g. The average length and weight of the test fish are reported, along with their respective ranges and standard deviations. For fish between 1-14 days old and within a 24-hour age range, weights and lengths usually will not be measured.

3.13 Solution Renewal (When Applicable)

When static-renewal testing is required, the test solution is renewed daily. New solutions are prepared on the day of renewal and dispensed according to Section 3.8. After the new solutions have reached test temperature and water quality measurements (temperature, pH, dissolved oxygen, and conductivity) are completed, the solution renewal may be performed by transferring the organisms from one test chamber to another or by replacing the test

solution. If the test solution replacement method is used, caution must be given not to stress the test organisms while the test chamber is siphoned. Usually 75 percent of the old solution is removed and replaced; however, the amount is dependent on the size of the test organisms.

3.14 Data Analysis

The LC50 and/or EC50 values and associated statistics are calculated using the probit, moving average, and binomial methods as described by Stephan (1977). Depending on the nature of the data, other methods may be used including the Trimmed Spearman-Karber Method, the probit approximation method of Litchfield and Wilcoxon (1949), SAS probit analysis (SAS Institute 1985), or graphical interpolation using the log concentration vs. percent mortality and/or percent affected as described by APHA et al. (1989). The methods used are specified in the final report.

3.15 Test Applicability

An individual test may be conditionally acceptable if temperature, DO, and other specified conditions fall outside specifications, depending on the degree of the departure and the objectives of the tests.

4. FINAL REPORT

The final report is prepared to contain, at a minimum, the following information:

- Objectives and procedures stated in the approved protocol, including any changes made to the original protocol
- Identity of the test article(s) by name or code number and their strength (i.e., quality/purity), and a description of any pretreatment
- Source of the dilution water, its chemical characteristics, and a description of any pretreatment

- Test concentration series used and duration of the assay
- Mean standard lengths and wet weights of test fish, the respective standard deviations, and approximate biomass loadings (g fish/L of test solution), if applicable
- Water quality characteristics (pH, dissolved oxygen, temperature, etc.) of dilution water and selected test concentrations during testing
- Any unforeseen circumstances that may have affected the quality or integrity of the study
- Signature of the project manager, senior technical reviewer, and quality control officer authorizing release of the report
- Location of all archived data and the original copy of the final report at EA

Items of data to be included in the report consist of experimental design and test performance; effects on general appearance of test organisms (if applicable); morbidity and mortality; presentation of water quality characteristics, and survival data.

5. QUALITY ASSURANCE

5.1 Amendments to Protocol

Amendments to the authorized protocol established by EA or by the client are made only after proper authorization. Such authorization is achieved by completion of the Amendment to Protocol Form by EA after consultation with the client.

5.2 Standard Operating Procedures

Unless otherwise specified, all procedures given in the protocol are subject to detailed Standard Operating Procedures (SOPs) which are contained in the SOP manuals of the participating departments. These SOPs and protocols generally follow the types of requirements outlined in the U.S. EPA's Good Laboratory Practice Standards (GLPs) (EPA 1989).

5.3 Reference Toxicant

A reference toxicant test, utilizing sodium dodecyl sulfate (SDS), cadmium chloride, or another appropriate chemical is used as an internal quality check of the sensitivity of the test organisms. Testing is conducted at least once monthly on organisms that are cultured in-house. The results of each test are compared with historical, species-specific toxicological information from reference toxicant tests performed at EA, to determine if the results are within acceptable limits. Limits are established using the control charts outlined in Weber (1991).

5.4 Quality Assurance Evaluation

Studies conducted under this protocol may be subject to internal audit by EA's Quality Assurance Unit. A quality control officer is responsible for monitoring each study to assure the client that the facilities, equipment, personnel, methods, practices, records, and controls are in conformance with EA's QC program and, if applicable, EPA's GLPs.

5.5 Inspection by Regulatory Authorities

In the event of an inspection of EA by an outside authority during the course of the study, the client whose study is being inspected will be consulted before examiners are permitted access to any of the project records or the experimental areas.

5.6 Archives

Copies of project-specific records shall be transferred to the client promptly after the project is completed or as negotiated and budgeted. Original primary data are retained at EA for 5 years. Primary data include chain-of-custody records, laboratory data sheets, records, memoranda, notes, photographs, microfilm, and computer printouts that are a result of the original observations and activities of the study and which are necessary for the reconstruction and evaluation of the study report.

5.7 Location

Studies are conducted at the Aquatic Toxicology Laboratory of EA Engineering, Science, and Technology, Inc. at the Loveton Office in Sparks, Maryland.

6. SPECIFICATIONS OF THE FATHEAD MINNOW ACUTE TOXICITY TEST

6.1 Basic References

American Public Health Association (APHA) American Water Works Association, Water Pollution Control Federation. 1989. Standard Methods for Examination of Water and Wastewater, 17th or updated edition. APHA, AWWA, and WPCF. Washington, D.C.

American Society for Testing and Materials (ASTM). 1991. Standard Practice for Conducting Acute Tests with Fishes, Macroinvertebrates, and Amphibians. ASTM Designation: E729-80, Philadelphia, Pa.

EA Manual ATS-102. 1992. Aquatic Toxicology Studies, Quality Control and Standard Operating Procedures Manual. Third Edition. Internal document prepared by Aquatic Toxicology Services, EA Engineering, Science, and Technology, Inc.

Litchfield, J.T., Jr. and F. Wilcoxon. 1949. A simplified method of evaluating dose-effect experiments. J. Pharm. Exp. Ther. 96:99-113.

SAS Institute Inc. 1985. SAS® User's Guide: Basics, Version 5 Edition. Cary, NC: SAS Institute Inc. 1290 pp.

Stephan, C.E. 1977. Methods for calculating an LC50, in Aquatic Toxicology and Hazard Evaluation (F.L. Mayer and J.L. Hamelink, eds.), pp. 65-84. ASTM STP 634. American Society for Testing and Materials, Philadelphia.

U.S. Environmental Protection Agency. 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020. U.S. EPA, Washington.

U.S. EPA. 1989. Toxic Substances Control Act (TSCA); Good Laboratory Practice Standards. Title 40 CFR Part 792. Fed. Regist. 54.

Weber, C.I. 1991. Editor. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms. Fourth Edition. EPA/600/4-90/027. U.S. Environmental Protection Agency. Environmental Monitoring Systems Laboratory, Cincinnati, Ohio.

6.2 Test Specifications

Test organism:	Fathead minnow (*Pimephales promelas*)
Temperature:	20±1 C or 25±1 C
Fish age:	Dependent on test guidelines being followed, but in general, 1-14 days with a 24-hour range in age
Fish length:	The largest fish is not more than 50 percent longer than the smallest fish
Loading ratio:	In general, test containers may not contain greater than 0.65 g/L biomass

Aeration:	None, unless dissolved oxygen falls below 4 mg/L
Light quality:	Wide-spectrum fluorescent light
Light intensity:	50-100 f.c.
Photoperiod:	16-hour light, 8-hour dark
Dilution water:	Dechlorinated municipal tap water, reconstituted fresh water, or appropriate receiving water
Test containers:	2 L glass culture bowl
Test volume:	1 L/replicate
No. of concentrations:	Minimum of five test concentrations and a control
No. of replicates:	2
Test animals per container:	10 (if loading is exceeded, more replicates or larger test containers may be used)
Feeding regime:	Animals are not fed during tests unless fish are too small to survive 96 hours without feeding.
Test type and duration:	Rangefinding--24-96 hours Definitive--24-96 hours

Endpoints:	Mortality and/or Immobilization Immobilization—defined as cessation of movement except for minor activity of appendages Mortality—defined as cessation of opercular movement and inability to respond to external stimuli (gentle prodding with glass rod)
Test acceptability:	90 percent or greater survival in the control solution

ATTACHMENT II

DATA SHEETS

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No.: 7CXX13010 TEST: Static Flow-through Renewal
Test Article: 223 Test Container: 4" culture Bowl
Client: Beth LACK Test Volume: 200 ml
QC Test No.: SR-102492-1125 Test Duration: 48 hrs
Sample No.: AT2-827
Dilution No.: AT2-827B

TEST ORGANISM:
Common Name: water flea
Scientific Name: Daphnia
Lot No.: 1174
Source: EA culture LAB
Acclimation: ___ or Age <24 hr days

Beginning Date: 10/29/92 Time: 1450
Ending Date: 10/31/92 Time: 1640

New Test Solutions

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppt) 0	24	48	72	96	OTHER 0	24	48	72	96
Control	A	10	10	10			19.7	20.6	19.5 / 19.1			8.6	8.2	8.8			8.1	8.1	8.0			398	397	402							
	B	10	10	10																											
6.25	A	10	10	10			19.7	20.4	19.4			8.9	9.1	8.7			8.2	8.2	8.1			375	421	397							
	B	10	10	10																											
12.5	A	10	10	10			19.9	20.4	19.4			8.8	9.0	8.6			8.2	8.2	8.1			391	391	389							
	B	10	10	10																											
25	A	10	10	10			19.9	20.3	19.5			8.9	9.0	8.6			8.2	8.2	8.1			368	409	391							
	B	10	10	10																											
50	A	10	10	10			19.9	20.3	19.6			9.0	8.9	8.6			8.3	8.3	8.1			336	360	345							
	B	10	10	10					CU																						
100	A	10	10	10			19.7	20.8	19.2 / 19.7			8.9	8.8	8.6			8.3	8.3	8.0			282	324	278							
	B	10	10	10																											
Instrument Number							90	90	90			2	2	2			90	90	90			90	90	90							
Correction Factor							0.2	0.2	0.0			8.6		8.8			7.10	7.10	7.10			9/11.9	9/11.9	9/11.3							
Time		1610	1610	1610			1605	1628	1650			1644	1532	1702			1635	1638	1650			1637	1626	1658							
Investigator		DH	CH	CH			DC	DC	CH			DC	DC	CH			DC	DC	CH			DC	DC	CH							

48 hour values transcribed onto ctl test solution data sheet - VHS

AQUATIC ORGANISMS ACUTE TOXICITY T... DATA SHEET

Project No.: 2003.10
Test Article: 223
Client: Bath Iron Works
QC Test No.: SR-122992d125
Sample No: AD-877
Dilution No.: AD-878

TEST: Static, Flow-through, Renewal
Test Container: 4 liter Beaker
Test Volume: 2000 ml
Test Duration: 48 hrs

TEST ORGANISM:
Common Name: Mysid
Scientific Name: A. Mysis
Lot No.: NA
Source: EA culture LAB
Acclimation: ___ or Age 24 days Old test solutions

Beginning Date: 10-29-92 Time: 1650
Ending Date: 10-31-92 Time: 1640

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppt) 0	24	48	72	96	OTHER 0	24	48	72	96
Control	A							20.6	19.1				8.6	8.8				8.2	8.0				411	402							
	B							20.9																							
6.25	A							20.9	19.4				8.6	8.7				8.2	8.1				430	397							
	B																														
12.5	A							20.7	19.4				8.4	8.6				8.2	8.1				428	389							
	B																														
25	A							20.6	19.5				8.5	8.6				8.2	8.1				412	391							
	B																														
50	A							20.6	19.6				8.6	8.6				8.2	8.1				372	345							
	B																														
100	A							20.8	19.7				8.4	8.6				8.2	8.0				304	278							
	B																														
Lab Control	A							20.2	19.4				8.4	8.9				8.0	7.8				246	260							
	B																														
Instrument Number								90	90				90	90	2			90	90				90	90							
Correction Factor								20.2	+0.2				8.9	8.6	8.2			7.10	7.10				8.17	19							
Time								1615	1649				1650	1649	1649			1645	1649				1650	1658							
Investigator								WLG VMS	CH				WLG VMS	CH	CH			WLG VMS	CH				WLG VMS	CH							

AQUATIC TOXICOLOGY LABORATORY BENCH SHEET

Project No.: 7022.10
Client: Beth LACK
Test No.: SR-102992-~~483~~ 1125

TEST SET-UP

TEST INITIATION

Date/Time	Initials	Activity
10/29/92 1630	D.GG	Dilutions made / Test Vessels Filled
1650	AL	Transferred Organisms
1710	DGG	Head Counts

TEST CONCENTRATION SERIES

Test Conc. (% or mg/l)	Volume Test Material (ml)	Final Volume
Control	0 mls	400 ml
6.25	25	
12.5	50	
25	100	
50	200	
100	400	

Comments:

INTERMEDIATE DILUTION PREPARATION AND FEEDING

DILUTION PREPARATION

Day	Time	Initials	Sample/Diluent
0	10/29/92	1630 DGG	ATQ-877 / ~~ATQ-878~~
1	10-30-92	1525 DGG	ATQ-883 / ATQ-884
2			
3			
4			
6			

FEEDING

Food: N/A

Day	Time Initials	Time Initials	Time Initials	Amt.	Amt.	Amt.
0						
1						
2						
3						
4						
5						
6						

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No.: 70003.10 TEST: (Static) Flow-through (Renewal) TEST ORGANISM: Beginning Date: 10-27-92 Time: 1845
Test Article: 223 Test Container: 8" Culture Bowl Common Name: Fathead Minnow Ending Date: 10-31-92 Time: 1727
Client: Beth Lack Test Volume: 500 mls Scientific Name: P. promelas
QC Test No.: SR-102992-1126 Test Duration: 48 hrs Lot No.: 2-10/15-16 FH
Sample No.: AT2-827 Source: EA Culture Lab
Dilution No.: AT2-878 Acclimation: ___ or Age <14 days Dead Test Solutions

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppt) 0	24	48	72	96	OTHER 0	24	48	72	96
Control	A	10	10	10			20.1	19.9				9.1	9.2				8.3	8.2				410	429								
	B	10	10	10																											
6.25	A	10	10	10			20.2	19.9				9.2	9.2				8.4	8.2				407	438								
	B	10	10	10																											
12.5	A	10	10	10			20.2	19.9				9.2	9.2				8.4	8.2				402	430								
	B	10	9	9																											
25	A	10	10	10			20.2	19.9				9.2	9.1				8.4	8.2				322	412								
	B	10	9	9																											
50	A	10	10	10			20.1	20.0				9.2	9.1				8.4	8.2				362	378								
	B	10	10	10																											
100	A	10	10	10			20.1	20.0				9.2	8.9				8.4	8.2				302	312								
	B	10	10	10																											
Instrument Number							90	90				2	2				90	90				90	90								
Correction Factor							NA	NA				8.6	8.4				7/0	7/0				1413	1413								
Time		1745	1730	1727			1813	1655				1810	1640				1813	1655				1810	1654								
Investigator		DEB	WM	KC			KE DEB	LS				KE DEB	LS				KE DEB	LS				KE DEB	LS								

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No.: 72203.10
Test Article: 223
Client: Beth LACK
QC Test No.: SR-100MQ-1126
Sample No.: ATA-877
Dilution No.: ATA-878

TEST (Static) Flow-through, (Renewal)
Test Container: 8" culture Bowl
Test Volume: 1000 ml
Test Duration: 48 hrs

TEST ORGANISM:
Common Name: Fathead minnow
Scientific Name: P. promelas
Lot No.: 2-1015-16 FM
Source: EA Culture Lab
Acclimation: ____ or Age 11-14 days

Beginning Date: 10/29/12 Time: 1845
Ending Date: 10/31/12 Time: 1835 (1237 DMS)

Old Test Solutions

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS*) Salinity (ppt) 0	24	48	72	96	OTHER 0	24	48	72	96
Cont	A							24.3	19.6				8.4	8.5				8.1	8.3				458	432							
	B																													
6.25	A							20.6	19.5				8.4	8.6				8.2	8.3				419	422							
	B																													
12.5	A							20.1	19.3				8.4	8.5				8.2	8.3				443	423							
	B																													
25	A							19.9	19.2				8.5	8.6				8.2	8.3				423	413							
	B																													
50	A							20.0	19.5				8.5	8.7				8.1	8.3				389	363							
	B																													
100	A							19.9	19.6				8.5	8.7				8.1	8.2				323	298							
	B																													
Instrument Number								90	97				2	2				90	97				90	97						
Correction Factor								0	NA				8.9	8.7				0	0				0/1413	C/1413						
Time								1702	1734				1110	1232				1102	1230				1702	1732						
Investigator								MG LS	KC				MG LS	KC				MG LS	KC				MG LS	KC						

AQUATIC TOXICOLOGY LABORATORY BENCH SHEET

Project No.: 70663.10
Client: Beth LACK
Test No.: 6R-10292-1126

TEST SET-UP

TEST INITIATION

Date/Time	Initials	Activity
10-29-92		
	1745 KC	Dilutions made
		Test Vessels Filled
	[illegible] KC	Transferred Organisms
	[illegible]	Head Counts

TEST CONCENTRATION SERIES

Test Conc. (% or mg/l)	Volume Test Material (ml)	Final Volume
Control	0 ml	2000 ml
6.25	125 ml	
12.5	250 ml	
25	500 ml	
50	1000 ml	
100	2000 ml	

Comments:

INTERMEDIATE DILUTION PREPARATION AND FEEDING

DILUTION PREPARATION

Day	Time	Initials	Sample/Diluent
0	10-29-92 1745	KC	AT2-877 / AT2-878
1	10/30/92 1525	CS	AT2-883 / AT2-884
2			
3			
4			
5			
6			

FEEDING

Food:

Day	Time Initials	Time Initials	Time Initials	Amt.	Amt.	Amt.
0		N/A				
1						
2						
3						
4						
5						
6						

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No: 7CXCB.10 | TEST: (Static) Flow through (Renewal) | TEST ORGANISM: | Beginning Date: 10/29/92 Time: 1640
Test Article: 216/217 | Test Container: 4" Culture Bowl | Common Name: water flea | Ending Date: 10/31/92 Time: 1640
Client: Beth Lack | Test Volume: 200ml | Scientific Name: D. Magna
QC Test No: SR 1022M-1123 | Test Duration: 48hrs | Lot No: AM
Sample No: AR2-876 | Source: EA Culture Lab
Dilution No: AR2 878 | Acclimation: ___ or Age <24hrs days

New Test Selection

Con. or %	Test Container No	Number of Live Organisms 0	24	48	72	96	Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppt) 0	24	48	72	96	OTHER 0	24	48	72	96
Control	A	10	10	10			19.9	19.8	19.5			8.9	8.9	8.7			8.2	8.2	8.4			413	269 416	285							
	B	10	10	10																											
6.25	A	10	10	10			19.9	19.8	19.4			8.9	8.9	8.6			8.3	8.2	8.1			420	431	402							
	B	10	10	10																											
12.5	A	10	10	10			19.9	19.4	19.4			8.9	8.9	8.7			8.3	8.2	8.1			424	418	409							
	B	10	10	10																											
25	A	10	10	10			19.9	19.9	19.6			8.9	8.9	8.6			8.3	8.2	8.1			431	449	418							
	B	10	10	10																											
50	A	10	10	10			19.8	20.4	19.6			8.9	8.9	8.6			8.2	8.1	8.1			441	420	417							
	B	10	10	10																											
100	A	10	10	10			19.8	20.8	19.2			9.0	8.6	8.8			8.2	8.1	8.0			462	426	409							
	B	10	10	10																											
Instrument Number							90	90	90			2	2	2			90	90	90			90	90	90							
Correction Factor							8.2	8.2	8.2			8.6	8.9	8.2			7/10	7/10	7/10			9/143	9/143	9/143							
Time		1621	1650	1650			1621	1650	1650			1621	1650	1650			1621	1650	1650			1621	1650	1650							
Investigator		VAS	VAS	CH			AC	VAS WLG	CH			A19	VAS WLG	CH			AC	VAS WLG	CH			AC	VAS WLG	CH							

48 hour values transcribed onto old test selection data sheet - VAS

AQUATIC ORGANISMS ACUTE TOXICITY [illegible] ATA SHEET

Project No.: 70003.10 TEST: Static, Flow-through, Renewal
Test Article: 216/217 Test Container: 4" Culture
Client: Bay R/Lack Test Volume: 200 ml
QC Test No.: SR-10-29-92-1123 Test Duration: 48 hrs
Sample No.: AT2-876
Dilution No.: AT2-878

TEST ORGANISM:
Common Name: Water flea
Scientific Name: D. magna
Lot No.: NA
Source: EA
Acclimation: ____ or Age <24 hrs days

Beginning Date: 10/29/92 Time: 1646
Ending Date: 10/31/92 Time: 1649

Circle Test Selections

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppt) 0	24	48	72	96	OTHER 0	24	48	72	96
Control	A							21.4	19.5				8.5	8.7				8.1	8.0				125	325							
	B																														
6.25	A							21.4	19.4				8.5	8.6				8.2	8.1				150	402							
	B																														
12.5	A							21.2	19.4				8.6	8.7				8.2	8.1				158	409							
	B																														
25	A							20.0	19.5				8.8	8.6				8.2	8.1				139	392							
	B																														
50	A							19.8	19.6				8.8	8.6				8.1	8.1				103	417							
	B																														
100	A							19.9	19.7				8.8	8.8				8.1	8.0				170	409							
	B																														
Instrument Number								90	90				2	2				90	90				90	90							
Correction Factor								0.2	0.2				8.9	8.2				7/10	7/10				9/140	9/145							
Time								1730	1654				1725	1700				1730	1654				1730	1656							
Investigator								JAG VMS	CH				JAG	CH				JAG VMS	CH				VMS	CH							

AQUATIC TOXICOLOGY LABORATORY BENCH SHEET

Project No.: 76003.10
Client: Bath Steel - Jacksonville
Test No.: SE-102992-#35 1123

TEST SET-UP

TEST INITIATION

Date/Time	Initials	Activity
10/29/92 1620	DGG	Dilutions made
		Test Vessels Filled
1640	AK	Transferred Organisms
1645	DGG	Head Counts

TEST CONCENTRATION SERIES

Test Conc. (% or mg/l)	Volume Test Material (ml)	Final Volume
Lab Control	0 mls	400 mls
Control	0 mls	
6.25	25	
12.5	50	
25	100	
50	200	
100	400	

Comments:

INTERMEDIATE DILUTION PREPARATION AND FEEDING

DILUTION PREPARATION

Day	Time	Initials	Sample/Diluent
0	10/29/92 1620	DGG	ATD-876 / ~~ATD-878~~ ATD-882
1	10-30-92 1640	DGG	ATD-884
2			
3			
4			
5			
6			

FEEDING

Food: NA

Day	Time Initials	Time Initials	Time Initials	Amt.	Amt.	Amt.
0						
1						
2						
3						
4						
5						
6						

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No.: 70003.10 TEST (Static) Flow through (Renewal) TEST ORGANISM: Beginning Date: 10-29-92 Time: 1830
Test Article 216/217 Test Container: 8" culture Bowl Common Name: fathead minnow Ending Date: 10/31/92 Time: 1738
Client: Beth Lack Test Volume: ~~4000 ml~~ 500 ml Scientific Name: P. promelas
QC Test No.: SR-102992-1124 Test Duration: 48 hrs Lot No.: 2-10/15-16 F11
Sample No.: AR2-876 Source: EA Culture Lab
Dilution No.: AR2-878 Acclimation: ___ or Age 214 days Mean Test Solutions

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppt) 0	24	48	72	96	OTHER 0	24	48	72	96
Control	A	10	10	10			19.9	19.7	19.5			8.9	9.2	8.7			8.4	8.1	7.8			418	431	418							
	B	10	10	10																											
6.25	A	10	10	10			19.9	20.0	19.3			8.7	9.0	8.7			8.4	8.1	7.9			412	447	405							
a)	B	10	10	9																											
12.5	A	10	10	10			19.9	20.1	19.5			8.7	9.0	8.5			8.4	8.1	7.9			411	444	413							
a)	B	10	10	10																											
25	A	10	9	9			20.0	20.3	19.8			8.1	9.1	8.5			8.4	8.1	7.9			422	450	416							
	B	10	10	10																											
50	A	10	10	10			20.0	20.4	19.9			8.1	9.0	8.5			8.3	8.1	7.9			423	453	420							
	B	10	10	10																											
100	A	11	10	10			20.0	21.0	20.0			8.1	9.0	8.5			8.3	8.1	7.9			421	466	431							
	B	11	10	10																											
Instrument Number							90	90	90			2	2	2			90	90	90			90	90	90							
Correction Factor							NA	NA	0.3			8.6	8.4	8.2			7.0	7.7	7.10			1413	1413	1413							
Time		1800	1715	1715			1806	1655	1730			1801	1640	1735			1806	1655	1730			1808	1654	1733							
Investigator		KC	CS	CH			KC	CS	CH			KC	CS	CH			KC	CS	CH			KC	CS	CH							

Kc

a) see bench sheet

48 hour values transcribed onto QA/QC test solution data sheets VM

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No.: 70003.10
Test Article: 216/217
Client: Lackawanna
QC Test No.: SR-100992-1124
Sample No.: AT2-876
Dilution No.: AT2-8[illegible]878

TEST: Static, Flow-through, (Renewal)
Test Container: 8" bowl
Test Volume: 500ml
Test Duration: 48hrs

TEST ORGANISM:
Common Name: fathead minnow
Scientific Name: P. promelas
Lot No.: 2-10/15-16 F11
Source: EA Culture Lab
Acclimation: ____ or Age ≤14 days

Beginning Date: 10/29/92 Time: 1830
Ending Date: 10/31/92 Time: 1728

Old Test Solutions

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppt) 0	24	48	72	96	OTHER 0	24	48	72	96
Control	A							19.1	19.5				8.4	8.7				8.1	7.8				348								
	B																														
6.25	A							19.1	19.3				8.4	8.7				8.1	7.9				358	405							
	B																														
12.5	A							20.1	19.5				8.2	8.5				8.1	7.9				360	413							
	B																														
25	A							20.0	19.8				8.3	8.5				8.1	7.9				366	416							
	B																														
50	A							20.1	19.9				8.2	8.5				8.1	7.9				377	422							
	B																														
100	A							20.3	20.0				8.4	8.5				8.0	7.9				393	434							
	B																														
Instrument Number								90	90				2	2				90	90				90	90							
Correction Factor								7/10	7/10				8.4	8.2				7/10	7/10				10/[illegible]	0/[illegible]							
Time								1705	1730				[illegible]	1735				1705	1730				1707	1733							
Investigator								with LS	CH				LS	CH				with LS	CH				with LS	CH							

AQUATIC TOXICOLOGY LABORATORY BENCH SHEET

Project No.: 70003.10
Client: Beth. LACK
Test No.: SR-N24 102992-1124

TEST SET-UP

TEST INITIATION

Date/Time	Initials	Activity
10-29-92		
	1745 DGG	Dilutions made / Test Vessels Filled
	1830 DGG	Transferred Organisms
	1900 KC	Head Counts

TEST CONCENTRATION SERIES

Test Conc. (% or mg/l)	Volume Test Material (ml)	Final Volume
Control	0 ml	2000 ml
6.25	125 ml	
12.5	250 ml	
25	500 ml	
50	1000 ml	
100	2000 ml	

Comments:

INTERMEDIATE DILUTION PREPARATION AND FEEDING

DILUTION PREPARATION

Day	Time	Initials	Sample/Diluent
0	10-29-92 1745	DGG	AT2-876 / AT2-878
1	10/30/92 1535	CS	AT2-882 / AT2-884
2			
3			
4			
5			
6			

FEEDING

Food:

Day	Time Initials	Time Initials	Time Initials	Amt.	Amt.	Amt.
0						
1						
2						
3						
4						
5						
6						

AQUATIC TOXICOLOGY BENCH SHEET

Project No.: 70003.10
Client: Beth St LACK
QC Test No.: SR-102992-1124

Date/Time	Activity	Investigator
10/30/92 1740 LS	a) The 6.25% B replicate + the 12.5% B replicate were ~~inadvert~~ mistakeningly switched at time of renewal. These replicates will be considered "missing". -per WLG.	
10/31/92 CH	final LC was done and put on white water quality sheet.	

Chain-of-Custody Record

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

Aquatic Toxicology Laboratory
15 Loveton Circle
Sparks (Baltimore), Maryland 21152

Client: Empire Soils Project No.: BTA-8972B
BSC-TOX. TEST

FOR OFFICE USE ONLY
Species to be tested:

___ D. magna	___ Mysidia sp.
___ D. pulex	___ P. pugio
___ Ceriodaphnia sp.	___ C. variegatus
___ P. promelas	___ M. bahia
___ Other	___ Other

A=Acute C=Chronic B=Bioaccumulation

Accession Number (office use only)	Grab	Composite	Collection Start Date/Time	Collection End Date/Time	Sample Description (Including Site, Station Number and Outfall Number)	Number/Volume of Container
BTA-876		X	10/27/92 1010	10/28/92 1107	216/217	1-5gal Cnt
BTA-877		X	" "	" 1142	223	"
BTA-878	X		—	" 0958	Control Water	"

Sampled By: Jeff Cantin	Date/Time 10/28/92	Received By:	Date/Time
Relinquished By:	Date/Time	Received By:	Date/Time
Relinquished By:	Date/Time	Received By Laboratory: David Hinton	Date/Time 10-29-92 1030

Client Purchase Order Number: 18477

Comments: Cooler #1 — 216/217
Cooler #2 — 223
Cooler #3 — Control Water

Sample Shipped By: (circle)
Fed.Ex. Puro. (UPS) Airborne
Other: _____
Air Bill Number: _____

Sample Temperature at Receipt: 3.2 C

Please Read Sampling Instructions on Back of Form

White—Report Production Yellow—Laboratory Pink—Client/Sampler

Chain-of-Custody Record

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

Aquatic Toxicology Laboratory
15 Loveton Circle
Sparks (Baltimore), Maryland 21152

FOR OFFICE USE ONLY
Species to be tested:

___ D. magna	___ Mysidia sp.
___ D. pulex	___ P. pugio
___ Ceriodaphnia sp.	___ C. variegatus
___ P. promelas	___ M. bahia
___ Other	___ Other

A=Acute C=Chronic B=Bioaccumulation

Client: Empire Soils Project No.: BTA-89-12B
B&L-Tox. Test

Accession Number (office use only)	Grab	Composite	Collection Start Date/Time	Collection End Date/Time	Sample Description (Including Site, Station Number and Outfall Number)	Number/Volume of Container
AA-882		X	10/28/92 1117	10/29/92 1220	216/217	1-5gal. Cont.
AA-883		X	11 | 1128	11 | 1258	223	11
AA-884	X		—	11 | 1314	Control Water	11

Sampled By: [signature]	Date/Time 10/29/92 1415	Received By:	Date/Time
Relinquished By:	Date/Time	Received By:	Date/Time
Relinquished By:	Date/Time	Received By Laboratory: [signature]	Date/Time 10-30-92 1040

Client Purchase Order Number: 18477

Comments: Cooler #1 - 216/217
Cooler #2 - 223
Cooler #3 - Control Water

Sample Shipped By: (circle)
Fed.Ex. Puro. (UPS) Airborne
Other: ___
Air Bill Number: ___

Sample Temperature at Receipt: 3.0c

Please Read Sampling Instructions on Back of Form

ATTACHMENT III

REPORT QUALITY ASSURANCE RECORD

REPORT QUALITY ASSURANCE RECORD

CLIENT Bethlehem Steel Corp. EA REPORT NO. 1182

PROJECT NUMBER 7000.3.10 TYPE ANALYSIS Acute

AUTHOR Virginia A. Sohn TEST ORGANISMS D. magna & P. promelas

---

REPORT CHECKLIST

QA/QC ITEM	REVIEWER	DATE
1. Samples collected, transported, and received according to study plan requirements.	Virginia A. Sohn	11/6/92
2. Samples prepared and processed according to study plan requirements.	Virginia A. Sohn	11/6/92
3. Data collected using calibrated equipment.	Virginia A. Sohn	11/6/92
4. Calculations checked: - Hand calculations checked	Virginia A. Sohn	11/6/92
- Documented and verified statistical procedure used.	not applicable	
5. Data input/statistical analyses complete and correct.	Richard A. Connelly	11/9/92
6. Reported results and facts checked against original sources.	Richard A. Connelly	11/9/92
7. Data presented in figures and tables correct and in agreement with text.	Richard A. Connelly	11/9/92
8. Results revieved for compliance with study plan requirements.	William L. Hartfelder	11/10/92

	AUTHOR	DATE
9. Commentary revieved and resolved.	Virginia A. Sohn	11/11/92

10. All study plan and quality assurance/control requirements have been met and the report is approved:

William L. Hartfelder — PROJECT MANAGER — 11/10/92 DATE

Richard A. Connelly — Q.C. OFFICER — 9 November 1992 DATE

Mary A.D. Kotulak — SENIOR TECHNICAL REVIEWER — 11 November 1992 DATE

RESULTS OF ACUTE TOXICITY TESTS WITH *Daphnia magna* AND *Pimephales promelas* ON SAMPLES FROM BETHLEHEM STEEL CORPORATION LACKAWANNA GALVANIZE PRODUCTS DIVISION (LGPD)

Prepared for:

Bethlehem Steel Corporation

Prepared by:

EA Mid-Atlantic Regional Operations
EA Engineering, Science, and Technology, Inc.
15 Loveton Circle
Sparks, Maryland 21152

February 1993

EA Project 70003.10

Report Number 1244

EA Project 70003.10

RESULTS OF ACUTE TOXICITY TESTS WITH *Daphnia magna* AND *Pimephales promelas* ON SAMPLES FROM BETHLEHEM STEEL CORPORATION LACKAWANNA GALVANIZE PRODUCTS DIVISION (LGPD)

Prepared for:

Bethlehem Steel Corporation

Prepared by:

EA Mid-Atlantic Regional Operations
EA Engineering, Science, and Technology, Inc.
15 Loveton Circle
Sparks, Maryland 21152

William L. Goodfellow, Jr. — 9 Feb 93
Project Manager — Date

Wayne L. McCulloch — 9 February 1993
Senior Scientist — Date

February 1993

1. INTRODUCTION

At the request of Bethlehem Steel Corporation, EA Engineering, Science, and Technology performed 48-hour daily renewal acute toxicity tests on samples from the Lackawanna Galvanize Products Division (LGPD). *Daphnia magna* (water flea) and *Pimephales promelas* (fathead minnow) were used as the test species. The tests were conducted on 24-hour composite samples from 1) Outfall 223 and 2) Outfalls 216 and 217. The Outfalls 216/217 sample was a flow proportioned composite that was prepared by Empire Soils Investigations, Inc. Both species were exposed to 100, 50, 25, 12.5, and 6.25 percent of each effluent sample diluted with upstream creek water, and a dilution water control. The objective of the study was to determine the acute toxicity of the effluent samples expressed as the 48-hour median lethal concentration (LC50).

Sample collection and receipt data, together with initial water quality taken on the effluent samples, are reported in the summary of sample/test information. The summary of information, which includes time of test initiation and termination, test organism source and age, test results, water quality and reference toxicant data, are found on pages 3 through 10. Sample collection and initial water quality data are reported in Table 1. Test protocols, copies of raw data sheets, and the Report Quality Assurance Record are included in Attachments I, II, and III, respectively.

RESULTS

The results of the acute toxicity tests performed for Bethlehem Steel Corporation indicate that the samples from the Lackawanna Galvanize Products Division (LGPD) were not acutely toxic to either test species. After 48 hours of exposure, there was 100 percent survival of *D. magna* and *P. promelas* in all concentrations of both the Outfall 223 effluent samples and the Outfalls 216/217 composite samples. Control survival was 100 percent for the *P. promelas* tests and a minimum of 90 percent for the *D. magna* tests. The 48-hour LC50 values for the samples from Outfall 223, and for the composite of Outfalls 216 and 217, were >100 percent effluent for both *D. magna* and *P. promelas*.

SUMMARY OF SAMPLE/TEST INFORMATION

Test: 48-hour *Daphnia magna* daily renewal acute test

Client Name: **Bethlehem Steel Corporation**
Lackawanna Galvanize Products Division

Test Procedure: EA Protocol ATS-SAI-DS-04
Acute 48-hour LC50 assay with *Daphnia* sp.

Sample Description: **Outfall 223**
EA Accession Numbers: **AT3-026, AT3-032**

EA QC Test Number: **SR-01-20-93-024**
Test initiation time and date: 1535, 27 January 1993
Test completion time and date: 1535, 29 January 1993

Dilution Water Description: **Upstream creek water**
EA Accession Numbers: **AT3-024, AT3-030**

Organism Lot Information

Lot Number: NA
Source: EA's Culture Facility, Sparks, Maryland
Age: <24 hours

Reference Toxicant (SDS) Test Information

Reference Toxicant: Sodium dodecyl sulfate
EA QC Test Number: RT-01-07-93-011
Dilution Water: Dechlorinated tap water

Results:
24-hour LC50: 57.0 mg/L
Laboratory control chart acceptability range for 24-hour LC50:
26.1 - 59.7 mg/L

SUMMARY OF SELECTED TEST DATA (Cont.)

Test Organism: *D. magna*
EA QC Test Number: **SR-01-20-93-024**
Sample Description: **Outfall 223**
Sample Numbers: **AT3-026, AT3-032**
Dilution Water Description: **Upstream creek water**
Sample Numbers: **AT3-024, AT3-030**

Test Concentration (percent effluent)	Percent Survival at 48 Hours
Dilution Water Control	100
6.25	100
12.5	100
25	100
50	100
100	100
48-hour LC50 value: (percent effluent)	> 100

Selected Water Quality	Range
Temperature (C)	18.4 - 20.1[a]
pH	7.4 - 8.2
Dissolved oxygen (mg/L)	8.2 - 9.3
Conductivity (μS°)	334 - 836

(a) Temperature in all concentrations was less than the target range of 20±1 C at 24 hours.

SUMMARY OF SAMPLE/TEST INFORMATION

Test: 48-hour *Pimephales promelas* daily renewal acute test

Client Name: **Bethlehem Steel Corporation**
Lackawanna Galvanize Products Division

Test Procedure: EA Protocol ATS-SAF-FM-04
Acute assay with fathead minnows (*Pimephales promelas*)

Sample Description: **Outfall 223**
EA Accession Numbers: **AT3-026, AT3-032**

EA QC Test Number: **SR-01-20-93-026**
Test initiation time and date: 1650, 27 January 1993
Test completion time and date: 1630, 29 January 1993

Dilution Water Description: **Upstream creek water**
EA Accession Numbers: **AT3-024, AT3-030**

Organism Lot Information

Lot Number: FH 3-1/18-19
Source: EA's Culture Facility, Sparks, Maryland
Age: 8-9 days (hatched within a 24-hour window)

Reference Toxicant (SDS) Test Information

Reference Toxicant: Sodium dodecyl sulfate
EA QC Test Number: RT-01-08-93-016
Dilution Water: Dechlorinated tap water

Results:
24-hour LC50: 26.3 mg/L
Laboratory control chart acceptability range for 24-hour LC50:
19.4 - 41.7 mg/L

SUMMARY OF SELECTED TEST DATA (Cont.)

Test Organism: ***P. promelas***
EA QC Test Number: **SR-01-20-93-026**
Sample Description: **Outfall 223**
Sample Numbers: **AT3-026, AT3-032**
Dilution Water Description: **Upstream creek water**
Sample Numbers: **AT3-024, AT3-030**

Test Concentration (percent effluent)	Percent Survival at 48 Hours
Diltion Water Control	100
6.25	100
12.5	100
25	100
50	100
100	100
48-Hour LC50 value: (percent effluent)	>100

Selected Water Quality	Range
Temperature (C)	18.9 - 20.1[a]
pH	7.4 - 8.3
Dissolved oxygen (mg/L)	7.7 - 9.1
Conductivity (µS°)	334 - 814

(a) Temperature in 100% concentration at 48-hours was less than target range of 20±1 C.

SUMMARY OF SAMPLE/TEST INFORMATION

Test: 48-hour *Daphnia magna* daily renewal acute test

Client Name: **Bethlehem Steel Corporation**
Lackawanna Galvanize Products Division

Test Procedure: EA Protocol ATS-SAI-DS-04
Acute 48-hour LC50 assay with *Daphnia* sp.

Sample Description: **Outfall 216/217 composited**
EA Accession Numbers: **AT3-025, AT3-031**

EA QC Test Number: **SR-01-20-93-025**
Test initiation time and date: 1615, 27 January 1993
Test completion time and date: 1610, 29 January 1993

Dilution Water Description: **Upstream creek water**
EA Accession Numbers: **AT3-024, AT3-030**

Organism Lot Information

Lot Number: NA
Source: EA's Culture Facility, Sparks, Maryland
Age: <24 hours

Reference Toxicant (SDS) Test Information

Reference Toxicant: Sodium dodecyl sulfate
EA QC Test Number: RT-01-07-93-011
Dilution Water: Dechlorinated tap water

Results:
24-hour LC50: 57.0 mg/L
Laboratory control chart acceptability range for 24-hour LC50:
26.1 - 59.7 mg/L

SUMMARY OF SELECTED TEST DATA (Cont.)

Test Organism: *D. magna*
EA QC Test Number: **SR-01-20-93-025**
Sample Description: **Outfalls 216/217 composited**
Sample Numbers: **AT3-025, AT3-031**
Dilution Water Description: **Upstream creek water**
Sample Numbers: **AT3-024, AT3-030**

Test Concentration (percent effluent)	Percent Survival at 48 Hours
Diltion Water Control	90
6.25	100
12.5	100
25	100
50	100
100	100
48-Hour LC50 value: (percent effluent)	> 100

Selected Water Quality	Range
Temperature (C)	18.3 - 20.6[a]
pH	7.1 - 8.1
Dissolved oxygen (mg/L)	8.4 - 9.3
Conductivity (μS°)	560 - 834

(a) Temperature in all concentrations was less than the target range of 20±1 C at 24 hours.

SUMMARY OF SAMPLE/TEST INFORMATION

Test: 48-hour *Pimephales promelas* daily renewal acute test

Client Name: **Bethlehem Steel Corporation**
Lackawanna Galvanize Products Division

Test Procedure: EA Protocol ATS-SAF-FM-04
Acute assay with fathead minnows (*Pimephales promelas*)

Sample Description: **Outfall 216/217 composited**
EA Accession Numbers: **AT3-025, AT3-031**

EA QC Test Number: **SR-01-20-93-027**
Test initiation time and date: 1615, 27 January 1993
Test completion time and date: 1627, 29 January 1993

Dilution Water Description: **Upstream creek water**
EA Accession Numbers: **AT3-024, AT3-030**

Organism Lot Information

Lot Number: FH 3-1/14-15
Source: EA's Culture Facility, Sparks, Maryland
Age: 12-13 days (hatched within a 24-hour window)

Reference Toxicant (SDS) Test Information

Reference Toxicant: Sodium dodecyl sulfate
EA QC Test Number: RT-01-08-93-016
Dilution Water: Dechlorinated tap water

Results:
24-hour LC50: 26.3 mg/L
Laboratory control chart acceptability range for 24-hour LC50:
19.4 - 41.7 mg/L

SUMMARY OF SELECTED TEST DATA (Cont.)

Test Organism: ***P. promelas***
EA QC Test Number: **SR-01-20-93-027**
Sample Description: **Outfall 216/217 composited**
Sample Numbers: **AT3-025, AT3-031**
Dilution Water Description: **Upstream creek water**
Sample Numbers: **AT3-024, AT3-030**

Test Concentration (percent effluent)	Percent Survival at 48 Hours
Dilution Water Control	100
6.25	100
12.5	100
25	100
50	100
100	100
48-Hour LC50 value: (percent effluent)	> 100

Selected Water Quality	Range
Temperature (C)	18.7 - 20.6[a]
pH	7.7 - 8.1
Dissolved oxygen (mg/L)	6.8 - 9.2
Conductivity (µS°)	519 - 834

(a) Temperature in several concentrations was less than the target range of 20±1 C at 24 hours.

TABLE 1 SAMPLE COLLECTION AND INITIAL WATER QUALITY DATA FOR SAMPLES FROM BETHLEHEM STEEL'S LACKAWANNA FACILITY

EA Accession Number	Sample Collection	Sample Receipt	Alkalinity (mg/L $CaCO_3$)	Hardness (mg/L $CaCO_3$)
UPSTREAM CREEK WATER:				
AT3-024	1036, 26 JAN 93	1200, 27 JAN 93	116	196
AT3-030	1315, 27 JAN 93	1000, 28 JAN 93	144	212
OUTFALL 223:				
AT3-026	1049, 25 JAN 93 to 1059, 26 JAN 93	1200, 27 JAN 93	88	112
AT3-032	1245, 26 JAN 93 to 1306, 27 JAN 93	1000, 28 JAN 93	86	116
OUTFALL 216/217 - COMPOSITED:				
AT3-025	1115, 25 JAN 93 to 1138, 26 JAN 93	1200, 27 JAN 93	78	200
AT3-031	1220, 26 JAN 93 to 1245, 27 JAN 93	1000, 28 JAN 93	74	184

ATTACHMENT I

PROTOCOLS

3. ACUTE ASSAY WITH *Daphnia* sp.

1. TEST OBJECTIVE

To assess the toxicity of a test material to *Daphnia* and determine the LC50 or EC50 using mortality or immobilization, respectively, as the test end points.

2. TEST ARTICLE

2.1 Description/Identification

Unless otherwise specified, the test material is supplied by the client. Adequate chemical specifications with special reference to hazardous properties and storage conditions is also supplied by the client.

2.2 Methods of Synthesis

In most cases the test article is an effluent sample. Information on the methods of synthesis, stability, and composition or other characteristics which define the test article are on file with the client.

3. EXPERIMENTAL DESIGN

3.1 Test Organisms

A species of *Daphnia* (water fleas), as determined by project needs, is the test organism.

3.2 Source

Daphnia used for acute toxicity tests are obtained from stock cultures maintained in EA's Aquatic Toxicology Culturing Facility.

3.3 Culturing and Holding Conditions

Daphnia cultures are maintained at 20±2 C and a 16-hour light, 8-hour dark photoperiod cycle in an environmentally controlled laboratory. Cultures are maintained in 18.9-L all glass aquaria or other appropriate container and are fed algae (*Selenastrum capricornutum*) and a trout chow/yeast/cereal leaves suspension in the manner described in Weber 1991. New cultures are initiated on a routine basis to ensure healthy, productive populations. Organisms from cultures producing ephippia are not used for toxicity tests.

3.4 Age of Test Organisms at Test Initiation

Neonates of known age (i.e., less than 24-hours old) are obtained for testing by segregating adult females from the mass cultures on the day before a test is initiated. On the day of the test, neonates are segregated from the parent organisms.

3.5 Dilution Water

The source of dilution water is the City of Baltimore Municipal Water System. Upon entry to the laboratory, the water is passed through a high-capacity, activated-carbon filtration system to remove chlorine and other possible contaminants such as detergents, and hexane-soluble organic materials. This water source has proven safe for aquatic organism toxicity testing as evidenced by maintenance of the multigeneration *Daphnia* and *Pimephales promelas* cultures, with no evident loss of fecundity. If requested, reconstituted fresh water or an appropriate receiving water can be used as the dilution water.

3.6 Test Concentration Series

The test concentration series consists of a minimum of five dilutions and may be determined from a prior screening of the test material (e.g., 1, 3, 10, 30, and 100 percent effluent; or 6.25, 12.5, 25, 50, and 100 percent effluent plus a control).

3.7 Test Concentration Preparation

Test concentrations are prepared with Class A glassware.

3.8 Test Vessels and Test Volume

Test vessels are 400-ml glass beakers or 200-ml culture bowls; the final test volume of each replicate is 200 ml. Depending on the study requirements, other test vessels and test volumes may be used.

3.9 Test Organism Number

Tests are conducted using two replicates per concentration, with ten organisms per container. Neonates are randomly assigned to each replicate test container. More replicates can be added, if appropriate.

3.10 Test Environment

The test vessels are maintained at 20 ± 1 C or 25 ± 1 C in an environmentally controlled laboratory with a 16-hour light, 8-hour dark photoperiod.

3.11 Analysis of Test Concentrations for Test Article

If required, test solutions may be analyzed for verification of chemical concentrations. The analytical method and number of analyses are determined after consultation with the client. When chemical analyses are necessary, both nominal and actual measured test solution concentrations are reported.

3.12 Test Observations

Each test day, test organisms are observed to record the number of surviving organisms. The study terminates after completion of the 2-day observation period. The study may be extended, however, at the request of the client.

Each sample received is analyzed for temperature, conductivity, alkalinity, and hardness. Measurements of water quality taken daily include dissolved oxygen, pH, temperature and conductivity from a minimum of one replicate of every concentration. Aliquots of effluent and receiving water may be gently aerated (100 bubbles/min) if dissolved oxygen is less than 4 mg/L or greater than 105% saturation. After test initiation, if the dissolved oxygen in any

test chamber is less than 4 mg/L, all test chambers are gently aerated or other corrective action is taken. Analytical determinations are conducted according to APHA et al. (1989) and EPA (1979).

3.13 Solution Renewal (When Applicable)

When static-renewal testing is required, the test solutions are renewed at 24-hours. New test solutions are prepared on the day of renewal and dispensed according to Section 3.7. After the new solutions have reached test temperature, the test organisms are transferred from the old test vessels to the new test vessels using a wide bore pipet or glass tube. The number of live organisms is recorded. Caution is given not to stress the test organisms during transfer. After water quality measurements (temperature, pH, dissolved oxygen, and conductivity) are completed, the old solution is discarded.

3.14 Data Analysis

The LC50 or EC50 values and associated statistics are calculated using the probit, moving average, and binomial methods as described by Stephan (1977). Depending on the nature of the data, other methods may be used, including the Trimmed Spearman-Karber method, the probit approximation method of Litchfield and Wilcoxon (1949), SAS probit analysis (SAS Institute 1985) or graphical interpolation using the log concentration vs. percent mortality as described by APHA et al. (1989). The methods used are specified in the final report.

3.15 Test Acceptability

An individual test may be conditionally acceptable if temperature, DO, and other specified conditions fall outside specifications, depending on the degree of the departure and the objectives of the tests.

4. FINAL REPORT

The final report is prepared to contain at a minimum the following information:

- Objectives and procedures stated in the approved protocol, including any changes made to the original protocol

- Identity of the test article(s) by name or code number and the strength (i.e., quality/purity and a description of any pretreatment)
- Source of the dilution water, its chemical characteristics, and a description of any pretreatment
- Test concentration series used and duration of the assay
- Water quality characteristics of dilution water and selected test concentrations during testing (pH, dissolved oxygen, temperature, etc.)
- Any unforeseen circumstances that may have affected the quality or integrity of the study
- Signature of the project manager, senior technical reviewer, and quality control officer, authorizing release of the report
- Location of all archived data and the original copy of the final report at EA

Items of data to be included in the report consist of experimental design and test performance; effects on general appearance of test organisms (if applicable); morbidity and mortality; presentation of water quality characteristics; and survival data.

5. QUALITY ASSURANCE

5.1 Amendments to Protocol

Amendments to the authorized protocol established by EA or by the client are made only after proper authorization. Such authorization is achieved by completion of the Amendment to Protocol Form by EA after consultation with the client.

5.2 Standard Operating Procedures

Unless otherwise specified, all procedures specified in the protocol are subject to detailed Standard Operating Procedures (SOPs) which are contained in the SOP manuals of the participating departments. These SOPs and protocols generally follow the types of requirements as outlined in the U.S. EPA's Good Laboratory Practice Standards (GLPs) (EPA 1989).

5.3 Reference Toxicant

A reference toxicant test, utilizing sodium dodecyl sulfate (SDS), cadmium chloride, or another appropriate chemical is used as an internal quality check of the sensitivity of the test organisms. Testing is conducted at least once monthly on organisms which are cultured in-house. The results of each test are compared with historical, species-specific toxicological information from reference toxicant tests performed at EA, to determine if the results are within acceptable limits. Limits are established using the control charts outlined in Weber (1991).

5.4 Quality Assurance Evaluation

Studies conducted under this protocol may be subject to internal audit by EA's Quality Assurance Unit. A quality control officer is responsible for monitoring each study to assure the client that the facilities, equipment, personnel, methods, practices, records, and controls are in conformance with EA's QC program and, if applicable, EPA's GLPs.

5.5 Inspection by Regulatory Authorities

In the event of an inspection of EA by an outside authority during the course of the study, the client whose study is being inspected will be consulted before examiners are permitted access to any of the project records or the experimental areas.

5.6 Archives

Copies of project-specific records shall be transferred to the client promptly after the project is completed or as negotiated and budgeted. Original primary data are retained at EA for 5 years. Primary data include chain-of-custody records, laboratory data sheets, records, memoranda, notes, photographs, microfilm, and computer printouts that are a result of the original observations and activities of the study and which are necessary for the reconstruction and evaluation of the study report.

5.7 Location

Studies are conducted at the Aquatic Toxicology Laboratory of EA Engineering, Science, and Technology, Inc. at the Loveton Office in Sparks, Maryland.

6. SPECIFICATIONS OF THE *Daphnia* ACUTE TOXICITY TEST

6.1 Basic References

American Public Health Association (APHA), American Waterworks Association, Water Pollution Control Federation. 1989. Standard Methods for Examination of Water and Wastewater, 17th edition or an updated edition. APHA, AWWA, and WPCF. Washington, D.C.

EA Manual ATS-102. 1992. Aquatic Toxicology Studies, Quality Control and Standard Operating Procedures Manual. Third Edition. Internal document prepared by Aquatic Toxicology Services, EA Engineering, Science, and Technology, Inc.

Litchfield, J.T., Jr. and F. Wilcoxon. 1949. A simplified method of evaluating dose-effect experiments. J. Pharm. Exp. Ther. 96:99-113.

SAS Institute Inc. 1985. SAS® User's Guide: Basics, Version 5 Edition. Cary, NC: SAS Institute Inc. 1290 pp.

Stephan, C.E. 1977. Methods for calculating an LC50, in Aquatic Toxicology and Hazard Evaluation (F.L. Mayer and J.L. Hamelink, eds.), pp. 65-84. ASTM STP 634. American Society for Testing and Materials, Philadelphia.

U.S. Environmental Protection Agency. 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020. U.S. EPA, Washington.

Weber, C.I. 1991. Editor. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms. Fourth Edition. EPA/600/4-90/027. U.S. Environmental Protection Agency. Environmental Monitoring Systems Laboratory, Cincinnati, Ohio.

U.S. EPA. 1989. Toxic Substances Control Act (TSCA); Good Laboratory Practice Standards. Title 40 CFR Part 792. Fed. Regist. 54(158):34034-34074.

6.2 Test Specifications

Test organism:	*Daphnia magna* or *D. pulex*; species to be specified in the study plan and final report
Age:	Less than 24 hours old
Temperature:	20±1 C or 25±1 C
Light quality:	Wide-spectrum fluorescent light
Light intensity:	50-100 f.c.
Photoperiod:	16-hour light, 8-hour dark
Aeration:	None, unless dissolved oxygen falls below 4 mg/L

Dilution water:	Dechlorinated municipal water, reconstituted water, or appropriate receiving water
Test container:	400-ml beaker or 200 ml culture bowl
Test volume:	200 ml per replicate
No. of concentrations:	Minimum of five test concentrations and a control
No. of replicates:	Two
No. of animals per replicate:	Ten
Feeding regime:	Animals will not be fed during test
Test type and duration:	Rangefinding--24 to 48 hours Definitive--48 hours
Endpoints:	Mortality or immobilization
	Immobilization--defined as cessation of movement except for minor activity of appendages
	Mortality--defined as cessation of all movement for a period of at least 5 seconds even when the test container is tapped or rotated, or the organism is gently prodded with glass rod
Test acceptability:	90% or greater survival in the control solution.

11. ACUTE ASSAY WITH FATHEAD MINNOWS (*Pimephales promelas*)

1. TEST OBJECTIVE

To assess the toxicity of a test material to *Pimephales promelas* and determine the LC50 or EC50 using mortality and/or immobilization, respectively, as the test endpoint(s).

2. TEST ARTICLE

2.1 Description/Identification

Unless otherwise specified, the test material is supplied by the client. Adequate chemical specifications with special reference to hazardous properties and storage conditions are also supplied by the client.

2.2 Methods of Synthesis

In most cases the test article is an effluent sample. Information on the methods of synthesis, stability, and composition or other characteristics which define the test article are on file with the client.

3. EXPERIMENTAL DESIGN

3.1 Test Organisms

The test species is the fathead minnow, *Pimephales promelas*.

3.2 Source

P. promelas used for toxicity tests are usually obtained from stock cultures maintained at EA's Aquatic Toxicology Culturing Facility. However, organisms may be obtained from a scientific organism vendor, if necessary.

3.3 Culturing and Holding Conditions

P. promelas stock are maintained at 20±2 C and a 16-hour light, 8-hour dark photoperiod cycle in an environmentally controlled laboratory. Test organisms are maintained in 18.9-L or 30-L all glass aquaria in a recirculating system of dechlorinated municipal tap water. If organisms are obtained from a scientific vendor, the fish, upon receipt, are transferred to static recirculating holding tanks of an appropriate size containing dechlorinated tap water at the temperature (±2 C) of the water in which the organisms were shipped. All fish stocks are examined regularly. Dead fish, or those displaying abnormal swimming behavior, discoloration, or pronounced lethargy are removed as observed, and recorded on appropriate log sheets. Fish stocks are fed a commercial fish food or *Artemia* nauplii a minimum of once daily.

3.4 Age of Test Organisms at Test Initiation

The age of the test organisms is dependent on the objectives of the study and the specific guidelines being followed, but in general, fathead minnows used for acute toxicity testing are 1-14 days old (with a 24-hour range in age) upon test initiation.

3.5 Dilution Water

The source of dilution water is the City of Baltimore Municipal Water System. Upon entry to the laboratory, the water is passed through a high-capacity, activated-carbon filtration system to remove chlorine and other possible contaminants such as detergents and hexane-soluble organic materials. This water source has proven safe for aquatic organism toxicity testing, as evidenced by maintenance of the multigeneration *Daphnia* and fathead minnow cultures, with no evident loss of fecundity. If requested, reconstituted fresh water or other dilution water may be used.

3.6 Test Concentration Series

The test concentration series consists of a minimum of five dilutions and may be determined from a prior screening of the test material (e.g., 1, 3, 10, 30, and 100 percent effluent; or 6.25, 12.5, 25, 50, and 100 percent effluent plus a control).

3.7 Test Concentration Preparation

Test concentrations are prepared with Class A glassware.

3.8 Test Vessels and Test Volume

Test vessels are 2 L glass culture bowls; the final test volume is 1 L. Other test vessels may be used depending on the study's requirements.

3.9 Test Organism Number

Tests are conducted using 2 replicates per concentration, with 10 organisms per container. Fish are randomly assigned to each replicate test container. More replicates can be added, if appropriate.

3.10 Test Environment

The test vessels are maintained at 20 ± 1 C or 25 ± 1 C (unless a different project-specific temperature is required) in an environmentally controlled laboratory with a 16-hour light, 8-hour dark photoperiod. Temperature within the environmental room is monitored continuously using temperature recorders.

3.11 Analysis of Test Concentrations for Test Article

If required, test solutions may be analyzed for verification of chemical concentrations. The analytical method and number of analyses are determined after consultation with the client.

When chemical analyses are necessary, both nominal and actual measured test concentrations are reported.

3.12 Test Observations

Each test day, test organisms are observed to record the number of surviving organisms. Dead organisms are removed when observed. The study terminates after completion of the observation period (24 to 96 hours). The study may be extended, however, at the request of the client.

Each sample received is analyzed for temperature, conductivity, alkalinity, and hardness. Measurements of water quality taken daily include dissolved oxygen, pH, temperature, and conductivity from a minimum of one replicate of every concentration. Aliquots of effluent and receiving water may be gently aerated (100 bubbles/min) if dissolved oxygen is less than 4 mg/L or greater than 105% saturation. After test initiation, if the dissolved oxygen in any test chamber is less than 4 mg/L, all test chambers are gently aerated or other corrective action is taken. Analytical determinations are conducted according to APHA et al. (1989) and EPA (1979).

At the end of the test period, a minimum of 30 surviving fish are removed from the test vessels, placed in labeled containers, and frozen for later measurements. The fish are subsequently thawed, measured to the nearest mm (standard length), patted dry, and weighed to the nearest 0.01 g. The average length and weight of the test fish are reported, along with their respective ranges and standard deviations. For fish between 1-14 days old and within a 24-hour age range, weights and lengths usually will not be measured.

3.13 Solution Renewal (When Applicable)

When static-renewal testing is required, the test solution is renewed daily. New solutions are prepared on the day of renewal and dispensed according to Section 3.8. After the new solutions have reached test temperature and water quality measurements (temperature, pH, dissolved oxygen, and conductivity) are completed, the solution renewal may be performed by transferring the organisms from one test chamber to another or by replacing the test

solution. If the test solution replacement method is used, caution must be given not to stress the test organisms while the test chamber is siphoned. Usually 75 percent of the old solution is removed and replaced; however, the amount is dependent on the size of the test organisms.

3.14 Data Analysis

The LC50 and/or EC50 values and associated statistics are calculated using the probit, moving average, and binomial methods as described by Stephan (1977). Depending on the nature of the data, other methods may be used including the Trimmed Spearman-Karber Method, the probit approximation method of Litchfield and Wilcoxon (1949), SAS probit analysis (SAS Institute 1985), or graphical interpolation using the log concentration vs. percent mortality and/or percent affected as described by APHA et al. (1989). The methods used are specified in the final report.

3.15 Test Applicability

An individual test may be conditionally acceptable if temperature, DO, and other specified conditions fall outside specifications, depending on the degree of the departure and the objectives of the tests.

4. FINAL REPORT

The final report is prepared to contain, at a minimum, the following information:

- Objectives and procedures stated in the approved protocol, including any changes made to the original protocol
- Identity of the test article(s) by name or code number and their strength (i.e., quality/purity), and a description of any pretreatment
- Source of the dilution water, its chemical characteristics, and a description of any pretreatment

- Test concentration series used and duration of the assay
- Mean standard lengths and wet weights of test fish, the respective standard deviations, and approximate biomass loadings (g fish/L of test solution), if applicable
- Water quality characteristics (pH, dissolved oxygen, temperature, etc.) of dilution water and selected test concentrations during testing
- Any unforeseen circumstances that may have affected the quality or integrity of the study
- Signature of the project manager, senior technical reviewer, and quality control officer authorizing release of the report
- Location of all archived data and the original copy of the final report at EA

Items of data to be included in the report consist of experimental design and test performance; effects on general appearance of test organisms (if applicable); morbidity and mortality; presentation of water quality characteristics, and survival data.

5. QUALITY ASSURANCE

5.1 Amendments to Protocol

Amendments to the authorized protocol established by EA or by the client are made only after proper authorization. Such authorization is achieved by completion of the Amendment to Protocol Form by EA after consultation with the client.

5.2 Standard Operating Procedures

Unless otherwise specified, all procedures given in the protocol are subject to detailed Standard Operating Procedures (SOPs) which are contained in the SOP manuals of the participating departments. These SOPs and protocols generally follow the types of requirements outlined in the U.S. EPA's Good Laboratory Practice Standards (GLPs) (EPA 1989).

5.3 Reference Toxicant

A reference toxicant test, utilizing sodium dodecyl sulfate (SDS), cadmium chloride, or another appropriate chemical is used as an internal quality check of the sensitivity of the test organisms. Testing is conducted at least once monthly on organisms that are cultured in-house. The results of each test are compared with historical, species-specific toxicological information from reference toxicant tests performed at EA, to determine if the results are within acceptable limits. Limits are established using the control charts outlined in Weber (1991).

5.4 Quality Assurance Evaluation

Studies conducted under this protocol may be subject to internal audit by EA's Quality Assurance Unit. A quality control officer is responsible for monitoring each study to assure the client that the facilities, equipment, personnel, methods, practices, records, and controls are in conformance with EA's QC program and, if applicable, EPA's GLPs.

5.5 Inspection by Regulatory Authorities

In the event of an inspection of EA by an outside authority during the course of the study, the client whose study is being inspected will be consulted before examiners are permitted access to any of the project records or the experimental areas.

5.6 Archives

Copies of project-specific records shall be transferred to the client promptly after the project is completed or as negotiated and budgeted. Original primary data are retained at EA for 5 years. Primary data include chain-of-custody records, laboratory data sheets, records, memoranda, notes, photographs, microfilm, and computer printouts that are a result of the original observations and activities of the study and which are necessary for the reconstruction and evaluation of the study report.

5.7 Location

Studies are conducted at the Aquatic Toxicology Laboratory of EA Engineering, Science, and Technology, Inc. at the Loveton Office in Sparks, Maryland.

6. SPECIFICATIONS OF THE FATHEAD MINNOW ACUTE TOXICITY TEST

6.1 Basic References

American Public Health Association (APHA) American Water Works Association, Water Pollution Control Federation. 1989. Standard Methods for Examination of Water and Wastewater, 17th or updated edition. APHA, AWWA, and WPCF. Washington, D.C.

American Society for Testing and Materials (ASTM). 1991. Standard Practice for Conducting Acute Tests with Fishes, Macroinvertebrates, and Amphibians. ASTM Designation: E729-80, Philadelphia, Pa.

EA Manual ATS-102. 1992. Aquatic Toxicology Studies, Quality Control and Standard Operating Procedures Manual. Third Edition. Internal document prepared by Aquatic Toxicology Services, EA Engineering, Science, and Technology, Inc.

Litchfield, J.T., Jr. and F. Wilcoxon. 1949. A simplified method of evaluating dose-effect experiments. J. Pharm. Exp. Ther. 96:99-113.

SAS Institute Inc. 1985. SAS® User's Guide: Basics, Version 5 Edition. Cary, NC: SAS Institute Inc. 1290 pp.

Stephan, C.E. 1977. Methods for calculating an LC50, in Aquatic Toxicology and Hazard Evaluation (F.L. Mayer and J.L. Hamelink, eds.), pp. 65-84. ASTM STP 634. American Society for Testing and Materials, Philadelphia.

U.S. Environmental Protection Agency. 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020. U.S. EPA, Washington.

U.S. EPA. 1989. Toxic Substances Control Act (TSCA); Good Laboratory Practice Standards. Title 40 CFR Part 792. Fed. Regist. 54.

Weber, C.I. 1991. Editor. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms. Fourth Edition. EPA/600/4-90/027. U.S. Environmental Protection Agency. Environmental Monitoring Systems Laboratory, Cincinnati, Ohio.

6.2 Test Specifications

Test organism:	Fathead minnow (*Pimephales promelas*)
Temperature:	20±1 C or 25±1 C
Fish age:	Dependent on test guidelines being followed, but in general, 1-14 days with a 24-hour range in age
Fish length:	The largest fish is not more than 50 percent longer than the smallest fish
Loading ratio:	In general, test containers may not contain greater than 0.65 g/L biomass

Aeration:	None, unless dissolved oxygen falls below 4 mg/L
Light quality:	Wide-spectrum fluorescent light
Light intensity:	50-100 f.c.
Photoperiod:	16-hour light, 8-hour dark
Dilution water:	Dechlorinated municipal tap water, reconstituted fresh water, or appropriate receiving water
Test containers:	2 L glass culture bowl
Test volume:	1 L/replicate
No. of concentrations:	Minimum of five test concentrations and a control
No. of replicates:	2
Test animals per container:	10 (if loading is exceeded, more replicates or larger test containers may be used)
Feeding regime:	Animals are not fed during tests unless fish are too small to survive 96 hours without feeding.
Test type and duration:	Rangefinding--24-96 hours Definitive--24-96 hours

Endpoints:	Mortality and/or Immobilization Immobilization—defined as cessation of movement except for minor activity of appendages Mortality—defined as cessation of opercular movement and inability to respond to external stimuli (gentle prodding with glass rod)
Test acceptability:	90 percent or greater survival in the control solution

ATTACHMENT II

DATA SHEETS

AQUATIC ORGANISMS ACUTE TOXICITY DATA SHEET

Project No.: 70003.10 TEST: Static, Flow-through, (Renewal) TEST ORGANISM: Beginning Date: 1-27-93 Time: 1535
Test Article: EFFLUENT 223 Test Container: 4" culture bowl Common Name: water flea Ending Date: 1-29-93 Time: 1535
Client: BETHSTEEL-LACK Test Volume: 200 mls. Scientific Name: D. magna
QC Test No.: SR-01-20-93-034 Test Duration: 48 hrs. Lot No.: N/A
Sample No.: AT3-026 Source: EA Tox Lab
Dilution No.: AT3-024 Acclimation: ___ or Age <24 hr days

New Solutions
out-fall 223

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS) / Salinity (ppt) 0	24	48	72	96	OTHER 0	24	48	72	96
RIVER H2O CONTROL	A	10	10	10			19.6	19.6				8.5	9.1				7.6	7.4				775	785								
	B	10	10	10																		778	814								
6.25%	A	10	10	10			19.7	19.6				8.6	9.1				7.9	7.6													
	B	10	10	10																		782	771								
12.5	A	10	10	10			19.8	19.7				8.5	9.1				7.9	7.6													
	B	10	10	10																		781	792								
25	A	10	10	10			19.8	19.8				8.5	9.1				8.1	7.9													
	B	10	10	10																		810	802								
50	A	10	10	10			20.2	20.0				8.5	9.1				8.1	8.0													
	B	10	10	10																		851	834								
100	A	10	10	10			20.1	20.1				8.4	8.7				8.2	8.1													
	B	10	10	10																											
Instrument Number							97	97				2	2				7.7	7.7				97	97								
Correction Factor							N/A	N/A				8.9	8.5				7/10	7/10				7/12	8/1403								
Time		1535	1510	1535			1445	1440				1511	1415				1506	1400				1501	1440								
Investigator		LS	DCC	Cm			DCC	DCC				DCC	DCC				DCC	DCC				DCC	QC								

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No.: 70003.10
Test Article: EFFLUENT
Client: Bethsteel-Lack.
QC Test No.: SR-01-20-93024
Sample No: AT3-026
Dilution No.: AT3-024

TEST: Static, Flow-through, (Renewal)
Test Container: 4" culture bowl
Test Volume: 200-mL
Test Duration: 48-hr

TEST ORGANISM:
Common Name: water flea
Scientific Name: D. magna
Lot No.: N/A
Source: EA Tox Lab
Acclimation: ___ or Age 24 days

Beginning Date: 1/27/93 Time: 1535
Ending Date: 1/29/93 Time: 1535

Old Solution
outfall 223

Con. or %	Test Container No	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppt) 0	24	48	72	96	OTHER 0	24	48	72	96
Rive Control	A							18.4					9.3					8.1					777								
	B								19.4					8.6				8.0						836							
6.25%	A							16.4					9.3					8.2					823							
	B								19.3					8.6				8.1						827							
12.5	A							18.5					9.1					8.2					782							
	B								19.3					8.5				8.1						803							
25	A							18.7					9.2					8.2					732							
	B								19.4					8.5				8.2						719							
50	A							18.7					9.2					8.2					622							
	B								19.2					6.4				8.0						638							
100	A							18.9					9.1					8.2					391							
	B								19.3					8.2				8.2						367							
Instrument Number								92	90				2	2				90	90				97	90							
Correction Factor								PA	10.2				8.6	8.9				110	110				9.03	11.18							
Time								1015	1530				1635	1535				1615	1530				1623	1528							
Investigator								KK VS	Gm				KK VS	Gm				KK VS	Gm				KK VS	Gm							

AQUATIC TOXICOLOGY LABORATORY BENCH SHEET

Project No.: 70003.10
Client: Bkth Steel - Lackawanna
Test No.: SR-012093-024

TEST SET-UP

TEST INITIATION

Date/Time	Initials	Activity
1-27-93 1455	DG	Dilutions made
1455	DG	Test Vessels Filled
1535	DG	Transferred Organisms
~~1455~~ 1638	LS	Head Counts

TEST CONCENTRATION SERIES

Test Conc. (% or mg/l)	Volume Test Material (ml)	Final Volume
Lab control	0 ml →	400 ml
River control	0	
6.25%	25 ml	
	50	
12.5		
25	100	
50	200	
100	400	

Comments:

INTERMEDIATE DILUTION PREPARATION AND FEEDING

DILUTION PREPARATION

Day	Time	Initials	Sample/Diluent
0	1-27-93 DG	1455	AT3-026 / AT3-024
1	1-28-93 DG	1350	AT3-032 / AT3-030
2	NIA		
3			
4			
5			
6			

FEEDING

Food: NIA

Day	Time / Initials	Time / Initials	Time / Initials	Amt.	Amt.	Amt.
0						
1						
2						
3						
4						
5						
6						

AQUATIC ORGANISMS ACUTE TOXICITY DATA SHEET

Project No.: 70003.10 TEST: Static, Flow-through (Renewal) TEST ORGANISM:
Test Article: Outfall 003 Test Container: 8 oz Styrofoam Cup Common Name: fathead minnow
Client: LACSD/Carlsbad Test Volume: 250 mls 1L beaker Scientific Name: P. promelas
QC Test No.: SC-012093-026 Test Duration: 48 hours Lot No.: 3-1/14-15 3-1/18-19 FH WW
Sample No.: AT3-0356 Source: EA
Dilution No.: Receiving H2O/AT3-0351 Acclimation: Same or Age 14 days New Solution

Beginning Date: 1-27-93 Time: 1650
Ending Date: 1-29-93 Time: 1630

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppt) 0	24	48	72	96	OTHER 0	24	48	72	96
Control	A	10	10	10			19.6	19.6	19.1			8.5	9.1	8.1			7.6	7.4	8.0			775	783	776							
	B	10	10	10																											
6.25%	A	10	10	10			19.3	19.6	19.0			8.6	9.1	8.0			7.9	7.6	8.1			778	814	791							
	B	10	10	10																											
12.5%	A	10	10	10			19.5	19.7	19.0			8.5	9.1	8.1			7.9	7.6	8.2			781	811	782							
	B	10	10	10																											
25%	A	10	10	10			19.8	19.8	19.0			8.5	9.1	8.0			8.1	7.9	8.2			836	822	831							
	B	10	10	10																											
50%	A	10	10	10			19.5	19.8	19.0			8.5	9.1	8.1			8.1	8.0	8.3			611	640	583							
	B	10	10	10																											
100%	A	10	10	10			19.1	19.6	18.9			8.4	8.7	8.1			8.2	8.1	8.3			389	334	361							
	B	10	10	10																											
Instrument Number							97	97	96			7.2	7.5	7.5			97	97	96			97	97	90							
Correction Factor							NA	NA	0.0			8.9	8.5	8.9			7/0	7/0	7/0			0/00	0/00	14/3							
Time		1200	1635	1630			1506	1466	1633			1511	1472	1625			1506	1461	1633			1502	1462	1631							
Investigator		WW	CH	CH			DG	DG	KG			DG	DG	KG			DG	DG	CH			DG	DG	CH							

AQUATIC ORGANISMS ACUTE TOXICITY ... DATA SHEET

Project No.: 20003.10 TEST: Static, Flow-through, (Renewal) TEST ORGANISM
Test Article: Diuthail223 Test Container: 1L beaker
Client: Beth. Steel - Lack Test Volume: 250mls
QC Test No.: SL-012093-026 Test Duration: 48 hours
Sample No.: AT3-026
Dilution No.: receiving H2O/AT3-021

Common Name: fathead minnow
Scientific Name: P. promelas
Lot No.: 3-1218-1211
Source: EA
Acclimation: ___ or Age 14 days

Beginning Date: 1-22-93 Time: 1650
Ending Date: 1-24-93 Time: 1630

Old Solutions

Conc. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppt) 0	24	48	72	96	OTHER 0	24	48	72	96
Control	A							11.3	19.1				7.7	8.1				7.6	8.0				244	226							
	B							11.2	19.0				7.8	8.0				7.7	8.1				216	251							
1.25%	A																														
	B							11.2	19.0				7.9	8.1				7.9	8.2				192	232							
2.5%	A																														
	B							11.2	19.0				7.7	8.0				8.0	8.2				211	681							
5%	A																														
	B							11.0	19.0				7.1	8.1				8.0	8.3				569	583							
10%	A																														
	B							11.1	18.9				7.9	8.1				8.1	8.3				355	361							
20%	A																														
	B																														
---	---																														
---	---																														
Instrument Number								971	96				2	15				97	90				17	20							
Correction Factor								NA	0.2				8.7	8.9				7/10	7/10				0/	0							
Time								0930	1635				0910	1635				0930	1635				1335	1633							
Investigator								MC	KC				MC	KC				MC	KC				MC	KC							

AQUATIC TOXICOLOGY LABORATORY BENCH SHEET

Project No.: 70003.10
Client: Penn Steel - Lackawanna
Test No.: CR-01-2093-026

TEST SET-UP

TEST INITIATION

Date/Time	Initials	Activity
1-27-93 1455	DGG	Dilutions made
1455	DGG	Test Vessels Filled
1650	DGG KC	Transferred Organisms
1700	LS WN	Head Counts

TEST CONCENTRATION SERIES

Test Conc. (% or mg/l)	Volume Test Material (ml)	Final Volume
LAB CONTROL	0 mls	500 mls
River CONTROL	0 mls	500 mls
6.25%	31.25 mls	
12.5%	62.5 mls	
25%	125 mls	
50%	250 mls	
100%	500 mls	

Comments:

INTERMEDIATE DILUTION PREPARATION AND FEEDING

DILUTION PREPARATION

Day	Time	Initials	Sample/Diluent
	1-27-93		HT3-026
0	1455	DGG	AT3-024
1	1-28-93 1350	DGG	AT3-032 AT3-030
2			
3			
4			
5			
6			

FEEDING

Food:

Day	Time Initials	Time Initials	Time Initials	Amt.	Amt.	Amt.
0						
1						
2						
3						
4						
5						
6						

AQUATIC ORGANISMS ACUTE TOXICITY DATA SHEET

Project No.: 70003110 TEST: Static, Flow-through, (Renewal) TEST ORGANISM:
Test Article: EAB H20 2A/2J Test Container: 4" culture bowl Common Name: water flea
Client: BETHSTEEL-LACK Test Volume: 200-ml. Scientific Name: D. magna
QC Test No.: SR-01-20-93-025 Test Duration: 48-hr Lot No.: NIA
Sample No.: AT3-025 Source: EA Tox Lab
Dilution No.: AT3-00.1 Acclimation: NA or Age 24/ days hrs

Beginning Date: 1-27-93 Time: 1615
Ending Date: 1-29-93 Time: 1610

outfall 216/217

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppt) 0	24	48	72	96	OTHER 0	24	48	72	96
River Control	A	10	10	10			19.6	17.3				8.7	9.2				8.0	7.7				800	819								
	B	10	10	8																											
6.25%	A	10	10	10			19.8	19.4				8.7	9.1				8.0	7.9				816	834								
	B	10	10	10																											
12.5%	A	10	10	10			19.9	19.5				8.4	9.0				8.1	8.0				801	807								
	B	10	10	10																											
25%	A	10	10	10			19.9	19.5				8.5	9.0				8.1	8.0				780	776								
	B	10	10	10																											
50%	A	10	10	10			20.2	19.2				8.5	9.1				8.0	8.1				735	714								
	B	10	10	10																											
100%	A	10	11	11			20.4	19.6				8.4	9.1				8.1	8.1				637	600								
	B	10	10	10																											
Instrument Number							97	97				2	2				97	97				97	97								
Correction Factor							NA	1.4				8.9	8.5				7/10	7/10				7/13	7/16								
Time		1630	1610	1610			1517	1616				1520	1623				1517	1616				195	205								
Investigator		CS	DIG	KC			YK	DC				YK	DC				YK	DC				YK	DC								

AQUATIC ORGANISMS ACUTE TOXICITY DATA SHEET

Project No.: 10003110 TEST: Static, Flow-through, Renewal
Test Article: EFFLUENT 24hr
Client: BETH STEEL - LACK
QC Test No.: SR-01-20-93-005
Sample No.: AT3-025
Dilution No.: AT3-024

Test Container: 1" culture bowl
Test Volume: 200-ml
Test Duration: 48 hrs

TEST ORGANISM:
Common Name: water flea
Scientific Name: D. magna
Lot No.: NM
Source: EA Tox Lab
Acclimation: ___ or Age 24 hrs days

Beginning Date: 1/27/93 Time: 1615
Ending Date: 1/29/93 Time: 1610

Old Solutions

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS) Salinity (ppt) 0	24	48	72	96	OTHER 0	24	48	72	96
RIVER WATER	A							18.7	20.2				9.1	8.4				7.5	7.1				779	732							
	B																						805								
6.25	A							18.7	20.1				9.0	8.4				7.6	7.2					758							
	B		1																				803								
12.5	A							18.6	20.2				9.0	8.5				7.9	7.4					754							
	B																						801								
25	A							18.5	20.3				9.2	8.5				8.1	7.5					727							
	B																						663								
50	A							18.7	20.4				9.2	8.4				8.1	7.6				736	669							
	B																						663								
100	A							18.7	20.5				9.3	8.5				8.1	7.6					560							
	B																														
Instrument Number								97	90				2	2				97	90				97	90							
Correction Factor								MF	6.3				8.6	8.9				7/10	7/10				7/10	1413							
Time								1603	1615				1628	1630				1605	1615				1607	1617							
Investigator								JK	KC				KC	KC				JK	KC				KC	KC							

AQUATIC TOXICOLOGY LABORATORY BENCH SHEET

Project No.: 70003.10
Client: Bethl. Steel - Lackawanna
Test No.: SL-012093-025

TEST SET-UP

TEST INITIATION

Date/Time	Initials	Activity
1-27-93 1510	KK	Dilutions made
1-27-93 1530	KK	Test Vessels Filled
1615	DCG	Transferred Organisms
1630	CS	Head Counts

TEST CONCENTRATION SERIES

Test Conc. (% or mg/l)	Volume Test Material (ml)	Final Volume
Lab control	0mls →	400mLs
River control	0mls	
6.25%	25mls	
12.5%	50	
25	100	
50	200	
100	400	

Comments:

INTERMEDIATE DILUTION PREPARATION AND FEEDING

DILUTION PREPARATION

Day	Time	Initials	Sample/Diluent
0	1-27-93 1510	KK	AT3-025 / AT3-034
1	1-29-93 0GG 1325		AT3-031 / AT3-030
2	N/A		
3			
4			

FEEDING

Food: N/A

Day	Time Initials	Time Initials	Time Initials	Amt.	Amt.	Amt.
0						
1						
2						
3						
4						
5						
6						

AQUATIC ORGANISMS ACUTE TOXICI DATA SHEET

Project No.: 70003.10 TEST: Static, Flow-through (Renewal) TEST ORGANISM: Beginning Date: 1-27-93 Time: 1615
Test Article: Diffa11 2/6/12/2 Test Container: 8oz cultured glass Common Name: fathead minnow Ending Date: 1-29-93 Time: 1622
Client: Rhône-Poulenc Lacqueanna Test Volume: 250 mls 1L beaker Scientific Name: P. promelas
QC Test No.: SR-012093-02 Test Duration: 48 hours Lot No.: 3-1/14-15 FH
Sample No.: AT3-0225 Source: EM
Dilution No.: receiving water/AT3-024 Acclimation: 8 or Age 4/4 days New Solutions

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppt) 0	24	48	72	96	OTHER 0	24	48	72	96
Control	A	10	10	10			19.6	19.3	19.2			8.7	9.2	7.3			8.0	7.7	8.1			800	819	296							
	B	10	10	10																											
6.25%	A	10	10	10			19.8	19.4	19.1			8.7	9.1	7.5			8.0	7.9	8.1			316	834	256							
	B	10	10	10																											
12.5%	A	10	10	10			19.9	19.9	19.0			8.6	9.2	7.5			8.1	8.0	8.1			801	809	296							
	B	10	10	10																											
25%	A	10	10	10			19.9	19.3	19.0			8.5	9.2	7.1			8.1	8.0	8.1			782	774	230							
	B	10	10	10																											
50%	A	11	10	10			20.2	19.9	19.0			8.5	9.1	7.3			8.0	8.1	8.1			733	733	629							
	B	10	10	10																											
100%	A	10	10	10			20.1	19.6	19.0			8.4	9.1	7.5			8.1	8.1	8.1			634	666	569							
	B	11	10	10																											
Instrument Number							97	97	90			2	2	15			97	97	90			97	92	90							
Correction Factor							NA	NA	+0.2			8.9	8.6	8.9			7/10	7/10	7/10			9/10	9/13	9/13							
Time		1615	1604	1627			1517	1406	1634			1520	1413	1635			1517	1406	1634			1515	1406	1630							
Investigator		DB	KC	KC			KC	DG	KC			KC	DG	KC			KC	DG	KC			KC	DG	KC							

AQUATIC ORGANISMS ACUTE TOXICIT. . . DATA SHEET

Project No.: 20003.10
Test Article: outfall 2116/217
Client: Bth Steel - Lackawanna
QC Test No.: SR-012093-022
Sample No: AT3-5125
Dilution No.: receiving H2O/AT3-0241

TEST: Static, Flow-through (Renewal)
Test Container: 1L beaker
Test Volume: 250 mls
Test Duration: 48 hours

TEST ORGANISM:
Common Name: fathead minnow
Scientific Name: P. promelas
Lot No.: 3-1/14-15FH
Source: EA
Acclimation: ___ or Age 214 days

Beginning Date: 1-22-93 Time: 1615
Ending Date: 1-24-93 Time: 1622

Old Solutions

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppt) 0	24	48	72	96	OTHER 0	24	48	72	96
control	A							19.2	19.2				7.3	2.3				7.9	8.1				743	726							
	B							19.1	19.1				7.4	2.5				7.9	8.1				753	755							
6.25%	A							18.7	19.0				6.8	2.5				7.9	8.1				741	756							
	B							18.7	19.0				7.1	2.4				8.0	8.1				726	732							
12.5%	A							19.1	19.0				7.2	2.3				8.0	8.1				677	629							
	B							19.2	19.0				7.3	2.5				8.0	8.1				519	589							
25%	A																													
	B																													
50%	A																													
	B																													
100%	A							19.2	19.0				7.3	2.5				8.0	8.1				519	589							
	B																													
Instrument Number								17	90				9	15				7.97	7.90				17	90							
Correction Factor								NA	6.2				6.9	8.9				7.10	7.10				1413	1413							
Time								1612	1634				0911	1635				1713	1634				1615	1633							
Investigator								GRR	KC				GM	KC				7M2	KC				GM	KC							

AQUATIC TOXICOLOGY LABORATORY BENCH SHEET

Project No.: 7000.5.10
Client: 26th STEEL - LACKAWANNA
Test No.: SR-012093-027

TEST SET-UP

TEST INITIATION

Date/Time	Initials	Activity
1-27-93	1510 KK	Dilutions made
1-27-93	1530 KK	Test Vessels Filled
	16[illegible]	Transferred Organisms
	1633 KK	Head Counts

TEST CONCENTRATION SERIES

Test Conc. (% or mg/l)	Volume Test Material (ml)	Final Volume
LAB CONTROL	0 mls	500 mls
river control	0 mls	500 mls
6.25%	31.25 mls	
12.5%	62.5 mls	
25%	125 mls	
50%	250 mls	
100%	500 mls	

Comments:

INTERMEDIATE DILUTION PREPARATION AND FEEDING

DILUTION PREPARATION

Day	Time	Initials	Sample/Diluent
0	1-27-93	KK 1510	AT3-025 AT3-024
1	1-28-93	DCG 1325	AT3-031 AT3-030
2			
3			
4			
5			
6			

FEEDING

Food:

Day	Time Initials	Time Initials	Time Initials	Amt.	Amt.	Amt.
0						
1						
2						
3						
4						
5						
6						

Chain-of-Custody Record

EA Engineering, Science, and Technology

EA Aquatic Toxicology Laboratories

EA Aquatic Toxicology Laboratories
15 Loveton Circle
Sparks (Baltimore), Maryland 21152
Telephone: (410) 771-4950
Fax: (410) 771-4204

FOR OFFICE USE ONLY
Species to be tested:

____ D. magna	____ Menidia sp.
____ D. pulex	____ P. pugio
____ C. dubia	____ C. variegatus
____ P. promelas	____ M. bahia
____ Other	____ Other

A = Acute C = Chronic B = Bioaccumulation

Client: Empire Soils / BSC Project No.: BTL-89-12B

NPDES Number: NY-0001368 Client Purchase Order Number: 2768 (Empire)

State/City/County Collected: NY / Lackawanna / Erie Co

PLEASE READ SAMPLING INSTRUCTIONS ON BACK OF FORM

Accession Number (office use only)	Grab	Composite	Collection Start Date/Time	Collection End Date/Time	Sample Description (including Site, Station Number, and Outfall Number)	Number/Volume of Container
AT3-024	X		—	1/26/93 1036	Control Water	1-5gal Cn
AT3-025		X	1/25/93 1115	1/26/93 1135	216/217	"
AT3-026		X	1/25/93 1049	1/26/93 1059	223	"

Sampled By:	Date/Time 1/26/93 1420	Received By:	Date/Time
Sampler's Printed Name:	Title:	Relinquished By:	Date/Time
Relinquished By:	Date/Time	Received By Laboratory:	Date/Time 1-27-93 1206

Was Sample Chilled During Collection? (Yes) No

Comments: Cooler #1 - Control Water + Ice In Comp " " 2 - 216/217 Water " " 3 - 223

Results Needed by Feb. 11, 1993

Sample Shipped By: (circle)

Fed. Ex. Puro. UPS Next Day Air Airborne

Other:

Air Bill Number: 1098 5211 304 / 1098 5277 31 / 1098 5277 32

Sample Temperature at Receipt: 3.7C

Chain-of-Custody Record

EA Engineering, Science, and Technology

EA Aquatic Toxicology Laboratories

EA Aquatic Toxicology Laboratories
15 Loveton Circle
Sparks (Baltimore), Maryland 21152
Telephone: (410) 771-4950
Fax: (410) 771-4204

FOR OFFICE USE ONLY
Species to be tested:

____	D. magna	____	Menicia sc.
____	D. pulex	____	P. pugio
____	C. dubia	____	C. variegatus
____	P. promelas	____	M. bahia
____	Other	____	Other

A = Acute C = Chronic B = Bioaccumulation

Client: Empire Soils / BSC Project No.: BTA-84-12B

NPDES Number: NY-0001368 Client Purchase Order Number: 2768 (Empire)

State/City/County Collected: NY / Lackawanna / Erie Co.

PLEASE READ SAMPLING INSTRUCTIONS ON BACK OF FORM

Accession Number (office use only)	Grab	Composite	Collection Start Date/Time	Collection End Date/Time	Sample Description (including Site, Station Number, and Outfall Number)	Number/Volume of Container
AT3-030	X		1/26/93 // 1335		Control Water	1-5 gal Cont.
AT3-031		X	1/26/93 // 1220	1/27/93 // 1245	216/217	"
AT3-032		X	1/26/93 // 1245	1/27/93 // 1305	223	"

Sampled By: [signature] Date/Time 1/27/93 1435

Sampler's Printed Name: Title:

Relinquished By: Date/Time

Received By: Date/Time

Relinquished By: Date/Time

Received By Laboratory: [signature] Date/Time 1/28/93 1000

Was Sample Chilled During Collection? (Yes) No

Sample Shipped By: (circle)

Fed. Ex. Puro. (UPS Next Day Air) Airborne

Other:

Air Bill Number: 1998-5277-271

Sample Temperature at Receipt: 3.7 C

Comments: Cooler #1 – Control Water
" #2 – 216/217
" #3 – 223
Results Needed by Feb. 11, 1993

Pink—Client/Sampler

ATTACHMENT III

REPORT QUALITY ASSURANCE RECORD

REPORT QUALITY ASSURANCE RECORD

CLIENT Bethlehem Steel Corporation EA REPORT NO. 1244

PROJECT NUMBER 20003 10 TYPE ANALYSIS Acute

AUTHOR Virginia A. Sabo TEST ORGANISMS D. magna & P. promelas

---

REPORT CHECKLIST

QA/QC ITEM	REVIEWER	DATE
1. Samples collected, transported, and received according to study plan requirements.	Virginia A. Sabo	2/2/93
2. Samples prepared and processed according to study plan requirements.	Virginia A. Sabo	2/2/93
3. Data collected using calibrated equipment.	Virginia A Sabo	2/2/93
4. Calculations checked: - Hand calculations checked	Virginia A. Sabo	2/2/93
- Documented and verified statistical procedure used.	Richard A. Connelly	2/5/93
5. Data input/statistical analyses complete and correct.	Richard A. Connelly	2/5/93
6. Reported results and facts checked against original sources.	Richard A. Connelly	2/5/93
7. Data presented in figures and tables correct and in agreement with text.	Richard A. Connelly	2/5/93
8. Results reviewed for compliance with study plan requirements.	William J. Smith	2/8/93

	AUTHOR	DATE
9. Commentary reviewed and resolved.	Virginia A. Sabo	9 February 1993

10. All study plan and quality assurance/control requirements have been met and the report is approved:

William J. Smith — 2/8/93
PROJECT MANAGER — DATE

Richard A. Connelly — 5 February 1993
Q.C. OFFICER — DATE

Wayne Gillard — 9 February 1993
SENIOR TECHNICAL REVIEWER — DATE

RESULTS OF ACUTE TOXICITY TESTS WITH *Daphnia magna* AND *Pimephales promelas* ON SAMPLES FROM BETHLEHEM STEEL CORPORATION LACKAWANNA GALVANIZE PRODUCTS DIVISION (LGPD)

Prepared for:

Bethlehem Steel Corporation

Prepared by:

EA Mid-Atlantic Regional Operations
EA Engineering, Science, and Technology, Inc.
15 Loveton Circle
Sparks, Maryland 21152

May 1993

EA Project 70003.10

Report Number 1335

RESULTS

The results of the acute toxicity tests performed for Bethlehem Steel Corporation indicate that the samples from the Lackawanna Galvanize Products Division (LGPD) were not acutely toxic to either test species. After 48 hours of exposure, there was a minimum of 95 percent survival of *D. magna* and a minimum of 90 percent survival of *P. promelas* in all concentrations of both the Outfall 223 effluent samples and the Outfalls 216/217 composite samples. Control survival was 100 percent for the *D. magna* tests and a minimum of 95 percent for the *P. promelas* tests. The 48-hour LC50 values for the samples from Outfall 223, and for the composite of Outfalls 216 and 217, were >100 percent effluent for both *D. magna* and *P. promelas*.

SUMMARY OF SAMPLE/TEST INFORMATION

Test: 48-hour *Daphnia magna* daily renewal acute test

Client Name: **Bethlehem Steel Corporation**
Lackawanna Galvanize Products Division

Test Procedure: EA Protocol ATS-SAI-DS-04
Acute 48-hour LC50 assay with *Daphnia* sp.

Sample Description: **Outfall 223**
EA Accession Numbers: **AT3-431, AT3-439**

EA QC Test Number: **SR-05-12-93-552**
Test initiation time and date: 1520, 12 May 1993
Test completion time and date: 1525, 14 May 1993

Dilution Water Description: **Upstream creek water**
EA Accession Numbers: **AT3-429, AT3-437**

Organism Lot Information

Lot Number: NA
Source: EA's Culture Facility, Sparks, Maryland
Age: <24 hours

Reference Toxicant (SDS) Test Information

Reference Toxicant: Sodium dodecyl sulfate
EA QC Test Number: RT-05-11-93-542
Dilution Water: Dechlorinated tap water

Results:
24-hour LC50: 45.4 mg/L SDS
Laboratory control chart acceptability range for 24-hour LC50:
23.3 - 61.4 mg/L SDS

SUMMARY OF SELECTED TEST DATA (Cont.)

Test Organism: *D. magna*
EA QC Test Number: **SR-05-12-93-552**
Sample Description: **Outfall 223**
Sample Numbers: **AT3-431, AT3-439**
Dilution Water Description: **Upstream creek water**
Sample Numbers: **AT3-429, AT3-437**

Test Concentration (percent effluent)	Percent Survival at 48 Hours
Dilution Water Control	100
6.25	100
12.5	100
25	100
50	100
100	95
48-hour LC50 value: (percent effluent)	> 100

Selected Water Quality	Range
Temperature (C)	19.6 - 21.0
pH	8.2 - 8.5
Dissolved oxygen (mg/L)	8.6 - 8.9
Conductivity ($\mu S°$)	317 - 746

SUMMARY OF SAMPLE/TEST INFORMATION

Test: 48-hour *Pimephales promelas* daily renewal acute test

Client Name: Bethlehem Steel Corporation
Lackawanna Galvanize Products Division

Test Procedure: EA Protocol ATS-SAF-FM-04
Acute assay with fathead minnows (*Pimephales promelas*)

Sample Description: Outfall 223
EA Accession Numbers: AT3-431, AT3-439

EA QC Test Number: SR-05-12-93-551
Test initiation time and date: 1625, 12 May 1993
Test completion time and date: 1610, 14 May 1993

Dilution Water Description: Upstream creek water
EA Accession Numbers: AT3-429, AT3-427

Organism Lot Information

Lot Number: FH 3-5/1-12
Source: EA's Culture Facility, Sparks, Maryland
Age: 10-11 days (hatched within a 24-hour window)

Reference Toxicant ($CdCl_2$) Test Information

Reference Toxicant: Cadmium chloride
EA QC Test Number: RT-05-20-93-587
Dilution Water: Dechlorinated tap water

Results:
48-hour LC50: 17.0 µg/L Cd
Laboratory control chart acceptability range for 48-hour LC50:
13.7 - 43.0 µg/L Cd

SUMMARY OF SELECTED TEST DATA (Cont.)

Test Organism: *P. promelas*
EA QC Test Number: **SR-05-12-93-551**
Sample Description: **Outfall 223**
Sample Numbers: **AT3-431, AT3-439**
Dilution Water Description: **Upstream creek water**
Sample Numbers: **AT3-429, AT3-437**

Test Concentration (percent effluent)	Percent Survival at 48 Hours
Dilution Water Control	100
6.25	95
12.5	90
25	100
50	100
100	90
48-Hour LC50 value: (percent effluent)	>100

Selected Water Quality	Range
Temperature (C)	19.7 - 20.4
pH	7.8 - 8.4
Dissolved oxygen (mg/L)	7.8 - 8.9
Conductivity (μS°)	312 - 743

SUMMARY OF SAMPLE/TEST INFORMATION

Test: 48-hour *Daphnia magna* daily renewal acute test

Client Name: **Bethlehem Steel Corporation**
Lackawanna Galvanize Products Division

Test Procedure: EA Protocol ATS-SAI-DS-04
Acute 48-hour LC50 assay with *Daphnia* sp.

Sample Description: **Outfall 216/217 composited**
EA Accession Numbers: **AT3-430, AT3-438**

EA QC Test Number: **SR-05-12-93-554**
Test initiation time and date: 1530, 12 May 1993
Test completion time and date: 1527, 14 May 1993

Dilution Water Description: **Upstream creek water**
EA Accession Numbers: **AT3-429, AT3-437**

Organism Lot Information

Lot Number: NA
Source: EA's Culture Facility, Sparks, Maryland
Age: <24 hours

Reference Toxicant (SDS) Test Information

Reference Toxicant: Sodium dodecyl sulfate
EA QC Test Number: RT-05-11-93-542
Dilution Water: Dechlorinated tap water

Results:
24-hour LC50: 45.4 mg/L SDS
Laboratory control chart acceptability range for 24-hour LC50:
23.3 - 61.4 mg/L SDS

SUMMARY OF SELECTED TEST DATA (Cont.)

Test Organism: *D. magna*
EA QC Test Number: **SR-05-12-93-554**
Sample Description: **Outfalls 216/217 composited**
Sample Numbers: **AT3-430, AT3-438**
Dilution Water Description: **Upstream creek water**
Sample Numbers: **AT3-429, AT3-437**

Test Concentration (percent effluent)	Percent Survival at 48 Hours
Dilution Water Control	100
6.25	100
12.5	100
25	95
50	100
100	100
48-Hour LC50 value: (percent effluent)	> 100

Selected Water Quality	Range
Temperature (C)	19.6 - 20.3
pH	8.0 - 8.3
Dissolved oxygen (mg/L)	8.5 - 8.8
Conductivity (μS°)	528 - 770

SUMMARY OF SAMPLE/TEST INFORMATION

Test: 48-hour *Pimephales promelas* daily renewal acute test

Client Name: **Bethlehem Steel Corporation**
Lackawanna Galvanize Products Division

Test Procedure: EA Protocol ATS-SAF-FM-04
Acute assay with fathead minnows (*Pimephales promelas*)

Sample Description: **Outfall 216/217 composited**
EA Accession Numbers: **AT3-430, AT3-438**

EA QC Test Number: **SR-05-12-93-553**
Test initiation time and date: 1645, 12 May 1993
Test completion time and date: 1615, 14 May 1993

Dilution Water Description: **Upstream creek water**
EA Accession Numbers: **AT3-429, AT3-437**

Organism Lot Information

Lot Number: FH 3-5/1-2
Source: EA's Culture Facility, Sparks, Maryland
Age: 10-11 days (hatched within a 24-hour window)

Reference Toxicant ($CdCl_2$) Test Information

Reference Toxicant: Cadmium chloride
EA QC Test Number: RT-05-20-93-587
Dilution Water: Dechlorinated tap water

Results:
24-hour LC50: 17.0 µg/L Cd
Laboratory control chart acceptability range for 24-hour LC50:
13.7 - 43.0 µg/L Cd

SUMMARY OF SELECTED TEST DATA (Cont.)

Test Organism: *P. promelas*
EA QC Test Number: **SR-05-12-93-553**
Sample Description: **Outfall 216/217 composited**
Sample Numbers: **AT3-430, AT3-438**
Dilution Water Description: **Upstream creek water**
Sample Numbers: **AT3-429, AT3-437**

Test Concentration (percent effluent)	Percent Survival at 48 Hours
Dilution Water Control	95
6.25	100
12.5	100
25	100
50	100
100	100
48-Hour LC50 value: (percent effluent)	> 100

Selected Water Quality	Range
Temperature (C)	19.6 - 20.2
pH	7.6 - 8.4
Dissolved oxygen (mg/L)	7.9 - 8.8
Conductivity (μS°)	521 - 740

TABLE 1 SAMPLE COLLECTION AND INITIAL WATER QUALITY DATA FOR SAMPLES FROM BETHLEHEM STEEL'S LACKAWANNA FACILITY

EA Accession Number	Sample Collection	Sample Receipt	Alkalinity (mg/L $CaCO_3$)	Hardness (mg/L $CaCO_3$)
UPSTREAM CREEK WATER:				
AT3-429	(a), 11 MAY 93	1005, 12 MAY 9	170	232
AT3-437	(a), 12 MAY 93	1057, 13 MAY 93	172	240
OUTFALL 223:				
AT3-431	1140, 10 MAY 93 to 1200, 11 MAY 93	1005, 12 MAY 93	90	120
AT3-439	1345, 11 MAY 93 to 1406, 12 MAY 93	1057, 13 MAY 93	86	104
OUTFALL 216/217 - COMPOSITED:				
AT3-430	1140, 10 MAY 93 to 1200, 11 MAY 93	1005, 12 MAY 93	78	188
AT3-438	1345, 11 MAY 93 to 1406, 12 MAY 93	1057, 13 MAY 93	82	180

(a) Time of sample collection not recorded.

ATTACHMENT I

PROTOCOLS

3. ACUTE ASSAY WITH *Daphnia* sp.

1. TEST OBJECTIVE

To assess the toxicity of a test material to *Daphnia* and determine the LC50 or EC50 using mortality or immobilization, respectively, as the test end points.

2. TEST ARTICLE

2.1 Description/Identification

Unless otherwise specified, the test material is supplied by the client. Adequate chemical specifications with special reference to hazardous properties and storage conditions is also supplied by the client.

2.2 Methods of Synthesis

In most cases the test article is an effluent sample. Information on the methods of synthesis, stability, and composition or other characteristics which define the test article are on file with the client.

3. EXPERIMENTAL DESIGN

3.1 Test Organisms

A species of *Daphnia* (water fleas), as determined by project needs, is the test organism.

3.2 Source

Daphnia used for acute toxicity tests are obtained from stock cultures maintained in EA's Aquatic Toxicology Culturing Facility.

3.3 Culturing and Holding Conditions

Daphnia cultures are maintained at 20±2 C and a 16-hour light, 8-hour dark photoperiod cycle in an environmentally controlled laboratory. Cultures are maintained in 18.9-L all glass aquaria or other appropriate container and are fed algae (*Selenastrum capricornutum*) and a trout chow/yeast/cereal leaves suspension in the manner described in Weber 1991. New cultures are initiated on a routine basis to ensure healthy, productive populations. Organisms from cultures producing ephippia are not used for toxicity tests.

3.4 Age of Test Organisms at Test Initiation

Neonates of known age (i.e., less than 24-hours old) are obtained for testing by segregating adult females from the mass cultures on the day before a test is initiated. On the day of the test, neonates are segregated from the parent organisms.

3.5 Dilution Water

The source of dilution water is the City of Baltimore Municipal Water System. Upon entry to the laboratory, the water is passed through a high-capacity, activated-carbon filtration system to remove chlorine and other possible contaminants such as detergents, and hexane-soluble organic materials. This water source has proven safe for aquatic organism toxicity testing as evidenced by maintenance of the multigeneration *Daphnia* and *Pimephales promelas* cultures, with no evident loss of fecundity. If requested, reconstituted fresh water or an appropriate receiving water can be used as the dilution water.

3.6 Test Concentration Series

The test concentration series consists of a minimum of five dilutions and may be determined from a prior screening of the test material (e.g., 1, 3, 10, 30, and 100 percent effluent; or 6.25, 12.5, 25, 50, and 100 percent effluent plus a control).

3.7 Test Concentration Preparation

Test concentrations are prepared with Class A glassware.

3.8 Test Vessels and Test Volume

Test vessels are 400-ml glass beakers or 200-ml culture bowls; the final test volume of each replicate is 200 ml. Depending on the study requirements, other test vessels and test volumes may be used.

3.9 Test Organism Number

Tests are conducted using two replicates per concentration, with ten organisms per container. Neonates are randomly assigned to each replicate test container. More replicates can be added, if appropriate.

3.10 Test Environment

The test vessels are maintained at 20±1 C or 25±1 C in an environmentally controlled laboratory with a 16-hour light, 8-hour dark photoperiod.

3.11 Analysis of Test Concentrations for Test Article

If required, test solutions may be analyzed for verification of chemical concentrations. The analytical method and number of analyses are determined after consultation with the client. When chemical analyses are necessary, both nominal and actual measured test solution concentrations are reported.

3.12 Test Observations

Each test day, test organisms are observed to record the number of surviving organisms. The study terminates after completion of the 2-day observation period. The study may be extended, however, at the request of the client.

Each sample received is analyzed for temperature, conductivity, alkalinity, and hardness. Measurements of water quality taken daily include dissolved oxygen, pH, temperature and conductivity from a minimum of one replicate of every concentration. Aliquots of effluent and receiving water may be gently aerated (100 bubbles/min) if dissolved oxygen is less than 4 mg/L or greater than 105% saturation. After test initiation, if the dissolved oxygen in any

test chamber is less than 4 mg/L, all test chambers are gently aerated or other corrective action is taken. Analytical determinations are conducted according to APHA et al. (1989) and EPA (1979).

3.13 Solution Renewal (When Applicable)

When static-renewal testing is required, the test solutions are renewed at 24-hours. New test solutions are prepared on the day of renewal and dispensed according to Section 3.7. After the new solutions have reached test temperature, the test organisms are transferred from the old test vessels to the new test vessels using a wide bore pipet or glass tube. The number of live organisms is recorded. Caution is given not to stress the test organisms during transfer. After water quality measurements (temperature, pH, dissolved oxygen, and conductivity) are completed, the old solution is discarded.

3.14 Data Analysis

The LC50 or EC50 values and associated statistics are calculated using the probit, moving average, and binomial methods as described by Stephan (1977). Depending on the nature of the data, other methods may be used, including the Trimmed Spearman-Karber method, the probit approximation method of Litchfield and Wilcoxon (1949), SAS probit analysis (SAS Institute 1985) or graphical interpolation using the log concentration vs. percent mortality as described by APHA et al. (1989). The methods used are specified in the final report.

3.15 Test Acceptability

An individual test may be conditionally acceptable if temperature, DO, and other specified conditions fall outside specifications, depending on the degree of the departure and the objectives of the tests.

4. FINAL REPORT

The final report is prepared to contain at a minimum the following information:

- Objectives and procedures stated in the approved protocol, including any changes made to the original protocol

- Identity of the test article(s) by name or code number and the strength (i.e., quality/purity and a description of any pretreatment)
- Source of the dilution water, its chemical characteristics, and a description of any pretreatment
- Test concentration series used and duration of the assay
- Water quality characteristics of dilution water and selected test concentrations during testing (pH, dissolved oxygen, temperature, etc.)
- Any unforeseen circumstances that may have affected the quality or integrity of the study
- Signature of the project manager, senior technical reviewer, and quality control officer, authorizing release of the report
- Location of all archived data and the original copy of the final report at EA

Items of data to be included in the report consist of experimental design and test performance; effects on general appearance of test organisms (if applicable); morbidity and mortality; presentation of water quality characteristics; and survival data.

5. QUALITY ASSURANCE

5.1 Amendments to Protocol

Amendments to the authorized protocol established by EA or by the client are made only after proper authorization. Such authorization is achieved by completion of the Amendment to Protocol Form by EA after consultation with the client.

5.2 Standard Operating Procedures

Unless otherwise specified, all procedures specified in the protocol are subject to detailed Standard Operating Procedures (SOPs) which are contained in the SOP manuals of the participating departments. These SOPs and protocols generally follow the types of requirements as outlined in the U.S. EPA's Good Laboratory Practice Standards (GLPs) (EPA 1989).

5.3 Reference Toxicant

A reference toxicant test, utilizing sodium dodecyl sulfate (SDS), cadmium chloride, or another appropriate chemical is used as an internal quality check of the sensitivity of the test organisms. Testing is conducted at least once monthly on organisms which are cultured in-house. The results of each test are compared with historical, species-specific toxicological information from reference toxicant tests performed at EA, to determine if the results are within acceptable limits. Limits are established using the control charts outlined in Weber (1991).

5.4 Quality Assurance Evaluation

Studies conducted under this protocol may be subject to internal audit by EA's Quality Assurance Unit. A quality control officer is responsible for monitoring each study to assure the client that the facilities, equipment, personnel, methods, practices, records, and controls are in conformance with EA's QC program and, if applicable, EPA's GLPs.

5.5 Inspection by Regulatory Authorities

In the event of an inspection of EA by an outside authority during the course of the study, the client whose study is being inspected will be consulted before examiners are permitted access to any of the project records or the experimental areas.

5.6 Archives

Copies of project-specific records shall be transferred to the client promptly after the project is completed or as negotiated and budgeted. Original primary data are retained at EA for 5 years. Primary data include chain-of-custody records, laboratory data sheets, records, memoranda, notes, photographs, microfilm, and computer printouts that are a result of the original observations and activities of the study and which are necessary for the reconstruction and evaluation of the study report.

5.7 Location

Studies are conducted at the Aquatic Toxicology Laboratory of EA Engineering, Science, and Technology, Inc. at the Loveton Office in Sparks, Maryland.

6. SPECIFICATIONS OF THE *Daphnia* ACUTE TOXICITY TEST

6.1 Basic References

American Public Health Association (APHA), American Waterworks Association, Water Pollution Control Federation. 1989. Standard Methods for Examination of Water and Wastewater, 17th edition or an updated edition. APHA, AWWA, and WPCF. Washington, D.C.

EA Manual ATS-102. 1992. Aquatic Toxicology Studies, Quality Control and Standard Operating Procedures Manual. Third Edition. Internal document prepared by Aquatic Toxicology Services, EA Engineering, Science, and Technology, Inc.

Litchfield, J.T., Jr. and F. Wilcoxon. 1949. A simplified method of evaluating dose-effect experiments. J. Pharm. Exp. Ther. 96:99-113.

SAS Institute Inc. 1985. SAS® User's Guide: Basics, Version 5 Edition. Cary, NC: SAS Institute Inc. 1290 pp.

Stephan, C.E. 1977. Methods for calculating an LC50. in Aquatic Toxicology and Hazard Evaluation (F.L. Mayer and J.L. Hamelink, eds.), pp. 65-84. ASTM STP 634., American Society for Testing and Materials, Philadelphia.

U.S. Environmental Protection Agency. 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020. U.S. EPA, Washington.

Weber, C.I. 1991. Editor. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms. Fourth Edition. EPA/600/4-90/027. U.S. Environmental Protection Agency. Environmental Monitoring Systems Laboratory, Cincinnati, Ohio.

U.S. EPA. 1989. Toxic Substances Control Act (TSCA); Good Laboratory Practice Standards. Title 40 CFR Part 792. Fed. Regist. 54(158):34034-34074.

6.2 Test Specifications

Test organism:	*Daphnia magna* or *D. pulex*; species to be specified in the study plan and final report
Age:	Less than 24 hours old
Temperature:	20±1 C or 25±1 C
Light quality:	Wide-spectrum fluorescent light
Light intensity:	50-100 f.c.
Photoperiod:	16-hour light, 8-hour dark
Aeration:	None, unless dissolved oxygen falls below 4 mg/L

Dilution water:	Dechlorinated municipal water, reconstituted water, or appropriate receiving water
Test container:	400-ml beaker or 200 ml culture bowl
Test volume:	200 ml per replicate
No. of concentrations:	Minimum of five test concentrations and a control
No. of replicates:	Two
No. of animals per replicate:	Ten
Feeding regime:	Animals will not be fed during test
Test type and duration:	Rangefinding--24 to 48 hours Definitive--48 hours
Endpoints:	Mortality or immobilization Immobilization--defined as cessation of movement except for minor activity of appendages Mortality--defined as cessation of all movement for a period of at least 5 seconds even when the test container is tapped or rotated, or the organism is gently prodded with glass rod
Test acceptability:	90% or greater survival in the control solution.

11. ACUTE ASSAY WITH FATHEAD MINNOWS
(*Pimephales promelas*)

1. TEST OBJECTIVE

To assess the toxicity of a test material to *Pimephales promelas* and determine the LC50 or EC50 using mortality and/or immobilization, respectively, as the test endpoint(s).

2. TEST ARTICLE

2.1 Description/Identification

Unless otherwise specified, the test material is supplied by the client. Adequate chemical specifications with special reference to hazardous properties and storage conditions are also supplied by the client.

2.2 Methods of Synthesis

In most cases the test article is an effluent sample. Information on the methods of synthesis, stability, and composition or other characteristics which define the test article are on file with the client.

3. EXPERIMENTAL DESIGN

3.1 Test Organisms

The test species is the fathead minnow, *Pimephales promelas*.

3.2 Source

P. promelas used for toxicity tests are usually obtained from stock cultures maintained at EA's Aquatic Toxicology Culturing Facility. However, organisms may be obtained from a scientific organism vendor, if necessary.

3.3 Culturing and Holding Conditions

P. promelas stock are maintained at 20±2 C and a 16-hour light, 8-hour dark photoperiod cycle in an environmentally controlled laboratory. Test organisms are maintained in 18.9-L or 30-L all glass aquaria in a recirculating system of dechlorinated municipal tap water. If organisms are obtained from a scientific vendor, the fish, upon receipt, are transferred to static recirculating holding tanks of an appropriate size containing dechlorinated tap water at the temperature (±2 C) of the water in which the organisms were shipped. All fish stocks are examined regularly. Dead fish, or those displaying abnormal swimming behavior, discoloration, or pronounced lethargy are removed as observed, and recorded on appropriate log sheets. Fish stocks are fed a commercial fish food or *Artemia* nauplii a minimum of once daily.

3.4 Age of Test Organisms at Test Initiation

The age of the test organisms is dependent on the objectives of the study and the specific guidelines being followed, but in general, fathead minnows used for acute toxicity testing are 1-14 days old (with a 24-hour range in age) upon test initiation.

3.5 Dilution Water

The source of dilution water is the City of Baltimore Municipal Water System. Upon entry to the laboratory, the water is passed through a high-capacity, activated-carbon filtration system to remove chlorine and other possible contaminants such as detergents and hexane-soluble organic materials. This water source has proven safe for aquatic organism toxicity testing, as evidenced by maintenance of the multigeneration *Daphnia* and fathead minnow cultures, with no evident loss of fecundity. If requested, reconstituted fresh water or other dilution water may be used.

3.6 Test Concentration Series

The test concentration series consists of a minimum of five dilutions and may be determined from a prior screening of the test material (e.g., 1, 3, 10, 30, and 100 percent effluent: or 6.25, 12.5, 25, 50, and 100 percent effluent plus a control).

3.7 Test Concentration Preparation

Test concentrations are prepared with Class A glassware.

3.8 Test Vessels and Test Volume

Test vessels are 2 L glass culture bowls; the final test volume is 1 L. Other test vessels may be used depending on the study's requirements.

3.9 Test Organism Number

Tests are conducted using 2 replicates per concentration, with 10 organisms per container. Fish are randomly assigned to each replicate test container. More replicates can be added, if appropriate.

3.10 Test Environment

The test vessels are maintained at 20 ± 1 C or 25 ± 1 C (unless a different project-specific temperature is required) in an environmentally controlled laboratory with a 16-hour light, 8-hour dark photoperiod. Temperature within the environmental room is monitored continuously using temperature recorders.

3.11 Analysis of Test Concentrations for Test Article

If required, test solutions may be analyzed for verification of chemical concentrations. The analytical method and number of analyses are determined after consultation with the client.

When chemical analyses are necessary, both nominal and actual measured test concentrations are reported.

3.12 Test Observations

Each test day, test organisms are observed to record the number of surviving organisms. Dead organisms are removed when observed. The study terminates after completion of the observation period (24 to 96 hours). The study may be extended, however, at the request of the client.

Each sample received is analyzed for temperature, conductivity, alkalinity, and hardness. Measurements of water quality taken daily include dissolved oxygen, pH, temperature, and conductivity from a minimum of one replicate of every concentration. Aliquots of effluent and receiving water may be gently aerated (100 bubbles/min) if dissolved oxygen is less than 4 mg/L or greater than 105% saturation. After test initiation, if the dissolved oxygen in any test chamber is less than 4 mg/L, all test chambers are gently aerated or other corrective action is taken. Analytical determinations are conducted according to APHA et al. (1989) and EPA (1979).

At the end of the test period, a minimum of 30 surviving fish are removed from the test vessels, placed in labeled containers, and frozen for later measurements. The fish are subsequently thawed, measured to the nearest mm (standard length), patted dry, and weighed to the nearest 0.01 g. The average length and weight of the test fish are reported, along with their respective ranges and standard deviations. For fish between 1-14 days old and within a 24-hour age range, weights and lengths usually will not be measured.

3.13 Solution Renewal (When Applicable)

When static-renewal testing is required, the test solution is renewed daily. New solutions are prepared on the day of renewal and dispensed according to Section 3.8. After the new solutions have reached test temperature and water quality measurements (temperature, pH, dissolved oxygen, and conductivity) are completed, the solution renewal may be performed by transferring the organisms from one test chamber to another or by replacing the test

solution. If the test solution replacement method is used, caution must be given not to stress the test organisms while the test chamber is siphoned. Usually 75 percent of the old solution is removed and replaced; however, the amount is dependent on the size of the test organisms.

3.14 Data Analysis

The LC50 and/or EC50 values and associated statistics are calculated using the probit, moving average, and binomial methods as described by Stephan (1977). Depending on the nature of the data, other methods may be used including the Trimmed Spearman-Karber Method, the probit approximation method of Litchfield and Wilcoxon (1949), SAS probit analysis (SAS Institute 1985), or graphical interpolation using the log concentration vs. percent mortality and/or percent affected as described by APHA et al. (1989). The methods used are specified in the final report.

3.15 Test Applicability

An individual test may be conditionally acceptable if temperature, DO, and other specified conditions fall outside specifications, depending on the degree of the departure and the objectives of the tests.

4. FINAL REPORT

The final report is prepared to contain, at a minimum, the following information:

- Objectives and procedures stated in the approved protocol, including any changes made to the original protocol
- Identity of the test article(s) by name or code number and their strength (i.e., quality/purity), and a description of any pretreatment
- Source of the dilution water, its chemical characteristics, and a description of any pretreatment

- Test concentration series used and duration of the assay
- Mean standard lengths and wet weights of test fish, the respective standard deviations, and approximate biomass loadings (g fish/L of test solution), if applicable
- Water quality characteristics (pH, dissolved oxygen, temperature, etc.) of dilution water and selected test concentrations during testing
- Any unforeseen circumstances that may have affected the quality or integrity of the study
- Signature of the project manager, senior technical reviewer, and quality control officer authorizing release of the report
- Location of all archived data and the original copy of the final report at EA

Items of data to be included in the report consist of experimental design and test performance; effects on general appearance of test organisms (if applicable); morbidity and mortality; presentation of water quality characteristics, and survival data.

5. QUALITY ASSURANCE

5.1 Amendments to Protocol

Amendments to the authorized protocol established by EA or by the client are made only after proper authorization. Such authorization is achieved by completion of the Amendment to Protocol Form by EA after consultation with the client.

5.2 Standard Operating Procedures

Unless otherwise specified, all procedures given in the protocol are subject to detailed Standard Operating Procedures (SOPs) which are contained in the SOP manuals of the participating departments. These SOPs and protocols generally follow the types of requirements outlined in the U.S. EPA's Good Laboratory Practice Standards (GLPs) (EPA 1989).

5.3 Reference Toxicant

A reference toxicant test, utilizing sodium dodecyl sulfate (SDS), cadmium chloride, or another appropriate chemical is used as an internal quality check of the sensitivity of the test organisms. Testing is conducted at least once monthly on organisms that are cultured in-house. The results of each test are compared with historical, species-specific toxicological information from reference toxicant tests performed at EA, to determine if the results are within acceptable limits. Limits are established using the control charts outlined in Weber (1991).

5.4 Quality Assurance Evaluation

Studies conducted under this protocol may be subject to internal audit by EA's Quality Assurance Unit. A quality control officer is responsible for monitoring each study to assure the client that the facilities, equipment, personnel, methods, practices, records, and controls are in conformance with EA's QC program and, if applicable, EPA's GLPs.

5.5 Inspection by Regulatory Authorities

In the event of an inspection of EA by an outside authority during the course of the study, the client whose study is being inspected will be consulted before examiners are permitted access to any of the project records or the experimental areas.

5.6 Archives

Copies of project-specific records shall be transferred to the client promptly after the project is completed or as negotiated and budgeted. Original primary data are retained at EA for 5 years. Primary data include chain-of-custody records, laboratory data sheets, records, memoranda, notes, photographs, microfilm, and computer printouts that are a result of the original observations and activities of the study and which are necessary for the reconstruction and evaluation of the study report.

5.7 Location

Studies are conducted at the Aquatic Toxicology Laboratory of EA Engineering, Science, and Technology, Inc. at the Loveton Office in Sparks, Maryland.

6. SPECIFICATIONS OF THE FATHEAD MINNOW ACUTE TOXICITY TEST

6.1 Basic References

American Public Health Association (APHA) American Water Works Association, Water Pollution Control Federation. 1989. Standard Methods for Examination of Water and Wastewater, 17th or updated edition. APHA, AWWA, and WPCF. Washington, D.C.

American Society for Testing and Materials (ASTM). 1991. Standard Practice for Conducting Acute Tests with Fishes, Macroinvertebrates, and Amphibians. ASTM Designation: E729-80, Philadelphia, Pa.

EA Manual ATS-102. 1992. Aquatic Toxicology Studies, Quality Control and Standard Operating Procedures Manual. Third Edition. Internal document prepared by Aquatic Toxicology Services, EA Engineering, Science, and Technology, Inc.

Litchfield, J.T., Jr. and F. Wilcoxon. 1949. A simplified method of evaluating dose-effect experiments. J. Pharm. Exp. Ther. 96:99-113.

SAS Institute Inc. 1985. SAS® User's Guide: Basics, Version 5 Edition. Cary, NC: SAS Institute Inc. 1290 pp.

Stephan, C.E. 1977. Methods for calculating an LC50, in Aquatic Toxicology and Hazard Evaluation (F.L. Mayer and J.L. Hamelink, eds.), pp. 65-84. ASTM STP 634. American Society for Testing and Materials, Philadelphia.

U.S. Environmental Protection Agency. 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020. U.S. EPA, Washington.

U.S. EPA. 1989. Toxic Substances Control Act (TSCA); Good Laboratory Practice Standards. Title 40 CFR Part 792. Fed. Regist. 54.

Weber, C.I. 1991. Editor. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms. Fourth Edition. EPA/600/4-90/027. U.S. Environmental Protection Agency. Environmental Monitoring Systems Laboratory, Cincinnati, Ohio.

6.2 Test Specifications

Test organism:	Fathead minnow (*Pimephales promelas*)
Temperature:	20±1 C or 25±1 C
Fish age:	Dependent on test guidelines being followed, but in general, 1-14 days with a 24-hour range in age
Fish length:	The largest fish is not more than 50 percent longer than the smallest fish
Loading ratio:	In general, test containers may not contain greater than 0.65 g/L biomass

Aeration:	None, unless dissolved oxygen falls below 40 percent saturation
Light quality:	Wide-spectrum fluorescent light
Light intensity:	50-100 f.c.
Photoperiod:	16-hour light, 8-hour dark
Dilution water:	Dechlorinated municipal tap water, reconstituted fresh water, or appropriate receiving water
Test containers:	2 L glass culture bowl
Test volume:	1 L/replicate
No. of concentrations:	Minimum of five test concentrations and a control
No. of replicates:	2
Test animals per container:	10 (if loading is exceeded, more replicates or larger test containers may be used)
Feeding regime:	Animals are not fed during tests unless fish are too small to survive 96 hours without feeding.
Test type and duration:	Rangefinding--24-96 hours Definitive--24-96 hours

Endpoints:	Mortality and/or Immobilization Immobilization--defined as cessation of movement except for minor activity of appendages Mortality--defined as cessation of opercular movement and inability to respond to external stimuli (gentle prodding with glass rod)
Test acceptability:	90 percent or greater survival in the control solution

ATTACHMENT II

DATA SHEETS

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No.: 7000 3.10
Test Article: ρ-Ε a u t . 223
Client: BethSteel - Lackawanna
QC Test No.: SROS1293 - 552
Sample No.: A-13-431
Dilution No.: A-13-429

TEST: Static, Flow-through, Renewal
Test Container: 4" Bowl
Test Volume: 200 ml
Test Duration: 48 hrs

TEST ORGANISM:
Common Name: water flea
Scientific Name: D. magna
Lot No.: NA
Source: EA culture lab
Acclimation: ___ or Age 24 days hrs

Beginning Date: 5-12-93 Time: 1520
Ending Date: 5-14-93 Time: 1525

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppt) 0	24	48	72	96	OTHER 0	24	48	72	96
River Control	A	10	10	10			19.8					8.9					8.2					691									
	B	10	10	10				20.3					8.8					8.2					713								
6.25%	A	10	10	10			19.9					8.8					8.3					691									
	B	10	10	10				20.2					8.7					8.3					731								
12.5%	A	10	10	10			19.9					8.8					8.3					677									
	B	10	10	10				20.2					8.7					8.3					705								
25%	A	10	10	10			19.9					8.8					8.3					631									
	B	10	10	10				20.2					8.7					8.4					654								
50%	A	10	10	10			20.1					8.9					8.3					533									
	B	10	10	10				20.3					8.7					8.4					585								
100%	A	10	10	10			20.2					8.9					8.3					326									
	B	10	10	9				20.4					8.7					8.4					329								
Instrument Number							90	90				2	1				90	90				90	97								
Correction Factor							±0.2	0.2				8.8	8.8				7/0	7/0				7/13	7/13								
Time		1535	1520	1525			1448	1520				1432	1501				1446	1501				1448	1501								
Investigator		NCC	GM	CH			WW	WW GM				WW	WW GM				WW	WW GM				WW	WW GM								

Transcribed 5-13-93 WW

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No.: 70003.10
Test Article: Effluent OUT 223
Client: Bethlehem Steel-Lackawanna
QC Test No.: SR-051393-552
Sample No: AT3-431
Dilution No.: AT3-429

TEST: (Static) Flow-through (Renewal)
Test Container: 4" Beaker
Test Volume: 200 mls
Test Duration: 48 hours

TEST ORGANISM:
Common Name: Water flea
Scientific Name: D. magna
Lot No.: NA
Source: EA culture lab
Acclimation: ____ or Age <24 hours days

Beginning Date: 5-12-93 Time: 1520
Ending Date: 5-14-93 Time: 1525

Con. or %	Test Container No	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppt) 0	24	48	72	96	OTHER 0	24	48	72	96
River Control	A							21.0	20.6				8.8	8.1				8.3	8.5				228	230							
	B																														
6.25%	A							20.8	20.5				8.6	8.4				8.4	8.5				215	246							
	B																														
12.5%	A							20.6	20.4				8.6	8.7				8.4	8.4				691	726							
	B																														
25%	A							19.6	20.4				8.7	8.7				8.4	8.3				644	628							
	B																														
50%	A							19.9	20.3				8.8	8.7				8.3	8.2				812	853							
	B																														
100%	A							20.1	20.3				8.8	8.7				8.3	8.3				317	311							
	B																														
____	____																														
Instrument Number								90	90				2	1				90	90				92	90							
Correction Factor								8.2	8.3				8.3	8.3				7/10	7/10				7/10	7/10							
Time								1602	1539				1602	1539				1602	1539				1601	1533							
Investigator								CH GH	CH				CH GH	CH				CH GH	CH				CH AH	CH							

AQUATIC TOXICOLOGY LABORATORY BENCH SHEET

Project No.: 7AAB3.10
Client: Bethlehem Steel - Tacoma
Test No.: SR 051293-552

TEST SET-UP

TEST INITIATION

Date/Time	Initials	Activity
5/12/93	1431	WN Dilutions made
	1431	WN Test Vessels Filled
	1520	WN Transferred Organisms
	1535	DG Head Counts

TEST CONCENTRATION SERIES

Test Conc. (% or mg/l)	Volume Test Material (ml)	Final Volume
LAB CONTROL	0 ml	400 ml
River Control	0 ml	
6.25%	25 ml	
12.5%	50	
25.0%	100	
50.0%	200	
100%	400	

Comments:

INTERMEDIATE DILUTION PREPARATION AND FEEDING

DILUTION PREPARATION

Day	Time	Initials	Sample/Diluent
0	5/12/93 1431	WN	ATJ-431 / ~~ATJ-429~~
15-13-93	1450	GM	ATJ-439 / ATJ-437
2			
3			
4			
5			
6			

FEEDING

Food: NA

Day	Time Initials	Time Initials	Time Initials	Amt.	Amt.	Amt.
0		NA				
1						
2						
3						
4						
5						
6						

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No.: 74003.10
Test Article: 11a216ll-223
Client: Bell Steel - Lackawanna
QC Test No.: SRQ51293-551
Sample No: AT3-431
Dilution No.: AT3-429

TEST: Static Flow-through (Renewal)
Test Container: 1L Beaker
Test Volume: 250 ml
Test Duration: 48 hrs

TEST ORGANISM:
Common Name: Fathead minnow
Scientific Name: P promelas
Lot No.: 3-5/1-3 Fit
Source: EA culture lab
Acclimation: ___ or Age 14 days

Beginning Date: 5/12/93 Time: 1625
Ending Date: 5/14/93 Time: 1610

Con. or %	Test Container No	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppt) 0	24	48	72	96	OTHER 0	24	48	72	96
River water	A							19.7	20.3				7.8	8.2				8.1	7.8				673	683							
	B																														
6.25%	A							19.7	20.1				8.0	8.4				8.4	7.9				688	687							
	B																														
12.5%	A							19.9	19.9				8.0	8.5				8.4	7.9				667	643							
	B																														
25%	A							19.7	20.0				8.1	8.5				8.4	7.9				615	525							
	B																														
50%	A							19.8	20.2				7.8	8.5				8.4	7.9				579	321							
	B																														
100%	A							19.8					8.1					8.1					312								
	B																														
Instrument Number							90	90				90	2				1	90				97	90							
Correction Factor							6.2	6.2				7/10	9.0				8.8	7/10				1013	1013							
Time							0911	1615				0911	1628				6918	1615				0911	1622							
Investigator							WD GM	GM				WD GM	GM				WD GM	GM				WD GM	GM							

Transcribed from other sheet
5-13-93

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No.: 70003.10
Test Article: eff out 223
Client: BethSteel - Lackawanna
QC Test No.: SR-051293-55
Sample No.: A-T3-431
Dilution No.: A-T3-429

TEST: (Static) Flow-through, (Renewal)
Test Container: 1L Beaker
Test Volume: 250ml
Test Duration: 48hrs

TEST ORGANISM:
Common Name: fathead minnow
Scientific Name: P. promelas
Lot No.: 3-5/1-3 FH
Source: EA culture lab
Acclimation: ____ or Age 4/4 days

Beginning Date: 5-12-93 Time: 1625
Ending Date: 5/14/93 Time: 1610

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppt) 0	24	48	72	96	OTHER 0	24	48	72	96
River Control	A	10	10	10			19.8					8.9					8.2					691									
	B	10	10	10				20.3					8.8					8.2				748									
6.25%	A	10	10	9			19.8					8.8					8.3					649									
	B	10	10	10				20.2					8.7					8.3				731									
12.5%	A	10	10	9			19.9					8.8					8.3					677									
	B	10	10	9				20.2					8.7					8.3				705									
25%	A	10	10	10			19.9					8.8					8.3					631									
	B	10	10	10				20.2					8.7					8.4				654									
50%	A	10	10	10			19.9					8.9					8.3					533									
	B	10	10	10			20.1	20.3					8.7					8.4				535									
100%	A	10	10	9			20.2					8.9					8.3					384									
	B	10	10	9				20.4					8.7					8.4				522									
Instrument Number							90	90				2	1				90	90				90	97								
Correction Factor							±.2	±2				8.8	8.8				7/10	7/10				9/413	9/412								
Time		1626	1630	1640			1448	1500				1437	1501				1448	1502				1442	1502								
Investigator		WW	WW	CM			WW	CM				WW	CM				WW	CM				WW	CM								

Transcribed from 1st sheet.

AQUATIC TOXICOLOGY LABORATORY BENCH SHEET

Project No.: 70003.10
Client: Bethlehem - Lackawanna
Test No.: SR-051293-551

TEST SET-UP

TEST INITIATION

Date/Time	Initials	Activity
5-12-93 1431	WN	Dilutions made
"	WN	Test Vessels Filled
1625	~~1520~~ WN	Transferred Organisms
1636	DC	Head Counts

TEST CONCENTRATION SERIES

Test Conc. (% or mg/l)	Volume Test Material (ml)	Final Volume
LAB CONTROL	0 ml	500 ml
River CONTROL	0 ml	
6.25%	31.25	
12.5 %	62.5	
25 %	125	
50%	250	
100 %	500	

Comments:

INTERMEDIATE DILUTION PREPARATION AND FEEDING

DILUTION PREPARATION

Day	Time	Initials	Sample/Diluent
0	5-12-93 1431	WN	AT3-431 / AT3-429
1	5-13-93 1450	GM	AT3-439 / AT3-437
2			
3			
4			
5			
6			

FEEDING

Food: NA

Day	Time Initials	Time Initials	Time Initials	Amt.	Amt.	Amt.
0			NA			
1						
2						
3						
4						
5						
6						

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No.: 20003.10 TEST: (Static, Flow-through, Renewal) TEST ORGANISM: Beginning Date: 5/12/93 Time: 1530

Test Article: Effluent 216/217 Test Container: 4" brown Common Name: Water flea Ending Date: 5/14/93 Time: 1527

Client: Bar Steel - Jacksonville Test Volume: 200 ml Scientific Name: D. magna

EC Test No.: SR-051293-554 Test Duration: 48 hrs Lot No.: NA

Sample No.: AT3-430 Source: EA Culture facility

Dilution No.: AT3-429 Acclimation: ___ or Age <24 days hrs. DOD TEST [illegible]

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppt) 0	24	48	72	96	OTHER 0	24	48	72	96
River Control	A	10	10	10			20.1					8.5					8.2					660									
	B	10	10	10				20.0					8.8					8.0					234								
6.25%	A	10	10	10			20.0					8.5					8.2					264								
	B	10	10	10				20.0					8.8					8.3					240								
12.5%	A	10	10	10			20.0					8.5					8.2					264								
	B	10	10	10				20.0					8.7					8.3					232								
25%	A	10	10	10			20.1					8.5					8.2					684								
	B	10	9	9				20.0					8.7					8.3					206								
50%	A	10	10	10			20.2					8.5					8.2					630								
	B	10	10	10				20.1					8.8					8.3					650								
100%	A	10	10	10			20.2					8.5					8.1					531								
	B	10	10	10				20.0					8.8					8.3					528								
Instrument Number							90	90				2	1				90	90				90	90								
Correction Factor							± 0.2	± 0.2				8.8	8.5				90	90				0.148	0.142								
Time	1200	1530	1527				1445	1457				1455	1455				1445	1457				1155	1457								
Investigator	TBG	CH	MS				RH	WN GM				RH	WN GM				RH	WN GM				RH	WN GM								

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No.: 70003.10 TEST: Static, Flow-through, (Renewal) TEST ORGANISM: Beginning Date: 5-12-93 Time: 1530
Test Article: effluent 2/16/217 Test Container: 4L Bowl Common Name: water flea Ending Date: 5-14-93 Time: 1522
Client: Bellsouth-Lack Test Volume: 200ml Scientific Name: D. Magna
QC Test No.: SR 051293-554 Test Duration: 48hrs Lot No.: NA
Sample No.: A-T3-430 Source: EA culture lab
Dilution No.: AT3-424 Acclimation: ___ or Age 24 days 1 hrs OLD AT TEST INITIATION

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppt) 0	24	48	72	96	OTHER 0	24	48	72	96
LAB CONTROL	A																														
	B																														
WW																															
RIVER CONTROL	A								19.7					8.7					8.0					220							
	B								19.9					8.6					8.1					220							
6.25%	A																														
	B								19.7					8.6					8.2					208							
12.5%	A																														
	B								19.6					8.7					8.2					692							
25%	A																														
	B							20.2	19.9				8.7	8.7				8.0	8.3				650							
50%	A																								644						
	B							20.3	19.8				8.8	8.7				8.1	8.2				916							
100%	A																								538						
	B							20	20				2	1				20	20				20	20							
Instrument Number								6.2	6.2				8.3	8.7				7/10	7/10				7/13	7/13							
Correction Factor								1601	1530				1606	1535				1601	1530				1604	1531							
Time								CH	MS				CH	MS				CH	MS				CH	MS							
Investigator																															

AQUATIC TOXICOLOGY LABORATORY BENCH SHEET

Project No.: 70003.10
Client: BethSteel – Lackawanna
Test No.: SR 051293- 554

TEST SET-UP

TEST INITIATION

Date/Time	Initials	Activity
5/12/93 1435	RSH	Dilutions made
5/12/93 1435	RSH	Test Vessels Filled
1536	WW	Transferred Organisms
1532	DG	Head Counts

TEST CONCENTRATION SERIES

Test Conc. (% or mg/l)	Volume Test Material (ml)	Final Volume
LAB CONTROL	0 ml	400 ml
River CONTROL	0 ml	
6.25%	25	
12.5%	50	
25%	100	
50%	200	
100%	400	

Comments:

INTERMEDIATE DILUTION PREPARATION AND FEEDING

DILUTION PREPARATION

Day	Time	Initials	Sample/Diluent
0	1435	RSH	AT3 430 / AT3 429
1	1500	WW	AT3-438 / AT3 437
2			
3			
4			
5			
6			

FEEDING

Food: NA

Day	Time Initials	Time Initials	Time Initials	Amt.	Amt.	Amt.
0						
1		NA				
2						
3						
4						
5						
6						

AQUATIC TOXICOLOGY BENCH SHEET

Project No.: 7C503.10
Client: Beth Steel - Lack.
QC Test No.: SR-554

Date/Time	Activity	Investigator
5-12-93	Ddi	DOP
AB-430	10.6 1140	8.5 1340 aerated 2 hour
AB-429	10.3 1140	8.5 1339 aerated 1 hour 59 mins

WN

5-13-93 Old WQ lost/ due to technician error CH. dumped

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No.: 70003.10 TEST: (Static,) Flow-through, (Renewal) TEST ORGANISM: Beginning Date: 5/12/93 Time: 1645

Test Article: Effluent 2/6/2/17 Test Container: 1 L beaker Common Name: Fathead minnow Ending Date: 5/14/93 Time: 1615

Client: Rio A. Steel - Jacksonville Test Volume: 250 ml Scientific Name: P. promelas

EC Test No.: 38-05-12-93-553 Test Duration: 48 hrs Lot No.: 3-5/1-2 FH

Sample No.: AT3-430 Source: EA culture facility

Dilution No.: AT3-429 Acclimation: ____ or Age ≤ 14 days

DEAD TEST SELECTIONS

Con. or %	Test Container No.	Number of Live Organisms 0	24	48	72	96	ALL TESTS: Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppt) 0	24	48	72	96	OTHER 0	24	48	72	96
River control	A	10	10	10			20.1					8.5					8.2					660									
	B	10	9	9				20.0					8.8					8.0					734								
6.25%	A	10	10	10			20.0					8.5					8.2					704								
	B	10	10	10				20.0					8.8					8.3					740								
12.5%	A	10	10	10			20.0					8.5					8.2					704								
	B	10	10	10				20.0					8.7					8.3					738								
25%	A	10	10	10			20.1					8.5					8.2					684								
	B	10	10	10				20.0					8.7					8.3					766								
50%	A	10	10	10			20.2					8.5					8.2					636								
	B	10	10	10				20.1					8.7					8.3					650								
100%	A	10	10	10			20.2					8.5					8.1					539								
	B	10	10	10				20.0					8.8					8.3					528								
Instrument Number							90	90				2	1				90	90				90	90								
Correction Factor							±0.2	±0.2				8.8	8.5				7/10	7/10				0/1413	0/1412								
Time	1200	1442	1615				1445	1452				1455	1453				1445	1457				1455	1457								
Investigator	DGG	NN	KC				RSH	WN GM				RSH	WN GM				RSH	WN GM				RSH	WN GM								

AQUATIC ORGANISMS ACUTE TOXICITY TEST DATA SHEET

Project No.: 70003.10 TEST (Static, Flow-through, Renewal) TEST ORGANISM: Beginning Date: 5-12-93 Time: 1645
Test Article: effluent 211217 Test Container: 1 L beaker Common Name: fathead minnow Ending Date: 5-14-93 Time: 1615
Client: BethSteel- Lackawanna Test Volume: 250 ml Scientific Name: Pimephales
QC Test No.: SRG51293 - 553 Test Duration: 48 hrs Lot No.: 3-5/1-2 F11
Sample No.: AT3-430 Source: EA culture lab
Dilution No.: AT3-429 Acclimation: ____ or Age 14 days

Container %	Test Container No.	Number of Live Organisms 0	24	48	72	96	Temperature (C) 0	24	48	72	96	Dissolved Oxygen (mg/liter) 0	24	48	72	96	pH 0	24	48	72	96	Conductivity (µS°) Salinity (ppt) 0	24	48	72	96	OTHER 0	24	48	72	96
~~CXA~~	~~A~~																														
~~CXA~~	~~A~~																														
WW	B					1																									
River	A								20.5					8.2					2.8				216								
control	B							19.6					7.9					8.2				648								
6.25%	A								19.9					8.3					2.9				732								
	B							19.9					7.9					8.3				688								
12.5%	A								19.9					8.4					2.8				720								
	B							19.9					7.9					8.3				685								
25%	A								20.3					8.4					2.8				692								
	B							19.6					8.0					8.4				671								
50%	A								20.0					8.4					2.8				638								
	B							19.8					7.9					8.4				623								
100%	A								20.1					8.4					2.6				521								
	B							19.7					8.1					8.3				523								
Instrument Number								90	90				1.2					90	90			77	80							
Correction Factor								+1.2	0.2				8.8	8.8				7/10	7/10			0/1413	0/1413							
Time								1627	1620				1615	1624				1615	1624			1627	1621							
Investigator								BM WW	AD KC				WW BM	AD KC				BM WW	AD KC			WW BM	AD KC							

AQUATIC TOXICOLOGY LABORATORY BENCH SHEET

Project No.: 76003.10
Client: BethSteel - Lackawanna
Test No.: SR 05493-553

TEST SET-UP

TEST INITIATION

Date/Time	Initials	Activity
5/12/93 1435	RSH	Dilutions made
5/12/93 1435	RSH	Test Vessels Filled
1645 hrs		Transferred Organisms
1700 hrs		Head Counts

TEST CONCENTRATION SERIES

Test Conc. (% or mg/l)	Volume Test Material (ml)	Final Volume
LAB CONTROL	0 ml	500 ml
River CONTROL	0 ml	
6.25%	31.25	
12.5%	62.5	
25%	125	
50%	250	
100%	500	

Comments:

INTERMEDIATE DILUTION PREPARATION AND FEEDING

DILUTION PREPARATION

Day	Time	Initials	Sample/Diluent
0	1435	RSH	ATJ 430 / ATJ 429
1	1500	WW	ATJ 438 / ATJ 437
2			
3			
4			
5			
6			

FEEDING

Food: NA

Day	Time Initials	Time Initials	Time Initials	Amt.	Amt.	Amt.
0			NA			
1						
2						
3						
4						
5						
6						

Chain-of-Custody Record

EA® Engineering, Science, and Technology

EA Aquatic Toxicology Laboratories

EA Aquatic Toxicology Laboratories
15 Loveton Circle
Sparks (Baltimore), Maryland 21152
Telephone: (410) 771-4950
Fax: (410) 771-4204

Client: Empire Soils Inv / BSC Project No.: BTA-89-12B

NPDES Number: NY0001368 Client Purchase Order Number: 3712

State/City/County Collected: NY / Lackawanna / Erie Co

PLEASE READ SAMPLING INSTRUCTIONS ON BACK OF FORM

FOR OFFICE USE ONLY
Species to be tested:

___	D. magna	___	Menidia sp.
___	D. pulex	___	P. pugio
___	C. dubia	___	C. variegatus
___	P. promelas	___	M. bahia
___	Other	___	Other

A = Acute C = Chronic B = Bioaccumulation

Accession Number (office use only)	Grab	Composite	Collection Start Date/Time	Collection End Date/Time	Sample Description (including Site, Station Number, and Outfall Number)	Number/Volume of Container
AT3-429	X			5/11/93	Control Water	2 - 1 gal Jugs
AT3-430		X	5/10/93/1140	5/11/93/1200	216/217	1 - 1 gal Jug
AT3-431		X	"	"	223	1 - 1 gal Jug

Sampled By: [signature]	Date/Time: 5/11/93	Received By:	Date/Time
Sampler's Printed Name:	Title:	Relinquished By:	Date/Time
Relinquished By:	Date/Time	Received By Laboratory: [signature]	Date/Time: 5-12-93 1005

Was Sample Chilled During Collection? (Yes) No

Comments: Results Needed By May 27, 1993

Sample Shipped By: (circle)
Fed. Ex. Puro. UPS Airborne
Other: Next Day Air

Air Bill Number:

Sample Temperature at Receipt: 4.5 °C

Chain-of-Custody Rec

EA Engineering, Science, and Technology

Aquatic Toxicology Laboratories
Loveton Circle
Sparks (Baltimore), Maryland 21152
Telephone: (410) 771-4960
Fax: (410) 771-4204

EA Aquatic Toxicology Laboratories

FOR OFFICE USE ONLY
Species to be tested:

___	C. magna	___	Menidia sp.
___	D. pulex	___	P. pugio
___	C. dubia	___	C. variegatus
___	P. promelas	___	M. bahia
___	Other	___	Other

A = Acute C = Chronic B = Bioaccumulation

Client: Empire Soils Invest. Project No.: BIM-89-128

NPDES Number: NY0001368 Client Purchase Order Number: 3727

State/City/County Collected: NY/Lackawanna/Erie Co.

PLEASE READ SAMPLING INSTRUCTIONS ON BACK OF FORM

Accession Number (office use only)	Grab	Composite	Collection Start Date/Time	Collection End Date/Time	Sample Description (including Site, Station Number, and Outfall Number)	Number/Volume of Containe
AB-437	X			5/12/93	Control Water	2-1 gal J
AB-438		X	5/14/93/1345	5/12/93/1345	216/217	1-5 gal Jug
AB-439		X	11/11	11/1345	223	1 1 1 1

Sampled By: [signature] Date/Time: 5/14/93

Sampler's Printed Name: [illegible] Title: [illegible]

Relinquished By: [illegible] Date/Time [illegible]

Received By: [illegible] Date/Time [illegible]

Relinquished By: [illegible] Date/Time [illegible]

Received By Laboratory: [signature] Date/Time 5-13-93 1657

Was Sample Chilled During Collection? Yes/No

Comments: Results Needed by May 27, 1993

Sample Shipped By: (circle)

Fed. Ex. Post UPS Airborne

Other:

Air Bill Number: [illegible]

Sample Temperature at Receipt: 5.4°C

ATTACHMENT III

REPORT QUALITY ASSURANCE RECORD

REPORT QUALITY ASSURANCE RECORD

CLIENT Bethlehem Steel Corporation EA REPORT NO. 1335

PROJECT NUMBER 7000-10 TYPE ANALYSIS Acute

AUTHOR Virginia A. Sohn TEST ORGANISMS D. magna & P. promelas

REPORT CHECKLIST

QA/QC ITEM	REVIEWER	DATE
1. Samples collected, transported, and received according to study plan requirements.	Virginia A. Sohn	5/20/93
2. Samples prepared and processed according to study plan requirements.	Virginia A. Sohn	5/20/93
3. Data collected using calibrated equipment.	Virginia A. Sohn	5/20/93
4. Calculations checked: - Hand calculations checked	Not applicable	
- Documented and verified statistical procedure used.	Not applicable	
5. Data input/statistical analyses complete and correct.	Richard A. Connelly	5/20/93
6. Reported results and facts checked against original sources.	Richard A. Connelly	5/20/93
7. Data presented in figures and tables correct and in agreement with text.	Richard A. Connelly	5/20/93
8. Results revieved for compliance with study plan requirements.	William L. Armitage	21 May 93

	AUTHOR	DATE
9. Commentary reviewed and resolved.	Virginia A. Sohn	24 May 1993

10. All study plan and quality assurance/control requirements have been met and the report is approved:

William L. Armitage — PROJECT MANAGER — 21 May 1993 — DATE

Richard A. Connelly — Q.C. OFFICER — 5/20/93 — DATE

A. Blair — SENIOR TECHNICAL REVIEWER — 5/24/93 — DATE

ATTACHMENT L

SMOKES CREEK DATA

BETHLEHEM STEEL CORPORATION

LACKAWANNA, NEW YORK

Table L-1
Analytical Results for Smokes Creek Surface Water - Volatile Organic Compounds (VOCs)
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID:	Federal Ambient Water Quality Criteria [1]		SS-1	SS-2	SS-3	SS-4(SS-3 DUP)	SC-1	SC-1V	SC-2	SC-3	SC-3 DUP	SC-2V	SC-4	SC-3V
Lab ID:			SS-1	SS-2	SS-3	SS-4	SC-1	SC-1V	SC-2	SC-3	SC-8	SC-2V	SC-4	SC-3V
Date Sampled:			06/19/91	06/19/91	06/19/91	06/19/91	10/27/94	11/18/94	10/27/94	10/28/94	10/28/94	11/18/94	10/28/94	11/18/94
Sample Depth:							0-6"	Mid-Depth	Mid-Depth	6.2' BWS	Mid-Depth	Mid-Depth	0-6"	Mid-Depth
Matrix:			Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
VOCs (ug/L)	CMC[2]	CCC[3]												
Acrylonitrile	7550	2600	50 U	50 U	50 U	50 U	50 U	0.5 U	50 U	50 U	50 U	0.5 U	50 U	0.5 U
Benzene	5300	NC	5 U	5 U	5 U	5 U	5 U	4	5 U	5 U	5 U	1	5 U	1
Bromodichloromethane	11000	NC	5 U	5 U	5 U	5 U	5 U	0.4 J	5 U	5 U	5 U	0.5 U	5 U	0.5 U
Bromoform	NC	NC	5 U	5 U	5 U	5 U	5 U	R	5 U	5 U	5 U	R	5 U	5 J
Bromomethane	NC	NC	10 U	10 U	10 U	10 U	10 U	0.5 UJ	10 U	10 U	10 U	0.5 UJ	10 U	0.5 UJ
Carbon disulfide	NC	NC	NR	NR	NR	NR	5 U	0.5 U	5 U	5 U	5 U	0.5 U	5 U	0.5 U
Carbon tetrachloride	35200	NC	5 U	5 U	5 U	5 U	5 U	0.5 U	5 U	5 U	5 U	0.5 U	5 U	0.5 U
Chlorobenzene	250	50	5 U	5 U	5 U	5 U	1 U	0.5 U	5 U	5 U	5 U	0.5 U	5 U	0.5 U
Chloroethane	NC	NC	10 U	10 U	10 U	10 U	10 U	0.5 U	10 U	10 U	10 U	0.5 U	10 U	0.5 U
2-Chloroethyl vinyl ether	NC	NC	5 U	5 U	5 U	5 U	R	0.5 U	R	R	R	0.5 U	R	0.5 U
Chloroform	NC	NC	10 U	5 U	5 U	5 U	5 U	0.7	5 U	5 U	5 U	0.4 J	5 U	0.5 U
Chloromethane	NC	NC	5 U	10 U	10 U	10 U	10 U	0.5 U	10 U	10 U	10 U	0.5 U	10 U	0.5 U
Dibromochloromethane	11000	NC	5 U	5 U	5 U	5 U	5 U	0.5 U	5 U	5 U	5 U	0.5 U	5 U	1
Dichlorodifluoromethane	11000	NC	5 U	5 U	5 U	5 U	NR	0.5 U	NR	NR	NR	0.5 U	NR	0.5 U
1,1-Dichloroethane	NC	NC	5 U	5 U	5 U	5 U	5 U	0.5 U	5 U	5 U	5 U	0.5 U	5 U	0.5 U
1,2-Dichloroethane	118000	2000	10 U	10 U	10 U	10 U	5 U	0.5 U	5 U	5 U	5 U	0.5 U	5 U	0.5 U
1,1-Dichloroethene	NC	NC	5 U	5 U	5 U	5 U	5 U	0.5 U	5 U	5 U	5 U	0.5 U	5 U	0.5 U
trans-1,2-Dichloroethene	11600	NC	5 U	5 U	5 U	5 U	5 U	0.5 U	5 U	5 U	5 U	0.5 U	5 U	0.5 U
Dichlorofluoromethane	NC	NC	NR	NR	NR	NR	10 U	NR	10 U	10 U	10 U	NR	10 U	NR
1,2-Dichloropropane	NC	NC	5 U	5 U	5 U	5 U	5 U	0.5 U	5 U	5 U	5 U	0.5 U	5 U	0.5 U
cis-1,3-Dichloropropene	6060	244	5 U	5 U	5 U	5 U	5 U	0.5 U	5 U	5 U	5 U	0.5 U	5 U	0.5 U
trans-1,3-Dichloropropene			5 U	5 U	5 U	5 U	5 U	0.5 U	5 U	5 U	5 U	0.5 U	5 U	0.5 U
Ethylbenzene	32000	NC	5 U	5 U	5 U	5 U	1 U	0.5 U	5 U	5 U	5 U	0.5 U	5 U	0.5 U
Methylene chloride	NC	NC	10 U	10 U	10 U	10 U	14	0.2 UJ	10	6.8 J	10 U	0.2 UJ	10 U	1 U
Methyl ethyl ketone	NC	NC	NR	NR	NR	NR	50 U	0.5 U	50 U	50 U	50 U	0.5 U	50 U	0.5 U
1,1,1,2-Tetrachloroethane	9320	2400	5 U	5 U	5 U	5 U	5 U	0.5 U	5 U	5 U	5 U	0.5 U	5 U	0.5 U
1,1,2,2-Tetrachloroethane	9320	NC	5 U	5 U	5 U	5 U	5 U	0.5 U	5 U	5 U	5 U	0.5 U	5 U	0.5 U
Tetrachloroethene	NC	NC	5 U	5 U	5 U	5 U	5 U	0.5 U	5 U	5 U	5 U	0.5 U	5 U	0.5 U
Toluene	17500	NC	5 U	5 U	5 U	5 U	5 U	0.2 J	5 U	5 U	5 U	0.5 U	5 U	0.5 U
1,1,1-Trichloroethane	18000	NC	5 U	5 U	5 U	5 U	5 U	0.5 U	5 U	5 U	5 U	0.5 U	5 U	0.5 U
1,1,2-Trichloroethane	18000	9400	5 U	5 U	5 U	5 U	5 U	0.5 U	5 U	5 U	5 U	0.5 U	5 U	0.5 U
Trichlorofluoromethane	NC	NC	5 U	5 U	5 U	5 U	5 U	0.5 U	5 U	5 U	5 U	0.5 U	5 U	0.5 U
Trichloroethene	45000	21900	5 U	5 U	5 U	5 U	5 U	0.5 U	5 U	5 U	5 U	0.5 U	5 U	0.5 U
Vinyl chloride	NC	NC	10 U	10 U	10 U	10 U	10 U	0.5 U	10 U	10 U	10 U	0.5 U	10 U	0.5 U
Xylenes, total	NC	NC	5 U	5 U	5 U	5 U	1 U	0.2 J	5 U	5 U	5 U	0.5 U	5 U	0.5 U

NOTES:
BOLD - Above USEPA Criteria Maximum Concentration.
Italic - Above USEPA Criteria Continuous Concentration.
U = Not detected at the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
NR = No analysis performed.
J = The concentration was detected at a value below the MDL.
R = The sample results were rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte could not be determined.
NC = No criteria.

(1) Values are Federal Ambient Water Quality Criteria for the protection of aquatic life in freshwater in ug/L.
(2) Criteria Maximum Concentration - (acute).
(3) Criteria Continuous Concentration - (chronic).

Table L-1
Analytical Results for Smokes Creek Surface Water - Volatile Organic Compounds (VOCs)
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID: / Lab ID: / Date Sampled: / Sample Depth: / Matrix:	Federal Ambient Water Quality Criteria [1]		SC-5 (BKG) SC-5 10/28/94 4.0' BWS Water	SCS-3 SCS-3 11/15/94 Surface Seeps Water	SCS-4 SCS-4 11/15/94 Surface Seeps Water	SC-1N 30247 07/25/95 1.5' BGS Water	SC-1S 30248 07/25/95 4.0' BGS Water	SC-2N 30249 07/25/95 2.9' BGS Water	SC-2S 30250 07/25/95 1.5' BGS Water	SC-2S DUP 30253 07/25/95 1.5' BGS Water	SC-3 30458 07/27/95 6.2' BWS Water	SC-5 30459 07/27/95 4.0' BWS Water	SC-6N 30251 07/25/95 2.3' BGS Water	SC-6S 30252 07/25/95 2.3' BGS Water
VOCs (ug/L)	CMC[2]	CCC[3]												
Acrylonitrile	7550	2600	50 U	0.5 U	0.5 U	R	R	R	R	10 U	R	R	R	R
Benzene	5300	NC	5 U	3	4	0.6	0.4 J	2.1	1.1	1.2	0.5 U	0.5 U	0.8	0.5
Bromodichloromethane	11000	NC	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromoform	NC	NC	5 U	R	R	0.9	2.1	1.6	1.6	1.7	2.1	0.5 U	1.8	1.4
Bromomethane	NC	NC	10 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon disulfide	NC	NC	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon tetrachloride	35200	NC	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chlorobenzene	250	50	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroethane	NC	NC	10 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Chloroethyl vinyl ether	NC	NC	R	0.5 U	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	NC	NC	5 U	0.5 U	0.5 U	0.4 J	0.4 J	0.5	0.5	0.5	8.8	5.5	0.4 J	0.5 J
Chloromethane	NC	NC	10 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	11000	NC	5 U	0.5 U	0.5 U	0.4 J	0.4 J	0.5	0.5	0.5	0.5 J	0.5 U	0.5	0.5
Dichlorodifluoromethane	11000	NC	NR	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	NC	NC	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethane	118000	2000	5 U	2	3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	NC	NC	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,2-Dichloroethene	11600	NC	5 U	1	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dichlorofluoromethane	NC	NC	10 U	NR	NR	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	NC	NC	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
cis-1,3-Dichloropropene	6060	244	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene			5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Ethylbenzene	32000	NC	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene chloride	NC	NC	10 U	0.41 UJ	0.21 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methyl ethyl ketone	NC	NC	50 U	0.5 U	0.5 U	R	R	R	R	5 U	R	R	R	R
1,1,1,2-Tetrachloroethane	9320	2400	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	9320	NC	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Tetrachloroethene	NC	NC	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	17500	NC	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,1-Trichloroethane	18000	NC	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	18000	9400	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichlorofluoromethane	NC	NC	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene	45000	21900	5 U	0.41 J	0.41 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Vinyl chloride	NC	NC	10 U	0.5 U	2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Xylenes, total	NC	NC	5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

NOTES:
BOLD - Above USEPA Criteria Maximum Concentration.
Italic - Above USEPA Criteria Continuous Concentration.
U = Not detected at the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
NR = No analysis performed.
J = The concentration was detected at a value below the MDL.
R = The sample results were rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte could not be determined.
NC = No criteria.

(1) Values are Federal Ambient Water Quality Criteria for the protection of aquatic life in freshwater in ug/L.
(2) Criteria Maximum Concentration - (acute).
(3) Criteria Continuous Concentration - (chronic).

Table L-1
Analytical Results for Smokes Creek Surface Water - Semi-Volatile Organic Compounds (SVOCs)
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID:	Federal Ambient Water Quality Criteria [1]		SS-1	SS-2	SS-3	SS-4 (SS-3DUP)	SC-1	SC-2	SC-3	SC-3 DUP	SC-4	SC-5 (BKG)
Lab ID:			SS-1	SS-2	SS-3	SS-4	SC-1	SC-2	SC-3	SC-8	SC-4	SC-5
Date Sampled:			06/19/91	06/19/91	06/19/91	06/19/91	10/27/94	10/27/94	10/28/94	10/28/94	10/28/94	10/28/94
Sample Depth:							0-6"	Mid-Depth	6.2' BWS	Mid-Depth	0-6"	4.0' BWS
Matrix:			Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
SVOCs (ug/L)	CMC[2]	CCC[3]										
Acenapthene	1700	520	NR	NR	NR	NR	10 U	10 U	10 U	10 U	10 U	10 U
Acenaphthylene	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Anthracene	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo (a) anthracene	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo (a) pyrene	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo (b) fluoranthene	NC	NC	NR	NR	NR	NR	10 U	10 U	10 U	10 U	10 U	10 U
Benzo (ghi) perylene	NC	NC	NR	NR	NR	NR	10 U	10 U	10 U	10 U	10 U	10 U
Benzo (k) fluoranthene	NC	NC	NR	NR	NR	NR	10 U	10 U	10 U	10 U	10 U	10 U
bis (2-Chloroethyl) ether	NC	NC	10 U	10 U	10 U	10 U	NR	NR	NR	NR	NR	NR
bis (2-Ethylhexyl) phthalate	400	360	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Butyl benzyl phthalate	940	3	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Chloro-3-methylphenol	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Chloronaphthalene	1600	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chrysene	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Di-n-butyl phthalate	940	3	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichlorobenzene	NC	NC	10 U	10 U	10 U	10 U	1 U	10 U	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	NC	NC	5 U	5 U	5 U	5 U	1 U	10 U	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	NC	NC	10 U	10 U	10 U	10 U	1 U	10 U	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	2020	365	10 U	NR	NR	NR	10 U	10 U	10 U	10 U	10 U	10 U
Diethyl phthalate	940	3	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	*5.7 J*
2,4-Dimethylphenol	2120	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dimethyl phthalate	940	3	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Di-n-octyl phthalate	940	3	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibenz (a,h) anthracene	NC	NC	NR	NR	NR	NR	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrotoluene	330	230	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,6-Dinitrotoluene	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene	3980	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluorene	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorobenzene	6	3.68	10 U	10 U	10 U	10 U	NR	NR	NR	NR	NR	NR
Hexachlorocyclobutadiene	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorobutadiene	90	9.3	NR	NR	NR	NR	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
Hexachlorocyclopentadiene	7	5.2	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachloroethane	980	540	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Indeno (1,2,3-cd) pyrene	NC	NC	NR	NR	NR	NR	10 U	10 U	10 U	10 U	10 U	10 U
Isophorone	117000	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Methylphenol	NC	NC	10 U	10 U	10 U	10 U	10 UJ	10 UJ	10 U	10 U	10 U	10 U
Naphthalene	2300	620	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Pentachlorophenol	20	13	50 U	50 U	50 U	50 U	50 U	50 U	50 U	51 U	50 U	51 U
Phenanthrene	30	6.3	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Phenol	10200	2560	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Pyrene	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Pyridine	NC	NC	10 U	10 U	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
2,3,4,6-Tetrachlorophenol	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2,4-Trichlorobenzene	250	50	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	100	63	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4,6-Trichlorophenol	NC	970	10 U	10 U	10 U	10 U	NR	NR	NR	NR	NR	NR
3-Methylphenol	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Methylphenol	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Methyl-4,6-dinitrophenol	NC	NC	50 U	50 U	50 U	50 U	50 U	50 U	50 U	51 U	50 U	51 U

NOTES:
BOLD - Above USEPA Criteria Maximum Concentration.
Italic - Above USEPA Criteria Continuous Concentration.
U = Not detected at the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
B = Result between MDL and RL
NR = No analysis performed.
J = The concentration was detected at a value below the MDL.
R = The sample results were rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte could not be determined.
NC = No criteria.
(1) Values are Federal Ambient Water Quality Criteria for the protection of aquatic life in freshwater in ug/L.
(2) Criteria Maximum Concentration - (acute).
(3) Criteria Continuous Concentration - (chronic).

Table L-1
Analytical Results for Smokes Creek Surface Water - Semi-Volatile Organic Compounds (SVOCs)
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID: / Lab ID: / Date Sampled: / Sample Depth: / Matrix:	Federal Ambient Water Quality Criteria [1]		SC-1N 30247 07/25/95 1.5' BGS Water	SC-1S 30248 07/25/95 4.0' BGS Water	SC-2N 30249 07/25/95 2.9' BGS Water	SC-2S 30250 07/25/95 1.5' BGS Water	SC-2S DUP 30253 07/25/95 1.5' BGS Water	SC-3 30458 07/27/95 6.2' BWS Water	SC-5 30459 07/27/95 4.0' BWS Water	SC-6N 30251 07/25/95 2.3' BGS Water	SC-6S 30252 07/25/95 2.3 'BGS Water
SVOCs (ug/L)	CMC[2]	CCC[3]									
Acenapthene	1700	520	0.2 U	0.2 UJ	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 U
Acenaphthylene	NC	NC	0.2 U	0.2 UJ	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 U
Anthracene	NC	NC	0.2 U	0.2 UJ	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 U
Benzo (a) anthracene	NC	NC	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 U
Benzo (a) pyrene	NC	NC	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 U
Benzo (b) fluoranthene	NC	NC	0.2 UJ	0.2 UJ	0.2 UJ	0.2 UJ	0.2 U	0.2 UJ	0.2 UJ	0.2 UJ	0.2 UJ
Benzo (ghi) perylene	NC	NC	0.2 UJ	0.2 UJ	0.2 UJ	0.2 UJ	0.2 U	0.2 UJ	0.2 UJ	0.2 UJ	0.2 UJ
Benzo (k) fluoranthene	NC	NC	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 U
bis (2-Chloroethyl) ether	NC	NC	1 UJ	R	R	R	1 U	1 UJ	1 UJ	1 UJ	R
bis (2-Ethylhexyl) phthalate	400	360	1.1 UJ	17 B	2.5 J	10 UJ	3.6 J	7.8 U	24 B	9.8 J	6.7 B
Butyl benzyl phthalate	940	3	1 U	1 U	0.1 J	5 UJ	0.2 J	0.2 J	0.2 J	0.1 J	0.2 J
4-Chloro-3-methylphenol	NC	NC	5 U	R	5 UJ	5 UJ	5 U	5 U	5 U	5 UJ	5 U
2-Chloronaphthalene	1600	NC	0.2 U	0.2 UJ	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 U
Chrysene	NC	NC	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 U
Di-n-butyl phthalate	940	3	1.2 J	1 J	0.6 J	5 UJ	0.4 J	0.3 UJ	0.5 UJ	0.6 J	0.4 J
1,2-Dichlorobenzene	NC	NC	1 UJ	R	R	R	1 U	0.1 J	1 UJ	1 UJ	R
1,3-Dichlorobenzene	NC	NC	1 UJ	R	R	R	1 U	0.1 J	1 UJ	1 UJ	R
1,4-Dichlorobenzene	NC	NC	1 UJ	R	R	R	1 U	0.1 J	1 UJ	0.1 J	R
2,4-Dichlorophenol	2020	365	5 U	R	5 UJ	R	5 U	5 U	5 U	5 UJ	5 UJ
Diethyl phthalate	940	3	0.5 J	5 UJ	0.2 J	5 UJ	0.2 J	0.2 J	0.2 J	0.2 J	0.4 J
2,4-Dimethylphenol	2120	NC	5 U	R	5 UJ	R	5 U	5 U	5 U	5 UJ	5 UJ
Dimethyl phthalate	940	3	5 U	5 UJ	5 U	5 UJ	5 U	5 U	5 U	5 UJ	5 U
Di-n-octyl phthalate	940	3	5 U	5 U	5 U	5 UJ	0.2 J	5 U	5 U	0.3 J	5 U
Dibenz (a,h) anthracene	NC	NC	0.2 UJ	0.2 UJ	0.2 UJ	0.2 UJ	0.2 U	0.2 UJ	0.2 UJ	0.2 UJ	0.2 UJ
2,4-Dinitrotoluene	330	230	1 U	1 UJ	1 U	1 UJ	1 U	1 U	1 U	1 UJ	1 U
2,6-Dinitrotoluene	NC	NC	1 U	1 UJ	1 U	1 UJ	1 U	0.2 J	1 U	1 UJ	1 U
Fluoranthene	3980	NC	0.2 U	0.2 UJ	0.2 U	0.2 UJ	0.2 U	0.2 U	0.1 J	0.2 UJ	0.2 U
Fluorene	NC	NC	0.2 U	0.2 UJ	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 U
Hexachlorobenzene	6	3.68	1 U	1 UJ	1 U	5 UJ	1 U	1 U	1 U	1 UJ	1 U
Hexachlorocyclobutadiene	NC	NC	NR	NR	NR	NR	NR	NR	NR	NR	NR
Hexachlorobutadiene	90	9.3	5 U	R	5 UJ	R	5 U	5 U	5 U	5 UJ	5 U
Hexachlorocyclopentadiene	7	5.2	2 U	2 UJ	2 U	2 UJ	2 U	2 U	2 U	2 UJ	2 U
Hexachloroethane	980	540	1 UJ	R	R	R	1 U	1 UJ	1 UJ	1 UJ	R
Indeno (1,2,3-cd) pyrene	NC	NC	0.2 UJ	0.2 UJ	0.2 UJ	0.2 UJ	0.2 U	0.2 UJ	0.2 UJ	0.2 UJ	0.2 UJ
Isophorone	117000	NC	1 U	R	1 UJ	R	1 U	1 U	1 U	1 UJ	1 UJ
2-Methylphenol	NC	NC	5 UJ	R	R	R	5 U	5 UJ	5 UJ	5 UJ	R
Naphthalene	2300	620	0.4	R	0.6 UJ	R	0.5	0.2 U	0.4	1.3 J	0.2 UJ
Pentachlorophenol	20	13	2.5 U	2.5 UJ	2.5 U	2 UJ	2.5 U	2.5 U	2.5 U	2.5 UJ	2.5 U
Phenanthrene	30	6.3	0.2 U	0.2 UJ	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 U
Phenol	10200	2560	5 UJ	R	R	R	5 U	5 UJ	5 UJ	5 UJ	R
Pyrene	NC	NC	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 U
Pyridine	NC	NC	1 U	1 U	1 U	1 UJ	1 U	1 U	1 U	1 UJ	1 U
2,3,4,6-Tetrachlorophenol	NC	NC	5 U	5 U	5 U	5 UJ	5 U	5 U	5 U	5 UJ	5 U
1,2,4-Trichlorobenzene	250	50	1 U	R	1 UJ	R	1 U	1 U	1 U	1 UJ	1 UJ
2,4,5-Trichlorophenol	100	63	5 U	5 UJ	5 U	5 UJ	5 U	5 U	5 U	5 UJ	5 U
2,4,6-Trichlorophenol	NC	970	5 U	5 UJ	5 U	5 UJ	5 U	5 U	5 U	5 UJ	5 U
3-Methylphenol	NC	NC	5 U	5 U	5 U	5 UJ	5 U	5 U	5 U	5 UJ	5 U
4-Methylphenol	NC	NC	5 UJ	R	R	R	5 U	5 UJ	5 UJ	5 UJ	R
2-Methyl-4,6-dinitrophenol	NC	NC	5 U	5 UJ	5 U	5 UJ	5 U	5 U	5 U	5 UJ	5 U

NOTES:
BOLD - Above USEPA Criteria Maximum Concentration.
Italic - Above USEPA Criteria Continuous Concentration.
U = Not detected at the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
B = Result between MDL and RL
NR = No analysis performed.
J = The concentration was detected at a value below the MDL.
R = The sample results were rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte could not be determined.
NC = No criteria.
(1) Values are Federal Ambient Water Quality Criteria for the protection of aquatic life in freshwater in ug/L.
(2) Criteria Maximum Concentration - (acute).
(3) Criteria Continuous Concentration - (chronic).

Table L-1
Analytical Results for Smokes Creek Surface Water - TAL Metals, Cyanide and General Chemistry
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID: Lab ID: Date Sampled: Sample Depth: Matrix:	Federal Ambient Water Quality Criteria [1]		SS-1 SS-1 06/19/91 Water	SS-2 SS-2 06/19/91 Water	SS-3 SS-3 06/19/91 Water	SS-4 (SS-3DUP) SS-4 06/19/91 Water	SC-1 SC-1 10/27/94 0-6" Water	SC-2 SC-2 10/27/94 Mid-Depth Water	SC-3 SC-3 10/28/94 6.2' BWS Water	SC-3 DUP SC-8 10/28/94 Mid-Depth Water	SC-4 SC-4 10/28/94 0-6" Water	SC-5 (BKG) SC-5 10/28/94 4.0' BWS Water
Metals (ug/L)	CMC[2]	CCC[3]										
Antimony	88	30	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U	60 U
Arsenic	360	190	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Barium	NC	NC	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
Cadmium[4,5]	4.4	2.3	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Calcium	NC*		46000	47000	48000	47000	44100	44500 J	42000 J	42400	41800 J	54900 J
Chromium	16	11	10 U	10 U	10 U	10 U	*14.4*	10 U	10 U	10 U	10 U	10 U
Lead [6,7]	67	2.6	*5.2*	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Mercury	2.4	0.01	0.2 UJ	0.2 UJ	0.2 UJ	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Nickel [8,9]	475	53	40 U	40 U	40 U	40 U	40 U	40 U	40 U	40 U	40 U	40 U
Potassium	NC*		5000 U	5000 U	5000 U	5000 U	5000 U	5000 U	5000 U	5000 U	5000 U	5000 U
Selenium	20	5	5 U	5 U	5 U	5 U	5 U	*7.3*	*6.3* J	*5.2* J	*6.9*	5 U
Silver [10]	3	0.12	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Sodium	NC*		21000	24000	20000	19000	31500	37800	39300 J	40100 J	38900	38100 J
Thallium	1400	40	NR	NR	NR	NR	10 U	10 U	10 U	10 U	10 U	10 U
Cyanide	22	5.2	10 U	10 U	10 U	10 U	NR	NR	NR	NR	NR	NR
General Analytical												
Alkalinity ($CaCO_3$)(mg/L)	NC	20[11]	*98*	*97*	*94*	*93*	NR	NR	NR	NR	NR	NR
Alkalinity (total)(mg/L)	NC	NC	98	97	94	93	103	110	108	108	107	139
CNLIQ (mg/L)	NC	NC	NR	NR	NR	NR	0.022	0.041	0.043	0.044	0.036	0.01 U
Conductivity (umhos/cm)	NC	NC	NR	NR	NR	NR	556	578	600	584	573	648
PHLIQ (su)	NC	NC	NR	NR	NR	NR	7.6 J	7.6 J	7.6 J	7.7 J	7.7 J	7.8 J
TOC (mg/L)	NC	NC	3.4	2.6	3.3	3.7	4.9 J	4.8 J	5.6 J	4.2 J	4.1 J	5.9 J
Chloride (mg/L)	860[11]	230[11]	51	54	49	49	67.4	74.4	76.2	75.3	73.6	73.6
TOX (ug/L)	NC	NC	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Phenolics (ug/L)	NC	NC	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Total Solids (mg/L)	NC	NC	NR	NR	NR	NR	319	345	325	243	322	415
Total Suspended Solids (mg/L)	NC	NC	NR	NR	NR	NR	9	7	5	5 U	5 U	6
Total Dissolved Solids (mg/L)	NC	NC	250	270	300	280	NR	NR	NR	NR	NR	NR
Sulfate (mg/L)	NC	NC	26	28	24	26	43.3	42.5	41.6	40.6	39.1	65

NOTES:
BOLD - Above USEPA Criteria Maximum Concentration.
Italic - Above USEPA Criteria Continuous Concentration.
U = Not detected at the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
B = Result between MDL and RL
NR = No analysis performed.
J = The concentration was detected at a value below the MDL.
NC = No criteria.
* = The analyte is an essential nutrient.
(1) Values are Federal Ambient Water Quality Criteria for the protection of aquatic life in freshwater in ug/L.
(2) Criteria Maximum Concentration - (acute).
(3) Criteria Continuous Concentration - (chronic).
(4) CMC criterion is hardness dependent using the following formula: CMC = exp{1.128{ln(hardness)}+(-3.6867}*(1.136672-[ln(hardness)*0.041838]
Total alkalinity concentrations were averaged to determine hardness = 102.9 mg/L.
(5) CCC criterion is hardness dependent using the following formula: CCC = exp{0.7852{ln(hardness)}+(-2.715}*(1.101672-[ln(hardness)*0.041838]
Total alkalinity concentrations were averaged to determine hardness = 102.9 mg/L.
(6) CMC criterion is hardness dependent using the following formula: CMC = exp{1.273{ln(hardness)}+(-1.46}*(1.46203-[ln(hardness)*0.145712]
Total alkalinity concentrations were averaged to determine hardness = 102.9 mg/L.
(7) CCC criterion is hardness dependent using the following formula: CCC = exp{1.273{ln(hardness)}+(-4.705}*(1.46203-[ln(hardness)*0.145712]
Total alkalinity concentrations were averaged to determine hardness = 102.9 mg/L.
(8) CMC criterion is hardness dependent using the following formula: CMC = exp{0.846{ln(hardness)}+2.255}*0.998
Total alkalinity concentrations were averaged to determine hardness = 102.9 mg/L.
(9) CCC criterion is hardness dependent using the following formula: CCC = exp{0.846{ln(hardness)}+0.0584*0.997
Total alkalinity concentrations were averaged to determine hardness = 102.9 mg/L.
(10) CMC criterion is hardness dependent using the following formula: CMC = exp{1.72{ln(hardness)}+(-6.52)}*0.85
Total alkalinity concentrations were averaged to determine hardness = 102.9 mg/L.
(11) Value based on the National Recommended Water Quality Criteria (EPA, 1999d)

Table L-1
Analytical Results for Smokes Creek Surface Water - TAL Metals, Cyanide and General Chemistry
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID: Lab ID: Date Sampled: Sample Depth: Matrix:	Federal Ambient Water Quality Criteria [1]		SC-1N 30247 07/25/95 1.5' BGS Water	SC-1S 30248 07/25/95 4.0' BGS Water	SC-2N 30249 07/25/95 2.9' BGS Water	SC-2S 30250 07/25/95 1.5' BGS Water	SC-2S DUP 30253 07/25/95 1.5' BGS Water	SC-3 30458 07/27/95 6.2' BWS Water	SC-5 30459 07/27/95 4.0' BWS Water	SC-6N 30251 07/25/95 2.3' BGS Water	SC-6S 30252 07/25/95 2.3 'BGS Water
Metals (ug/L)	CMC[2]	CCC[3]									
Antimony	88	30	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
Arsenic	360	190	4.6 U	7 B	5.4 B	6.5 B	7.4 B	4.6 U	4.6 U	6.2 B	4.6 U
Barium	NC	NC	29.7 B	29.9 B	27.8 B	26.1 B	28 B	29.1 B	50.2 B	27.8 B	28.3 B
Cadmium[4,5]	4.4	2.3	*4.1* B	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U
Calcium	NC•		49800	49000	51000	49900	51900	54200	60700	49000	48800
Chromium	16	11	*11.5* J	*21.2* J	*16* J	5.7 UJ	*19.4* J	1 B	1 B	5.7 UJ	5.7 UJ
Lead [6,7]	67	2.6	1 U	1 U	1 U	1 U	*4.3* J	2.7 U	2.7 U	1 U	1 J
Mercury	2.4	0.01	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Nickel [8,9]	475	53	10.2 U	16.9 B	16.8 B	10.2 U	10.2 U	10.2 U	10.2 U	10.2 U	10.2 U
Potassium	NC•		2600 B	2530 B	2740 B	2760 B	2910 B	2830 B	3610 B	2630 B	2560 B
Selenium	20	5	4.2 B	3 UJ	*5.8*	3.8 J	3 U	3.8 J	3 UJ	3.1 J	3 U
Silver [10]	3	0.12	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U	8.3 U
Sodium	NC•		39700	37300	48600	46300	48600	55400	83200	37800	37300
Thallium	1400	40	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U
Cyanide	22	5.2	10 U	10 U	*19*	*18*	*17*	*18*	10 U	10 U	10 U
General Analytical											
Alkalinity ($CaCO_3$)(mg/L)	NC	20[11]	NR	NR	NR	NR	NR	NR	NR	NR	NR
Alkalinity (total)(mg/L)	NC	NC	96	93	98	100	97	110	120	92	92
CNLIQ (mg/L)	NC	NC	NR	NR	NR	NR	NR	NR	NR	NR	NR
Conductivity (umhos/cm)	NC	NC	NR	NR	NR	NR	NR	NR	NR	NR	NR
PHLIQ (su)	NC	NC	NR	NR	NR	NR	NR	NR	NR	NR	NR
TOC (mg/L)	NC	NC	5.8	6.7	4.9	6.6	7.1	4.9	6.6	4.8	8.4
Chloride (mg/L)	860[11]	230[11]	80	78	93	93	93	100	120	78	80
TOX (ug/L)	NC	NC	38	33	33	27	51	47	34	22	62
Phenolics (ug/L)	NC	NC	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Total Solids (mg/L)	NC	NC	NR	NR	NR	NR	NR	NR	NR	NR	NR
Total Suspended Solids (mg/L)	NC	NC	NR	NR	NR	NR	NR	NR	NR	NR	NR
Total Dissolved Solids (mg/L)	NC	NC	380	360	400	390	390	350	410	340	350
Sulfate (mg/L)	NC	NC	38	38	41	49	44	43	57	38	41

NOTES:
BOLD - Above USEPA Criteria Maximum Concentration.
Italic - Above USEPA Criteria Continuous Concentration.
U = Not detected at the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
B = Result between MDL and RL
NR = No analysis performed.
J = The concentration was detected at a value below the MDL.
NC = No criteria.
• = The analyte is an essential nutrient.
(1) Values are Federal Ambient Water Quality Criteria for the protection of aquatic life in freshwater in ug/L.
(2) Criteria Maximum Concentration - (acute).
(3) Criteria Continuous Concentration - (chronic).
(4) CMC criterion is hardness dependent using the following formula: CMC = exp{1.128{ln(hardness)}+(-3.6867}*(1.136672-[ln(hardness)*0.041838]
Total alkalinity concentrations were averaged to determine hardness = 102.9 mg/L.
(5) CCC criterion is hardness dependent using the following formula: CCC = exp{0.7852{ln(hardness)}+(-2.715}*(1.101672-{ln(hardness)*0.041838]
Total alkalinity concentrations were averaged to determine hardness = 102.9 mg/L.
(6) CMC criterion is hardness dependent using the following formula: CMC = exp{1.273{ln(hardness)}+(-1.46}*(1.46203-[ln(hardness)*0.145712]
Total alkalinity concentrations were averaged to determine hardness = 102.9 mg/L.
(7) CCC criterion is hardness dependent using the following formula: CCC = exp{1.273{ln(hardness)}+(-4.705}*(1.46203-[ln(hardness)*0.145712]
Total alkalinity concentrations were averaged to determine hardness = 102.9 mg/L.
(8) CMC criterion is hardness dependent using the following formula: CMC = exp{0.846{ln(hardness)}+2.255}*0.998
Total alkalinity concentrations were averaged to determine hardness = 102.9 mg/L.
(9) CCC criterion is hardness dependent using the following formula: CCC = exp{0.846{ln(hardness)}+0.0584*0.997
Total alkalinity concentrations were averaged to determine hardness = 102.9 mg/L.
(10) CMC criterion is hardness dependent using the following formula: CMC = exp{1.72{ln(hardness)}+(-6.52)}*0.85
Total alkalinity concentrations were averaged to determine hardness = 102.9 mg/L.
(11) Value based on the National Recommended Water Quality Criteria (EPA, 1999d)

Table L-2
Analytical Results for Smokes Creek Sediment - Volatile Organic Compounds (VOCs)
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID:	NOAA	SC-1	SC-2-CORE	SC-2-DREDGE	SC-3	SC-4	SC-4 DUP	SC-5 (BKG)	SC-1S/N	SC-1S/S
Lab ID:	Screening Quick	C4K020072-001	C4K070004-003	C4K070004-004	C4K020072-002	C4K020072-003	C4K020072-005	C4K020072-004	9501.674	9501.674
Date Sampled:	Reference Tables	10/31/94	11/04/94	11/04/94	10/31/94	10/31/94	10/31/94	10/31/94	07/25/95	07/25/95
Sample Depth:	(SQRT's)	0-6"	0-8'	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"
Matrix:	(1999)	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
VOCs (ug/kg)	AET									
Acrylonitrile	NC	74 UJ	110 U	110 U	180 UJ	93 UJ	97 UJ	120 UJ	170 U	170 U
Benzene	NC	7.4 U	11 U	11 U	18 U	9.3 U	9.7 U	12 U	9 U	7 J
Bromodichloromethane	NC	7.4 U	11 U	11 U	18 U	9.3 U	9.7 U	12 U	9 U	8 U
Bromoform	NC	7.4 U	11 UJ	11 UJ	18 U	9.3 U	9.7 U	12 U	9 U	8 U
Bromomethane	NC	15 UJ	21 U	22 U	35 UJ	19 UJ	19 UJ	23 UJ	9 U	8 U
Carbon disulfide	NC	7.4 U	6.2 J	11 U	37	4.6 J	9.7 U	12 U	9 U	8 U
Carbon tetrachloride	NC	7.4 U	11 U	11 U	18 U	9.3 U	9.7 U	12 U	9 U	8 U
Chlorobenzene	NC	7.4 U	11 U	11 U	18 U	9.3 U	9.7 U	12 U	9 U	2 J
Chloroethane	NC	15 U	21 UJ	22 UJ	35 U	19 U	19 U	23 U	17 U	17 U
2-Chloroethyl vinyl ether	NC	15 U	R	R	35 U	19 U	19 U	23 U	35 UJ	33 UJ
Chloroform	NC	7.4 U	11 U	11 U	18 U	9.3 U	9.7 U	12 U	9 U	8 U
Chloromethane	NC	15 UJ	21 UJ	22 UJ	35 UJ	19 UJ	19 UJ	12 J	17 U	17 U
Dibromochloromethane	NC	7.4 U	11 U	11 U	18 U	9.3 U	9.7 U	12 U	9 U	8 U
Dichlorodifluoromethane	NC	15 U	21 U	22 U	35 U	19 U	19 U	23 U	9 U	8 U
1,1-Dichloroethane	NC	7.4 UJ	11 UJ	11 UJ	18 UJ	9.3 UJ	9.7 UJ	12 UJ	9 U	8 U
1,2-Dichloroethane	NC	7.4 U	11 U	11 U	18 U	9.3 U	9.7 U	12 U	9 U	8 U
1,1-Dichloroethene	NC	7.4 U	11 U	11 U	18 U	9.3 U	9.7 U	12 U	9 U	8 U
trans-1,2-Dichloroethene	NC	7.4 U	11 U	11 U	18 U	9.3 U	9.7 U	12 U	9 U	8 U
1,2-Dichloropropane	NC	7.4 U	11 U	11 U	18 U	9.3 U	9.7 U	12 U	9 U	8 U
cis-1,3-Dichloropropene	NC	7.4 U	11 U	11 U	18 U	9.3 U	9.7 U	12 U	9 U	8 U
trans-1,3-Dichloropropene	NC	7.4 U	11 U	11 U	18 U	9.3 U	9.7 U	12 U	9 U	8 U
Methyl ethyl ketone	NC	74 UJ	110 UJ	69 J	180 UJ	93 UJ	97 UJ	120 UJ	17 UJ	17 UJ
Ethylbenzene	NC	7.4 U	11 U	11 U	18 U	9.3 U	9.7 U	12 U	9 U	8 U
Methylene chloride	NC	25 J	21 U	22 U	35 UJ	19 UJ	19 UJ	18 J	3 U	3 U
1,1,1,2-Tetrachloroethane	NC	7.4 U	11 U	11 U	18 UJ	9.3 U	9.7 U	12 U	9 U	8 U
1,1,2,2-Tetrachloroethane	NC	7.4 U	11 U	11 U	18 U	9.3 U	9.7 U	12 U	9 U	8 U
Tetrachloroethene	NC	7.4 U	11 U	11 U	18 U	9.3 U	9.7 U	12 U	9 U	8 U
Toluene	NC	7.4 U	11 U	11 U	270	68	9.7 U	12 U	9 U	10
1,1,1-Trichloroethane	NC	7.4 U	11 U	11 U	18 U	9.3 U	9.7 U	12 U	9 U	8 U
1,1,2-Trichloroethane	NC	7.4 U	11 U	11 U	18 U	9.3 U	9.7 U	12 U	9 U	8 U
Trichlorofluoromethane	NC	7.8 J	11 UJ	11 UJ	130 J	11 J	9.7 UJ	12 UJ	9 U	8 U
Trichloroethene	41(a)	7.4 U	11 U	11 U	18 U	9.3 U	9.7 U	12 U	9 U	8 U
Vinyl chloride	NC	15 U	21 U	22 U	35 U	19 U	19 U	23 U	17 U	17 U
Xylenes, total	NC	7.4 U	11 U	11 U	18 U	9.3 U	9.7 U	12 U	9 U	12

NOTES:
BOLD - Above NOAA SQRT AET Criteria.
U = Not detected at the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
B = Result between MDL and RL
J = The concentration was detected at a value below the MDL.
R = The sample results were rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte could not be determined.
NC = No criteria.

(a) - Value based on marine sediment *Neanthes* bioassays.
AET - Apparent Effects Threshold.

Table L-2
Analytical Results for Smokes Creek Sediment - Volatile Organic Compounds (VOCs)
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID:	NOAA	SC-2S/N	SC-2S/N RE	SC-2S/S	SC-2S/S DUP	SC-2S/S RE	SC-3/S	SC-5/S	SC-6S/N	SC-6S/S
Lab ID:	Screening Quick	9501.674	9501.674	9501.674	9501.674	9501.674	9501.674	9501.674	9501.674	9501.674
Date Sampled:	Reference Tables	07/25/95	07/25/95	07/25/95	07/25/95	07/25/95	07/27/95	07/27/95	07/25/95	07/25/95
Sample Depth:	(SQRT's)	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"
Matrix:	(1999)	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
VOCs (ug/kg)	AET									
Acrylonitrile	NC	200 U	200 UJ	260 U	250 U	260 UJ	200 U	230 U	210 U	200 U
Benzene	NC	8 J	7 J	12 J	25	22	10 U	12 U	10 U	10 U
Bromodichloromethane	NC	10 U	10 U	13 U	12 U	13 U	10 UJ	12 U	10 U	10 U
Bromoform	NC	10 U	10 U	13 U	12 U	13 U	10 U	12 U	10 U	10 U
Bromomethane	NC	10 U	10 U	13 U	12 U	13 U	10 U	12 U	10 U	10 U
Carbon disulfide	NC	6 J	10 U	20	12 U	13	10 U	12 U	10 U	10 U
Carbon tetrachloride	NC	10 U	10 U	13 U	12 U	13 U	10 U	12 U	10 U	10 U
Chlorobenzene	NC	10 UJ	10 UJ	13 UJ	12 U	13 UJ	10 U	12 U	10 U	10 U
Chloroethane	NC	20 U	20 U	26 U	25 U	27 U	20 U	23 U	21 U	20 U
2-Chloroethyl vinyl ether	NC	41 UJ	41 U	52 UJ	50 U	53 U	41 UJ	46 UJ	42 UJ	40 UJ
Chloroform	NC	10 U	10 U	13 U	12 U	13 U	10 U	12 U	10 U	10 U
Chloromethane	NC	20 U	20 UJ	26 U	25 U	26 UJ	20 U	23 UJ	21 U	20 U
Dibromochloromethane	NC	10 U	10 U	13 U	12 U	13 U	10 U	12 U	10 U	10 U
Dichlorodifluoromethane	NC	10 U	10 U	13 U	12 U	13 U	10 U	12 U	10 U	10 U
1,1-Dichloroethane	NC	10 U	10 U	13 U	12 U	13 U	10 U	12 U	10 U	10 U
1,2-Dichloroethane	NC	10 U	10 U	13 U	12 U	13 U	10 U	12 U	10 U	10 U
1,1-Dichloroethene	NC	10 U	10 U	13 U	12 U	13 U	10 U	12 U	10 U	10 U
trans-1,2-Dichloroethene	NC	10 U	10 U	13 U	12 U	13 U	10 U	12 U	10 U	10 U
1,2-Dichloropropane	NC	10 U	10 U	13 U	12 U	13 U	10 U	12 UJ	10 U	10 U
cis-1,3-Dichloropropene	NC	10 U	10 U	13 U	12 U	13 U	10 UJ	12 UJ	10 U	10 U
trans-1,3-Dichloropropene	NC	10 U	10 U	13 U	12 U	13 U	10 U	12 UJ	10 U	10 U
Methyl ethyl ketone	NC	77 J	78	100 J	25 U	91	20 U	23 UJ	21 UJ	20 UJ
Ethylbenzene	NC	10 UJ	10 UJ	13 UJ	12 U	13 UJ	10 U	12 U	10 U	10 U
Methylene chloride	NC	10 U	10 U	6 UJ	5 B	13 U	10 U	12 U	4 UJ	4 UJ
1,1,1,2-Tetrachloroethane	NC	10 U	10 U	13 U	12 U	13 U	10 U	12 U	10 U	10 U
1,1,2,2-Tetrachloroethane	NC	10 UJ	10 UJ	13 UJ	12 U	13 UJ	10 U	12 UJ	10 U	10 U
Tetrachloroethene	NC	10 U	10 U	13 U	12 U	13 U	10 U	12 U	10 U	10 U
Toluene	NC	10 UJ	10 UJ	13 UJ	12 U	13 UJ	10 U	12 U	10 U	10 U
1,1,1-Trichloroethane	NC	10 U	10 U	13 U	12 U	13 U	10 U	12 U	10 U	10 U
1,1,2-Trichloroethane	NC	10 U	10 U	13 U	12 U	13 U	10 U	12 U	10 U	10 U
Trichlorofluoromethane	NC	10 U	10 UJ	13 U	12 U	13 UJ	10 U	12 UJ	10 U	10 U
Trichloroethene	41[a]	10 U	10 U	13 U	12 U	13 U	10 UJ	12 U	10 U	10 U
Vinyl chloride	NC	20 U	20 UJ	26 U	25 U	27 UJ	20 U	23 U	21 U	20 U
Xylenes, total	NC	10 UJ	10 UJ	13 UJ	12 U	13 UJ	10 U	12 U	10 U	10 U

NOTES:
BOLD - Above NOAA SQRT AET Criteria.
U = Not detected at the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
B = Result between MDL and RL
J = The concentration was detected at a value below the MDL.
R = The sample results were rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte could not be determined.
NC = No criteria.

(a) - Value based on marine sediment *Neanthes* bioassays.
AET - Apparent Effects Threshold.

Table L-2
Analytical Results for Smokes Creek Sediment - Semi-Volatile Organic Compounds (SVOCs)
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID: Lab ID: Date Sampled: Sample Depth: Matrix:	Sediment Screening Criteria		SC-1 C4K020072-001 10/31/94 0-6" Sediment	SC-2-CORE C4K070004-003 11/04/94 0-8' Sediment	SC-2-DREDGE C4K070004-004 11/04/94 0-6" Sediment	SC-3 C4K020072-002 10/31/94 0-6" Sediment	SC-4 C4K020072-003 10/31/94 0-6" Sediment	SC-4 DUP C4K020072-005 10/31/94 0-6" Sediment	SC-5 (BKG) C4K020072-004 10/31/94 0-6" Sediment	SC-(N)BKG 9501.674 07/26/95 0-6" Sediment	SC-IS/N 9501.674 07/25/95 0-6" Sediment
SVOCs (ug/kg)	ER-M/SEL	ER-L/LEL									
Acenapthene	650[a]	150[a]	490 U	1400 UJ	1500 UJ	5800 U	770 J	1300 U	3100 U	610 U	590 U
Acenaphthylene	640[b]	44[b]	490 U	1400 UJ	1500 UJ	5800 U	1200 U	1300 U	3100 U	610 U	590 U
Anthracene	960[a]	85[a]	*240 J*	1400 UJ	1500 UJ	5800 U	*2600*	*1100 J*	3100 U	*110 J*	*140 J*
Benzo (a) anthracene	1600[a]	230[a]	*560*	*830 J*	*990 J*	*2900 J*	*3000*	*1900*	*1100 J*	*560 J*	*650*
Benzo (a) pyrene	2500[a]	400[a]	*500*	*1100 J*	*1400 J*	*2400 J*	*2100*	*1700*	*1300 J*	*530 J*	*480 J*
Benzo (b) fluoranthene	NC	NC	710	1400 J	2000 J	5700 J	3300	2800	2400 J	680	650
Benzo (ghi) perylene	7680[c]	408[c]	*460 J*	*950 J*	*1200 J*	*2700 J*	*1600*	*1300*	*1300 J*	280 J	370 J
Benzo (k) fluoranthene	32160[c]	576[c]	260 J	*650 J*	500 J	5800 U	*850 J*	*990 J*	*770 J*	420 J	390 J
bis (2-Chloroethyl) ether	NC	NC	NR	NR	NR	NR	NR	NR	NR	610 U	590 U
bis (2-Ethylhexyl) phthalate	NC	750[d]	*780*	*2700 J*	*2400 J*	*5900*	*1700*	*1000 J*	*1900 J*	90 UJ	740
Butyl benzyl phthalate	NC	NC	490 U	1400 UJ	1500 UJ	5800 U	1200 U	1300 U	3100 U	610 U	590 U
4-Chloro-3-methylphenol	NC	NC	490 U	1400 UJ	1500 UJ	5800 U	1200 U	1300 U	3100 U	610 U	590 U
2-Chloronaphthalene	NC	NC	490 U	1400 UJ	1500 U	5800 U	1200 U	1300 U	3100 U	610 U	590 U
Chrysene	2800[a]	400[a]	*530*	*1300 J*	*1300 J*	*2800 J*	*2700*	*2200*	*1800 J*	*610*	*600*
Di-n-butyl phthalate	NC	NC	490 U	1400 UJ	1500 UJ	5800 U	1200 U	1300 U	3100 U	610 UJ	590 U
1,2-Dichlorobenzene	NC	NC	490 U	1400 U	1500 U	5800 U	1200 U	1300 U	3100 U	610 U	590 U
1,3-Dichlorobenzene	NC	NC	490 U	1400 U	1500 U	5800 U	1200 U	1300 U	3100 U	610 U	590 U
1,4-Dichlorobenzene	NC	NC	490 U	1400 U	1500 U	5800 U	1200 U	1300 U	3100 U	610 U	590 U
2,4-Dichlorophenol	NC	NC	490 U	1400 UJ	1500 UJ	5800 U	1200 U	1300 U	3100 U	610 U	590 U
Diethyl phthalate	NC	NC	490 U	1400 UJ	1500 UJ	5800 U	1200 U	1300 U	3100 UJ	610 U	590 U
2,4-Dimethylphenol	NC	NC	490 U	1400 UJ	1500 UJ	5800 U	1200 U	1300 U	3100 U	610 U	590 U
Dimethyl phthalate	NC	NC	490 U	1400 UJ	1500 UJ	5800 U	1200 U	1300 U	3100 U	610 U	590 U
Di-n-octyl phthalate	NC	NC	490 U	1400 UJ	1500 UJ	5800 U	1200 U	1300 U	3100 U	610 U	590 U
Dibenz (a,h) anthracene	260[a]	60[a]	*150 J*	1400 UJ	*380 J*	5800 U	1200 U	1300 U	3100 U	*100 J*	*180 J*
2,4-Dinitrotoluene	NC	NC	490 U	1400 UJ	1500 UJ	5800 U	1200 U	1300 U	3100 U	610 U	590 U
2,6-Dinitrotoluene	NC	NC	490 U	1400 UJ	1500 UJ	5800 U	1200 U	1300 U	3100 U	610 U	590 U
Fluoranthene	3600[a]	600[a]	*1100*	*1900 J*	*2800 J*	*6500*	*7600*	*3200*	*3700*	*1300*	*1100*
Fluorene	640[a]	35[a]	490 U	1400 UJ	1500 UJ	5800 U	*900 J*	*550 J*	3100 UJ	*100 J*	*85 J*
Hexachlorobenzene	576[c]	48[c]	490 U	1400 UJ	1500 UJ	5800 U	1200 U	1300 U	3100 U	610 UJ	590 U
Hexachlorobutadiene	NC	NC	490 U	1400 UJ	1500 UJ	5800 U	1200 U	1300 U	3100 U	610 UJ	590 U
Hexachlorocyclopentadiene	NC	NC	490 U	1400 UJ	1500 UJ	5800 U	1200 U	1300 U	3100 U	610 UJ	590 U
Hexachloroethane	NC	NC	490 U	1400 UJ	1500 UJ	5800 U	1200 U	1300 U	3100 U	610 U	590 U
Indeno (1,2,3-cd) pyrene	7680[c]	480[c]	470 J	*880 J*	*1300 J*	*3300 J*	*1700*	*1300*	*1400 J*	290 J	340 J
Isophorone	NC	NC	490 U	1400 UJ	1500 UJ	5800 U	1200 U	1300 U	3100 U	610 U	590 U
2-Methylphenol	NC	NC	490 U	1400 UJ	1500 UJ	5800 U	1200 U	1300 U	3100 U	610 U	590 U
Naphthalene	2100[a]	340[a]	130 J	1400 UJ	1500 UJ	5800 U	*730 J*	1300 U	3100 U	610 U	100 J
Pentachlorophenol	NC	NC	2400 U	6800 UJ	7100 UJ	28000 U	5900 U	6200 U	15000 U	3100 U	2900 U
Phenanthrene	1380[a]	225[a]	*560*	*1100 J*	*1200 J*	*2800 J*	*5700*	*2900*	*1200 J*	*880*	*720*
Phenol	NC	NC	490 U	1400 U	1500 U	5800 U	1200 U	1300 U	3100 U	610 U	590 U
Pyrene	2200[a]	350[a]	*950*	*1900 J*	*2400 J*	*4300 J*	*5200*	*3700*	*2700 J*	*1600*	*1200*
Pyridine	NC	NC	490 U	1400 U	1500 U	5800 U	1200 U	1300 U	3100 U	610 U	590 U
2,3,4,6-Tetrachlorophenol	NC	NC	490 U	1400 UJ	1500 UJ	5800 U	1200 U	1300 U	3100 U	3100 U	2900 U
1,2,4-Trichlorobenzene	NC	NC	490 U	1400 UJ	1500 UJ	5800 U	1200 U	1300 U	3100 U	610 U	590 U
2,4,5-Trichlorophenol	NC	NC	490 U	1400 UJ	1500 UJ	5800 U	1200 U	1300 U	3100 U	610 U	590 U
2,4,6-Trichlorophenol	NC	NC	NR	NR	NR	NR	NR	NR	NR	610 U	590 U
3-Methylphenol	NC	NC	490 U	1400 UJ	1500 UJ	5800 U	1200 U	1300 U	3100 U	610 U	590 U
4-Methylphenol	NC	NC	490 U	1400 UJ	1500 UJ	5800 U	1200 U	1300 U	3100 U	610 U	590 U
2-Methyl-4,6-dinitrophenol	NC	NC	2400 U	6800 UJ	7100 UJ	28000 U	5900 U	6200 U	15000 U	3100 U	2900 U

NOTES:
BOLD - Above the ER-M/SEL Sediment Screening Criteria.
Italic - Above the ER-L/LEL Sediment Screening Criteria.
U = Not detected at the MDL.
J = The concentration was detected at a value below the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R = The sample results were rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte could not be determined.
B = Result between MDL and RL
NR = No analysis performed.
NC = No criteria.
(a) - Effects Range Low (ER-L) and Effects Range Median (ER-M) - Long and Morgan (1990).
(b) - Effects Range Low (ER-L) and Effects Range Median (ER-M) - Long *et al.*, (1995).
(c) - Lowest Effects Level (LEL) and Severe Effects Level (SEL) - Jaagumagi (1992;1994).
(d) - Upper Effects Threshold (UET) - NOAA Screening Quick Reference Table (1999).

Table L-2
Analytical Results for Smokes Creek Sediment - Semi-Volatile Organic Compounds (SVOCs)
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID:	Sediment Screening Criteria		SC-1S/S	SC-2S/N	SC-2S/S	SC-2S/S DUP	SC-3/S	SC-3/S RE	SC-5/S	SC-6S/N	SC-6S/S
Lab ID:			9501.674	9501.674	9501.674	9501.674	9501.674	9501.674	9501.674	9501.674	9501.674
Date Sampled:			07/25/95	07/25/95	07/25/95	07/25/95	07/27/95	07/27/95	07/27/95	07/25/95	07/25/95
Sample Depth:			0-6"	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"	0-6"
Matrix:			Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
SVOCs (ug/kg)	ER-M/SEL	ER-L/LEL									
Acenapthene	650[a]	150[a]	570 U	70 J	890 U	1600 U	81 J	77 J	770 U	1400 U	34000 U
Acenaphthylene	640[b]	44[b]	570 U	1400 U	890 U	1600 U	670 U	670 U	770 U	1400 U	*7000 J*
Anthracene	960[a]	85[a]	*210 J*	*130 J*	890 U	*140 J*	*180 J*	*180 J*	770 U	*170 J*	*46000*
Benzo (a) anthracene	1600[a]	230[a]	*770*	*370 J*	*540 J*	*910 J*	*850 J*	*760 J*	*420 J*	*980 J*	*85000*
Benzo (a) pyrene	2500[a]	400[a]	*540 J*	400 J	*430 J*	*760 J*	*770 J*	*690 J*	*410 J*	*1000 J*	*61000*
Benzo (b) fluoranthene	NC	NC	1100	510 J	710 J	1700	1600 J	1200 J	540 J	1300 J	62000
Benzo (ghi) perylene	7680[c]	408[c]	*480 J*	300 J	340 J	*770 J*	400 J	*560 J*	350 J	*730 J*	*35000*
Benzo (k) fluoranthene	32160[c]	576[c]	570 U	290 J	380 J	1600 U	R	670 UJ	410 J	*850 J*	*48000*
bis (2-Chloroethyl) ether	NC	NC	570 U	1400 U	890 U	1600 U	670 U	670 U	770 U	1400 U	34000 U
bis (2-Ethylhexyl) phthalate	NC	750[d]	740	*810 J*	*1100* B	*1900*	*830 J*	*800 J*	510 J	*1800* B	34000 U
Butyl benzyl phthalate	NC	NC	570 U	1400 U	890 U	1600 U	670 UJ	R	770 U	70 J	34000 U
4-Chloro-3-methylphenol	NC	NC	570 U	1400 U	890 U	1600 U	670 U	670 U	770 U	1400 U	34000 U
2-Chloronaphthalene	NC	NC	570 U	1400 U	890 U	1600 U	670 U	670 U	770 U	1400 U	34000 U
Chrysene	2800[a]	400[a]	*680*	*510 J*	*510 J*	*970 J*	*840 J*	*840 J*	*560 J*	*1200 J*	*83000*
Di-n-butyl phthalate	NC	NC	570 U	1400 U	890 U	140 J	670 UJ	83 UJ	770 U	85 UJ	34000 U
1,2-Dichlorobenzene	NC	NC	570 U	1400 U	890 U	1600 U	670 U	670 U	770 U	1400 U	34000 U
1,3-Dichlorobenzene	NC	NC	570 U	1400 U	890 U	1600 U	670 U	670 U	770 U	1400 U	34000 U
1,4-Dichlorobenzene	NC	NC	570 U	1400 U	890 U	1600 U	670 U	670 U	770 U	1400 U	34000 U
2,4-Dichlorophenol	NC	NC	570 U	1400 U	890 U	1600 U	670 U	670 U	770 U	1400 U	34000 U
Diethyl phthalate	NC	NC	570 U	1400 U	890 U	1600 U	670 U	670 U	770 U	1400 U	34000 U
2,4-Dimethylphenol	NC	NC	570 U	1400 U	890 U	1600 U	670 U	670 U	770 U	1400 U	34000 U
Dimethyl phthalate	NC	NC	570 U	1400 U	890 U	1600 U	670 U	670 U	770 U	1400 U	34000 U
Di-n-octyl phthalate	NC	NC	570 U	1400 U	890 U	140 J	R	670 UJ	770 U	160 J	34000 U
Dibenz (a,h) anthracene	260[a]	60[a]	*200 J*	*130 J*	*130 J*	*300 J*	*230 J*	*240 J*	*140 J*	*280 J*	*19000 J*
2,4-Dinitrotoluene	NC	NC	570 U	1400 U	890 U	1600 U	670 U	670 UJ	770 U	1400 U	34000 U
2,6-Dinitrotoluene	NC	NC	570 U	1400 U	890 U	1600 U	670 U	670 U	770 U	1400 U	34000 U
Fluoranthene	3600[a]	600[a]	*1300*	*990 J*	*1600*	*1800*	*1100 J*	*1100 J*	*1000*	*2300*	*180000*
Fluorene	640[a]	35[a]	*100 J*	*120 J*	890 U	*98 J*	*99 J*	*110 J*	770 U	*100 J*	*33000 J*
Hexachlorobenzene	576[c]	48[c]	570 U	1400 U	890 U	1600 U	670 UJ	670 UJ	770 U	1400 U	34000 U
Hexachlorobutadiene	NC	NC	570 U	1400 U	890 U	1600 U	670 U	670 U	770 U	1400 U	34000 U
Hexachlorocyclopentadiene	NC	NC	570 U	1400 U	890 U	1600 U	670 U	670 U	770 U	1400 U	34000 U
Hexachloroethane	NC	NC	570 U	1400 U	890 U	1600 U	670 U	670 U	770 U	1400 U	34000 U
Indeno (1,2,3-cd) pyrene	7680[c]	480[c]	440 J	280 J	320 J	*690 J*	*500 J*	*540 J*	370 J	*680 J*	*38000*
Isophorone	NC	NC	570 U	1400 U	890 U	1600 U	670 U	1100	770 U	1400 U	34000 U
2-Methylphenol	NC	NC	570 U	1400 U	890 U	1600 U	670 U	670 U	770 U	1400 U	34000 U
Naphthalene	2100[a]	340[a]	*360 J*	1400 U	890 U	1600 U	69 J	76 J	770 U	72 J	34000 U
Pentachlorophenol	NC	NC	2800 U	6900 U	4500 U	8200 U	3400 UJ	3400 UJ	3800 UJ	6900 U	170000 U
Phenanthrene	1380[a]	225[a]	*830*	*530 J*	*600 J*	*920 J*	*920 J*	*950 J*	*500 J*	*1200 J*	*170000*
Phenol	NC	NC	570 U	1400 U	890 U	1600 U	670 U	670 U	770 U	1400 U	34000 U
Pyrene	2200[a]	350[a]	*1300*	*820 J*	*980*	*1900*	*1600 J*	*1500 J*	*960*	*2100*	*190000*
Pyridine	NC	NC	570 U	1400 U	890 UJ	1600 U	R	670 UJ	770 U	1400 U	34000 U
2,3,4,6-Tetrachlorophenol	NC	NC	2800 U	6900 U	4500 U	8200 U	R	3400 UJ	3800 U	6900 U	170000 U
1,2,4-Trichlorobenzene	NC	NC	570 U	1400 U	890 U	1600 U	670 U	670 U	770 U	1400 U	34000 U
2,4,5-Trichlorophenol	NC	NC	570 U	1400 U	890 U	1600 U	670 U	670 U	770 U	1400 U	34000 U
2,4,6-Trichlorophenol	NC	NC	570 U	1400 U	890 U	1600 U	670 U	670 U	770 U	1400 U	34000 U
3-Methylphenol	NC	NC	570 U	1400 U	890 U	1600 U	R	670 UJ	770 U	1400 U	34000 U
4-Methylphenol	NC	NC	570 U	1400 U	890 U	1600 U	670 U	670 U	770 U	1400 U	34000 U
2-Methyl-4,6-dinitrophenol	NC	NC	2800 U	6900 U	4500 U	8200 U	3400 UJ	3400 UJ	3800 U	6900 U	170000 U

NOTES:
BOLD - Above the ER-M/SEL Sediment Screening Criteria.
Italic - Above the ER-L/LEL Sediment Screening Criteria.
U = Not detected at the MDL.
J = The concentration was detected at a value below the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R = The sample results were rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte could not be determined.
B = Result between MDL and RL
NR = No analysis performed.
NC = No criteria.
(a) - Effects Range Low (ER-L) and Effects Range Median (ER-M) - Long and Morgan (1990).
(b) - Effects Range Low (ER-L) and Effects Range Median (ER-M) - Long *et al.*, (1995).
(c) - Lowest Effects Level (LEL) and Severe Effects Level (SEL) - Jaagumagi (1992;1994).
(d) - Upper Effects Threshold (UET) - NOAA Screening Quick Reference Table (1999).

Table L-2
Analytical Results for Smokes Creek Sediment - TAL Metals, Cyanide, and General Chemistry
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID: Lab ID: Date Sampled: Sample Depth: Matrix:	Sediment Screening Criteria		SC-1 C4K020072-001 10/31/94 0-6" Sediment	SC-2-CORE C4K070004-003 11/04/94 0-8' Sediment	SC-2-DREDGE C4K070004-004 11/04/94 0-6" Sediment	SC-3 C4K020072-002 10/31/94 0-6" Sediment	SC-4 C4K020072-003 10/31/94 0-6" Sediment	SC-4 DUP C4K020072-005 10/31/94 0-6" Sediment	SC-5 (BKG) C4K020072-004 10/31/94 0-6" Sediment	SC-(N)BKG 9501.674 07/26/95 0-6" Sediment	SC-1S/N 9501.674 07/25/95 0-6" Sediment
Metals (mg/kg)	ER-M[a]	ER-L[a]									
Aluminum	NC	NC	NR	NR	NR	NR	NR	NR	NR	3760	NR
Antimony	25	2	*15.5* J	*13.8* J	13.3 UJ	*23.4* J	*12.7* J	11.7 UJ	*14.9* J	0.81 UJ	0.79 U
Arsenic	85	33	5.9	8.6 J	8.2 J	*34.7* J	6.3	6.2	*59.8* J	*53.2*	7.8
Barium	NC	48[b]	*52.1*	*98.5* J	*67.6* J	*215* J	37.1 U	39 U	*85.8* J	41.6 B	*63.2* B
Beryllium	NC	NC	NR	NR	NR	NR	NR	NR	NR	0.58 B	NR
Cadmium	9	5	3.9	2.8 J	2.4 J	*8.6* J	2.6	3.3	2.5 J	1 U	1 U
Calcium	NC*		42900	26500 J	23200 J	115000 J	15100	15400	25900 J	21500	NR
Chromium	145	80	*102*	37.7 J	30.8 J	*105* J	22.2	23.3	25.7 J	9.8	*97.3*
Cobalt	NC	10[b]	NR	NR	NR	NR	NR	NR	NR	6.7 B	NR
Copper	197[c]	35.7[d]	NR	NR	NR	NR	NR	NR	NR	*36.5*	NR
Iron	NC	NC	NR	NR	NR	NR	NR	NR	NR	14500	NR
Lead	110	35	26.5	*46.2* J	*45.8* J	*465* J	*45.2*	*39.1*	*634* J	30.3	*39.3*
Magnesium	NC*		NR	NR	NR	NR	NR	NR	NR	1830 B	NR
Manganese	1100[e]	NC	NR	NR	NR	NR	NR	NR	NR	438	NR
Mercury	1.3	0.15	0.15 U	0.21 UJ	0.22 UJ	0.35 UJ	0.19 U	0.19 U	0.23 UJ	0.18 U	0.18 U
Nickel	50	30	20.6	*34.8* J	28.6 J	*38.1* J	20.2	20.8	*30.8* J	16.2	*38.1* J
Potassium	NC*		862	1180 J	1600 J	2090 J	962	1110	2110 J	565 B	NR
Selenium	NC	1[b]	*3.1*	*5.8* J	*6.2* J	*13* J	*6.6*	*6.9*	*18.1* J	1.5 U	*3.6* J
Silver	2.2	1	1.5 U	2.1 UJ	2.2 UJ	3.5 UJ	1.9 U	1.9 U	2.3 UJ	3.1 U	*4.4*
Sodium	NC*		918	1860 J	1380 J	2480 J	1140	1210	1510 J	259 B	NR
Thallium	NC	NC	1 U	1 UJ	1 UJ	1 UJ	1 U	1 U	1 UJ	1.6 U	1.5 U
Vanadium	NC	57[b]	NR	NR	NR	NR	NR	NR	NR	23.1	NR
Zinc	315[c]	123.1[d]	NR	NR	NR	NR	NR	NR	NR	*162* J	NR
Cyanide, total	NC	NC	6.9	8	14	4.9	9.7	9.8	1.2 U	NR	0.9 UJ
General Analytical TOC (mg/kg)	NC	NC	10800	20100	32000	84800	33600	23500	31000	NR	NR

NOTES:
BOLD - Above the ER-M Sediment Screening Criteria.
Italic - Above the ER-L Sediment Screening Criteria.
U = Not detected at the MDL .
J = The concentration was detected at a value below the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
B = Result between MDL and RL.
R = The sample results were rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte could not be determined.
NR = No analysis performed.
NC = No criteria.
* = The analyte is an essential nutrient.

(a) - Effects Range Low (ER-L) and Effects Range Median (ER-M) - Long and Morgan (1990).
(b) - Apparent Effects Threshold (AET) for marine sediment from the NOAA Screening Quick Reference Tables (1999).
(c) - Probable Effects Level (PEL) for freshwater sediment derived from the NOAA Screening Quick Reference Tables (1999).
(d) - Threshold Effects Level (TEL) for freshwater sediment derived from the NOAA Screening Quick Reference Tables (1999).
(e) - Upper Effects Threshold (UET) value for freshwater sediment derived from the NOAA Screening Quick Reference Tables (1999).

Table L-2
Analytical Results for Smokes Creek Sediment - TAL Metals, Cyanide, and General Chemistry
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID: / Lab ID: / Date Sampled: / Sample Depth: / Matrix:	Sediment Screening Criteria		SC-1S/S 9501.674 07/25/95 0-6" Sediment	SC-2S/N 9501.674 07/25/95 0-6" Sediment	SC-2S/S 9501.674 07/25/95 0-6" Sediment	SC-2S/S DUP 9501.674 07/25/95 0-6" Sediment	SC-3/S 9501.674 07/27/95 0-6" Sediment	SC-5/S 9501.674 07/27/95 0-6" Sediment	SC-6S/N 9501.674 07/25/95 0-6" Sediment	SC-6S/S 9501.674 07/25/95 0-6" Sediment
Metals (mg/kg)	ER-M[a]	ER-L[a]								
Aluminum	NC	NC	NR	NR	NR	NR	NR	NR	NR	NR
Antimony	25	2	1 J	1 J	1.2 U	1.4 J	2.2 B	0.95 B	1.3 J	0.89 U
Arsenic	85	33	7.5	7.1	11.2	9.7	10.8	8.2	8.5	8.5
Barium	NC	48[b]	*70.5*	*77.2* B	*121*	*90.8* B	*114*	*78.7*	*80.9* B	*70.7* B
Beryllium	NC	NC	NR	NR	NR	NR	NR	NR	NR	NR
Cadmium	9	5	0.96 U	1.2 U	1.5 U	1.4 U	0.57 U	0.65 U	1.2 U	1.1 UJ
Calcium	NC*		NR	NR	NR	NR	NR	NR	NR	NR
Chromium	145	80	*91.9*	34.4	40.5	30.6	*197*	24.2	31.4	31
Cobalt	NC	10[b]	NR	NR	NR	NR	NR	NR	NR	NR
Copper	197[c]	35.7[d]	NR	NR	NR	NR	NR	NR	NR	NR
Iron	NC	NC	NR	NR	NR	NR	NR	NR	NR	NR
Lead	110	35	*47.4*	*60.3*	*82.5*	*72*	*137* J	*62.4* J	*63.9*	*63.8*
Magnesium	NC*		NR	NR	NR	NR	NR	NR	NR	NR
Manganese	1100[e]	NC	NR	NR	NR	NR	NR	NR	NR	NR
Mercury	1.3	0.15	0.17 U	0.21 U	0.27 U	0.25 U	*0.78*	0.23 U	0.21 U	0.2 U
Nickel	50	30	*35.9* J	*43* J	*63.5* J	*52.9* J	*40.1* J	*38.9* J	*43* J	*39.3* J
Potassium	NC*		NR	NR	NR	NR	NR	NR	NR	NR
Selenium	NC	1[b]	*5.2*	*4*	*13*	*11.5*	*3.4*	R	*9.8*	*7.7*
Silver	2.2	1	*4*	*4.2*	*6*	*4.7* B	*8* J	*3.1* J	*3.7* B	*3.9* B
Sodium	NC*		NR	NR	NR	NR	NR	NR	NR	NR
Thallium	NC	NC	1.5 U	1.8 U	2.3 U	2.1 U	0.88 U	1 U	1.8 U	1.7 U
Vanadium	NC	57[b]	NR	NR	NR	NR	NR	NR	NR	NR
Zinc	315[c]	123.1[d]	NR	NR	NR	*925*	NR	NR	NR	NR
Cyanide, total	NC	NC	0.86 UJ	1 UJ	1.4 UJ	1.2 U	43.5	1.2 U	1 UJ	1 U
General Analytical										
TOC (mg/kg)	NC	NC	NR	NR	NR	NR	NR	NR	NR	NR

NOTES:
BOLD - Above the ER-M Sediment Screening Criteria.
Italic - Above the ER-L Sediment Screening Criteria.
U = Not detected at the MDL .
J = The concentration was detected at a value below the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
B = Result between MDL and RL.
R = The sample results were rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte could not be determined.
NR = No analysis performed.
NC = No criteria.
* = The analyte is an essential nutrient.

(a) - Effects Range Low (ER-L) and Effects Range Median (ER-M) - Long and Morgan (1990).
(b) - Apparent Effects Threshold (AET) for marine sediment from the NOAA Screening Quick Reference Tables (1999).
(c) - Probable Effects Level (PEL) for freshwater sediment derived from the NOAA Screening Quick Reference Tables (1999).
(d) - Threshold Effects Level (TEL) for freshwater sediment derived from the NOAA Screening Quick Reference Tables (1999).
(e) - Upper Effects Threshold (UET) value for freshwater sediment derived from the NOAA Screening Quick Reference Tables (1999).

ATTACHMENT M

RAPID BIOASSESSMENT FORMS

BETHLEHEM STEEL CORPORATION

LACKAWANNA, NEW YORK

Rapid Bioassessment Protocols for Streams and Wadeable Rivers (USEPA, 1999) for the South Return Water Trench

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Epifaunal Substrate/Available Cover	Greater than 50% of substrate favorable for epifaunal colonization/fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient)	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than10% stable habitat; lack of habitat is obvious; substrate unstable or lacking
SCORE: 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mat and submerged vegetation common.	Mixture of soft sand, mud, or clay; ;mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sandbottom; little or not root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE: 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Pool Variability	Even mix of large-shallow, large deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shall or absent.
SCORE: 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Sediment Deposition	Little or no enlargement of islands or point bars & <20% of bottom affected by sediment deposition	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of bottom affected; sediment deposit at obstruction, constrictions, and bends; moderate deposition of pools prevalent	Heavy deposits of fine material, increased bar development; >80% of bottom changing frequently; pools almost absent due to substantial sediment deposition
SCORE: 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills>75% of the available channel; or <25% of channel substrate is exposed	Water fills 25-75% of available channel and/or riffle substrate are mostly exposed	Very little water in channel and mostly present as standing pools.
SCORE: 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (>20 yrs ago) may be present but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted	Banks shored w/gabion or cement; >80% of stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE: 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Channel Sinuosity	The bends in the stream increase the stream length 3-4x longer than if it was in a straight line (Note - channel braiding is considered normal in coastal plans and other low-lying areas. This parameter sis not easily rated in these areas).	The bends in the stream increase the stream length 1-2x longer than if it was in a straight line.	The bends in the stream increase the stream length 1-2x longer than if it was in a straight line.	Channel straight; water has been channelized for long distance.
SCORE: 0	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Bank Stability (score each bank) Note: determine left or right side by facing downstream	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% bank affected	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
LB SCORE: 10	Left Bank 10 9	8 7 6	5 4 3	2 1 0
RB SCORE: 10	Right Bank 10 9	8 7 6	5 4 3	2 1 0
Vegetative Protection (score each bank)	More than 90% of stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of stream bank surfaces covered by native vegetation, but on class of plants is not well-represented; disruption evident by not affecting full plant growth potential to any great extent; > 1/2 of potential plant stubble height remaining.	50-70% of stream bank surfaces covered by vegetation; disruption obvious; patches of bares soil or closely cropped vegetation common; < 1/2 potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to < 5 cm in average stubble height.
LB SCORE: 5	Left Bank 10 9	8 7 6	5 4 3	2 1 0
RB SCORE: 1	Right Bank 10 9	8 7 6	5 4 3	2 1 0
Riparian Vegetation Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal	Width of riparian zone < 6 meters; little or no riparian vegetation due to human activities.
LB SCORE: 1	Left Bank 10 9	8 7 6	5 4 3	2 1 0
RB SCORE: 0	Right Bank 10 9	8 7 6	5 4 3	2 1 0

TOTAL SCORE: 71
(Total possible score = 200)

Rapid Bioassessment Protocols for Streams and Wadeable Rivers (USEPA, 1999) for the Blasdell Creek above Hamburg Tpke.

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Epifaunal Substrate/Available Cover	Greater than 50% of substrate favorable for epifaunal colonization/fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient)	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than10% stable habitat; lack of habitat is obvious; substrate unstable or lacking
SCORE: 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; ;mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sandbottom; little or not root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE: 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Pool Variability	Even mix of large-shallow, large deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shall or absent.
SCORE: 8	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Sediment Deposition	Little or no enlargement of islands or point bars & <20% of bottom affected by sediment deposition	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of bottom affected; sediment deposit at obstruction, constrictions, and bends; moderate deposition of pools prevalent	Heavy deposits of fine material, increased bar development; >80% of bottom changing frequently; pools almost absent due to substantial sediment deposition
SCORE: 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills>75% of the available channel; or <25% of channel substrate is exposed	Water fills 25-75% of available channel and/or riffle substrate are mostly exposed	Very little water in channel and mostly present as standing pools.
SCORE: 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (>20 yrs ago) may be present but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted	Banks shored w/gabion or cement; >80% of stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE: 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Channel Sinuosity	The bends in the stream increase the stream length 3-4x longer than if it was in a straight line (Note - channel braiding is considered normal in coastal plans and other low-lying areas. This parameter sis not easily rated in these areas).	The bends in the stream increase the stream length 1-2x longer than if it was in a straight line.	The bends in the stream increase the stream length 1-2x longer than if it was in a straight line.	Channel straight; water has been channelized for long distance.
SCORE: 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Bank Stability (score each bank) Note: determine left or right side by facing downstream	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% bank affected	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
LB SCORE: 8	Left Bank 10 9	8 7 6	5 4 3	2 1 0
RB SCORE: 8	Right Bank 10 9	8 7 6	5 4 3	2 1 0
Vegetative Protection (score each bank)	More than 90% of stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of stream bank surfaces covered by native vegetation, but on class of plants is not well-represented; disruption evident by not affecting full plant growth potential to any great extent; > 1/2 of potential plant stubble height remaining.	50-70% of stream bank surfaces covered by vegetation; disruption obvious; patches of bares soil or closely cropped vegetation common; < 1/2 potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very nigh; vegetation has been removed to < 5 cm in average stubble height.
LB SCORE: 10	Left Bank 10 9	8 7 6	5 4 3	2 1 0
RB SCORE: 10	Right Bank 10 9	8 7 6	5 4 3	2 1 0
Riparian Vegetation Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal	Width of riparian zone < 6 meters; little or no riparian vegetation due to human activities.
LB SCORE: 4	Left Bank 10 9	8 7 6	5 4 3	2 1 0
RB SCORE: 4	Right Bank 10 9	8 7 6	5 4 3	2 1 0

TOTAL SCORE: 137 - suboptimal
(Total possible score = 200)

Rapid Bioassessment Protocols for Streams and Wadeable Rivers (USEPA, 1999) for the Blasdell Creek below Hamburg Tpke.

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Epifaunal Substrate/Available Cover	Greater than 50% of substrate favorable for epifaunal colonization/fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat & at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient)	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than10% stable habitat; lack of habitat is obvious; substrate unstable or lacking
SCORE: 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay;mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sandbottom; little or not root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE: 7	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shall or absent.
SCORE: 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Sediment Deposition	Little or no enlargement of islands or point bars & <20% of bottom affected by sediment deposition	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of bottom affected; sediment deposit at obstruction, constrictions, and bends; moderate deposition of pools prevalent	Heavy deposits of fine material, increased bar development; >80% of bottom changing frequently; pools almost absent due to substantial sediment deposition
SCORE: 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills>75% of the available channel; or <25% of channel substrate is exposed	Water fills 25-75% of available channel and/or riffle substrate are mostly exposed	Very little water in channel and mostly present as standing pools.
SCORE: 20	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (>20 yrs ago) may be present but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted	Banks shored w/gabion or cement; >80% of stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE: 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Channel Sinuosity	The bends in the stream increase the stream length 3-4x longer than if it was in a straight line (Note - channel braiding is considered normal in coastal plans and other low-lying areas. This parameter sis not easily rated in these areas).	The bends in the stream increase the stream length 1-2x longer than if it was in a straight line.	The bends in the stream increase the stream length 1-2x longer than if it was in a straight line.	Channel straight; water has been channelized for long distance.
SCORE: 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
Bank Stability (score each bank) Note: determine left or right side by facing downstream	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% bank affected	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
LB SCORE: 8	Left Bank 10 9	8 7 6	5 4 3	2 1 0
RB SCORE: 4	Right Bank 10 9	8 7 6	5 4 3	2 1 0
Vegetative Protection (score each bank)	More than 90% of stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of stream bank surfaces covered by native vegetation, but on class of plants is not well-represented; disruption evident by not affecting full plant growth potential to any great extent; > 1/2 of potential plant stubble height remaining.	50-70% of stream bank surfaces covered by vegetation; disruption obvious; patches of bares soil or closely cropped vegetation common; < 1/2 potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to < 5 cm in average stubble height.
LB SCORE: 2	Left Bank 10 9	8 7 6	5 4 3	2 1 0
RB SCORE: 4	Right Bank 10 9	8 7 6	5 4 3	2 1 0
Riparian Vegetation Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal	Width of riparian zone < 6 meters; little or no riparian vegetation due to human activities.
LB SCORE: 0	Left Bank 10 9	8 7 6	5 4 3	2 1 0
RB SCORE: 1	Right Bank 10 9	8 7 6	5 4 3	2 1 0

TOTAL SCORE: 84. Average per category = 8.4 - marginal.
(Total possible score = 200)

ATTACHMENT N

SOUTH RETURN WATER TRENCH ANALYTICAL RESULTS

BETHLEHEM STEEL CORPORATION

LACKAWANNA, NEW YORK

Table N-1
Analytical Results for the South Return Water Trench Surface Water - Volatile Organic Compounds (VOCs)
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID: Lab ID: Date Sampled: Sample Depth: Matrix:	Federal Ambient Water Quality Criteria [1]		SW-2 BSC-SW-2-392 03/05/92 Water	SRW-1 SRW-1 11/23/94 Surface Water
VOCs (ug/L)	CMC[2]	CCC[3]		
Acrylonitrile	7550	2600	50 U	0.5 U
Benzene	5300	NC	5 U	0.2 J
Bromochloromethane	NC	NC	5 U	NR
Bromodichloromethane	11000	NC	5 U	0.5 U
Bromoform	NC	NC	5 U	R
Bromomethane	NC	NC	10 U	0.5 U
Carbon disulfide	NC	NC	NR	0.5 U
Carbon tetrachloride	35200	NC	5 U	0.5 U
Chlorobenzene	250	50	5 U	0.5 U
Chloroethane	NC	NC	10 U	0.5 U
2-Chloroethyl vinyl ether	NC	NC	10 U	0.5 U
Chloroform	NC	NC	5 U	0.5 U
Chloromethane	NC	NC	10 U	0.5 U
Dibromochloromethane	11000	NC	5 U	0.5 U
Dichlorodifluoromethane	11000	NC	5 U	0.5 U
1,1-Dichloroethane	NC	NC	5 U	0.5 U
1,2-Dichloroethane	118000	2000	5 U	0.5 UJ
1,1-Dichloroethene	NC	NC	5 U	0.5 U
trans-1,2-Dichloroethene	11600	NC	5 U	0.5 U
1,2-Dichloropropane	NC	NC	5 U	0.5 U
cis-1,3-Dichloropropene	6060	244	5 U	0.5 U
trans-1,3-Dichloropropene			5 U	0.5 U
Ethylbenzene	32000	NC	5 U	0.5 U
Methyl ethyl ketone	NC	NC	NR	0.5 U
Methylene chloride	NC	NC	10 U	0.5 U
1,1,1,2-Tetrachloroethane	9320	2400	5 U	0.5 U
1,1,2,2-Tetrachloroethane	9320	NC	5 U	0.5 U
Tetrachloroethene	NC	NC	5 U	0.5 U
Toluene	17500	NC	5 U	0.5 U
1,1,1-Trichloroethane	18000	NC	5 U	0.3 J
1,1,2-Trichloroethane	18000	9400	5 U	0.5 U
Trichlorofluoromethane	NC	NC	5 U	0.5 U
Trichloroethene	45000	21900	5 U	0.5 U
Vinyl chloride	NC	NC	10 U	0.5 U
Xylenes, total	NC	NC	5 U	0.5 U

NOTES:

BOLD - Above USEPA Criteria Maximum Concentration.

Italic - Above USEPA Criteria Continuous Concentration.

U = Not detected at the MDL.

UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

NR = No analysis performed.

J = The concentration was detected at a value below the MDL.

R = The sample results were rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte could not be determined.

NC = No criteria.

(1) Values are Federal Ambient Water Quality Criteria for the protection of aquatic life in freshwater in ug/L.

(2) Criteria Maximum Concentration - (acute).

(3) Criteria Continuous Concentration - (chronic).

Table N-1
Analytical Results for the South Return Water Trench Surface Water - Semi-Volatile Organic Compounds (SVOCs)
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID: Lab ID: Date Sampled: Sample Depth: Matrix:	Federal Ambient Water Quality Criteria [1]		SW-2 BSC-SW-2-392 03/05/92 Water	SRW-1 SRW-1 11/23/94 Surface Water
SVOCs (ug/L)	CMC[2]	CCC[3]		
Acenapthene	1700	520	NR	10 U
Acenaphthylene	NC	NC	10 U	10 U
Anthracene	NC	NC	10 U	10 U
Benzo (a) anthracene	NC	NC	10 U	10 U
Benzo (a) pyrene	NC	NC	10 U	10 U
Benzo (b) fluoranthene	NC	NC	NR	10 U
Benzo (ghi) perylene	NC	NC	NR	10 U
Benzo (k) fluoranthene	NC	NC	NR	10 U
bis (2-Chloroethyl) ether	NC	NC	10 U	10 U
bis (2-Ethylhexyl) phthalate	400	360	10 U	10 U
Butyl benzyl phthalate	940	3	10 U	10 U
4-Chloro-3-methylphenol	NC	NC	10 U	10 U
2-Chloronaphthalene	1600	NC	10 U	10 U
Chrysene	NC	NC	10 U	10 U
Di-n-butyl phthalate	940	3	10 U	10 U
1,2-Dichlorobenzene	NC	NC	10 U	10 U
1,3-Dichlorobenzene	NC	NC	10 U	10 U
1,4-Dichlorobenzene	NC	NC	10 U	10 U
2,4-Dichlorophenol	2020	365	10 U	10 U
Diethyl phthalate	940	3	10 U	10 U
2,4-Dimethylphenol	2120	NC	10 U	10 U
Dimethyl phthalate	940	3	10 U	10 U
Di-n-octyl phthalate	940	3	10 U	10 U
Dibenz (a,h) anthracene	NC	NC	NR	10 U
2,4-Dinitrotoluene	330	230	10 U	10 U
2,6-Dinitrotoluene	NC	NC	10 U	10 U
Fluoranthene	3980	NC	10 U	10 U
Fluorene	NC	NC	10 U	10 U
Hexachlorobenzene	6	3.68	10 U	10 U
Hexachlorobutadiene	90	9.3	NR	10 U
Hexachlorocyclobutadiene	NC	NC	10 U	NR
Hexachlorocyclopentadiene	7	5.2	10 U	10 U
Hexachloroethane	980	540	10 U	10 U
Indeno (1,2,3-cd) pyrene	NC	NC	NR	10 U
Isophorone	117000	NC	10 U	10 U
2-Methylphenol	NC	NC	10 U	10 U
Naphthalene	2300	620	10 U	10 U
Pentachlorophenol	20	13	50 U	50 U
Phenanthrene	30	6.3	10 U	10 U
Phenol	10200	2560	10 U	10 U
Pyrene	NC	NC	10 U	10 U
Pyridine	NC	NC	10 U	10 U
2,3,4,6-Tetrachlorophenol	NC	NC	50 U	10 U
1,2,4-Trichlorobenzene	250	50	10 U	10 U
2,4,5-Trichlorophenol	100	63	50 U	10 U
2,4,6-Trichlorophenol	NC	970	10 U	10 U
3-Methylphenol	NC	NC	10 U	10 U
4-Methylphenol	NC	NC	10 U	10 U
2-Methyl-4,6-dinitrophenol	NC	NC	50 U	50 U

NOTES:
BOLD - Above USEPA Criteria Maximum Concentration.
Italic - Above USEPA Criteria Continuous Concentration.
U = Not detected at the MDL.
NR = No analysis performed.
NC = No criteria.
(1) Values are Federal Ambient Water Quality Criteria for the protection of aquatic life in freshwater in ug/L.
(2) Criteria Maximum Concentration - (acute).
(3) Criteria Continuous Concentration - (chronic).

Table N-1
Analytical Results for the South Return Water Trench Surface Water - TAL Metals, Cyanide and General Chemistry
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID: Lab ID: Date Sampled: Sample Depth: Matrix:	Federal Ambient Water Quality Criteria [1]		SW-2 BSC-SW-2-392 03/05/92 Water	SRW-1 SRW-1 11/23/94 Surface Water
Metals (ug/L)	CMC[2]	CCC[3]		
Antimony	88	30	60 U	60 U
Arsenic	360	190	10 U	10 U
Barium	NC	NC	200 U	200 U
Cadmium[4,5]	6.4	2.9	5 U	5 U
Calcium	NC*		NR	R
Chromium	16	11	10 U	10 U
Lead [6,7]	97	3.8	*8.3*	3 U
Mercury	2.4	0.01	*0.58*	0.2 U
Nickel [8,9]	634	71	40 U	40 U
Potassium	NC*		NR	R
Selenium	20	5	5 U	R
Silver [10]	6	0.12	10 U	10 U
Sodium	NC*		NR	R
Thallium	1400	40	NR	10 U
Cyanide	22	5.2	10 U	NR
General Analytical				
Alkalinity (total)(mg/L)	NC	NC	NR	145
CNFREE(ug/L)	NC	NC	NR	10 U
Conductivity (umhos/cm)	NC	NC	NR	687
DICNFREE (ug/L)	NC	NC	NR	10 U
PHLIQ (su)	NC	NC	NR	7.3
TOC (mg/L)	NC	NC	NR	5.3
Chloride (mg/L)	860[11]	230[11]	NR	71.2
TOX (ug/L)	NC	NC	NR	77
Phenolics (ug/L)	NC	NC	NR	5 U
Total Solids (mg/L)	NC	NC	NR	458
Total Suspended Solids (mg/L)	NC	NC	NR	6
Sulfate (mg/L)	NC	NC	NR	91.8

NOTES:
BOLD - Above USEPA Criteria Maximum Concentration.
Italic - Above USEPA Criteria Continuous Concentration.
U = Not detected at the MDL.
R = The sample results were rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte could not be determined.
NR = No analysis performed.
NC = No criteria.
* = The analyte is an essential nutrient.

(1) Values are Federal Ambient Water Quality Criteria for the protection of aquatic life in freshwater in ug/L.
(2) Criteria Maximum Concentration - (acute).
(3) Criteria Continuous Concentration - (chronic).
(4) CMC criterion is hardness dependent using the following formula: CMC = exp{1.128{ln(hardness)}+(-3.6867}*(1.136672-[ln(hardness)*0.041838]
Total alkalinity concentrations were averaged to determine hardness = 145 mg/L.
(5) CCC criterion is hardness dependent using the following formula: CCC = exp{0.7852{ln(hardness)}+(-2.715}*(1.101672-[ln(hardness)*0.041838]
Total alkalinity concentrations were averaged to determine hardness = 145 mg/L.
(6) CMC criterion is hardness dependent using the following formula: CMC = exp{1.273{ln(hardness)}+(-1.46}*(1.46203-[ln(hardness)*0.145712]
Total alkalinity concentrations were averaged to determine hardness = 145 mg/L.
(7) CCC criterion is hardness dependent using the following formula: CCC = exp{1.273{ln(hardness)}+(-4.705}*(1.46203-[ln(hardness)*0.145712]
Total alkalinity concentrations were averaged to determine hardness = 145 mg/L.
(8) CMC criterion is hardness dependent using the following formula: CMC = exp{0.846{ln(hardness)}+2.255}*0.998
Total alkalinity concentrations were averaged to determine hardness = 145 mg/L.
(9) CCC criterion is hardness dependent using the following formula: CCC = exp{0.846{ln(hardness)}+0.0584*0.997
Total alkalinity concentrations were averaged to determine hardness = 145 mg/L.
(10) CMC criterion is hardness dependent using the following formula: CMC = exp{1.72{ln(hardness)}+(-6.52)}*0.85
Total alkalinity concentrations were averaged to determine hardness = 145 mg/L.
(11) Value based on the National Recommended Water Quality Criteria (EPA, 1999d)

Table N-2
Analytical Results for the South Return Water Trench Sediment - Volatile Organic Compounds (VOCs)
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID: Lab ID: Date Sampled: Sample Depth: Matrix:	NOAA Screening Quick Reference Tables (SQRT's) (1999)	NRS-1 NRS-1 11/23/94 0-6" Sediment	SRS-1 SRS-1 11/23/94 0-6" Sediment	SRS-1 DUP SRS-4 11/23/94 0-6" Sediment	SRS-2 SRS-2 11/23/94 0-6" Sediment	SRS-3 SRS-3 11/23/94 0-6" Sediment
VOCs (ug/kg)	AET					
Acrylonitrile	NC	140 U	120 U	120 UJ	68 U	80 U
Benzene	NC	14 U	12 U	12 U	6.8 U	8 U
Bromodichloromethane	NC	14 U	12 U	12 U	6.8 U	8 U
Bromoform	NC	14 U	12 U	12 UJ	6.8 U	8 U
Bromomethane	NC	28 U	24 U	25 U	14 U	16 U
Carbon disulfide	NC	14 U	12 U	12 U	6.8 U	8 U
Carbon tetrachloride	NC	14 U	12 U	12 U	6.8 U	8 U
Chlorobenzene	NC	14 U	12 U	12 U	6.8 U	8 U
Chloroethane	NC	28 U	24 U	25 UJ	14 U	16 U
2-Chloroethyl vinyl ether	NC	R	R	25 U	R	R
Chloroform	NC	14 U	12 U	12 U	6.8 U	8 U
Chloromethane	NC	28 UJ	24 UJ	25 U	14 UJ	16 UJ
Dibromochloromethane	NC	14 U	12 U	12 U	6.8 U	8 U
Dichlorodifluoromethane	NC	28 UJ	24 UJ	25 U	14 UJ	16 UJ
1,1-Dichloroethane	NC	14 U	12 U	12 U	6.8 U	8 U
1,2-Dichloroethane	NC	14 U	12 U	12 U	6.8 U	8 U
1,1-Dichloroethene	NC	14 U	12 U	12 U	6.8 U	8 U
trans-1,2-Dichloroethene	NC	14 U	12 U	12 U	6.8 U	8 U
1,2-Dichloropropane	NC	14 U	12 U	12 U	6.8 U	8 U
cis-1,3-Dichloropropene	NC	14 U	12 U	12 U	6.8 U	8 U
trans-1,3-Dichloropropene	NC	14 UJ	12 UJ	12 U	6.8 UJ	8 UJ
Methyl ethyl ketone	NC	140 U	120 U	120 U	68 U	80 U
Ethylbenzene	NC	14 U	12 U	12 U	6.8 U	8 U
Methylene chloride	NC	28 U	20 UJ	25 U	14 U	16 U
1,1,1,2-Tetrachloroethane	NC	14 UJ	12 UJ	12 U	6.8 UJ	8 UJ
1,1,2,2-Tetrachloroethane	NC	14 U	12 U	12 U	6.8 U	8 U
Tetrachloroethene	NC	14 U	12 U	12 UJ	5.2 J	8 U
Toluene	NC	14 U	12 U	12 U	6.8 U	8 U
1,1,1-Trichloroethane	NC	14 U	12 U	12 U	6.8 U	8 U
1,1,2-Trichloroethane	NC	14 U	12 U	12 U	6.8 U	8 U
Trichlorofluoromethane	NC	14 UJ	12 UJ	12 UJ	6.8 UJ	8 UJ
Trichloroethene	41[(a)]	14 U	12 U	12 U	6.8 U	8 U
Vinyl chloride	NC	28 U	24 U	25 U	14 U	16 U
Xylenes, total	NC	14 U	12 U	12 UJ	6.8 U	8 U

NOTES:
BOLD - Above NOAA SQRT AET Criteria.
U = Not detected at the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
J = The concentration was detected at a value below the MDL.
R = The sample results were rejected due to serious deficiencies in the ability to analyze the sample and to meet quality control criteria. The presence or absence of the analyte could not be determined.
NC = No criteria.

(a) - Value based on marine sediment *Neanthes* bioassays.
AET - Apparent Effects Threshold.

Table N-2
Analytical Results for the South Return Water Trench Sediment - Semi-Volatile Organic Compounds (SVOCs)
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID: Lab ID: Date Sampled: Sample Depth: Matrix:	Sediment Screening Criteria		NRS-1 NRS-1 11/23/94 0-6" Sediment	SRS-1 SRS-1 11/23/94 0-6" Sediment	SRS-1 DUP SRS-4 11/23/94 0-6" Sediment	SRS-2 SRS-2 11/23/94 0-6" Sediment	SRS-3 SRS-3 11/23/94 0-6" Sediment
SVOCs (ug/kg)	ER-M/SEL	ER-L/LEL					
Acenapthene	650[a]	150[a]	1800 U	3900 U	1600 U	2200 U	1100 U
Acenaphthylene	640[b]	44[b]	1800 U	3900 U	1600 U	2200 U	1100 U
Anthracene	960[a]	85[a]	1800 U	3900 U	1600 U	*770 J*	1100 U
Benzo (a) anthracene	1600[a]	230[a]	*1500 J*	*1000 J*	*1100 J*	*1200 J*	*740 J*
Benzo (a) pyrene	2500[a]	400[a]	*1900*	*1400 J*	*1300 J*	*1100 J*	*790 J*
Benzo (b) fluoranthene	NC	NC	3700	1300 J	1600	1300 J	1000 J
Benzo (ghi) perylene	7680[c]	408[c]	*1700 J*	*1200 J*	*1000 J*	*820 J*	*610 J*
Benzo (k) fluoranthene	32160[c]	576[c]	*990 J*	*1000 J*	*800 J*	*640 J*	370 J
bis (2-Chlorethyl) ether	NC	NC	1800 U	3900 U	1600 U	2200 U	1100 U
bis (2-Ethylhexyl) phthalate	NC	750[d]	1800 U	3900 U	570 J	2200 U	370 J
Butyl benzyl phthalate	NC	NC	1800 U	3900 U	1600 U	2200 U	1100 U
4-Chloro-3-methylphenol	NC	NC	1800 U	3900 U	1600 U	2200 U	1100 U
2-Chloronaphthalene	NC	NC	1800 U	3900 U	1600 U	2200 U	1100 U
Chrysene	2800[a]	400[a]	*2700*	*1300 J*	*1300 J*	*1200 J*	*880 J*
Di-n-butyl phthalate	NC	NC	1800 U	3900 U	1600 U	2200 U	1100 U
1,2-Dichlorobenzene	NC	NC	1800 U	3900 U	1600 U	2200 U	1100 U
1,3-Dichlorobenzene	NC	NC	1800 U	3900 U	1600 U	2200 U	1100 U
1,4-Dichlorobenzene	NC	NC	1800 U	3900 U	1600 U	2200 U	1100 U
2,4-Dichlorophenol	NC	NC	1800 U	3900 U	1600 U	2200 U	1100 U
Diethyl phthalate	NC	NC	1800 U	3900 U	1600 U	2200 U	1100 U
2,4-Dimethylphenol	NC	NC	1800 U	3900 U	1600 U	2200 U	1100 U
Dimethyl phthalate	NC	NC	1800 U	3900 U	1600 U	2200 U	1100 U
Di-n-octyl phthalate	NC	NC	1800 U	3900 U	1600 U	2200 U	1100 U
Dibenz (a,h) anthracene	260[a]	60[a]	*500 J*	3900 U	1600 U	2200 U	1100 U
2,4-Dinitrotoluene	NC	NC	1800 U	3900 U	1600 U	2200 U	1100 U
2,6-Dinitrotoluene	NC	NC	1800 U	3900 U	1600 U	2200 U	1100 U
Fluoranthene	3600[a]	600[a]	*3500*	*2000 J*	*2000*	*2800*	*1600*
Fluorene	640[a]	35[a]	1800 U	3900 U	1600 U	2200 U	1100 U
Hexachlorobenzene	576[c]	48[c]	1800 UJ	3900 U	1600 UJ	2200 U	1100 UJ
Hexachlorobutadiene	NC	NC	1800 U	3900 U	1600 U	2200 U	1100 U
Hexachlorocyclopentadiene	NC	NC	1800 U	3900 U	1600 U	2200 U	1100 U
Hexachloroethane	NC	NC	1800 U	3900 U	1600 U	2200 U	1100 U
Indeno (1,2,3-cd) pyrene	7680[c]	480[c]	*1800*	*1200 J*	*950 J*	*770 J*	*580 J*
Isophorone	NC	NC	1800 U	3900 U	1600 U	2200 U	1100 U
2-Methylphenol	NC	NC	1800 U	3900 U	1600 U	2200 U	1100 U
Naphthalene	2100[a]	340[a]	1800 U	3900 U	1600 U	2200 U	1100 U
Pentachlorophenol	NC	NC	8800 U	19000 U	7900 U	11000 U	5100 U
Phenanthrene	1380[a]	225[a]	*1100 J*	3900 U	*710 J*	*2300*	*730 J*
Phenol	NC	NC	1800 U	3900 U	1600 U	2200 U	1100 U
Pyrene	2200[a]	350[a]	*2900*	*2200 J*	*1800*	*2400*	*1300*
Pyridine	NC	NC	1800 U	3900 UJ	1600 U	2200 UJ	1100 U
2,3,4,6-Tetrachlorophenol	NC	NC	1800 U	3900 U	1600 U	2200 U	1100 U
1,2,4-Trichlorobenzene	NC	NC	1800 U	3900 U	1600 U	2200 U	1100 U
2,4,5-Trichlorophenol	NC	NC	1800 U	3900 U	1600 U	2200 U	1100 U
2,4,6-Trichlorophenol	NC	NC	1800 U	3900 U	1600 U	2200 U	1100 U
3-Methylphenol	NC	NC	1800 U	3900 U	1600 U	2200 U	1100 U
4-Methylphenol	NC	NC	1800 U	3900 U	1600 U	2200 U	1100 U
2-Methyl-4,6-dinitrophenol	NC	NC	8800 U	19000 U	7900 U	11000 U	5100 U

NOTES:
BOLD - Above the ER-M/SEL Sediment Screening Criteria.
Italic - Above the ER-L/LEL Sediment Screening Criteria.
U = Not detected at the MDL.
J = The concentration was detected at a value below the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
NC = No criteria.

(a) - Effects Range Low (ER-L) and Effects Range Median (ER-M) - Long and Morgan (1990).
(b) - Effects Range Low (ER-L) and Effects Range Median (ER-M) - Long *et al.*, (1995).
(c) - Lowest Effects Level (LEL) and Severe Effects Level (SEL) - Jaagumagi (1992;1994).
(d) - Upper Effects Threshold (UET) - NOAA Screening Quick Reference Table (1999).

Table N-2
Analytical Results for the South Return Water Trench Sediment - TAL Metals, Cyanide, and General Chemistry
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

Client ID: Lab ID: Date Sampled: Sample Depth: Matrix:	Sediment Screening Criteria		NRS-1 NRS-1 11/23/94 0-6" Sediment	SRS-1 SRS-1 11/23/94 0-6" Sediment	SRS-1 DUP SRS-4 11/23/94 0-6" Sediment	SRS-2 SRS-2 11/23/94 0-6" Sediment	SRS-3 SRS-3 11/23/94 0-6" Sediment
Metals (mg/kg)	ER-M[a]	ER-L[a]					
Antimony	25	2	*20.7* J	*14.6* J	*17* J	*53.3* J	9.6 UJ
Arsenic	85	33	***102***	28.9	24.3	21.6	19.9
Barium	NC	48[b]	*96.9*	*56.5*	*55.3*	*139*	*48.7*
Cadmium	9	5	1.4 J	1.2 UJ	1.2 UJ	3.5 J	0.8 UJ
Chromium	145	80	63 J	49.7 J	45.5 J	*127* J	19.3 J
Lead	110	35	***366*** J	***355*** J	***326*** J	***1010*** J	*96.6* J
Mercury	1.3	0.15	***1.4***	*0.33*	0.25 U	*0.59*	0.16 U
Nickel	50	30	18 J	14.7 J	13.7 J	24.9 J	13.5 J
Selenium	NC	1[b]	*4.4*	*1.7*	*2*	*1.2*	*2.9*
Silver	2.2	1	2.8 U	2.4 U	2.5 U	*2.1*	1.6 U
Thallium	NC	NC	2.8 U	2.4 U	2.5 U	2.1	1.6 U
General Analytical							
CNFREE (mg/kg)	NC	NC	1.4	1.2 U	1.2 U	1.4	0.8 U
TOC (mg/kg)	NC	NC	42400	25200	25400	18300	18200

NOTES:
BOLD - Above the ER-M Sediment Screening Criteria.
Italic - Above the ER-L Sediment Screening Criteria.
U = Not detected at the MDL .
J = The concentration was detected at a value below the MDL.
UJ = The analyte was not deemed above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
NC = No criteria.

(a) - Effects Range Low (ER-L) and Effects Range Median (ER-M) - Long and Morgan (1990).
(b) - Apparent Effects Threshold (AET) for marine sediment from the NOAA Screening Quick Reference Tables (1999).

ATTACHMENT O

AVERAGE DAILY DOSE BACK-UP CALCULATIONS

BETHLEHEM STEEL CORPORATION

LACKAWANNA, NEW YORK

Table O-1
Area Use Factors for SWMUs
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

SWMU #	Estimated Total Area (ft^2)	Deer Mouse Home Range (ft^2) (a)	Area Use for Deer Mouse	SWMU #	Estimated Total Area (ft^2)	Short-Tailed Shrew Home Range (ft^2) (b)	Area Use for Short-Tailed Shrew
S-1	87801	3550.8	25	S-1	87801	41964	2.1
S-2	67958	3550.8	19	S-2	67958	41964	1.6
S-3	152004	3550.8	43	S-3	152004	41964	3.6
S-4	100046	3550.8	28	S-4	100046	41964	2.4
S-5	59035	3550.8	17	S-5	59035	41964	1.4
S-6	44331	3550.8	12	S-6	44331	41964	1.1
S-7/S-20	166335	3550.8	47	S-7/S-20	166335	41964	4.0
S-8	114080	3550.8	32	S-8	114080	41964	2.7
S-11	56818	3550.8	16	S-11	56818	41964	1.4
S-21	16929	3550.8	4.8	S-21	16929	41964	0.40
S-22	69358	3550.8	20	S-22	69358	41964	1.7
S-27	25779	3550.8	7.3	S-27	25779	41964	0.61
S-24	46156	3550.8	13	S-24	46156	41964	1.1
Zone 2 Background	30624528	3550.8	8625	Zone 2 Background	30624528	41964	730
S-10	101449	3550.8	29	S-10	101449	41964	2.4
Zone 3 Background	36274833	3550.8	10216	Zone 3 Background	36274833	41964	864
S-14	77176	3550.8	22	S-14	77176	41964	1.8
S-15	8826	3550.8	2.5	S-15	8826	41964	0.21
S-23	35357	3550.8	10	S-23	35357	41964	0.84
Zone 4 Background	33127239	3550.8	9330	Zone 4 Background	33127239	41964	789
Zone 5 Background	15529819	3550.8	4374	Zone 5 Background	15529819	41964	370

SWMU #	Estimated Total Area (ft^2)	Robin Home Range (ft^2) (b)	Area Use for Robin	SWMU #	Estimated Total Area (ft^2)	Hawk Home Range (ft^2) (b)	Area Use for Hawk
S-1	87801	45192	1.9	S-1	87801	25070.8	3.5
S-2	67958	45192	1.5	S-2	67958	25071.8	2.7
S-3	152004	45192	3.4	S-3	152004	25072.8	6.1
S-4	100046	45192	2.2	S-4	100046	25073.8	4.0
S-5	59035	45192	1.3	S-5	59035	25074.8	2.4
S-6	44331	45192	0.98	S-6	44331	25075.8	1.8
S-7/S-20	166335	45192	3.7	S-7/S-20	166335	25076.8	6.6
S-8	114080	45192	2.5	S-8	114080	25077.8	4.5
S-11	56818	45192	1.3	S-11	56818	25078.8	2.3
S-21	16929	45192	0.37	S-21	16929	25079.8	0.68
S-22	69358	45192	1.5	S-22	69358	25080.8	2.8
S-27	25779	45192	0.57	S-27	25779	25081.8	1.0
S-24	46156	45192	1.0	S-24	46156	25082.8	1.8
Zone 2 Background	30624528	45192	678	Zone 2 Background	30624528	25083.8	1221
S-10	101449	45192	2.2	S-10	101449	25084.8	4.0
Zone 3 Background	36274833	45192	803	Zone 3 Background	36274833	25085.8	1446
S-14	77176	45192	1.7	S-14	77176	25086.8	3.1
S-15	8826	45192	0.20	S-15	8826	25087.8	0.35
S-23	35357	45192	0.78	S-23	35357	25088.8	1.4
Zone 4 Background	33127239	45192	733	Zone 4 Background	33127239	25089.8	1320
Zone 5 Background	15529819	45192	344	Zone 5 Background	15529819	25090.8	619

(a) - USEPA, 1993e.
(b) - Sample and Suter, 1994.

Table O-2
Area Use Factors for Water Bodies
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

	Blasdell length (ft)	Blasdell width (ft)	Home range (sqft) (b)	Area use - Blasdell	Smokes length (ft)	Smokes width (ft)	Home range (sqft) (b)	Area use - Smokes
Mallard	2560	15	62408000	0.00062	6320	80	62408000	0.0081
Heron	2560	5	64560	0.20	6320	80	64560	7.8
Raccoon	2560	2	16785600	0.00031	6320	2	16785600	0.00075
Spotted Sandpiper	2560	2	26900	0.19	6320	2	26900	0.47
Red Tailed Hawk (a)	NA	NA	11836000	1.4	NA	NA	11836000	1.4
	SRWT length (ft)	SRWT width (ft)	Home range (sqft) (b)	Area use - SRWT	NRWT length (ft)	NRWT width (ft)	Home range (sqft) (b)	Area use - NRWT
Mallard	5168	5	62408000	0.00041	3520	5	62408000	0.00028
Heron	NA	NA	NA	NA	NA	NA	NA	NA
Raccoon	2000	5	16785600	0.00060	NA	NA	NA	NA
Spotted Sandpiper	2000	5	26900	0.37	NA	NA	NA	NA
Red Tailed Hawk (a)	NA	NA	11836000	1.4	NA	NA	NA	NA
	Lake Erie length (ft)	Lake Erie width (ft)	Home range (sqft) (b)	Area use - Lake Erie				
Mallard	13000	50	62408000	0.0104				
Heron	NA	NA	NA	NA				
Raccoon	NA	NA	NA	NA				
Spotted Sandpiper	NA	NA	NA	NA				
Red Tailed Hawk	NA	NA	NA	NA				

NOTES:
(a) - Area use calculated by dividing the home range of the raccoon by the home range of the hawk.
(b) - USEPA, 1993e.

NRWT - North Return Water Trench
SRWT - South Return Water Trench
NA - Not Applicable

ATTACHMENT P

NOAEL/LOAEL CALCULATIONS

BETHLEHEM STEEL CORPORATION

LACKAWANNA, NEW YORK

Table P-1
Mammalian NOAEL Calculations
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

COPEC	NOAEL(mg/kg-d)		Body Weight(kg)					Derived NOAEL		
	mouse	rat	mouse	rat	deer mouse	shrew	raccoon	deer mouse	Shrew	raccoon
Acenapthene	350		0.03	0.35	0.022	0.015	6.67	357	365	253
Acenaphthylene	350		0.03	0.35	0.022	0.015	6.67	357	365	253
Anthracene	1000		0.03	0.35	0.022	0.015	6.67	1019	1042	723
Benzene	26.36		0.03	0.35	0.022	0.015	6.67	28	30	9.9
Benzo(a)anthracene	UF=10	20	0.03	0.35	0.022	0.015	6.67	2.4	2.4	1.7
Benzo(a)pyrene	1		0.03	0.35	0.022	0.015	6.67	1	1	1
Benzo(b)fluoranthene	1		0.03	0.35	0.022	0.015	6.67	1	1	1
Benzo(ghi)perylene	1		0.03	0.35	0.022	0.015	6.67	1	1	1
Benzo(k)fluoranthene	1		0.03	0.35	0.022	0.015	6.67	1	1	1
Bis(2-ethylhexyl)phthalate	18.3		0.03	0.35	0.022	0.015	6.67	16	13	322.6
Bromodichloromethane	17.9	UF=10	0.03	0.35	0.022	0.015	6.67	1.8	1.9	1.29
Bromoform		17.9	0.03	0.35	0.022	0.015	6.67	21	22	15.0
Butylbenzylphthalate	UF=10	159	0.03	0.35	0.022	0.015	6.67	18.8	19.2	13.3
Carbon disulfide	UF=10	200		0.35	0.022	0.015	6.67	23.6	24.2	16.8
Chlorobenzene		60		0.35	0.022	0.015	6.67	71	72	50.3
Chloromethane	No oral studies found in the literature (ATSDR, 1990; USEPA, 2002)									
Chloroform	15	UF=10	0.03	0.35	0.022	0.015	6.67	1.4	1.3	4.23
Chrysene	500		0.03	0.35	0.022	0.015	6.67	509	521	362
Dibenzo(ah)anthracene	UF=10	2	0.03	0.35	0.022	0.015	6.67	0.2	0.2	0.2
Dibromochloromethane	UF=10	21.4	0.03	0.35	0.022	0.015	6.67	2.5	2.6	1.8
Di-n-butylphthalate	550		0.03	0.35	0.022	0.015	6.67	494	433	3549
1,2-Dichlorobenzene		85.7	0.03	0.35	0.022	0.015	6.67	101	104	71.8
1,3-Dichlorobenzene										
1,4-Dichlorobenzene	600		0.03	0.35	0.022	0.015	6.67	611	625	434
1,2-Dichloroethane	50		0.03	0.35	0.022	0.015	6.67	53	56	20
trans-1,2-Dichloroethene	45.2		0.03	0.35	0.022	0.015	6.67	46	47	33
Diethyl phthalate	UF=10	750	0.03	0.35	0.022	0.015	6.67	165	183	32
Dimethyl phthalate										
2,6-Dinitrotoluene	13.5		0.03	0.35	0.022	0.015	6.67	14	14	10
Di-n-octylphthalate										
Ethylbenzene	97.1		0.03	0.35	0.022	0.015	6.67	99	101	70
Fluoranthene	250	UF=10	0.03	0.35	0.022	0.015	6.67	25.5	26.1	18.08
Fluorene	125	UF=10	0.03	0.35	0.022	0.015	6.67	12.7	13.0	9.04
Hexachlorobenzene		1	0.03	0.35	0.022	0.015	6.67	1	1	0.8
Hexachlorocyclopentadiene	UF=10	6	0.03	0.35	0.022	0.015	6.67	0.7	0.7	0.5
Indeno(1,2,3-cd)pyrene	1		0.03	0.35	0.022	0.015	6.67	1	1	1
Isophorone	1000		0.03	0.35	0.022	0.015	6.67	1019	1042	723
Methylene Chloride		5.85	0.03	0.35	0.022	0.015	6.67	10	11	3.4
Methyl ethyl ketone		1771	0.03	0.35	0.022	0.015	6.67	2091	2139	1483.9
3-methylphenol (m-cresol)		50	0.03	0.35	0.022	0.015	6.67	5.9	6.0	4.2
4-methylphenol (p-cresol)			0.03	0.35	0.022	0.015	6.67			
Naphthalene	UF=10	71	0.03	0.35	0.022	0.015	6.67	8.4	8.6	5.9
Pentachlorophenol		0.24	0.03	0.35	0.022	0.015	6.67	0.40	0.43	0.14
Phenanthrene	500		0.03	0.35	0.022	0.015	6.67	509	521	362
Pyrene	75	UF=10	0.03	0.35	0.022	0.015	6.67	7.6	7.8	5.42
Pyridine		1	0.03	0.35	0.022	0.015	6.67	1	1	0.8
1,1,2,2-Tetrachloroethane	UF=10	56	0.03	0.35	0.022	0.015	6.67	6.6	6.8	4.7
Tetrachloroethene	20	UF=10	0.03	0.35	0.022	0.015	6.67	2.0	2.1	1.45
Toluene	26		0.03	0.35	0.022	0.015	6.67	26	27	19
1,1,1-Trichloroethane	5615		0.03	0.35	0.022	0.015	6.67	6263	7167	838
Trichlorofluoromethane	UF=10	34.9		0.35	0.022	0.015	6.67	4.1	4.2	2.9
Trichloroethylene	0.7		0.03	0.35	0.022	0.015	6.67	0.68	0.65	1.28
Vinyl chloride		0.17	0.03	0.35	0.022	0.015	6.67	0.20	0.21	0.14
m-Xylene			0.03	0.35	0.022	0.015	6.67			
o-Xylene	2.1		0.03	0.35	0.022	0.015	6.67	2.1	2.2	1.5
p-Xylene			0.03	0.35	0.022	0.015	6.67			
Cyanide		10.8	0.03	0.35	0.022	0.015	6.67	19	21	5.9
Antimony	0.125		0.03	0.35	0.022	0.015	6.67	0	0	0
Arsenic	0.126		0.03	0.35	0.022	0.015	6.67	0.13	0.14	0.064
Barium		5.1	0.03	0.35	0.022	0.015	6.67	10	11	2.4
Cadmium		2.5	0.03	0.35	0.022	0.015	6.67	11.8	14.6	0.5
Chromium, trivalent		2737	0.03	0.35	0.022	0.015	6.67	3231	3306	2293.4
Chromium, hexavalent		3.28	0.03	0.35	0.022	0.015	6.67	4	4	2.7
Lead		8	0.03	0.35	0.022	0.015	6.67	9	10	6.7
Mercury	13.2		0.03	0.35	0.022	0.015	6.67	13	13	12.0
Nickel		40	0.03	0.35	0.022	0.015	6.67	47	48	33.5
Thallium		0.0074	0.03	0.35	0.022	0.015	6.67	0.013	0.014	0.0042
Selenium		0.2	0.03	0.35	0.022	0.015	6.67	0.19	0.19	0.21
Silver	UF=10	181.2	0.03	0.35	0.022	0.015	6.67	21.4	21.9	15.2
Zinc		160	0.03	0.35	0.022	0.015	6.67	174	176	146

Table P-2
Avian NOAEL Calculations
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

COPEC	non-avian NOAEL			NOAEL(mg/kg-d)							Body Weight (kg)														Derived NOAEL				
	mink	rat	mouse	chicken embryo	duck	Am. kestrel	Ringed dove	E. starling	chicken	Jap. quail	mink	rat	mouse	chicken embryo	Am. kestrel	ringed dove	E. starling	chicken	Jap. quail	Robin	Mallard	Spotted s'piper	RT Hawk	Gr. Bl. Heron	Robin	Mallard	Spotted s'piper	RT Hawk	Gr. Bl. Heron
Acenapthene				1										0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	1.09	1.86	1.0	1.86	2.16
Acenaphthylene				1										0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	1.09	1.86	1.0	1.86	2.16
Anthracene				1										0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	1.09	1.86	1.0	1.86	2.16
Benzene			26.36										0.03		124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	3.2	5.5	2.8	5.4	6.33
Benzo(a)anthracene				0.79										0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	0.86	1.47	0.8	1.47	1.71
Benzo(a)pyrene				1										0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	1.09	1.86	1.0	1.86	2.16
Benzo(b)fluoranthene				1										0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	1.1	1.9	1.0	1.9	2.2
Benzo(ghi)perylene				1										0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	1.09	1.86	1.0	1.86	2.16
Benzo(k)fluoranthene				0.14										0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	0.15	0.26	0.1	0.26	0.30
Bis(2-ethylhexyl)phthalate					1.1									0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	0.6	1.1	0.6	1.1	1.28
Bromodichloromethane			1.79										0.03							0.077	1.134	0.041	1.126	2.39	0.022	0.037	0.019	0.037	0.043
Bromoform		17.9									0.35									0.077	1.134	0.041	1.126	2.39	0.13	0.23	0.12	0.23	0.26
Butylbenzylphthalate		159									0.35			0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	1.17	2.01	1.04	2.01	2.33
Carbon disulfide		200									0.35									0.077	1.134	0.041	1.126	2.39	1.48	2.53	1.30	2.53	2.94
Chlorobenzene		60									0.35									0.077	1.134	0.041	1.126	2.39	4.43	7.59	3.91	7.58	8.81
Chloromethane	NOAEL	not available - not oral studies (ATSDR, 1990; USEPA, 2002)																		1.134									
Chloroform		15									0.35									0.077	1.134	0.041	1.126	2.39	0.11	0.19	0.10	0.19	0.22
Chrysene				1										0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	1.09	1.86	1.0	1.86	2.16
Dibenzo(ah)anthracene				0.39										0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	0.42	0.73	0.4	0.72	0.84
Dibromochloromethane		21.4									0.35									0.077	1.134	0.041	1.126	2.39	0.16	0.27	0.14	0.27	0.31
Di-n-butylphthalate								0.11									0.155		0.196	0.077	1.134	0.041	1.126	2.39	0.10	0.164	0.08	0.164	0.190
1,2-Dichlorobenzene		85.7									0.35									0.077	1.134	0.041	1.126	2.39	6.33	10.84	5.58	10.83	12.58
1,3-Dichlorobenzene																				0.077	1.134	0.041	1.126	2.39					
1,4-Dichlorobenzene			600										0.03							0.077	1.134	0.041	1.126	2.39	72.4	124.1	63.9	123.9	144.01
1,2-Dichloroethane									17.2									1.6		0.077	1.134	0.041	1.126	2.39	9	16	8	16	19
trans-1,2-Dichloroethene			45.2										0.03							0.077	1.134	0.041	1.126	2.39	5.5	9.3	4.8	9.3	10.85
Diethylphthalate								0.11									0.155		0.196	0.077	1.134	0.041	1.126	2.39	0.10	0.164	0.08	0.164	0.190
Dimethylphthalate								0.11									0.155		0.196	0.077	1.134	0.041	1.126	2.39	0.10	0.164	0.08	0.164	0.190
2,6-Dinitrotoluene			13.5										0.03							0.077	1.134	0.041	1.126	2.39	1.6	2.8	1.4	2.8	3.24
Di-n-octylphthalate								0.11									0.155		0.196	0.077	1.134	0.041	1.126	2.39	0.10	0.164	0.08	0.164	0.190
Ethylbenzene		97.1									0.35	0.03	0.051	124.4	0.088				0.196	0.077	1.134	0.041	1.126	2.39	7.17	12.28	6.32	12.27	14.26
Fluoranthene				1										0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	1.09	1.86	1.0	1.86	2.16
Fluorene				1										0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	1.09	1.86	1.0	1.86	2.16
Hexachlorobenzene		1									0.35									0.077	1.134	0.041	1.126	2.39	0.07	0.13	0.07	0.13	0.15
Hexachlorocyclopentadiene		6									0.35									0.077	1.134	0.041	1.126	2.39	0.04	0.08	0.04	0.08	0.09
Indeno(1,2,3-cd)pyrene				1										0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	1.09	1.86	1.0	1.86	2.16
Isophorone			1000										0.03							0.077	1.134	0.041	1.126	2.39	12	21	11	21	24
Methylene Chloride		5.85									0.35			0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	0.43	0.74	0.38	0.74	0.86
Methyl ethyl ketone		1771									0.35			0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	130.83	224.04	115.34	223.72	260.07
3-methylphenol (m-cresol)		50									0.35			0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	0.37	0.63	0.33	0.63	0.73
4-methylphenol (p-cresol)											1			0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39					
Naphthalene				1										0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	1.09	1.86	1.0	1.86	2.16
Pentachlorophenol		0.24									0.35									0.077	1.134	0.041	1.126	2.39	0.02	0.03	0.02	0.03	0.04
Phenanthrene				1							0.35			0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	1.09	1.86	1.0	1.86	2.16
Pyrene				1										0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	1.09	1.86	1.0	1.86	2.16
Pyridine		1									0.35			0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	0.07	0.13	0.07	0.13	0.15
1,1,2,2-Tetrachloroethane			56										0.03							0.077	1.134	0.041	1.126	2.39	0.7	1.2	0.6	1.2	1.3
Tetrachloroethene			20										0.03							0.077	1.134	0.041	1.126	2.39	0.24	0.41	0.21	0.41	0.48
Toluene			26										0.03	0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	3.1	5.4	2.8	5.4	6.24
1,1,1-Trichloroethane			5615										0.03							0.077	1.134	0.041	1.126	2.39	678.0	1161.0	597.7	1159.4	1347.74
Trichlorofluoromethane		34.9									0.35									0.077	1.134	0.041	1.126	2.39	0.26	0.44	0.23	0.44	0.51
Trichloroethylene			0.7										0.03	0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	0.1	0.1	0.1	0.1	0.17
Vinyl chloride		0.17									0.35									0.077	1.134	0.041	1.126	2.39	0.01	0.02	0.01	0.02	0.02
m-Xylene														0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39					
o-Xylene			2.1										0.03	0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	0.25	0.43	0.22	0.43	0.50
p-Xylene														0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39					

Table P-2
Avian NOAEL Calculations
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

COPEC	non-avian NOAEL			NOAEL(mg/kg-d)							Body Weight (kg)														Derived NOAEL				
	mink	rat	mouse	chicken embryo	duck	Am. kestrel	Ringed dove	E. starling	chicken	Jap. quail	mink	rat	mouse	chicken embryo	Am. kestrel	ringed dove	E. starling	chicken	Jap. quail	Robin	Mallard	Spotted s'piper	RT Hawk	Gr. Bl. Heron	Robin	Mallard	Spotted s'piper	RT Hawk	Gr. Bl. Heron
Cyanide						0.04								0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	0.039	0.039	0.039	0.039	0.040
Antimony			0.125										0.03	0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	0.015	0.026	0.013	0.026	0.030
Arsenic					5.1									0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	0.28	5.1	0.14	5.1	11
Barium				20.8										0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	23	39	20	39	45
Cadmium					1.45									0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	0.8	1.5	0.7	1.4	1.68
Chromium, trivalent					1									0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	0.6	1.0	0.5	1.0	1.16
Chromium, hexavalent					1									0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	0.6	1.0	0.5	1.0	1.16
Lead						3.85								0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	1	2	1	2	2
Mercury					0.006					0.45				0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	0.37	0.0064	0.33	0.64	0.74
Nickel						77.4								0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	18	30	16	30	35
Thallium							0.35							0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	0.34	0.81	0.27	0.80	1.0
Selenium					0.5									0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	0.3	0.5	0.3	0.5	0.58
Silver					178									0.051	124.4	0.088			0.196	0.077	1.134	0.041	1.126	2.39	104	178	92	178	207
Zinc									14.5									1.6		0.077	1.134	0.041	1.126	2.39	1141	24	2827	24	8.1

Table P-3
Mammalian LOAEL Calculations
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

COPEC	LOAEL (mg/kg-d)			Body Weight (kg)						Derived LOAEL		
	mouse	rat	mink	mouse	rat	deer mouse	shrew	mink	raccoon	deer mouse	shrew	raccoon
Acenaphthene	700			0.03	0.35	0.022	0.015		6.67	71	73	51
Acenaphthylene				0.03	0.35	0.022	0.015		6.67			
Anthracene				0.03	0.35	0.022	0.015		6.67			
Benzene	263.6			0.03	0.35	0.022	0.015		6.67	279	299	99
Benzo(a)anthracene	20			0.03	0.35	0.022	0.015		6.67	2.0	2.1	1.4
Benzo(a)pyrene	10			0.03	0.35	0.022	0.015		6.67	10	10	7.2
Benzo(b)fluoranthene				0.03	0.35	0.022	0.015		6.67			
Benzo(ghi)perylene				0.03	0.35	0.022	0.015		6.67			
Benzo(k)fluoranthene				0.03	0.35	0.022	0.015		6.67			
Bis(2-ethylhexyl)phthalate		109		0.03	0.35	0.022	0.015		6.67	25	20	521
Bromodichloromethane	17.9			0.03	0.35	0.022	0.015		6.67	18	19	12.9
Bromoform		35.7		0.03	0.35	0.022	0.015		6.67	4.2	4.3	3.0
Butylbenzylphthalate		470		0.03	0.35	0.022	0.015		6.67	55	57	39
Carbon disulfide	400			0.03	0.35	0.022	0.015		6.67	41	42	29
Chlorobenzene		120		0.03	0.35	0.022	0.015		6.67	142	145	101
Chloroform		41		0.03	0.35	0.022	0.015		6.67	2.4	2.2	7.2
Chloromethane									6.67			
Chrysene				0.03	0.35	0.022	0.015		6.67			
Dibenzo(ah)anthracene				0.03	0.35	0.022	0.015		6.67			
Dibromochloromethane		42.9		0.03	0.35	0.022	0.015		6.67	5.1	5.2	3.6
Di-n-butylphthalate	1833			0.03	0.35	0.022	0.015		6.67	1647	1443	11827
1,2-Dichlorobenzene		857		0.03	0.35	0.022	0.015		6.67	101	104	72
1,3-Dichlorobenzene				0.03	0.35	0.022	0.015		6.67			
1,4-Dichlorobenzene	300			0.03	0.35	0.022	0.015		6.67	306	313	216.9
1,2-Dichloroethane	500			0.03	0.35	0.022	0.015		6.67	526	561	205
trans-1,2-Dichloroethene	452			0.03	0.35	0.022	0.015		6.67	46	47	33
Diethyl phthalate	3160			0.03	0.35	0.022	0.015		6.67	345	385	68
Dimethyl phthalate				0.03	0.35	0.022	0.015		6.67			
2,6-Dinitrotoluene	97			0.03	0.35	0.022	0.015		6.67	99	101	70.1
Di-n-octylphthalate				0.03	0.35	0.022	0.015		6.67			
Ethylbenzene	291			0.03	0.35	0.022	0.015		6.67	296	303	210.4
Fluoranthene	500			0.03	0.35	0.022	0.015		6.67	51	52	36
Fluorene	250			0.03	0.35	0.022	0.015		6.67	25	26	18
Hexachlorobenzene		2		0.03	0.35	0.022	0.015		6.67	2.4	2.4	1.7
Hexachlorocyclopentadiene		11		0.03	0.35	0.022	0.015		6.67	1.3	1.3	0.92
Indeno(1,2,3-cd)pyrene				0.03	0.35	0.022	0.015		6.67			
Isophorone	2000			0.03	0.35	0.022	0.015		6.67	204	208	145
Methylene Chloride		50		0.03	0.35	0.022	0.015		6.67	84	90	29
Methyl ethyl ketone		4571		0.03	0.35	0.022	0.015		6.67	5396	5522	3830
3-methylphenol (m-cresol)		150		0.03	0.35	0.022	0.015	1	6.67	18	18	13
4-methylphenol (p-cresol)				0.03	0.35	0.022	0.015	1	6.67			
Naphthalene		142		0.03	0.35	0.022	0.015		6.67	17	17	12
Pentachlorophenol		24		0.03	0.35	0.022	0.015		6.67	40	43	14
Phenanthrene		500		0.03	0.35	0.022	0.015		6.67	59	60	42
Pyrene	125			0.03	0.35	0.022	0.015		6.67	13	13	9.0
Pyridine		10		0.03	0.35	0.022	0.015		6.67	1.2	1.2	0.84
1,1,2,2-Tetrachloroethane		100		0.03	0.35	0.022	0.015		6.67	12	12	8.4
Tetrachloroethene	100			0.03	0.35	0.022	0.015		6.67	10	10	7.2
Toluene	260			0.03	0.35	0.022	0.015		6.67	265	271	188.0
1,1,1-Trichloroethane	2897			0.03	0.35	0.022	0.015		6.67	3231	3698	432
Trichlorofluoromethane		349		0.03	0.35	0.022	0.015		6.67	412	422	292
Trichloroethylene	7			0.03	0.35	0.022	0.015		6.67	6.8	6.5	12.8
Vinyl chloride		1.7		0.03	0.35	0.022	0.015		6.67	2.0	2.1	1.4
m-Xylene				0.03	0.35	0.022	0.015		6.67			
o-Xylene	2.6			0.03	0.35	0.022	0.015		6.67	2.6	2.7	1.9
p-Xylene				0.03	0.35	0.022	0.015		6.67			
Cyanide		30		0.03	0.35	0.022	0.015		6.67	5.3	5.7	1.6
Antimony	1.25			0.03	0.35	0.022	0.015		6.67	1.3	1.3	0.90
Arsenic	1.26			0.03	0.35	0.022	0.015		6.67	1.3	1.4	0.64
Barium		19.8		0.03	0.35	0.022	0.015		6.67	40	44	9.4
Cadmium		10		0.03	0.35	0.022	0.015		6.67	47	58	1.9
Chromium, trivalent				0.03	0.35	0.022	0.015		6.67			
Chromium, hexavalent		13.14		0.03	0.35	0.022	0.015		6.67	16	16	11
Lead		80		0.03	0.35	0.022	0.015		6.67	94	97	67
Mercury			0.03	0.03	0.35	0.022	0.015	1	6.67	0.027	0.027	0.024
Nickel		80		0.03	0.35	0.022	0.015		6.67	94	97	67
Thallium		0.074		0.03	0.35	0.022	0.015		6.67	0.13	0.14	0.042
Selenium		0.33		0.03	0.35	0.022	0.015		6.67	0.32	0.32	0.34
Silver	18.1			0.03	0.35	0.022	0.015		6.67	1.8	1.9	1.3
Zinc		320		0.03	0.35	0.022	0.015		6.67	348	352	293

Table P-4
Avian LOAEL Calculations
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

COPEC	Non-avian LOAEL			LOAEL(mg/kg-d)							Body Weight (kg)														Derived LOAEL				
	mink	rat	mouse	chicken embryo	duck	Am. kestrel	Ringed dove	E. starling	chicken	Jap.quail	mink	rat	mouse	chicken embryo	Am. kestrel	ringed dove	E. starling	chicken	Jap. quail	Robin	Mallard	Spotted s'piper	RT Hawk	Gr. Bl. Heron	Robin	Mallard	Spotted s'piper	RT Hawk	Gr. Bl. Heron
Acenapthene			700								1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39	8.5	14.5	7.5	14.5	16.8
Acenaphthylene											1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39					
Anthracene			0.0								1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39					
Benzene			263.6								1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39	31.8	54.5	28.1	54.4	63.3
Benzo(a)anthracene			20								1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39	0.24	0.41	0.21	0.41	0.48
Benzo(a)pyrene			10								1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39	1.2	2.1	1.1	2.1	2.4
Benzo(b)fluoranthene											1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39					
Benzo(ghi)perylene											1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39					
Benzo(k)fluoranthene											1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39					
Bis(2-ethylhexyl)phthalate											1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39					
Bromodichloromethane			17.9										0.03						0.2	0.077	1.134	0.041	1.126	2.39	2.2	3.7	1.9	3.7	4.3
Bromoform		35.7										0.35							0.2	0.077	1.134	0.041	1.126	2.39	0.26	0.45	0.23	0.45	0.52
Butylbenzylphthalate																					1.134								
Carbon disulfide		400										0.35								0.077	1.134	0.041	1.126	2.39	2.95	5.06	2.60	5.05	5.87
Chlorobenzene		120										0.35								0.077	1.134	0.041	1.126	2.39	8.86	15.18	7.81	15.16	17.62
Chloroform		41										0.35							0.2	0.077	1.134	0.041	1.126	2.39	0.30	0.52	0.27	0.52	0.60
Chloromethane																					1.134								
Chrysene											1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39					
Dibenzo(ah)anthracene											1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39					
Dibromochloromethane		42.9										0.35							0.2	0.077	1.134	0.041	1.126	2.39	0.32	0.54	0.28	0.54	0.63
Di-n-butylphthalate							1.1									0.55				0.077	1.134	0.041	1.126	2.39	0.74	1.27	0.65	1.27	1.48
1,2-Dichlorobenzene		857										0.35							0.2	0.077	1.134	0.041	1.126	2.39	63	108	56	108	126
1,3-Dichlorobenzene																			0.2	0.077	1.134	0.041	1.126	2.39					
1,4-Dichlorobenzene			300										0.03						0.2	0.077	1.134	0.041	1.126	2.39	36	62	32	62	72
1,2-Dichloroethane									34.4									1.6	0.2	0.077	1.134	0.041	1.126	2.39	19	32	17	32	37
trans-1,2-Dichloroethene			452										0.03						0.2	0.077	1.134	0.041	1.126	2.39	55	93	48	93	108
Diethyl phthalate																					1.134								
Dimethyl phthalate																					1.134								
2,6-Dinitrotoluene			97										0.03							0.077	1.134	0.041	1.126	2.39	12	20	10	20	23
Di-n-octylphthalate																					1.134								
Ethylbenzene			291								1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39	35	60	31	60	70
Fluoranthene			500								1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39	6.0	10.3	5.3	10.3	12.0
Fluorene			250								1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39	3.0	5.2	2.7	5.2	6.0
Hexachlorobenzene		2										0.35							0.2	0.077	1.134	0.041	1.126	2.39	0.15	0.25	0.13	0.25	0.29
Hexachlorocyclopentadiene		11										0.35							0.2	0.077	1.134	0.041	1.126	2.39	0.081	0.14	0.072	0.14	0.16
Indeno(1,2,3-cd)pyrene											1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39					
Isophorone			2000										0.03							0.077	1.134	0.041	1.126	2.39	24	41	21	41	48
Methylene Chloride		50									1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39	3.69	6.33	3.26	6.32	7.34
Methyl ethyl ketone		4571									1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39	337.67	578.26	297.68	577.44	671.24
3-methylphenol (m-cresol)		150									1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39	1.11	1.90	0.98	1.89	2.20
4-methylphenol (p-cresol)											1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39					
Naphthalene		142									1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39	1.05	1.80	0.92	1.79	2.09
Pentachlorophenol		2.4										0.35							0.2	0.077	1.134	0.041	1.126	2.39	0.18	0.30	0.16	0.30	0.35
Phenanthrene		200									1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39	1.48	2.53	1.30	2.53	2.94
Pyrene			125								1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39	1.5	2.6	1.3	2.6	3.0
Pyridine		10									1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39	0.074	0.13	0.065	0.13	0.15

Table P-4
Avian LOAEL Calculations
ISG - Former Bethlehem Steel Corporation - Lackawanna, NY

COPEC	Non-avian LOAEL			LOAEL(mg/kg-d)							Body Weight (kg)													Derived LOAEL				
	mink	rat	mouse	chicken embryo	duck	Am. kestrel	Ringed dove	E. starling	chicken	Jap.quail	mink	rat	mouse	chicken embryo	Am. kestrel	ringed dove	E. starling	chicken	Jap. quail	Robin	Mallard	Spotted s'piper	RT Hawk	Gr. Bl. Heron	Robin	Mallard	Spotted s'piper	RT Hawk	Gr. Bl. Heron
1,1,2,2-Tetrachloroethane		100										0.35								0.077	1.134	0.041	1.126	2.39	0.74	1.27	0.65	1.26	1.47
Tetrachloroethene			100										0.03						0.2	0.077	1.134	0.041	1.126	2.39	1.2	2.1	1.1	2.1	2.4
Toluene			260								1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39	31	54	28	54	62
1,1,1-Trichloroethane			2897										0.03						0.2	0.077	1.134	0.041	1.126	2.39	350	599	308	598	695
Trichlorofluoromethane		349										0.35								0.077	1.134	0.041	1.126	2.39	26	44	23	44	51
Trichloroethylene			7								1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39	0.85	1.45	0.75	1.45	1.68
Vinyl chloride		1.7										0.35							0.2	0.077	1.134	0.041	1.126	2.39	0.13	0.22	0.11	0.21	0.25
m-Xylene											1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39					
o-Xylene			2.6								1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39					
p-Xylene											1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39	0.31	0.54	0.28	0.54	0.62
Cyanide		30									1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39	0.30	0.30	0.30	0.30	0.30
Antimony			1.25								1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39	0.15	0.26	0.13	0.26	0.30
Arsenic					12.8						1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39	0.70	13	0.36	13	29
Barium				41.7							1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39	45	78	40	77	90
Cadmium					20						1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39	12	20	10	20	23
Chromium, trivalent					5						1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39	2.9	5.0	2.6	5.0	5.8
Chromium, hexavalent		13.14									1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39	0.97	1.66	0.86	1.66	1.93
Lead										11.3	1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39	9.4	16.1	8.3	16.0	18.6
Mercury					0.06					0.9	1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39	0.75	0.064	0.66	1.3	1.5
Nickel					107						1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39	62	107	55	107	124
Thallium		0.074									1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39	0.0045	0.0109	0.0037	0.0108	0.0138
Selenium					1						1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39	0.58	1.00	0.51	1.00	1.16
Silver			18.1								1	0.35	0.03	0.051	124.4		0.088		0.2	0.077	1.134	0.041	1.126	2.39	0.22	0.37	0.19	0.37	0.43
Zinc									131									1.6		0.077	1.134	0.041	1.126	2.39	10312	215	25539	217	74

ATTACHMENT Q

HQ/HI CALCULATIONS FOR DEER MOUSE

BETHLEHEM STEEL CORPORATION

LACKAWANNA, NEW YORK

Table Q-1a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Maximum Concentrations
SWMU S-1
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	36		0.00030	1	0.48	0.015	0.20	0.18	1.3	1	0.87	0.022	1	1.4	0.13	1.3	10	1.0
Chromium	99		0.00030	1	1.3	0.015	0.0075	0.18	0.13	1	0.090	0.022	1	1.4	3.9	16	0.37	0.089
Lead	278		0.00030	1	3.8	0.015	0.34	0.18	17	1	12	0.022	1	15	9.4	94	1.6	0.16
Mercury	5.6		0.00030	1	0.076	0.015	1.5	0.18	1.5	1	1.0	0.022	1	1.1	13	0.027	0.085	41
Nickel	139		0.00030	1	1.9	0.015	0.91	0.18	23	1	15	0.022	1	17	47	94	0.37	0.18
Selenium	11		0.00030	1	0.15	0.015	2.3	0.18	4.5	1	3.1	0.022	1	3.2	0.19	0.32	17	10
Silver	2.1		0.00030	1	0.028	0.015	0.35	0.18	0.13	1	0.090	0.022	1	0.12	21	1.8	0.0056	0.066
Thallium		3.0	0.00030	1	0.041	0.015	0.0040	0.18	0.0022	1	0.0015	0.022	1	0.042	0.013	0.13	3.2	0.32
VOCs																		
Benzene	1.6		0.00030	1	0.022	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.022	28	279	0.00077	0.000078
Ethylbenzene	2.5		0.00030	1	0.034	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.034	99	296	0.00034	0.00011
Methyl ethyl ketone	5.9		0.00030	1	0.080	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.080	2091	5396	0.000038	0.000015
Xylenes, total	12		0.00030	1	0.16	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.16	2.1	2.6	0.077	0.063
SVOCs																		
Acenaphthene	170		0.00030	1	2.3	0.015	0.0	0.18	0.0	1	0.0	0.022	1	2.3	357	71	0.0065	0.032
Acenaphthylene	200		0.00030	1	2.7	0.015	0.17	0.18	6.1	1	4.1	0.022	1	6.9	357	71	0.019	0.097
Anthracene	460		0.00030	1	6.2	0.015	0.10	0.18	8.3	1	5.6	0.022	1	12	1019	51	0.012	0.23
Benzo (a) anthracene	630		0.00030	1	8.5	0.015	0.022	0.18	2.5	1	1.7	0.022	1	10	2.4	2.0	4.3	5.1
Benzo (a) pyrene	330		0.00030	1	4.5	0.015	0.0077	0.18	0.46	1	0.31	0.022	1	4.8	1.0	10	4.8	0.48
Benzo (b) fluoranthene	490		0.00030	1	6.6	0.015	0.012	0.18	1.1	1	0.72	0.022	1	7.4	1.0	10	7.4	0.74
Benzo (ghi) perylene	170		0.00030	1	2.3	0.015	0.0068	0.18	0.21	1	0.14	0.022	1	2.4	1.0	10	2.4	0.24
Benzo (k) fluoranthene	150		0.00030	1	2.0	0.015	0.012	0.18	0.32	1	0.22	0.022	1	2.3	1.0	10	2.3	0.23
Chrysene	540		0.00030	1	7.3	0.015	0.040	0.18	3.9	1	2.6	0.022	1	9.9	509	51	0.020	0.20
Dibenzo(a,h)anthracene	38		0.00030	1	0.51	0.015	0.0043	0.18	0.029	1	0.020	0.022	1	0.53	0.24	10	2.2	0.053
Fluoranthene	1500		0.00030	1	20	0.015	0.057	0.18	15	1	10	0.022	1	31	25	51	1.2	0.60
Fluorene	710		0.00030	1	9.6	0.015	0.15	0.18	19	1	13	0.022	1	23	13	25	1.7	0.90
Indeno (1,2,3-cd) pyrene	210		0.00030	1	2.8	0.015	0.0061	0.18	0.23	1	0.16	0.022	1	3.0	1.0	10	3.0	0.30
3-/4-Methylphenol	5.3		0.00030	1	0.072	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.072	5.9	18	0.012	0.0040
Naphthalene	1500		0.00030	1	20	0.015	0.0	0.18	0.0	1	0.0	0.022	1	20	8.4	17	2.4	1.2
Phenanthrene	1900		0.00030	1	26	0.015	0.10	0.18	34	1	23	0.022	1	49	509	59	0.096	0.83
Pyrene	1200		0.00030	1	16	0.015	0.059	0.18	13	1	8.6	0.022	1	25	7.6	13	3.3	1.9

Hazard Index - Detected Compounds	65	66
Hazard Index - Detected Compounds w/Detection Limits	68	66

NOTES:
(a) - The maximum concentration is the maximum detected concentration per SWMU.
(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.
(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion rate$_{food}$ = (0.0687 x body weight$^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)
(d) - See Attachment O, Table O-1
(e) - See Table 4-15.
(f) - Salisbury and Ross, 1992.
(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.
(h) - USEPA, 1993e.
(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-1b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Average Concentrations
SWMU S-1
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	67		0.00030	1	0.91	0.015	0.20	0.18	2.4	1	1.6	0.022	1	2.5	0.13	1.3	20	2.0
Chromium	99		0.00030	1	1.3	0.015	0.0075	0.18	0.13	1	0.091	0.022	1	1.4	3.9	16	0.37	0.092
Lead	184		0.00030	1	2.5	0.015	0.34	0.18	11	1	7.7	0.022	1	10	9.4	94	1.1	0.11
Mercury	1.9		0.00030	1	0.026	0.015	1.5	0.18	0.52	1	0.35	0.022	1	0.38	13	0.027	0.028	14
Nickel	98		0.00030	1	1.3	0.015	0.91	0.18	16	1	11	0.022	1	12	47	94	0.26	0.13
Selenium	3.9		0.00030	1	0.053	0.015	2.3	0.18	1.6	1	1.1	0.022	1	1.1	0.19	0.32	5.9	3.6
Silver	10		0.00030	1	0.14	0.015	0.35	0.18	0.63	1	0.43	0.022	1	0.56	21	1.8	0.026	0.30
Thallium		1.4	0.00030	1	0.019	0.015	0.0040	0.18	0.0010	1	0.00068	0.022	1	0.020	0.013	0.13	1.6	0.16
VOCs																		
Benzene	0.80		0.00030	1	0.011	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.011	28	279	0.00039	0.000039
Ethylbenzene	1.3		0.00030	1	0.017	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.017	99	296	0.00017	0.000057
Methyl ethyl ketone	0.30		0.00030	1	0.0040	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.0040	2091	5396	0.0000019	0.00000075
Xylenes, total	6.0		0.00030	1	0.081	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.081	2.1	2.6	0.038	0.031
SVOCs																		
Acenaphthene	75		0.00030	1	1.0	0.015	0.0	0.18	0.0	1	0.0	0.022	1	1.0	357	71	0.0028	0.014
Acenaphthylene	85		0.00030	1	1.1	0.015	0.17	0.18	2.6	1	1.8	0.022	1	2.9	357	71	0.0081	0.041
Anthracene	171		0.00030	1	2.3	0.015	0.10	0.18	3.1	1	2.1	0.022	1	4.4	1019	51	0.0043	0.086
Benzo (a) anthracene	228		0.00030	1	3.1	0.015	0.022	0.18	0.90	1	0.61	0.022	1	3.7	2.4	2.0	1.6	1.8
Benzo (a) pyrene	128		0.00030	1	1.7	0.015	0.0077	0.18	0.18	1	0.12	0.022	1	1.9	1.0	10	1.8	0.18
Benzo (b) fluoranthene	181		0.00030	1	2.5	0.015	0.012	0.18	0.39	1	0.27	0.022	1	2.7	1.0	10	2.7	0.27
Benzo (ghi) perylene	75		0.00030	1	1.0	0.015	0.0068	0.18	0.091	1	0.062	0.022	1	1.1	1.0	10	1.1	0.11
Benzo (k) fluoranthene	68		0.00030	1	0.92	0.015	0.012	0.18	0.15	1	0.099	0.022	1	1.0	1.0	10	1.0	0.10
Chrysene	198		0.00030	1	2.7	0.015	0.040	0.18	1.4	1	0.96	0.022	1	3.6	509	51	0.0072	0.072
Dibenzo(a,h)anthracene	31		0.00030	1	0.41	0.015	0.0043	0.18	0.024	1	0.016	0.022	1	0.43	0.24	10	1.8	0.042
Fluoranthene	518		0.00030	1	7.0	0.015	0.057	0.18	5.3	1	3.6	0.022	1	11	25	51	0.42	0.21
Fluorene	255		0.00030	1	3.4	0.015	0.15	0.18	6.9	1	4.7	0.022	1	8.1	13	25	0.64	0.32
Indeno (1,2,3-cd) pyrene	88		0.00030	1	1.2	0.015	0.0061	0.18	0.096	1	0.065	0.022	1	1.3	1.0	10	1.2	0.12
3-/4-Methylphenol	45		0.00030	1	0.61	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.61	5.9	18	0.10	0.035
Naphthalene	518		0.00030	1	7.0	0.015	0.0	0.18	0.0	1	0.0	0.022	1	7.0	8.4	17	0.84	0.42
Phenanthrene	651		0.00030	1	8.8	0.015	0.10	0.18	12	1	7.9	0.022	1	17	509	59	0.033	0.28
Pyrene	418		0.00030	1	5.7	0.015	0.059	0.18	4.4	1	3.0	0.022	1	8.7	7.6	13	1.1	0.68

Hazard Index - Detected Compounds	42	25
Hazard Index - Detected Compounds w/Detection Limits	44	25

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-2a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Maximum Concentrations
SWMU S-2
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	62		0.00030	1	0.83	0.015	0.20	0.18	2.2	1	1.5	0.022	1	2.3	0.13	1.3	18	1.8
Lead	1120		0.00030	1	15	0.015	0.34	0.18	69	1	47	0.022	1	62	9.4	94	6.6	0.66
Silver		17	0.00030	1	0.23	0.015	0.35	0.18	1.1	1	0.73	0.022	1	0.96	21	1.8	0.046	0.53
VOCs																		
Methylene chloride	0.0051		0.00030	1	0.000069	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.000069	9.8	84	0.0000070	0.00000082
SVOCs																		
Benzo (a) anthracene	0.15		0.00030	1	0.0020	0.015	0.022	0.18	0.00059	1	0.00040	0.022	1	0.0024	2.4	2.0	0.0010	0.0012
Benzo (b) fluoranthene	0.34		0.00030	1	0.0046	0.015	0.012	0.18	0.00073	1	0.00050	0.022	1	0.0051	1.0	10	0.0051	0.00051
Chrysene	0.10		0.00030	1	0.0014	0.015	0.040	0.18	0.00072	1	0.00049	0.022	1	0.0018	509	51	0.0000036	0.000036
Fluoranthene	0.096		0.00030	1	0.0013	0.015	0.057	0.18	0.00098	1	0.00067	0.022	1	0.0020	25	51	0.000079	0.000039
Indeno (1,2,3-cd) pyrene	0.092		0.00030	1	0.0012	0.015	0.0061	0.18	0.00010	1	0.000068	0.022	1	0.0013	1.0	10	0.0013	0.00013
Pyrene	0.12		0.00030	1	0.0016	0.015	0.059	0.18	0.0013	1	0.00086	0.022	1	0.0025	7.6	13	0.00033	0.00019

Hazard Index - Detected Compounds	25	2.5
Hazard Index - Detected Compounds w/Detection Limits	25	3.0

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion rate$_{food}$ = (0.0687 x body weight$^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-2b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Average Concentrations
SWMU S-2
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	82		0.00030	1	1.1	0.015	0.20	0.18	3.0	1	2.0	0.022	1	3.1	0.13	1.3	24	2.4
Lead	560		0.00030	1	7.6	0.015	0.34	0.18	35	1	23	0.022	1	31	9.4	94	3.3	0.33
Silver		8.9	0.00030	1	0.12	0.015	0.35	0.18	0.56	1	0.38	0.022	1	0.50	21	1.8	0.023	0.27
VOCs																		
Methylene chloride	0.0061		0.00030	1	0.000083	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.000083	9.8	84	0.0000084	0.00000099
SVOCs																		
Benzo (a) anthracene	0.63		0.00030	1	0.0085	0.015	0.022	0.18	0.0025	1	0.0017	0.022	1	0.010	2.4	2.0	0.0043	0.0050
Benzo (b) fluoranthene	0.72		0.00030	1	0.0098	0.015	0.012	0.18	0.0016	1	0.0011	0.022	1	0.011	1.0	10	0.011	0.0011
Chrysene	0.60		0.00030	1	0.0081	0.015	0.040	0.18	0.0043	1	0.0029	0.022	1	0.011	509	51	0.000022	0.00022
Fluoranthene	0.60		0.00030	1	0.0081	0.015	0.057	0.18	0.0061	1	0.0042	0.022	1	0.012	25	51	0.00048	0.00024
Indeno (1,2,3-cd) pyrene	0.60		0.00030	1	0.0081	0.015	0.0061	0.18	0.00065	1	0.00044	0.022	1	0.0085	1.0	10	0.0084	0.00084
Pyrene	0.61		0.00030	1	0.0083	0.015	0.059	0.18	0.0065	1	0.0044	0.022	1	0.013	7.6	13	0.0017	0.00099

Hazard Index - Detected Compounds	28	2.8
Hazard Index - Detected Compounds w/Detection Limits	28	3.1

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-3a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Maximum Concentrations
SWMU S-3
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Arsenic	41		0.00030	1	0.56	0.015	0.56	0.18	4.1	1	2.8	0.022	1	3.4	0.13	1.3	26	2.6
Chromium	118		0.00030	1	1.6	0.015	0.0075	0.18	0.16	1	0.11	0.022	1	1.7	3.9	16	0.44	0.11
Lead	3960		0.00030	1	54	0.015	0.34	0.18	244	1	166	0.022	1	219	9.4	94	23	2.3
Nickel	44		0.00030	1	0.60	0.015	0.91	0.18	7.3	1	4.9	0.022	1	5.5	47	94	0.12	0.059
Selenium	14		0.00030	1	0.19	0.015	2.3	0.18	5.8	1	3.9	0.022	1	4.1	0.19	0.32	22	13
Silver	6.5		0.00030	1	0.088	0.015	0.35	0.18	0.41	1	0.28	0.022	1	0.37	21	1.8	0.017	0.20
Thallium	5.6		0.00030	1	0.076	0.015	0.0040	0.18	0.0040	1	0.0027	0.022	1	0.079	0.013	0.13	6.0	0.60
VOCs																		
Trichloroethene	0.019		0.00030	1	0.00026	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.00026	0.68	6.8	0.00038	0.000038
SVOCs																		
Acenaphthylene	0.61		0.00030	1	0.0083	0.015	0.17	0.18	0.0	1	0.0	0.022	1	0.021	357	71	0.000059	0.00029
Anthracene	0.45		0.00030	1	0.0061	0.015	0.10	0.18	0.0081	1	0.0055	0.022	1	0.012	1019	51	0.000011	0.00023
Benzo (a) anthracene	1.2		0.00030	1	0.016	0.015	0.022	0.18	0.0048	1	0.0032	0.022	1	0.019	2.4	2.0	0.0081	0.0097
Benzo (a) pyrene	0.97		0.00030	1	0.013	0.015	0.0077	0.18	0.0013	1	0.00091	0.022	1	0.014	1.0	10	0.014	0.0014
Chrysene	1.3		0.00030	1	0.018	0.015	0.040	0.18	0.0094	1	0.0063	0.022	1	0.024	509	51	0.000047	0.00047
Fluoranthene	3.3		0.00030	1	0.045	0.015	0.057	0.18	0.034	1	0.023	0.022	1	0.068	25	51	0.0027	0.0013
Fluorene	0.14		0.00030	1	0.0019	0.015	0.15	0.18	0.0038	1	0.0026	0.022	1	0.0045	13	25	0.00034	0.00018
Naphthalene	0.19		0.00030	1	0.0026	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.0026	8.4	17	0.00031	0.00015
Phenanthrene	1.9		0.00030	1	0.026	0.015	0.10	0.18	0.034	1	0.023	0.022	1	0.049	509	59	0.000096	0.00083
Pyrene	1.5		0.00030	1	0.020	0.015	0.059	0.18	0.016	1	0.011	0.022	1	0.031	7.6	13	0.0041	0.0024

Hazard Index - Detected Compounds	78	19
Hazard Index - Detected Compounds w/Detection Limits	78	19

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion rate$_{food}$ = (0.0687 x body weight$^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-3b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Average Concentrations
SWMU S-3
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Arsenic	34		0.00030	1	0.46	0.015	0.56	0.18	3.4	1	2.3	0.022	1	2.8	0.13	1.3	21	2.1
Chromium	99		0.00030	1	1.3	0.015	0.0075	0.18	0.13	1	0.091	0.022	1	1.4	3.9	16	0.37	0.092
Lead	2520		0.00030	1	34	0.015	0.34	0.18	156	1	105	0.022	1	140	9.4	94	15	1.5
Nickel	33		0.00030	1	0.45	0.015	0.91	0.18	5.4	1	3.7	0.022	1	4.1	47	94	0.087	0.044
Selenium	12		0.00030	1	0.16	0.015	2.3	0.18	4.9	1	3.3	0.022	1	3.5	0.19	0.32	18	11
Silver	4.5		0.00030	1	0.061	0.015	0.35	0.18	0.28	1	0.19	0.022	1	0.25	21	1.8	0.012	0.14
Thallium	4.7		0.00030	1	0.064	0.015	0.0040	0.18	0.0034	1	0.0023	0.022	1	0.066	0.013	0.13	5.2	0.52
VOCs																		
Trichloroethene	0.016		0.00030	1	0.00022	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.00022	0.68	6.8	0.00032	0.000032
SVOCs																		
Acenaphthylene	0.43		0.00030	1	0.0058	0.015	0.17	0.18	0.0	1	0.0	0.022	1	0.015	357	71	0.000041	0.00021
Anthracene	0.35		0.00030	1	0.0047	0.015	0.10	0.18	0.0063	1	0.0043	0.022	1	0.0090	1019	51	0.0000088	0.00018
Benzo (a) anthracene	0.66		0.00030	1	0.0089	0.015	0.022	0.18	0.0026	1	0.0018	0.022	1	0.011	2.4	2.0	0.0045	0.0053
Benzo (a) pyrene	0.54		0.00030	1	0.0073	0.015	0.0077	0.18	0.00075	1	0.00051	0.022	1	0.0078	1.0	10	0.0077	0.00077
Chrysene	0.73		0.00030	1	0.0099	0.015	0.040	0.18	0.0053	1	0.0036	0.022	1	0.013	509	51	0.000026	0.00026
Fluoranthene	1.7		0.00030	1	0.023	0.015	0.057	0.18	0.018	1	0.012	0.022	1	0.035	25	51	0.0014	0.00069
Fluorene	0.20		0.00030	1	0.0026	0.015	0.15	0.18	0.0053	1	0.0036	0.022	1	0.0062	13	25	0.00049	0.00024
Naphthalene	0.12		0.00030	1	0.0016	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.0016	8.4	17	0.00020	0.000098
Phenanthrene	1.0		0.00030	1	0.014	0.015	0.10	0.18	0.018	1	0.012	0.022	1	0.026	509	59	0.000052	0.00045
Pyrene	0.83		0.00030	1	0.011	0.015	0.059	0.18	0.0088	1	0.0059	0.022	1	0.017	7.6	13	0.0022	0.0013

Hazard Index - Detected Compounds	60	15
Hazard Index - Detected Compounds w/Detection Limits	60	15

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion rate$_{food}$ = (0.0687 x body weight$^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-4a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Maximum Concentrations
SWMU S-4
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	49		0.00030	1	0.67	0.015	0.0075	0.18	0.066	1	0.045	0.022	1	0.71	3.9	16	0.18	0.044
Lead	415		0.00030	1	5.6	0.015	0.34	0.18	26	1	17	0.022	1	23	9.4	94	2.4	0.24
Mercury	1.6		0.00030	1	0.022	0.015	1.5	0.18	0.43	1	0.29	0.022	1	0.32	13	0.027	0.024	12
Nickel	40		0.00030	1	0.54	0.015	0.91	0.18	6.5	1	4.4	0.022	1	5.0	47	94	0.11	0.053
SVOCs																		
Benzo (a) anthracene	0.71		0.00030	1	0.0096	0.015	0.022	0.18	0.0028	1	0.0019	0.022	1	0.012	2.4	2.0	0.0048	0.0058
Benzo (a) pyrene	0.37		0.00030	1	0.0050	0.015	0.0077	0.18	0.00051	1	0.00035	0.022	1	0.0054	1.0	10	0.0054	0.00054
Benzo (b) fluoranthene	0.84		0.00030	1	0.011	0.015	0.012	0.18	0.0018	1	0.0012	0.022	1	0.013	1.0	10	0.013	0.0013
Benzo (ghi) perylene	0.62		0.00030	1	0.0084	0.015	0.0068	0.18	0.00076	1	0.00051	0.022	1	0.0089	1.0	10	0.0089	0.00089
Benzo (k) fluoranthene	0.34		0.00030	1	0.0046	0.015	0.012	0.18	0.00073	1	0.00050	0.022	1	0.0051	1.0	10	0.0051	0.00051
bis (2-Ethylhexyl) phthalate	0.98		0.00030	1	0.013	0.015	0.074	0.18	0.013	1	0.0088	0.022	1	0.022	16	25	0.0014	0.00088
Chrysene	0.45		0.00030	1	0.0061	0.015	0.040	0.18	0.0032	1	0.0022	0.022	1	0.0083	509	51	0.000016	0.00016
Fluoranthene	0.85		0.00030	1	0.012	0.015	0.057	0.18	0.0087	1	0.0059	0.022	1	0.017	25	51	0.00070	0.00034
Indeno (1,2,3-cd) pyrene	0.46		0.00030	1	0.0062	0.015	0.0061	0.18	0.00051	1	0.00034	0.022	1	0.0066	1.0	10	0.0066	0.00066
Naphthalene	0.33		0.00030	1	0.0045	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.0045	8.4	17	0.00053	0.00026
Phenanthrene	0.42		0.00030	1	0.0057	0.015	0.10	0.18	0.0076	1	0.0051	0.022	1	0.011	509	59	0.000021	0.00018
Pyrene	0.79		0.00030	1	0.011	0.015	0.059	0.18	0.0084	1	0.0057	0.022	1	0.016	7.6	13	0.0022	0.0013

Hazard Index - Detected Compounds	2.8	12
Hazard Index - Detected Compounds w/Detection Limits	2.8	12

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion rate$_{food}$ = (0.0687 x body weight$^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-4b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Average Concentrations
SWMU S-4
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	28		0.00030	1	0.38	0.015	0.0075	0.18	0.038	1	0.026	0.022	1	0.40	3.9	16	0.10	0.026
Lead	389		0.00030	1	5.3	0.015	0.34	0.18	24	1	16	0.022	1	22	9.4	94	2.3	0.23
Mercury	1.0		0.00030	1	0.014	0.015	1.5	0.18	0.27	1	0.18	0.022	1	0.20	13	0.027	0.015	7.4
Nickel	37		0.00030	1	0.50	0.015	0.91	0.18	6.1	1	4.1	0.022	1	4.6	47	94	0.098	0.049
SVOCs																		
Benzo (a) anthracene	0.58		0.00030	1	0.0079	0.015	0.022	0.18	0.0023	1	0.0016	0.022	1	0.0095	2.4	2.0	0.0040	0.0046
Benzo (a) pyrene	0.30		0.00030	1	0.0041	0.015	0.0077	0.18	0.00042	1	0.00028	0.022	1	0.0043	1.0	10	0.0043	0.00043
Benzo (b) fluoranthene	0.79		0.00030	1	0.011	0.015	0.012	0.18	0.0017	1	0.00115	0.022	1	0.012	1.0	10	0.012	0.0012
Benzo (ghi) perylene	0.38		0.00030	1	0.0051	0.015	0.0068	0.18	0.00047	1	0.00032	0.022	1	0.0055	1.0	10	0.0054	0.00054
Benzo (k) fluoranthene	0.38		0.00030	1	0.0052	0.015	0.012	0.18	0.00083	1	0.00056	0.022	1	0.0057	1.0	10	0.0056	0.00056
bis (2-Ethylhexyl) phthalate	0.63		0.00030	1	0.0085	0.015	0.074	0.18	0.0084	1	0.006	0.022	1	0.014	16	25	0.00092	0.00057
Chrysene	0.42		0.00030	1	0.0056	0.015	0.040	0.18	0.0030	1	0.0020	0.022	1	0.0077	509	51	0.000015	0.00015
Fluoranthene	0.83		0.00030	1	0.011	0.015	0.057	0.18	0.0085	1	0.0058	0.022	1	0.017	25	51	0.00067	0.00034
Indeno (1,2,3-cd) pyrene	0.36		0.00030	1	0.0049	0.015	0.0061	0.18	0.00040	1	0.00027	0.022	1	0.0052	1.0	10	0.0051	0.00051
Naphthalene	0.31		0.00030	1	0.0042	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.0042	8.4	17	0.00050	0.00025
Phenanthrene	0.40		0.00030	1	0.0055	0.015	0.10	0.18	0.0073	1	0.0049	0.022	1	0.010	509	59	0.000020	0.00018
Pyrene	0.77		0.00030	1	0.010	0.015	0.059	0.18	0.0081	1	0.0055	0.022	1	0.016	7.6	13	0.0021	0.0012

Hazard Index - Detected Compounds	2.5	7.7
Hazard Index - Detected Compounds w/Detection Limits	2.5	7.7

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-5a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Maximum Concentrations
SWMU S-5
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony		89	0.00030	1	1.2	0.015	0.20	0.18	3.2	1	2.2	0.022	1	3.4	0.13	1.3	26	2.6
Cadmium		67	0.00030	1	0.91	0.015	1.7	0.18	21	1	14	0.022	1	15	12	47	1.2	0.31
Lead	241		0.00030	1	3.3	0.015	0.34	0.18	15	1	10	0.022	1	13	9.4	94	1.4	0.14
Nickel		59	0.00030	1	0.80	0.015	0.91	0.18	9.7	1	6.6	0.022	1	7.4	47	94	0.16	0.078
Silver		15	0.00030	1	0.20	0.015	0.35	0.18	0.93	1	0.63	0.022	1	0.83	21	1.8	0.039	0.46
VOCs																		
Carbon disulfide	0.0022		0.00030	1	0.000030	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.000030	24	41	0.0000012	0.00000073
Methylene chloride	0.0024		0.00030	1	0.000033	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.000033	9.8	84	0.0000033	0.00000039

Hazard Index - Detected Compounds	1.4	0.14
Hazard Index - Detected Compounds w/Detection Limits	29	3.6

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-5b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Average Concentrations
SWMU S-5
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony		84	0.00030	1	1.1	0.015	0.20	0.18	3.0	1	2.0	0.022	1	3.2	0.13	1.3	25	2.5
Cadmium		37	0.00030	1	0.50	0.015	1.7	0.18	11	1	7.7	0.022	1	8.2	12	47	0.69	0.18
Lead	133		0.00030	1	1.8	0.015	0.34	0.18	8.2	1	5.6	0.022	1	7.4	9.4	94	0.78	0.078
Nickel		56	0.00030	1	0.76	0.015	0.91	0.18	9.2	1	6.2	0.022	1	7.0	47	94	0.15	0.074
Silver		14	0.00030	1	0.19	0.015	0.35	0.18	0.88	1	0.60	0.022	1	0.79	21	1.8	0.037	0.43
VOCs																		
Carbon disulfide	0.0026		0.00030	1	0.000035	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.000035	24	41	0.0000015	0.00000086
Methylene chloride	0.0040		0.00030	1	0.000054	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.000054	9.8	84	0.0000055	0.00000065

Hazard Index - Detected Compounds	0.78	0.078
Hazard Index - Detected Compounds w/Detection Limits	27	3.3

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-6a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Maximum Concentrations
SWMU S-6
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	375		0.00030	1	5.1	0.015	0.20	0.18	14	1	9.1	0.022	1	14	0.13	1.3	109	11
Lead	3670		0.00030	1	50	0.015	0.34	0.18	227	1	153	0.022	1	203	9.4	94	22	2.2
Nickel		92	0.00030	1	1.2	0.015	0.91	0.18	15	1	10	0.022	1	11	47	94	0.24	0.12
Selenium		2.3	0.00030	1	0.031	0.015	2.3	0.18	0.94	1	0.64	0.022	1	0.67	0.19	0.32	3.5	2.1
Silver		23	0.00030	1	0.31	0.015	0.35	0.18	1.4	1	0.98	0.022	1	1.3	21	1.8	0.061	0.72
SVOCs																		
Benzo (a) pyrene	0.14		0.00030	1	0.0019	0.015	0.0077	0.18	0.00019	1	0.00013	0.022	1	0.0020	1.0	10	0.0020	0.00020
Benzo (b) fluoranthene	0.30		0.00030	1	0.0041	0.015	0.012	0.18	0.00065	1	0.00044	0.022	1	0.0045	1.0	10	0.0045	0.00045
Benzo (ghi) perylene	0.12		0.00030	1	0.0016	0.015	0.0068	0.18	0.00015	1	0.000099	0.022	1	0.0017	1.0	10	0.0017	0.00017
Chrysene	0.34		0.00030	1	0.0046	0.015	0.040	0.18	0.0024	1	0.0017	0.022	1	0.0063	509	51	0.000012	0.00012
Fluoranthene	0.13		0.00030	1	0.0018	0.015	0.057	0.18	0.0013	1	0.00090	0.022	1	0.0027	25	51	0.00011	0.000052
Fluorene	0.13		0.00030	1	0.0018	0.015	0.15	0.18	0.0035	1	0.0024	0.022	1	0.0041	13	25	0.00032	0.00017
Indeno (1,2,3-cd) pyrene	0.15		0.00030	1	0.0020	0.015	0.0061	0.18	0.00016	1	0.00011	0.022	1	0.0021	1.0	10	0.0021	0.00021
Pyrene	0.13		0.00030	1	0.0018	0.015	0.059	0.18	0.0014	1	0.00094	0.022	1	0.0027	7.6	13	0.00035	0.00021

Hazard Index - Detected Compounds	131	13
Hazard Index - Detected Compounds w/Detection Limits	135	16

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-6b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Average Concentrations
SWMU S-6
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	254		0.00030	1	3.4	0.015	0.20	0.18	9.1	1	6.2	0.022	1	10	0.13	1.3	76	7.6
Lead	2315		0.00030	1	31	0.015	0.34	0.18	143	1	97	0.022	1	128	9.4	94	14	1.4
Nickel		90	0.00030	1	1.2	0.015	0.91	0.18	15	1	10	0.022	1	11	47	94	0.24	0.12
Selenium		1.4	0.00030	1	0.019	0.015	2.3	0.18	0.57	1	0.39	0.022	1	0.4	0.19	0.32	2.1	1.3
Silver		23	0.00030	1	0.31	0.015	0.35	0.18	1.4	1	0.98	0.022	1	1.3	21	1.8	0.060	0.70
SVOCs																		
Benzo (a) pyrene	0.22		0.00030	1	0.0030	0.015	0.0077	0.18	0.00030	1	0.00021	0.022	1	0.0032	1.0	10	0.0031	0.00031
Benzo (b) fluoranthene	0.22		0.00030	1	0.0029	0.015	0.012	0.18	0.00046	1	0.00031	0.022	1	0.0032	1.0	10	0.0032	0.00032
Benzo (ghi) perylene	0.21		0.00030	1	0.0028	0.015	0.0068	0.18	0.00026	1	0.00017	0.022	1	0.0030	1.0	10	0.0030	0.00030
Chrysene	0.24		0.00030	1	0.0032	0.015	0.040	0.18	0.0017	1	0.0011	0.022	1	0.0043	509	51	0.0000085	0.000085
Fluoranthene	0.22		0.00030	1	0.0029	0.015	0.057	0.18	0.0022	1	0.0015	0.022	1	0.0044	25	51	0.00017	0.000087
Fluorene	0.21		0.00030	1	0.0029	0.015	0.15	0.18	0.0058	1	0.0039	0.022	1	0.0068	13	25	0.00053	0.00027
Indeno (1,2,3-cd) pyrene	0.23		0.00030	1	0.0030	0.015	0.0061	0.18	0.00025	1	0.00017	0.022	1	0.0032	1.0	10	0.0032	0.00032
Pyrene	0.22		0.00030	1	0.0029	0.015	0.059	0.18	0.0023	1	0.0015	0.022	1	0.0045	7.6	13	0.00058	0.00035

Hazard Index - Detected Compounds	89	8.9
Hazard Index - Detected Compounds w/Detection Limits	92	11

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-7a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Maximum Concentrations
SWMU S-7/S-20
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
Metals															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Chromium	299		0.00030	1	4.1	0.015	0.0075	0.18	0.40	1	0.27	0.022	1	4.3	3.9	16	1.1	0.27
Lead	968		0.00030	1	13	0.015	0.34	0.18	60	1	40	0.022	1	54	9.4	94	5.7	0.57
Mercury	0.71		0.00030	1	0.0096	0.015	1.5	0.18	0.19	1	0.13	0.022	1	0.14	13	0.027	0.011	5.2
Nickel	62		0.00030	1	0.84	0.015	0.91	0.18	10	1	6.9	0.022	1	7.8	47	94	0.16	0.082
Selenium	8.9		0.00030	1	0.12	0.015	2.3	0.18	3.6	1	2.5	0.022	1	2.6	0.19	0.32	14	8.1
Thallium	7.2		0.00030	1	0.098	0.015	0.0040	0.18	0.0052	1	0.0035	0.022	1	0.10	0.013	0.13	7.8	0.78
VOCs																		
Trichloroethene	0.015		0.00030	1	0.00020	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.00020	0.68	6.8	0.00030	0.000030
SVOCs																		
bis (2-Ethylhexyl) phthalate	0.048		0.00030	1	0.00065	0.015	0.074	0.18	0.00064	1	0.00043	0.022	1	0.0011	16	25	0.000068	0.000043
Chrysene	0.060		0.00030	1	0.00081	0.015	0.040	0.18	0.00043	1	0.00029	0.022	1	0.0011	509	51	0.0000022	0.000022
Fluoranthene	0.083		0.00030	1	0.0011	0.015	0.057	0.18	0.00085	1	0.00058	0.022	1	0.0017	25	51	0.000068	0.000033
Naphthalene	0.049		0.00030	1	0.00066	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.00066	8.4	17	0.000079	0.000039
Phenanthrene	0.054		0.00030	1	0.00073	0.015	0.10	0.18	0.00097	1	0.00066	0.022	1	0.0014	509	59	0.0000027	0.000024
Pyrene	0.053		0.00030	1	0.00072	0.015	0.059	0.18	0.00056	1	0.00038	0.022	1	0.0011	7.6	13	0.00014	0.000085

Hazard Index - Detected Compounds	28	15
Hazard Index - Detected Compounds w/Detection Limits	28	15

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-7b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Average Concentrations
SWMU S-7/S-20
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	269		0.00030	1	3.6	0.015	0.0075	0.18	0.36	1	0.25	0.022	1	3.9	3.9	16	1.0	0.25
Lead	542		0.00030	1	7.3	0.015	0.34	0.18	33	1	23	0.022	1	30	9.4	94	3.2	0.32
Mercury	0.19		0.00030	1	0.0026	0.015	1.5	0.18	0.052	1	0.035	0.022	1	0.038	13	0.027	0.0028	1.4
Nickel	57		0.00030	1	0.77	0.015	0.91	0.18	9.3	1	6.3	0.022	1	7.1	47	94	0.15	0.075
Selenium	3.8		0.00030	1	0.051	0.015	2.3	0.18	1.6	1	1.1	0.022	1	1.1	0.19	0.32	5.7	3.5
Thallium	3.3		0.00030	1	0.045	0.015	0.0040	0.18	0.0024	1	0.0016	0.022	1	0.046	0.013	0.13	3.7	0.37
VOCs																		
Trichloroethene	0.0078		0.00030	1	0.00011	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.00011	0.68	6.8	0.00016	0.000016
SVOCs																		
bis (2-Ethylhexyl) phthalate	0.13		0.00030	1	0.0018	0.015	0.074	0.18	0.0017	1	0.0012	0.022	1	0.0029	16	25	0.00019	0.00012
Chrysene	0.14		0.00030	1	0.0019	0.015	0.040	0.18	0.0010	1	0.00069	0.022	1	0.0026	509	51	0.0000051	0.000051
Fluoranthene	0.11		0.00030	1	0.0015	0.015	0.057	0.18	0.0011	1	0.00076	0.022	1	0.0022	25	51	0.000088	0.000044
Naphthalene	0.18		0.00030	1	0.0025	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.0025	8.4	17	0.00029	0.00015
Phenanthrene	0.18		0.00030	1	0.0024	0.015	0.10	0.18	0.0032	1	0.0022	0.022	1	0.0046	509	59	0.0000089	0.000077
Pyrene	0.18		0.00030	1	0.0024	0.015	0.059	0.18	0.0019	1	0.0013	0.022	1	0.0037	7.6	13	0.00048	0.00029

Hazard Index - Detected Compounds	14	5.9
Hazard Index - Detected Compounds w/Detection Limits	14	5.9

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-8a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Maximum Concentrations
SWMU S-8
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Arsenic	74		0.00030	1	1.0	0.015	0.56	0.18	7.4	1	5.0	0.022	1	6.0	0.13	1.3	46	4.6
Barium	252		0.00030	1	3.4	0.015	0.15	0.18	6.8	1	4.6	0.022	1	8.0	10	40	0.80	0.20
Cadmium	50		0.00030	1	0.68	0.015	1.7	0.18	15	1	10	0.022	1	11	12	47	0.92	0.23
Chromium	436		0.00030	1	5.9	0.015	0.0075	0.18	0.59	1	0.40	0.022	1	6.3	3.9	16	1.6	0.39
Lead	2160		0.00030	1	29	0.015	0.34	0.18	133	1	90	0.022	1	120	9.4	94	13	1.3
Selenium		1.4	0.00030	1	0.018	0.015	2.3	0.18	0.55	1	0.37	0.022	1	0.39	0.19	0.32	2.1	1.2
Thallium	23		0.00030	1	0.31	0.015	0.0040	0.18	0.016	1	0.011	0.022	1	0.32	0.013	0.13	25	2.5
VOCs																		
Methylene chloride	0.0060		0.00030	1	0.000081	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.000081	9.8	84	0.0000083	0.00000097
SVOCs																		
Anthracene	0.80		0.00030	1	0.011	0.015	0.10	0.18	0.014	1	0.0098	0.022	1	0.021	1019	51	0.000020	0.00040
Benzo (a) anthracene	2.1		0.00030	1	0.028	0.015	0.022	0.18	0.0083	1	0.0056	0.022	1	0.034	2.4	2.0	0.014	0.017
Benzo (a) pyrene	1.3		0.00030	1	0.018	0.015	0.0077	0.18	0.0018	1	0.0012	0.022	1	0.019	1.0	10	0.019	0.0019
Benzo (b) fluoranthene	1.9		0.00030	1	0.026	0.015	0.012	0.18	0.0041	1	0.0028	0.022	1	0.029	1.0	10	0.029	0.0029
Benzo (ghi) perylene	0.95		0.00030	1	0.013	0.015	0.0068	0.18	0.0012	1	0.00079	0.022	1	0.014	1.0	10	0.014	0.0014
Benzo (k) fluoranthene	1.9		0.00030	1	0.026	0.015	0.012	0.18	0.0041	1	0.0028	0.022	1	0.029	1.0	10	0.029	0.0029
Chrysene	2.4		0.00030	1	0.033	0.015	0.040	0.18	0.017	1	0.012	0.022	1	0.044	509	51	0.000087	0.00087
Dibenzo(a,h)anthracene	0.40		0.00030	1	0.0054	0.015	0.0043	0.18	0.00031	1	0.00021	0.022	1	0.0056	0.24	10	0.023	0.00056
Fluoranthene	5.3		0.00030	1	0.072	0.015	0.057	0.18	0.054	1	0.037	0.022	1	0.11	25	51	0.0043	0.0021
Indeno (1,2,3-cd) pyrene	1.0		0.00030	1	0.014	0.015	0.0061	0.18	0.0011	1	0.00074	0.022	1	0.014	1.0	10	0.014	0.0014
Naphthalene	0.39		0.00030	1	0.0053	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.0053	8.4	17	0.00063	0.00031
Phenanthrene	3.3		0.00030	1	0.045	0.015	0.10	0.18	0.059	1	0.040	0.022	1	0.085	509	59	0.00017	0.0014
Pyrene	3.4		0.00030	1	0.046	0.015	0.059	0.18	0.036	1	0.024	0.022	1	0.071	7.6	13	0.0093	0.0054

Hazard Index - Detected Compounds	87	9.3
Hazard Index - Detected Compounds w/Detection Limits	89	10

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-8b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Average Concentrations
SWMU S-8
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Arsenic	43		0.00030	1	0.58	0.015	0.56	0.18	4.3	1	2.9	0.022	1	3.5	0.13	1.3	27	2.7
Barium	146		0.00030	1	2.0	0.015	0.15	0.18	3.9	1	2.7	0.022	1	4.6	10	40	0.45	0.12
Cadmium	29		0.00030	1	0.39	0.015	1.7	0.18	8.9	1	6.0	0.022	1	6.4	12	47	0.54	0.14
Chromium	372		0.00030	1	5.0	0.015	0.0075	0.18	0.50	1	0.34	0.022	1	5.4	3.9	16	1.4	0.35
Lead	1224		0.00030	1	17	0.015	0.34	0.18	76	1	51	0.022	1	68	9.4	94	7.2	0.72
Selenium		0.82	0.00030	1	0.011	0.015	2.3	0.18	0.34	1	0.23	0.022	1	0.24	0.19	0.32	1.2	0.75
Thallium	15		0.00030	1	0.20	0.015	0.0040	0.18	0.011	1	0.0073	0.022	1	0.21	0.013	0.13	17	1.7
VOCs																		
Methylene chloride	0.0058		0.00030	1	0.000079	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.000079	9.8	84	0.0000080	0.00000094
SVOCs																		
Anthracene	0.50		0.00030	1	0.0067	0.015	0.10	0.18	0.0090	1	0.0061	0.022	1	0.013	1019	51	0.000013	0.00025
Benzo (a) anthracene	1.2		0.00030	1	0.017	0.015	0.022	0.18	0.0049	1	0.0033	0.022	1	0.020	2.4	2.0	0.0084	0.0098
Benzo (a) pyrene	0.86		0.00030	1	0.012	0.015	0.0077	0.18	0.0012	1	0.00080	0.022	1	0.012	1.0	10	0.012	0.0012
Benzo (b) fluoranthene	1.2		0.00030	1	0.016	0.015	0.012	0.18	0.0026	1	0.0018	0.022	1	0.018	1.0	10	0.018	0.0018
Benzo (ghi) perylene	0.66		0.00030	1	0.0089	0.015	0.0068	0.18	0.00081	1	0.00055	0.022	1	0.0095	1.0	10	0.0093	0.00093
Benzo (k) fluoranthene	1.1		0.00030	1	0.014	0.015	0.012	0.18	0.0023	1	0.0015	0.022	1	0.016	1.0	10	0.016	0.0016
Chrysene	1.4		0.00030	1	0.019	0.015	0.040	0.18	0.010	1	0.0068	0.022	1	0.026	509	51	0.000050	0.00050
Dibenzo(a,h)anthracene	0.30		0.00030	1	0.0040	0.015	0.0043	0.18	0.00023	1	0.00016	0.022	1	0.0042	0.24	10	0.018	0.00041
Fluoranthene	2.9		0.00030	1	0.039	0.015	0.057	0.18	0.030	1	0.020	0.022	1	0.059	25	51	0.0023	0.0012
Indeno (1,2,3-cd) pyrene	0.69		0.00030	1	0.0093	0.015	0.0061	0.18	0.00075	1	0.00051	0.022	1	0.0098	1.0	10	0.0096	0.00096
Naphthalene	0.29		0.00030	1	0.0040	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.0040	8.4	17	0.00047	0.00024
Phenanthrene	1.8		0.00030	1	0.024	0.015	0.10	0.18	0.032	1	0.021	0.022	1	0.045	509	59	0.000088	0.00076
Pyrene	1.9		0.00030	1	0.026	0.015	0.059	0.18	0.020	1	0.014	0.022	1	0.040	7.6	13	0.0052	0.0031

Hazard Index - Detected Compounds	53	5.7
Hazard Index - Detected Compounds w/Detection Limits	54	6.4

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-9a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Maximum Concentrations
SWMU S-11
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	203		0.00030	1	2.7	0.015	0.0075	0.18	0.27	1	0.19	0.022	1	2.9	3.9	16	0.75	0.18
Lead	355		0.00030	1	4.8	0.015	0.34	0.18	22	1	15	0.022	1	20	9.4	94	2.1	0.21
Nickel	36		0.00030	1	0.48	0.015	0.91	0.18	5.8	1	3.9	0.022	1	4.4	47	94	0.094	0.047
Selenium	5.7		0.00030	1	0.077	0.015	2.3	0.18	2.3	1	1.6	0.022	1	1.7	0.19	0.32	8.7	5.2
Thallium	7.1		0.00030	1	0.096	0.015	0.0040	0.18	0.0051	1	0.0035	0.022	1	0.10	0.013	0.13	7.7	0.77
VOCs																		
Trichloroethene	0.0080		0.00030	1	0.00011	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.00011	0.68	6.8	0.00016	0.000016
SVOCs																		
Acenaphthylene	2.4		0.00030	1	0.033	0.015	0.17	0.18	0.073	1	0.050	0.022	1	0.082	357	71	0.00023	0.0012
Anthracene	2.4		0.00030	1	0.033	0.015	0.10	0.18	0.043	1	0.029	0.022	1	0.062	1019	51	0.000061	0.0012
Benzo (a) anthracene	8.9		0.00030	1	0.12	0.015	0.022	0.18	0.035	1	0.024	0.022	1	0.14	2.4	2.0	0.060	0.072
Benzo (a) pyrene	10		0.00030	1	0.14	0.015	0.0077	0.18	0.014	1	0.0094	0.022	1	0.14	1.0	10	0.14	0.014
Chrysene	10		0.00030	1	0.14	0.015	0.040	0.18	0.072	1	0.049	0.022	1	0.18	509	51	0.00036	0.0036
Fluoranthene	24		0.00030	1	0.33	0.015	0.057	0.18	0.25	1	0.17	0.022	1	0.49	25	51	0.020	0.0096
Fluorene	1.1		0.00030	1	0.015	0.015	0.15	0.18	0.030	1	0.020	0.022	1	0.035	13	25	0.0027	0.0014
Naphthalene	0.50		0.00030	1	0.0068	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.0068	8.4	17	0.00081	0.00040
Phenanthrene	14		0.00030	1	0.19	0.015	0.10	0.18	0.25	1	0.17	0.022	1	0.36	509	59	0.00071	0.0061
Pyrene	17		0.00030	1	0.23	0.015	0.059	0.18	0.18	1	0.12	0.022	1	0.35	7.6	13	0.046	0.027

Hazard Index - Detected Compounds	20	6.5
Hazard Index - Detected Compounds w/Detection Limits	20	6.5

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-9b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Average Concentrations
SWMU S-11
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	203		0.00030	1	2.7	0.015	0.0075	0.18	0.27	1	0.19	0.022	1	2.9	3.9	16	0.76	0.19
Lead	285		0.00030	1	3.9	0.015	0.34	0.18	18	1	12	0.022	1	16	9.4	94	1.7	0.17
Nickel	33		0.00030	1	0.45	0.015	0.91	0.18	5.4	1	3.7	0.022	1	4.1	47	94	0.087	0.044
Selenium	5.2		0.00030	1	0.070	0.015	2.3	0.18	2.1	1	1.4	0.022	1	1.5	0.19	0.32	7.8	4.8
Thallium	6.9		0.00030	1	0.093	0.015	0.0040	0.18	0.0050	1	0.0034	0.022	1	0.097	0.013	0.13	7.7	0.77
VOCs																		
Trichloroethene	0.008		0.00030	1	0.00010	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.00010	0.68	6.8	0.00015	0.000015
SVOCs																		
Acenaphthylene	1.9		0.00030	1	0.025	0.015	0.17	0.18	0.057	1	0.038	0.022	1	0.063	357	71	0.00018	0.00089
Anthracene	1.9		0.00030	1	0.025	0.015	0.10	0.18	0.033	1	0.023	0.022	1	0.048	1019	51	0.000047	0.00093
Benzo (a) anthracene	7.1		0.00030	1	0.096	0.015	0.022	0.18	0.028	1	0.019	0.022	1	0.12	2.4	2.0	0.049	0.057
Benzo (a) pyrene	8.1		0.00030	1	0.11	0.015	0.0077	0.18	0.011	1	0.0076	0.022	1	0.12	1.0	10	0.12	0.012
Chrysene	8.2		0.00030	1	0.11	0.015	0.040	0.18	0.059	1	0.040	0.022	1	0.15	509	51	0.00030	0.0030
Fluoranthene	20		0.00030	1	0.26	0.015	0.057	0.18	0.20	1	0.14	0.022	1	0.40	25	51	0.016	0.0078
Fluorene	0.88		0.00030	1	0.012	0.015	0.15	0.18	0.024	1	0.016	0.022	1	0.028	13	25	0.0022	0.0011
Naphthalene	1.2		0.00030	1	0.017	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.017	8.4	17	0.0020	0.0010
Phenanthrene	12		0.00030	1	0.16	0.015	0.10	0.18	0.21	1	0.14	0.022	1	0.30	509	59	0.00060	0.0052
Pyrene	14		0.00030	1	0.19	0.015	0.059	0.18	0.15	1	0.10	0.022	1	0.29	7.6	13	0.038	0.023

Hazard Index - Detected Compounds	18	6.0
Hazard Index - Detected Compounds w/Detection Limits	18	6.0

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-10a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Maximum Concentrations
SWMU S-21
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	78		0.00030	1	1.1	0.015	0.20	0.18	2.8	1	1.9	0.022	1	3.0	0.13	1.3	23	2.3
Arsenic	61		0.00030	1	0.82	0.015	0.56	0.18	6.0	1	4.1	0.022	1	4.9	0.13	1.3	38	3.8
Barium	124		0.00030	1	1.7	0.015	0.15	0.18	3.3	1	2.3	0.022	1	3.9	10	40	0.39	0.099
Chromium	292		0.00030	1	4.0	0.015	0.0075	0.18	0.39	1	0.27	0.022	1	4.2	3.9	16	1.1	0.26
Lead	1650		0.00030	1	22	0.015	0.34	0.18	102	1	69	0.022	1	91	9.4	94	9.7	0.97
Mercury	0.34		0.00030	1	0.0046	0.015	1.5	0.18	0.092	1	0.063	0.022	1	0.067	13	0.027	0.0052	2.5
Nickel	356		0.00030	1	4.8	0.015	0.91	0.18	58	1	40	0.022	1	44	47	94	0.94	0.47
Thallium		1.2	0.00030	1	0.016	0.015	0.0040	0.18	0.00083	1	0.00056	0.022	1	0.016	0.013	0.13	1.2	0.12
SVOCs																		
Benzo (a) anthracene	0.80		0.00030	1	0.011	0.015	0.022	0.18	0.0032	1	0.0021	0.022	1	0.013	2.4	2.0	0.0054	0.0065
Benzo (a) pyrene	0.55		0.00030	1	0.0075	0.015	0.0077	0.18	0.00076	1	0.00052	0.022	1	0.0080	1.0	10	0.0080	0.00080
Benzo (b) fluoranthene	1.1		0.00030	1	0.015	0.015	0.012	0.18	0.0024	1	0.0016	0.022	1	0.017	1.0	10	0.017	0.0017
Benzo (ghi) perylene	0.39		0.00030	1	0.0053	0.015	0.0068	0.18	0.00048	1	0.00032	0.022	1	0.0056	1.0	10	0.0056	0.00056
Benzo (k) fluoranthene	0.33		0.00030	1	0.0045	0.015	0.012	0.18	0.00071	1	0.00048	0.022	1	0.0050	1.0	10	0.0050	0.00050
bis (2-Ethylhexyl) phthalate	0.30		0.00030	1	0.0041	0.015	0.074	0.18	0.0040	1	0.0027	0.022	1	0.0068	16	25	0.00042	0.00027
Chrysene	0.51		0.00030	1	0.0069	0.015	0.040	0.18	0.0037	1	0.0025	0.022	1	0.0094	509	51	0.000018	0.00018
Fluoranthene	0.81		0.00030	1	0.011	0.015	0.057	0.18	0.0083	1	0.0056	0.022	1	0.017	25	51	0.00066	0.00033
Indeno (1,2,3-cd) pyrene	0.48		0.00030	1	0.0065	0.015	0.0061	0.18	0.00053	1	0.00036	0.022	1	0.0069	1.0	10	0.0069	0.00069
Naphthalene	0.27		0.00030	1	0.0037	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.0037	8.4	17	0.00044	0.00022
Phenanthrene	0.40		0.00030	1	0.0054	0.015	0.10	0.18	0.0072	1	0.0049	0.022	1	0.010	509	59	0.000020	0.00017
Pyrene	0.78		0.00030	1	0.011	0.015	0.059	0.18	0.0083	1	0.0056	0.022	1	0.016	7.6	13	0.0021	0.0012

Hazard Index - Detected Compounds	73	10
Hazard Index - Detected Compounds w/Detection Limits	74	10

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-10b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Average Concentrations
SWMU S-21
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	78		0.00030	1	1.1	0.015	0.20	0.18	2.8	1	1.9	0.022	1	3.0	0.13	1.3	23	2.3
Arsenic	61		0.00030	1	0.83	0.015	0.56	0.18	6.1	1	4.1	0.022	1	5.0	0.13	1.3	38	3.8
Barium	124		0.00030	1	1.7	0.015	0.15	0.18	3.3	1	2.3	0.022	1	3.9	10	40	0.38	0.099
Chromium	292		0.00030	1	4.0	0.015	0.0075	0.18	0.39	1	0.27	0.022	1	4.2	3.9	16	1.1	0.27
Lead	1650		0.00030	1	22	0.015	0.34	0.18	102	1	69	0.022	1	91	9.4	94	10	0.97
Mercury	0.34		0.00030	1	0.0046	0.015	1.5	0.18	0.092	1	0.063	0.022	1	0.067	13	0.027	0.0051	2.5
Nickel	356		0.00030	1	4.8	0.015	0.91	0.18	58	1	40	0.022	1	44	47	94	0.94	0.47
Thallium		1.2	0.00030	1	0.016	0.015	0.0040	0.18	0.00086	1	0.00059	0.022	1	0.017	0.013	0.13	1.3	0.13
SVOCs																		
Benzo (a) anthracene	0.80		0.00030	1	0.011	0.015	0.022	0.18	0.0032	1	0.0021	0.022	1	0.013	2.4	2.0	0.0055	0.0064
Benzo (a) pyrene	0.55		0.00030	1	0.0075	0.015	0.0077	0.18	0.00076	1	0.00052	0.022	1	0.0080	1.0	10	0.0078	0.00078
Benzo (b) fluoranthene	1.1		0.00030	1	0.015	0.015	0.012	0.18	0.0024	1	0.0016	0.022	1	0.017	1.0	10	0.016	0.0016
Benzo (ghi) perylene	0.39		0.00030	1	0.0053	0.015	0.0068	0.18	0.00048	1	0.00032	0.022	1	0.0056	1.0	10	0.0055	0.00055
Benzo (k) fluoranthene	0.33		0.00030	1	0.0045	0.015	0.012	0.18	0.00071	1	0.00048	0.022	1	0.0050	1.0	10	0.0049	0.00049
bis (2-Ethylhexyl) phthalate	0.30		0.00030	1	0.0041	0.015	0.074	0.18	0.0040	1	0.0027	0.022	1	0.0068	16	25	0.00044	0.00027
Chrysene	0.51		0.00030	1	0.0069	0.015	0.040	0.18	0.0037	1	0.0025	0.022	1	0.0094	509	51	0.000018	0.00018
Fluoranthene	0.81		0.00030	1	0.011	0.015	0.057	0.18	0.0083	1	0.0056	0.022	1	0.017	25	51	0.00065	0.00033
Indeno (1,2,3-cd) pyrene	0.48		0.00030	1	0.0065	0.015	0.0061	0.18	0.00053	1	0.00036	0.022	1	0.0069	1.0	10	0.0067	0.00067
Naphthalene	0.27		0.00030	1	0.0037	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.0037	8.4	17	0.00044	0.00022
Phenanthrene	0.40		0.00030	1	0.0054	0.015	0.10	0.18	0.0072	1	0.0049	0.022	1	0.010	509	59	0.000020	0.00017
Pyrene	0.78		0.00030	1	0.011	0.015	0.059	0.18	0.0083	1	0.0056	0.022	1	0.016	7.6	13	0.0021	0.0013

Hazard Index - Detected Compounds	73	10
Hazard Index - Detected Compounds w/Detection Limits	75	11

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-11a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Maximum Concentrations
SWMU S-22
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Arsenic	47		0.00030	1	0.63	0.015	0.56	0.18	4.7	1	3.2	0.022	1	3.8	0.13	1.3	29	2.9
Chromium	29		0.00030	1	0.39	0.015	0.0075	0.18	0.039	1	0.026	0.022	1	0.42	3.9	16	0.11	0.026
Lead	140		0.00030	1	1.9	0.015	0.34	0.18	8.6	1	5.9	0.022	1	7.8	9.4	94	0.82	0.082
Mercury	140		0.00030	1	1.9	0.015	1.5	0.18	38	1	26	0.022	1	28	13	0.027	2.1	1023
Selenium	37		0.00030	1	0.51	0.015	2.3	0.18	15	1	10	0.022	1	11	0.19	0.32	57	34
Thallium	1.5		0.00030	1	0.020	0.015	0.0040	0.18	0.0011	1	0.00073	0.022	1	0.021	0.013	0.13	1.6	0.16
VOCs																		
Benzene	1.0		0.00030	1	0.014	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.014	28	279	0.00048	0.000049
Xylenes, total	1.3		0.00030	1	0.018	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.018	2.1	2.6	0.0084	0.0068
SVOCs																		
Benzo (a) anthracene	2.2		0.00030	1	0.030	0.015	0.022	0.18	0.0087	1	0.0059	0.022	1	0.036	2.4	2.0	0.015	0.018
Chrysene	3.1		0.00030	1	0.042	0.015	0.040	0.18	0.022	1	0.015	0.022	1	0.057	509	51	0.00011	0.0011
Fluoranthene	6.1		0.00030	1	0.083	0.015	0.057	0.18	0.063	1	0.042	0.022	1	0.13	25	51	0.0050	0.0025
Fluorene	1.0		0.00030	1	0.014	0.015	0.15	0.18	0.027	1	0.018	0.022	1	0.032	13	25	0.0024	0.0013
Naphthalene	6.7		0.00030	1	0.091	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.091	8.4	17	0.011	0.0053
Phenanthrene	10		0.00030	1	0.14	0.015	0.10	0.18	0.18	1	0.12	0.022	1	0.26	509	59	0.00051	0.0044
Pyrene	3.1		0.00030	1	0.042	0.015	0.059	0.18	0.033	1	0.022	0.022	1	0.064	7.6	13	0.0085	0.0049

Hazard Index - Detected Compounds	91	1061
Hazard Index - Detected Compounds w/Detection Limits	91	1061

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-11b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Average Concentrations
SWMU S-22
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Arsenic	45		0.00030	1	0.61	0.015	0.56	0.18	4.5	1	3.0	0.022	1	3.7	0.13	1.3	28	2.8
Chromium	28		0.00030	1	0.38	0.015	0.0075	0.18	0.038	1	0.026	0.022	1	0.40	3.9	16	0.10	0.026
Lead	118		0.00030	1	1.6	0.015	0.34	0.18	7.3	1	4.9	0.022	1	6.5	9.4	94	0.69	0.069
Mercury	88		0.00030	1	1.2	0.015	1.5	0.18	24	1	16	0.022	1	17	13	0.027	1.3	651
Selenium	36		0.00030	1	0.49	0.015	2.3	0.18	15	1	10	0.022	1	10	0.19	0.32	54	33
Thallium	1.5		0.00030	1	0.020	0.015	0.0040	0.18	0.0011	1	0.00073	0.022	1	0.021	0.013	0.13	1.7	0.17
VOCs																		
Benzene	0.51		0.00030	1	0.0069	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.0069	28	279	0.00025	0.000025
Xylenes, total	0.73		0.00030	1	0.0098	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.0098	2.1	2.6	0.0046	0.0037
SVOCs																		
Benzo (a) anthracene	2.1		0.00030	1	0.028	0.015	0.022	0.18	0.0083	1	0.0056	0.022	1	0.034	2.4	2.0	0.014	0.017
Chrysene	2.9		0.00030	1	0.039	0.015	0.040	0.18	0.021	1	0.014	0.022	1	0.053	509	51	0.00010	0.0010
Fluoranthene	5.9		0.00030	1	0.079	0.015	0.057	0.18	0.060	1	0.041	0.022	1	0.12	25	51	0.0047	0.0024
Fluorene	1.0		0.00030	1	0.013	0.015	0.15	0.18	0.027	1	0.018	0.022	1	0.032	13	25	0.0025	0.0012
Naphthalene	6.4		0.00030	1	0.086	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.086	8.4	17	0.010	0.0051
Phenanthrene	10		0.00030	1	0.14	0.015	0.10	0.18	0.18	1	0.12	0.022	1	0.26	509	59	0.00051	0.0044
Pyrene	2.9		0.00030	1	0.039	0.015	0.059	0.18	0.030	1	0.020	0.022	1	0.059	7.6	13	0.0077	0.0046

Hazard Index - Detected Compounds	86	687
Hazard Index - Detected Compounds w/Detection Limits	86	687

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-12a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Maximum Concentrations
SWMU S-27
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	158		0.00030	1	2.1	0.015	0.0075	0.18	0.21	1	0.14	0.022	1	2.3	3.9	16	0.59	0.14
Lead	189		0.00030	1	2.6	0.015	0.34	0.18	12	1	7.9	0.022	1	10	9.4	94	1.1	0.11
Mercury	0.51		0.00030	1	0.0069	0.015	1.5	0.18	0.14	1	0.094	0.022	1	0.10	13	0.027	0.0077	3.7
Nickel	101		0.00030	1	1.4	0.015	0.91	0.18	17	1	11	0.022	1	13	47	94	0.27	0.13
Selenium	12		0.00030	1	0.16	0.015	2.3	0.18	4.9	1	3.3	0.022	1	3.5	0.19	0.32	18	11
Thallium		3.4	0.00030	1	0.045	0.015	0.0040	0.18	0.0024	1	0.0016	0.022	1	0.047	0.013	0.13	3.6	0.36
VOCs																		
Trichloroethene	0.0070		0.00030	1	0.000095	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.000095	0.68	6.8	0.00014	0.000014
SVOCs																		
Acenaphthylene	2.3		0.00030	1	0.031	0.015	0.17	0.18	0.070	1	0.048	0.022	1	0.079	357	71	0.00022	0.0011
Benzo (a) anthracene	5.2		0.00030	1	0.070	0.015	0.022	0.18	0.021	1	0.014	0.022	1	0.084	2.4	2.0	0.035	0.042
Benzo (a) pyrene	14		0.00030	1	0.19	0.015	0.0077	0.18	0.019	1	0.013	0.022	1	0.20	1.0	10	0.20	0.020
Chrysene	7.1		0.00030	1	0.096	0.015	0.040	0.18	0.051	1	0.035	0.022	1	0.13	509	51	0.00026	0.0026
Fluoranthene	4.8		0.00030	1	0.065	0.015	0.057	0.18	0.049	1	0.033	0.022	1	0.098	25	51	0.0039	0.0019
Naphthalene	2.0		0.00030	1	0.027	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.027	8.4	17	0.0032	0.0016
Pyrene	6.2		0.00030	1	0.084	0.015	0.059	0.18	0.066	1	0.045	0.022	1	0.13	7.6	13	0.017	0.0099

Hazard Index - Detected Compounds	20	15
Hazard Index - Detected Compounds w/Detection Limits	24	15

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-12b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Average Concentrations
SWMU S-27
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Sensonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	144		0.00030	1	2.0	0.015	0.0075	0.18	0.19	1	0.13	0.022	1	2.1	3.9	16	0.54	0.13
Lead	171		0.00030	1	2.3	0.015	0.34	0.18	11	1	7.2	0.022	1	9.5	9.4	94	1.0	0.10
Mercury	0.41		0.00030	1	0.0056	0.015	1.5	0.18	0.11	1	0.075	0.022	1	0.081	13	0.027	0.0061	3.0
Nickel	43		0.00030	1	0.58	0.015	0.91	0.18	7.1	1	4.8	0.022	1	5.4	47	94	0.11	0.057
Selenium	10		0.00030	1	0.14	0.015	2.3	0.18	4.1	1	2.8	0.022	1	2.9	0.19	0.32	15	9.1
Thallium		3.4	0.00030	1	0.046	0.015	0.0040	0.18	0.0024	1	0.0017	0.022	1	0.048	0.013	0.13	3.8	0.38
VOCs																		
Trichloroethene	0.0050		0.00030	1	0.000068	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.000068	0.68	6.8	0.00010	0.000010
SVOCs																		
Acenaphthylene	1.3		0.00030	1	0.017	0.015	0.17	0.18	0.039	1	0.026	0.022	1	0.044	357	71	0.00012	0.00061
Benzo (a) anthracene	2.7		0.00030	1	0.037	0.015	0.022	0.18	0.011	1	0.0073	0.022	1	0.044	2.4	2.0	0.019	0.022
Benzo (a) pyrene	7.2		0.00030	1	0.097	0.015	0.0077	0.18	0.010	1	0.0067	0.022	1	0.10	1.0	10	0.10	0.010
Chrysene	3.7		0.00030	1	0.050	0.015	0.040	0.18	0.027	1	0.018	0.022	1	0.068	509	51	0.00013	0.0013
Fluoranthene	2.6		0.00030	1	0.036	0.015	0.057	0.18	0.027	1	0.018	0.022	1	0.054	25	51	0.0021	0.0011
Naphthalene	1.5		0.00030	1	0.020	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.020	8.4	17	0.0024	0.0012
Pyrene	3.3		0.00030	1	0.044	0.015	0.059	0.18	0.035	1	0.023	0.022	1	0.068	7.6	13	0.0088	0.0053

Hazard Index - Detected Compounds	17	13
Hazard Index - Detected Compounds w/Detection Limits	21	13

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-13a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Maximum Concentrations
SWMU S-24
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Arsenic	53		0.00030	1	0.72	0.015	0.56	0.18	5.3	1	3.6	0.022	1	4.3	0.13	1.3	33	3.3
Chromium	54		0.00030	1	0.73	0.015	0.0075	0.18	0.073	1	0.049	0.022	1	0.78	3.9	16	0.20	0.049
Lead	98		0.00030	1	1.3	0.015	0.34	0.18	6.1	1	4.1	0.022	1	5.4	9.4	94	0.58	0.058
Mercury	1.6		0.00030	1	0.022	0.015	1.5	0.18	0.43	1	0.29	0.022	1	0.32	13	0.027	0.024	12
Selenium	20		0.00030	1	0.27	0.015	2.3	0.18	8.2	1	5.5	0.022	1	5.8	0.19	0.32	30	18
Thallium	2.3		0.00030	1	0.031	0.015	0.0040	0.18	0.0017	1	0.0011	0.022	1	0.032	0.013	0.13	2.5	0.25
VOCs																		
Benzene	250		0.00030	1	3.4	0.015	0.0	0.18	0.0	1	0.0	0.022	1	3.4	28	279	0.12	0.012
Trichloroethene	0.0094		0.00030	1	0.00013	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.00013	0.68	6.8	0.00019	0.000019
Xylenes, total	320		0.00030	1	4.3	0.015	0.0	0.18	0.0	1	0.0	0.022	1	4.3	2.1	2.6	2.1	1.7
SVOCs																		
Acenaphthylene	120		0.00030	1	1.6	0.015	0.17	0.18	3.7	1	2.5	0.022	1	4.1	357	71	0.012	0.058
Anthracene	530		0.00030	1	7.2	0.015	0.10	0.18	9.5	1	6.5	0.022	1	14	1019	51	0.013	0.27
Benzo (a) anthracene	620		0.00030	1	8.4	0.015	0.022	0.18	2.5	1	1.7	0.022	1	10	2.4	2.0	4.2	5.0
Benzo (a) pyrene	390		0.00030	1	5.3	0.015	0.0077	0.18	0.54	1	0.37	0.022	1	5.6	1.0	10	5.6	0.56
Chrysene	560		0.00030	1	7.6	0.015	0.040	0.18	4.0	1	2.7	0.022	1	10	509	51	0.020	0.20
Fluoranthene	1600		0.00030	1	22	0.015	0.057	0.18	16	1	11	0.022	1	33	25	51	1.3	0.64
Fluorene	900		0.00030	1	12	0.015	0.15	0.18	24	1	16	0.022	1	29	13	25	2.2	1.1
Naphthalene	0.36		0.00030	1	0.0049	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.0049	8.4	17	0.00058	0.00029
Phenanthrene	3000		0.00030	1	41	0.015	0.10	0.18	54	1	37	0.022	1	77	509	59	0.15	1.3
Pyrene	1200		0.00030	1	16	0.015	0.059	0.18	13	1	8.6	0.022	1	25	7.6	13	3.3	1.9
Pyridine	51		0.00030	1	0.69	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.69	1.2	1.2	0.58	0.58

Hazard Index - Detected Compounds	87	47
Hazard Index - Detected Compounds w/Detection Limits	87	47

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-13b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Average Concentrations
SWMU S-24
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Arsenic	28		0.00030	1	0.38	0.015	0.56	0.18	2.8	1	1.9	0.022	1	2.3	0.13	1.3	18	1.8
Chromium	14		0.00030	1	0.19	0.015	0.0075	0.18	0.019	1	0.013	0.022	1	0.20	3.9	16	0.052	0.013
Lead	76		0.00030	1	1.0	0.015	0.34	0.18	4.7	1	3.2	0.022	1	4.2	9.4	94	0.45	0.045
Mercury	0.87		0.00030	1	0.012	0.015	1.5	0.18	0.24	1	0.16	0.022	1	0.17	13	0.027	0.013	6.4
Selenium	11		0.00030	1	0.15	0.015	2.3	0.18	4.5	1	3.1	0.022	1	3.2	0.19	0.32	17	10
Thallium	2.1		0.00030	1	0.028	0.015	0.0040	0.18	0.0015	1	0.0010	0.022	1	0.029	0.013	0.13	2.3	0.23
VOCs																		
Benzene	125		0.00030	1	1.7	0.015	0.0	0.18	0.0	1	0.0	0.022	1	1.7	28	279	0.061	0.0061
Trichloroethene	12		0.00030	1	0.17	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.17	0.68	6.8	0.25	0.025
Xylenes, total	160		0.00030	1	2.2	0.015	0.0	0.18	0.0	1	0.0	0.022	1	2.2	2.1	2.6	1.0	0.82
SVOCs																		
Acenaphthylene	60		0.00030	1	0.82	0.015	0.17	0.18	1.8	1	1.2	0.022	1	2.1	357	71	0.0058	0.029
Anthracene	266		0.00030	1	3.6	0.015	0.10	0.18	4.8	1	3.2	0.022	1	6.8	1019	51	0.0067	0.13
Benzo (a) anthracene	311		0.00030	1	4.2	0.015	0.022	0.18	1.2	1	0.83	0.022	1	5.1	2.4	2.0	2.1	2.5
Benzo (a) pyrene	196		0.00030	1	2.7	0.015	0.0077	0.18	0.27	1	0.18	0.022	1	2.8	1.0	10	2.8	0.28
Chrysene	281		0.00030	1	3.8	0.015	0.040	0.18	2.0	1	1.4	0.022	1	5.2	509	51	0.010	0.10
Fluoranthene	803		0.00030	1	11	0.015	0.057	0.18	8.2	1	5.6	0.022	1	16	25	51	0.65	0.32
Fluorene	450		0.00030	1	6.1	0.015	0.15	0.18	12	1	8.2	0.022	1	14	13	25	1.1	0.56
Naphthalene	0.36		0.00030	1	0.0049	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.0049	8.4	17	0.00058	0.00029
Phenanthrene	1503		0.00030	1	20	0.015	0.10	0.18	27	1	18	0.022	1	39	509	59	0.076	0.66
Pyrene	602		0.00030	1	8.2	0.015	0.059	0.18	6.4	1	4.3	0.022	1	12	7.6	13	1.6	0.98
Pyridine	264		0.00030	1	3.6	0.015	0.0	0.18	0.0	1	0.0	0.022	1	3.6	1.2	1.2	3.0	3.0

Hazard Index - Detected Compounds	50	28
Hazard Index - Detected Compounds w/Detection Limits	50	28

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). ($Ingestion\ rate_{food} = (0.0687 \times body\ weight^{0.822})/0.2$) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-14a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Maximum Concentrations
Zone 2 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	218		0.00030	1	3.0	0.015	0.0075	0.18	0.29	1	0.20	0.022	1	3.2	3.9	16	0.81	0.20
Lead	1220		0.00030	1	17	0.015	0.34	0.18	75	1	51	0.022	1	68	9.4	94	7.2	0.72
Mercury	0.73		0.00030	1	0.0099	0.015	1.5	0.18	0.20	1	0.13	0.022	1	0.14	13	0.027	0.011	5.3
Selenium	11		0.00030	1	0.15	0.015	2.3	0.18	4.5	1	3.1	0.022	1	3.2	0.19	0.32	17	10
Thallium	4.0		0.00030	1	0.054	0.015	0.0040	0.18	0.0029	1	0.0020	0.022	1	0.056	0.013	0.13	4.3	0.43
VOCs																		
Trichloroethene	0.015		0.00030	1	0.00020	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.00020	0.68	6.8	0.00030	0.000030
SVOCs																		
Acenaphthylene	0.45		0.00030	1	0.0061	0.015	0.17	0.18	0.014	1	0.0093	0.022	1	0.015	357	71	0.000043	0.00022
Anthracene	0.60		0.00030	1	0.0081	0.015	0.10	0.18	0.011	1	0.0073	0.022	1	0.015	1019	51	0.000015	0.00030
Benzo (a) anthracene	3.7		0.00030	1	0.050	0.015	0.022	0.18	0.015	1	0.0099	0.022	1	0.060	2.4	2.0	0.025	0.030
Benzo (a) pyrene	5.5		0.00030	1	0.075	0.015	0.0077	0.18	0.0076	1	0.0052	0.022	1	0.080	1.0	10	0.080	0.0080
Chrysene	4.5		0.00030	1	0.061	0.015	0.040	0.18	0.032	1	0.022	0.022	1	0.083	509	51	0.00016	0.0016
Fluoranthene	5.8		0.00030	1	0.079	0.015	0.057	0.18	0.060	1	0.040	0.022	1	0.12	25	51	0.0048	0.0023
Naphthalene	0.27		0.00030	1	0.0037	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.0037	8.4	17	0.00044	0.00022
Phenanthrene	2.6		0.00030	1	0.035	0.015	0.10	0.18	0.047	1	0.032	0.022	1	0.067	509	59	0.00013	0.0011
Pyrene	4.9		0.00030	1	0.066	0.015	0.059	0.18	0.052	1	0.035	0.022	1	0.10	7.6	13	0.013	0.0078

Hazard Index - Detected Compounds	29	17
Hazard Index - Detected Compounds w/Detection Limits	29	17

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-14b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Average Concentrations
Zone 2 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	168		0.00030	1	2.3	0.015	0.0075	0.18	0.23	1	0.15	0.022	1	2.4	3.9	16	0.63	0.16
Lead	841		0.00030	1	11	0.015	0.34	0.18	52	1	35	0.022	1	47	9.4	94	4.9	0.49
Mercury	0.55		0.00030	1	0.0075	0.015	1.5	0.18	0.15	1	0.10	0.022	1	0.11	13	0.027	0.0082	4.1
Selenium	7.6		0.00030	1	0.10	0.015	2.3	0.18	3.1	1	2.1	0.022	1	2.2	0.19	0.32	11	6.9
Thallium	3.8		0.00030	1	0.051	0.015	0.0040	0.18	0.0027	1	0.0019	0.022	1	0.053	0.013	0.13	4.2	0.42
VOCs																		
Trichloroethene	0.011		0.00030	1	0.00015	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.00015	0.68	6.8	0.00022	0.000022
SVOCs																		
Acenaphthylene	0.36		0.00030	1	0.0048	0.015	0.17	0.18	0.011	1	0.0074	0.022	1	0.012	357	71	0.000034	0.00017
Anthracene	0.44		0.00030	1	0.0059	0.015	0.10	0.18	0.0078	1	0.0053	0.022	1	0.011	1019	51	0.000011	0.00022
Benzo (a) anthracene	2.5		0.00030	1	0.033	0.015	0.022	0.18	0.0097	1	0.0066	0.022	1	0.040	2.4	2.0	0.017	0.020
Benzo (a) pyrene	3.4		0.00030	1	0.046	0.015	0.0077	0.18	0.0047	1	0.0032	0.022	1	0.049	1.0	10	0.048	0.0048
Chrysene	3.0		0.00030	1	0.040	0.015	0.040	0.18	0.021	1	0.014	0.022	1	0.054	509	51	0.00011	0.0011
Fluoranthene	4.0		0.00030	1	0.054	0.015	0.057	0.18	0.041	1	0.027	0.022	1	0.081	25	51	0.0032	0.0016
Naphthalene	0.18		0.00030	1	0.0024	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.0024	8.4	17	0.00028	0.00014
Phenanthrene	1.9		0.00030	1	0.026	0.015	0.10	0.18	0.034	1	0.023	0.022	1	0.049	509	59	0.000096	0.00083
Pyrene	3.3		0.00030	1	0.045	0.015	0.059	0.18	0.035	1	0.024	0.022	1	0.068	7.6	13	0.0090	0.0054

Hazard Index - Detected Compounds	21	12
Hazard Index - Detected Compounds w/Detection Limits	21	12

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-15a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Maximum Concentrations
SWMU S-10
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	850		0.00030	1	12	0.015	0.0075	0.18	1.1	1	0.78	0.022	1	12	3.9	16	3.2	0.77
Lead	107		0.00030	1	1.4	0.015	0.34	0.18	6.6	1	4.5	0.022	1	5.9	9.4	94	0.63	0.063
Mercury	0.75		0.00030	1	0.010	0.015	1.5	0.18	0.20	1	0.14	0.022	1	0.15	13	0.027	0.011	5.5
Selenium	15		0.00030	1	0.21	0.015	2.3	0.18	6.2	1	4.2	0.022	1	4.4	0.19	0.32	23	14
Thallium	35		0.00030	1	0.47	0.015	0.0040	0.18	0.025	1	0.017	0.022	1	0.49	0.013	0.13	37	3.7
VOCs																		
Trichloroethene	0.0029		0.00030	1	0.000039	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.000039	0.68	6.8	0.000058	0.0000058
SVOCs																		
Acenaphthylene	0.15		0.00030	1	0.0020	0.015	0.17	0.18	0.0046	1	0.0031	0.022	1	0.0051	357	71	0.000014	0.000072
Anthracene	0.33		0.00030	1	0.0045	0.015	0.10	0.18	0.0059	1	0.0040	0.022	1	0.0085	1019	51	0.0000083	0.00017
Benzo (a) anthracene	1.2		0.00030	1	0.016	0.015	0.022	0.18	0.0048	1	0.0032	0.022	1	0.019	2.4	2.0	0.0081	0.0097
Benzo (a) pyrene	1.1		0.00030	1	0.015	0.015	0.0077	0.18	0.0015	1	0.0010	0.022	1	0.016	1.0	10	0.016	0.0016
bis (2-Ethylhexyl) phthalate	0.10		0.00030	1	0.0014	0.015	0.074	0.18	0.0013	1	0.00090	0.022	1	0.0023	16	25	0.00014	0.000090
Chrysene	1.2		0.00030	1	0.016	0.015	0.040	0.18	0.0086	1	0.0059	0.022	1	0.022	509	51	0.000043	0.00043
Fluoranthene	22		0.00030	1	0.30	0.015	0.057	0.18	0.23	1	0.15	0.022	1	0.45	25	51	0.018	0.0089
Fluorene	0.068		0.00030	1	0.00092	0.015	0.15	0.18	0.0018	1	0.0012	0.022	1	0.0022	13	25	0.00017	0.000087
Naphthalene	0.041		0.00030	1	0.00056	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.00056	8.4	17	0.000066	0.000033
Phenanthrene	1.3		0.00030	1	0.018	0.015	0.10	0.18	0.023	1	0.016	0.022	1	0.033	509	59	0.000066	0.00057
Pyrene	1.4		0.00030	1	0.019	0.015	0.059	0.18	0.015	1	0.010	0.022	1	0.029	7.6	13	0.0038	0.0022

Hazard Index - Detected Compounds	65	24
Hazard Index - Detected Compounds w/Detection Limits	65	24

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-15b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Average Concentrations
SWMU S-10
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	637		0.00030	1	8.6	0.015	0.0075	0.18	0.86	1	0.58	0.022	1	9.2	3.9	16	2.4	0.59
Lead	103		0.00030	1	1.4	0.015	0.34	0.18	6.4	1	4.3	0.022	1	5.7	9.4	94	0.60	0.060
Mercury	0.46		0.00030	1	0.0062	0.015	1.5	0.18	0.12	1	0.085	0.022	1	0.091	13	0.027	0.0068	3.4
Selenium	10		0.00030	1	0.14	0.015	2.3	0.18	4.1	1	2.8	0.022	1	2.9	0.19	0.32	15	9.1
Thallium	23		0.00030	1	0.31	0.015	0.0040	0.18	0.017	1	0.011	0.022	1	0.32	0.013	0.13	26	2.6
VOCs																		
Trichloroethene	0.0030		0.00030	1	0.000041	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.000041	0.68	6.8	0.000060	0.0000060
SVOCs																		
Acenaphthylene	0.14		0.00030	1	0.0019	0.015	0.17	0.18	0.0043	1	0.0029	0.022	1	0.0048	357	71	0.000013	0.000067
Anthracene	0.24		0.00030	1	0.0033	0.015	0.10	0.18	0.0043	1	0.0029	0.022	1	0.0062	1019	51	0.0000061	0.00012
Benzo (a) anthracene	1.0		0.00030	1	0.013	0.015	0.022	0.18	0.0038	1	0.0025	0.022	1	0.015	2.4	2.0	0.0065	0.0076
Benzo (a) pyrene	0.88		0.00030	1	0.012	0.015	0.0077	0.18	0.0012	1	0.00082	0.022	1	0.013	1.0	10	0.012	0.0012
bis (2-Ethylhexyl) phthalate	0.088		0.00030	1	0.0012	0.015	0.074	0.18	0.0012	1	0.00079	0.022	1	0.0020	16	25	0.00013	0.000079
Chrysene	0.98		0.00030	1	0.013	0.015	0.040	0.18	0.0071	1	0.0048	0.022	1	0.018	509	51	0.000035	0.00035
Fluoranthene	1.6		0.00030	1	0.022	0.015	0.057	0.18	0.016	1	0.011	0.022	1	0.033	25	51	0.0013	0.00064
Fluorene	0.13		0.00030	1	0.0018	0.015	0.15	0.18	0.0036	1	0.0025	0.022	1	0.0043	13	25	0.00033	0.00017
Naphthalene	0.12		0.00030	1	0.0017	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.0017	8.4	17	0.00020	0.000099
Phenanthrene	0.94		0.00030	1	0.013	0.015	0.10	0.18	0.017	1	0.011	0.022	1	0.024	509	59	0.000047	0.00041
Pyrene	1.2		0.00030	1	0.016	0.015	0.059	0.18	0.012	1	0.0084	0.022	1	0.024	7.6	13	0.0032	0.0019

Hazard Index - Detected Compounds	44	16
Hazard Index - Detected Compounds w/Detection Limits	44	16

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion rate$_{food}$ = (0.0687 x body weight$^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-16a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Maximum Concentrations
Zone 3 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Barium	125		0.00030	1	1.7	0.015	0.15	0.18	3.4	1	2.3	0.022	1	4.0	10	40	0.40	0.099
Chromium	721		0.00030	1	9.8	0.015	0.0075	0.18	0.97	1	0.66	0.022	1	10	3.9	16	2.7	0.65
Lead	208		0.00030	1	2.8	0.015	0.34	0.18	13	1	8.7	0.022	1	12	9.4	94	1.2	0.12
Mercury	4.3		0.00030	1	0.058	0.015	1.5	0.18	1.2	1	0.79	0.022	1	0.85	13	0.027	0.065	31
Nickel	134		0.00030	1	1.8	0.015	0.91	0.18	22	1	15	0.022	1	17	47	94	0.36	0.18
Selenium	9.7		0.00030	1	0.13	0.015	2.3	0.18	4.0	1	2.7	0.022	1	2.8	0.19	0.32	15	8.8
Thallium	18		0.00030	1	0.25	0.015	0.0040	0.18	0.013	1	0.0090	0.022	1	0.26	0.013	0.13	20	2.0
VOCs																		
Trichloroethene	0.015		0.00030	1	0.00020	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.00020	0.68	6.8	0.00030	0.000030
SVOCs																		
Acenaphthylene	0.16		0.00030	1	0.0022	0.015	0.17	0.18	0.0049	1	0.0033	0.022	1	0.0055	357	71	0.000015	0.000077
Anthracene	0.13		0.00030	1	0.0018	0.015	0.10	0.18	0.0023	1	0.0016	0.022	1	0.0033	1019	51	0.0000033	0.000066
Benzo (a) anthracene	0.56		0.00030	1	0.0076	0.015	0.022	0.18	0.0022	1	0.0015	0.022	1	0.0091	2.4	2.0	0.0038	0.0045
Benzo (a) pyrene	1.0		0.00030	1	0.014	0.015	0.0077	0.18	0.0014	1	0.00094	0.022	1	0.014	1.0	10	0.014	0.0014
bis (2-Ethylhexyl) phthalate	0.11		0.00030	1	0.0015	0.015	0.074	0.18	0.0015	1	0.00099	0.022	1	0.0025	16	25	0.00016	0.000099
Chrysene	0.72		0.00030	1	0.0098	0.015	0.040	0.18	0.0052	1	0.0035	0.022	1	0.013	509	51	0.000026	0.00026
Fluoranthene	0.85		0.00030	1	0.012	0.015	0.057	0.18	0.0087	1	0.0059	0.022	1	0.017	25	51	0.00070	0.00034
Naphthalene	0.046		0.00030	1	0.00062	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.00062	8.4	17	0.000074	0.000037
Phenanthrene	0.31		0.00030	1	0.0042	0.015	0.10	0.18	0.0056	1	0.0038	0.022	1	0.0080	509	59	0.000016	0.00014
Pyrene	0.73		0.00030	1	0.0099	0.015	0.059	0.18	0.0078	1	0.0053	0.022	1	0.015	7.6	13	0.0020	0.0012

Hazard Index - Detected Compounds	39	43
Hazard Index - Detected Compounds w/Detection Limits	39	43

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-16b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Average Concentrations
Zone 3 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Barium	104		0.00030	1	1.4	0.015	0.15	0.18	2.8	1	1.9	0.022	1	3.3	10	40	0.32	0.083
Chromium	312		0.00030	1	4.2	0.015	0.0075	0.18	0.42	1	0.29	0.022	1	4.5	3.9	16	1.2	0.29
Lead	145		0.00030	1	2.0	0.015	0.34	0.18	9.0	1	6.1	0.022	1	8.0	9.4	94	0.85	0.085
Mercury	1.1		0.00030	1	0.015	0.015	1.5	0.18	0.30	1	0.20	0.022	1	0.22	13	0.027	0.016	8.1
Nickel	53		0.00030	1	0.72	0.015	0.91	0.18	8.7	1	5.9	0.022	1	6.6	47	94	0.14	0.070
Selenium	4.5		0.00030	1	0.061	0.015	2.3	0.18	1.8	1	1.2	0.022	1	1.3	0.19	0.32	6.8	4.1
Thallium	11		0.00030	1	0.15	0.015	0.0040	0.18	0.0079	1	0.0054	0.022	1	0.15	0.013	0.13	12	1.2
VOCs																		
Trichloroethene	0.0063		0.00030	1	0.000085	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.000085	0.68	6.8	0.00013	0.000013
SVOCs																		
Acenaphthylene	0.10		0.00030	1	0.0013	0.015	0.17	0.18	0.0029	1	0.0020	0.022	1	0.0033	357	71	0.0000091	0.000046
Anthracene	0.19		0.00030	1	0.0026	0.015	0.10	0.18	0.0034	1	0.0023	0.022	1	0.0049	1019	51	0.0000048	0.000096
Benzo (a) anthracene	0.42		0.00030	1	0.0057	0.015	0.022	0.18	0.0017	1	0.0011	0.022	1	0.0068	2.4	2.0	0.0029	0.0033
Benzo (a) pyrene	0.61		0.00030	1	0.0082	0.015	0.0077	0.18	0.00084	1	0.00057	0.022	1	0.0088	1.0	10	0.0086	0.00086
bis (2-Ethylhexyl) phthalate	0.09		0.00030	1	0.0012	0.015	0.074	0.18	0.0011	1	0.00077	0.022	1	0.0019	16	25	0.00012	0.000076
Chrysene	0.49		0.00030	1	0.0066	0.015	0.040	0.18	0.0035	1	0.0024	0.022	1	0.0090	509	51	0.000018	0.00018
Fluoranthene	0.61		0.00030	1	0.0083	0.015	0.057	0.18	0.0063	1	0.0042	0.022	1	0.013	25	51	0.00049	0.00025
Naphthalene	0.20		0.00030	1	0.0027	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.0027	8.4	17	0.00032	0.00016
Phenanthrene	0.22		0.00030	1	0.0029	0.015	0.10	0.18	0.0039	1	0.0026	0.022	1	0.0055	509	59	0.000011	0.000094
Pyrene	0.54		0.00030	1	0.0072	0.015	0.059	0.18	0.0057	1	0.0038	0.022	1	0.011	7.6	13	0.0015	0.00087

Hazard Index - Detected Compounds	22	14
Hazard Index - Detected Compounds w/Detection Limits	22	14

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-17a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Maximum Concentrations
SWMU S-14
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	45		0.00030	1	0.61	0.015	0.20	0.18	1.6	1	1.1	0.022	1	1.7	0.13	1.3	13	1.3
Barium	2.8		0.00030	1	0.038	0.015	0.15	0.18	0.076	1	0.051	0.022	1	0.089	10	40	0.0089	0.0022
Lead	911		0.00030	1	12	0.015	0.34	0.18	56	1	38	0.022	1	50	9.4	94	5.4	0.54
Nickel	130		0.00030	1	1.8	0.015	0.91	0.18	21	1	14	0.022	1	16	47	94	0.34	0.17
Selenium		1.5	0.00030	1	0.020	0.015	2.3	0.18	0.61	1	0.42	0.022	1	0.44	0.19	0.32	2.3	1.4
Silver	3.3		0.00030	1	0.045	0.015	0.35	0.18	0.21	1	0.14	0.022	1	0.19	21	1.8	0.0088	0.10
Thallium	1.2		0.00030	1	0.016	0.015	0.0040	0.18	0.00086	1	0.00059	0.022	1	0.017	0.013	0.13	1.3	0.13
VOCs																		
Methylene chloride	0.043		0.00030	1	0.00058	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.00058	9.8	84	0.000059	0.0000069
SVOCs																		
Anthracene	1.2		0.00030	1	0.016	0.015	0.10	0.18	0.022	1	0.015	0.022	1	0.031	1019	51	0.000030	0.00061
Benzo (a) anthracene	2.9		0.00030	1	0.039	0.015	0.022	0.18	0.011	1	0.0078	0.022	1	0.047	2.4	2.0	0.020	0.024
Benzo (a) pyrene	1.9		0.00030	1	0.026	0.015	0.0077	0.18	0.0026	1	0.0018	0.022	1	0.028	1.0	10	0.028	0.0028
Benzo (b) fluoranthene	3.5		0.00030	1	0.047	0.015	0.012	0.18	0.0076	1	0.0051	0.022	1	0.053	1.0	10	0.053	0.0053
Benzo (ghi) perylene	1.3		0.00030	1	0.018	0.015	0.0068	0.18	0.0016	1	0.0011	0.022	1	0.019	1.0	10	0.019	0.0019
Benzo (k) fluoranthene	0.73		0.00030	1	0.0099	0.015	0.012	0.18	0.0016	1	0.0011	0.022	1	0.011	1.0	10	0.011	0.0011
bis (2-Ethylhexyl) phthalate	0.33		0.00030	1	0.0045	0.015	0.074	0.18	0.0044	1	0.0030	0.022	1	0.0074	16	25	0.00047	0.00030
Chrysene	2.5		0.00030	1	0.034	0.015	0.040	0.18	0.018	1	0.012	0.022	1	0.046	509	51	0.000090	0.00090
Dibenzo(a,h)anthracene	0.27		0.00030	1	0.0037	0.015	0.0040	0.18	0.00019	1	0.00013	0.022	1	0.0038	0.24	10	0.016	0.00038
Fluoranthene	4.1		0.00030	1	0.056	0.015	0.057	0.18	0.042	1	0.028	0.022	1	0.084	25	51	0.0034	0.0016
Fluorene	0.55		0.00030	1	0.0075	0.015	0.15	0.18	0.015	1	0.010	0.022	1	0.018	13	25	0.0013	0.00070
Indeno (1,2,3-cd) pyrene	1.4		0.00030	1	0.019	0.015	0.0061	0.18	0.0015	1	0.0010	0.022	1	0.020	1.0	10	0.020	0.0020
Naphthalene	0.75		0.00030	1	0.010	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.010	8.4	17	0.0012	0.00060
Phenanthrene	3.1		0.00030	1	0.042	0.015	0.10	0.18	0.056	1	0.038	0.022	1	0.080	509	59	0.00016	0.0014
Pyrene	3.4		0.00030	1	0.046	0.015	0.059	0.18	0.036	1	0.024	0.022	1	0.071	7.6	13	0.0093	0.0054

Hazard Index - Detected Compounds	20	2.3
Hazard Index - Detected Compounds w/Detection Limits	23	3.7

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion rate$_{food}$ = (0.0687 x body weight$^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-17b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Average Concentrations
SWMU S-14
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	28		0.00030	1	0.38	0.015	0.20	0.18	1.0	1	0.68	0.022	1	1.1	0.13	1.3	8.3	0.83
Barium	84		0.00030	1	1.1	0.015	0.15	0.18	2.3	1	1.5	0.022	1	2.7	10	40	0.26	0.067
Lead	299		0.00030	1	4.1	0.015	0.34	0.18	18	1	13	0.022	1	17	9.4	94	1.8	0.18
Nickel	57		0.00030	1	0.77	0.015	0.91	0.18	9.3	1	6.3	0.022	1	7.1	47	94	0.15	0.075
Selenium		0.61	0.00030	1	0.0083	0.015	2.3	0.18	0.25	1	0.17	0.022	1	0.18	0.19	0.32	0.92	0.56
Silver	1.3		0.00030	1	0.018	0.015	0.35	0.18	0.082	1	0.055	0.022	1	0.073	21	1.8	0.0034	0.040
Thallium	0.76		0.00030	1	0.010	0.015	0.0040	0.18	0.00055	1	0.00037	0.022	1	0.011	0.013	0.13	0.85	0.085
VOCs																		
Methylene chloride	0.017		0.00030	1	0.00023	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.00023	9.8	84	0.000023	0.0000027
SVOCs																		
Anthracene	0.41		0.00030	1	0.0056	0.015	0.10	0.18	0.0075	1	0.0050	0.022	1	0.011	1019	51	0.000010	0.00021
Benzo (a) anthracene	1.0		0.00030	1	0.014	0.015	0.022	0.18	0.0040	1	0.0027	0.022	1	0.016	2.4	2.0	0.0070	0.0081
Benzo (a) pyrene	0.72		0.00030	1	0.010	0.015	0.0077	0.18	0.0010	1	0.00068	0.022	1	0.010	1.0	10	0.010	0.0010
Benzo (b) fluoranthene	1.3		0.00030	1	0.018	0.015	0.012	0.18	0.0029	1	0.0020	0.022	1	0.020	1.0	10	0.020	0.0020
Benzo (ghi) perylene	0.56		0.00030	1	0.0075	0.015	0.0068	0.18	0.00068	1	0.00046	0.022	1	0.0080	1.0	10	0.0078	0.00078
Benzo (k) fluoranthene	0.35		0.00030	1	0.0047	0.015	0.012	0.18	0.00075	1	0.00051	0.022	1	0.0052	1.0	10	0.0051	0.00051
bis (2-Ethylhexyl) phthalate	0.24		0.00030	1	0.0032	0.015	0.074	0.18	0.0031	1	0.0021	0.022	1	0.0053	16	25	0.00034	0.00021
Chrysene	0.95		0.00030	1	0.013	0.015	0.040	0.18	0.0069	1	0.0046	0.022	1	0.018	509	51	0.000034	0.00034
Dibenzo(a,h)anthracene	0.19		0.00030	1	0.0026	0.015	0.0040	0.18	0.00014	1	0.000095	0.022	1	0.0027	0.24	10	0.012	0.00027
Fluoranthene	1.4		0.00030	1	0.019	0.015	0.057	0.18	0.014	1	0.0098	0.022	1	0.029	25	51	0.0011	0.00057
Fluorene	0.29		0.00030	1	0.0039	0.015	0.15	0.18	0.0078	1	0.0053	0.022	1	0.0092	13	25	0.00072	0.00036
Indeno (1,2,3-cd) pyrene	0.55		0.00030	1	0.0075	0.015	0.0061	0.18	0.00061	1	0.00041	0.022	1	0.0079	1.0	10	0.0078	0.00078
Naphthalene	0.32		0.00030	1	0.0043	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.0043	8.4	17	0.00051	0.00025
Phenanthrene	1.1		0.00030	1	0.015	0.015	0.10	0.18	0.020	1	0.014	0.022	1	0.029	509	59	0.000057	0.00049
Pyrene	1.2		0.00030	1	0.016	0.015	0.059	0.18	0.013	1	0.0085	0.022	1	0.025	7.6	13	0.0032	0.0019

Hazard Index - Detected Compounds	11	1.3
Hazard Index - Detected Compounds w/Detection Limits	12	1.9

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-18a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Maximum Concentrations
SWMU S-15
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	43		0.00030	1	0.58	0.015	0.20	0.18	1.5	1	1.0	0.022	1	1.6	0.13	1.3	12	1.2
Lead	53		0.00030	1	0.72	0.015	0.34	0.18	3.3	1	2.2	0.022	1	2.9	9.4	94	0.31	0.031
Nickel	38		0.00030	1	0.51	0.015	0.91	0.18	6.2	1	4.2	0.022	1	4.7	47	94	0.10	0.050
SVOCs																		
Anthracene	0.40		0.00030	1	0.0054	0.015	0.10	0.18	0.0072	1	0.0049	0.022	1	0.010	1019	51	0.000010	0.00020
Benzo (a) anthracene	1.5		0.00030	1	0.020	0.015	0.022	0.18	0.0059	1	0.0040	0.022	1	0.024	2.4	2.0	0.010	0.012
Benzo (a) pyrene	0.55		0.00030	1	0.0075	0.015	0.0077	0.18	0.00076	1	0.00052	0.022	1	0.0080	1.0	10	0.0080	0.00080
Benzo (b) fluoranthene	1.5		0.00030	1	0.020	0.015	0.012	0.18	0.0032	1	0.0022	0.022	1	0.023	1.0	10	0.023	0.0023
Benzo (ghi) perylene	0.40		0.00030	1	0.0054	0.015	0.0068	0.18	0.00049	1	0.00033	0.022	1	0.0057	1.0	10	0.0057	0.00057
Benzo (k) fluoranthene	0.26		0.00030	1	0.0035	0.015	0.012	0.18	0.00056	1	0.00038	0.022	1	0.0039	1.0	10	0.0039	0.00039
Chrysene	0.64		0.00030	1	0.0087	0.015	0.040	0.18	0.0046	1	0.0031	0.022	1	0.012	509	51	0.000023	0.00023
Fluoranthene	1.7		0.00030	1	0.023	0.015	0.057	0.18	0.017	1	0.012	0.022	1	0.035	25	51	0.0014	0.00068
Fluorene	0.11		0.00030	1	0.0015	0.015	0.15	0.18	0.0030	1	0.0020	0.022	1	0.0035	13	25	0.00027	0.00014
Indeno (1,2,3-cd) pyrene	0.77		0.00030	1	0.010	0.015	0.0061	0.18	0.00085	1	0.00057	0.022	1	0.011	1.0	10	0.011	0.0011
Naphthalene	0.63		0.00030	1	0.0085	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.0085	8.4	17	0.0010	0.00050
Phenanthrene	1.1		0.00030	1	0.015	0.015	0.10	0.18	0.020	1	0.013	0.022	1	0.028	509	59	0.000056	0.00048
Pyrene	1.5		0.00030	1	0.020	0.015	0.059	0.18	0.016	1	0.011	0.022	1	0.031	7.6	13	0.0041	0.0024

Hazard Index - Detected Compounds	13	1.3
Hazard Index - Detected Compounds w/Detection Limits	13	1.3

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-18b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Average Concentrations
SWMU S-15
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	37		0.00030	1	0.50	0.015	0.20	0.18	1.3	1	0.90	0.022	1	1.4	0.13	1.3	11	1.1
Lead	50		0.00030	1	0.68	0.015	0.34	0.18	3.1	1	2.1	0.022	1	2.8	9.4	94	0.29	0.029
Nickel	32		0.00030	1	0.43	0.015	0.91	0.18	5.2	1	3.6	0.022	1	4.0	47	94	0.084	0.042
SVOCs																		
Anthracene	0.29		0.00030	1	0.0039	0.015	0.10	0.18	0.0052	1	0.0035	0.022	1	0.0074	1019	51	0.0000073	0.00015
Benzo (a) anthracene	0.87		0.00030	1	0.012	0.015	0.022	0.18	0.0034	1	0.0023	0.022	1	0.014	2.4	2.0	0.0060	0.0069
Benzo (a) pyrene	0.39		0.00030	1	0.0052	0.015	0.0077	0.18	0.00053	1	0.00036	0.022	1	0.0056	1.0	10	0.0055	0.00055
Benzo (b) fluoranthene	0.95		0.00030	1	0.013	0.015	0.012	0.18	0.0021	1	0.0014	0.022	1	0.014	1.0	10	0.014	0.0014
Benzo (ghi) perylene	0.27		0.00030	1	0.0037	0.015	0.0068	0.18	0.00033	1	0.00022	0.022	1	0.0039	1.0	10	0.0038	0.00038
Benzo (k) fluoranthene	0.18		0.00030	1	0.0024	0.015	0.012	0.18	0.00039	1	0.00026	0.022	1	0.0027	1.0	10	0.0027	0.00027
Chrysene	0.43		0.00030	1	0.0058	0.015	0.040	0.18	0.0031	1	0.0021	0.022	1	0.0078	509	51	0.000015	0.00015
Fluoranthene	1.0		0.00030	1	0.014	0.015	0.057	0.18	0.011	1	0.0071	0.022	1	0.021	25	51	0.00082	0.00041
Fluorene	0.14		0.00030	1	0.0019	0.015	0.15	0.18	0.0039	1	0.0026	0.022	1	0.0046	13	25	0.00036	0.00018
Indeno (1,2,3-cd) pyrene	0.48		0.00030	1	0.0064	0.015	0.0061	0.18	0.00052	1	0.00035	0.022	1	0.0068	1.0	10	0.0067	0.00067
Naphthalene	0.35		0.00030	1	0.0048	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.0048	8.4	17	0.00057	0.00029
Phenanthrene	0.64		0.00030	1	0.0087	0.015	0.10	0.18	0.012	1	0.0078	0.022	1	0.016	509	59	0.000032	0.00028
Pyrene	0.90		0.00030	1	0.012	0.015	0.059	0.18	0.0096	1	0.0065	0.022	1	0.019	7.6	13	0.0024	0.0015

Hazard Index - Detected Compounds	11	1.2
Hazard Index - Detected Compounds w/Detection Limits	11	1.2

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-19a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Maximum Concentrations
SWMU S-23
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	609		0.00030	1	8.2	0.015	0.0075	0.18	0.82	1	0.56	0.022	1	8.8	3.9	16	2.3	0.55
Lead	124		0.00030	1	1.7	0.015	0.34	0.18	7.7	1	5.2	0.022	1	6.9	9.4	94	0.73	0.073
Mercury	1.1		0.00030	1	0.015	0.015	1.5	0.18	0.30	1	0.20	0.022	1	0.22	13	0.027	0.017	8.0
Nickel	46		0.00030	1	0.62	0.015	0.91	0.18	7.6	1	5.1	0.022	1	5.7	47	94	0.12	0.061
Selenium		4.5	0.00030	1	0.060	0.015	2.3	0.18	1.8	1	1.2	0.022	1	1.3	0.19	0.32	6.8	4.0
Silver	2.1		0.00030	1	0.028	0.015	0.35	0.18	0.13	1	0.090	0.022	1	0.12	21	1.8	0.0056	0.066
Thallium	23		0.00030	1	0.32	0.015	0.0040	0.18	0.017	1	0.011	0.022	1	0.33	0.013	0.13	25	2.5
SVOCs																		
Acenaphthylene	13		0.00030	1	0.18	0.015	0.17	0.18	0.40	1	0.27	0.022	1	0.45	357	71	0.0012	0.0063
Anthracene	11		0.00030	1	0.15	0.015	0.10	0.18	0.20	1	0.13	0.022	1	0.28	1019	51	0.00028	0.0056
Benzo (a) anthracene	57		0.00030	1	0.77	0.015	0.022	0.18	0.23	1	0.15	0.022	1	0.92	2.4	2.0	0.39	0.46
Benzo (a) pyrene	1.7		0.00030	1	0.023	0.015	0.0077	0.18	0.0024	1	0.0016	0.022	1	0.025	1.0	10	0.025	0.0025
Chrysene	54		0.00030	1	0.73	0.015	0.040	0.18	0.39	1	0.26	0.022	1	0.99	509	51	0.0020	0.020
Fluoranthene	2.8		0.00030	1	0.038	0.015	0.057	0.18	0.029	1	0.019	0.022	1	0.057	25	51	0.0023	0.0011
Fluorene	1.7		0.00030	1	0.023	0.015	0.15	0.18	0.046	1	0.031	0.022	1	0.054	13	25	0.0042	0.0022
Naphthalene	2.7		0.00030	1	0.037	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.037	8.4	17	0.0044	0.0022
Phenanthrene	25		0.00030	1	0.34	0.015	0.10	0.18	0.45	1	0.30	0.022	1	0.64	509	59	0.0013	0.011
Pyrene	2.7		0.00030	1	0.037	0.015	0.059	0.18	0.029	1	0.019	0.022	1	0.056	7.6	13	0.0074	0.0043

Hazard Index - Detected Compounds	29	12
Hazard Index - Detected Compounds w/Detection Limits	36	16

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-19b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Average Concentrations
SWMU S-23
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	592		0.00030	1	8.0	0.015	0.0075	0.18	0.80	1	0.54	0.022	1	8.6	3.9	16	2.2	0.55
Lead	130		0.00030	1	1.8	0.015	0.34	0.18	8.0	1	5.4	0.022	1	7.2	9.4	94	0.76	0.076
Mercury	0.55		0.00030	1	0.0075	0.015	1.5	0.18	0.15	1	0.10	0.022	1	0.11	13	0.027	0.0082	4.1
Nickel	44		0.00030	1	0.60	0.015	0.91	0.18	7.2	1	4.9	0.022	1	5.5	47	94	0.12	0.058
Selenium		4.4	0.00030	1	0.060	0.015	2.3	0.18	1.8	1	1.2	0.022	1	1.3	0.19	0.32	6.6	4.0
Silver	2.0		0.00030	1	0.027	0.015	0.35	0.18	0.13	1	0.085	0.022	1	0.11	21	1.8	0.0053	0.061
Thallium	20		0.00030	1	0.27	0.015	0.0040	0.18	0.014	1	0.0098	0.022	1	0.28	0.013	0.13	22	2.2
SVOCs																		
Acenaphthylene	6.6		0.00030	1	0.089	0.015	0.17	0.18	0.20	1	0.14	0.022	1	0.23	357	71	0.00063	0.0032
Anthracene	5.7		0.00030	1	0.077	0.015	0.10	0.18	0.10	1	0.070	0.022	1	0.15	1019	51	0.00014	0.0029
Benzo (a) anthracene	29		0.00030	1	0.40	0.015	0.022	0.18	0.12	1	0.078	0.022	1	0.47	2.4	2.0	0.20	0.23
Benzo (a) pyrene	1.7		0.00030	1	0.023	0.015	0.0077	0.18	0.0024	1	0.0016	0.022	1	0.025	1.0	10	0.024	0.0024
Chrysene	28		0.00030	1	0.38	0.015	0.040	0.18	0.20	1	0.14	0.022	1	0.51	509	51	0.0010	0.010
Fluoranthene	2.8		0.00030	1	0.038	0.015	0.057	0.18	0.029	1	0.019	0.022	1	0.057	25	51	0.0023	0.0011
Fluorene	0.93		0.00030	1	0.013	0.015	0.15	0.18	0.025	1	0.017	0.022	1	0.030	13	25	0.0023	0.0012
Naphthalene	1.4		0.00030	1	0.019	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.019	8.4	17	0.0023	0.0011
Phenanthrene	13		0.00030	1	0.18	0.015	0.10	0.18	0.24	1	0.16	0.022	1	0.35	509	59	0.00068	0.0059
Pyrene	2.7		0.00030	1	0.037	0.015	0.059	0.18	0.029	1	0.019	0.022	1	0.056	7.6	13	0.0073	0.0044

Hazard Index - Detected Compounds	26	7.3
Hazard Index - Detected Compounds w/Detection Limits	32	11

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-20a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Maximum Concentrations
Zone 4 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	515		0.00030	1	7.0	0.015	0.0075	0.18	0.70	1	0.47	0.022	1	7.4	3.9	16	1.9	0.47
Lead	408		0.00030	1	5.5	0.015	0.34	0.18	25	1	17	0.022	1	23	9.4	94	2.4	0.24
Mercury	5.7		0.00030	1	0.077	0.015	1.5	0.18	1.5	1	1.0	0.022	1	1.1	13	0.027	0.087	42
Nickel	373		0.00030	1	5.1	0.015	0.91	0.18	61	1	41	0.022	1	46	47	94	0.99	0.49
Selenium	10		0.00030	1	0.14	0.015	2.3	0.18	4.3	1	2.9	0.022	1	3.0	0.19	0.32	16	9.5
Silver	3.6		0.00030	1	0.049	0.015	0.35	0.18	0.23	1	0.15	0.022	1	0.20	21	1.8	0.0096	0.11
Thallium		16	0.00030	1	0.21	0.015	0.0040	0.18	0.011	1	0.0077	0.022	1	0.22	0.013	0.13	17	1.7
VOCs																		
Trichloroethene	0.016		0.00030	1	0.00022	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.00022	0.68	6.8	0.00032	0.000032
SVOCs																		
Acenaphthylene	1.3		0.00030	1	0.018	0.015	0.17	0.18	0.040	1	0.027	0.022	1	0.045	357	71	0.00012	0.00063
Anthracene	9.3		0.00030	1	0.13	0.015	0.10	0.18	0.17	1	0.11	0.022	1	0.24	1019	51	0.00023	0.0047
Benzo (a) anthracene	22		0.00030	1	0.30	0.015	0.022	0.18	0.087	1	0.059	0.022	1	0.36	2.4	2.0	0.15	0.18
Benzo (a) pyrene	20		0.00030	1	0.27	0.015	0.0077	0.18	0.028	1	0.019	0.022	1	0.29	1.0	10	0.29	0.029
bis (2-Ethylhexyl) phthalate	0.049		0.00030	1	0.00066	0.015	0.074	0.18	0.00065	1	0.00044	0.022	1	0.0011	16	25	0.000069	0.000044
Chrysene	22		0.00030	1	0.30	0.015	0.040	0.18	0.16	1	0.11	0.022	1	0.41	509	51	0.00080	0.0079
Fluoranthene	43		0.00030	1	0.58	0.015	0.057	0.18	0.44	1	0.30	0.022	1	0.88	25	51	0.035	0.017
Fluorene	3.4		0.00030	1	0.046	0.015	0.15	0.18	0.092	1	0.062	0.022	1	0.11	13	25	0.0083	0.0043
Naphthalene	2.5		0.00030	1	0.034	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.034	8.4	17	0.0040	0.0020
Phenanthrene	34		0.00030	1	0.46	0.015	0.10	0.18	0.61	1	0.41	0.022	1	0.88	509	59	0.0017	0.015
Pyrene	31		0.00030	1	0.42	0.015	0.059	0.18	0.33	1	0.22	0.022	1	0.64	7.6	13	0.085	0.049

Hazard Index - Detected Compounds	22	53
Hazard Index - Detected Compounds w/Detection Limits	39	54

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-20b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Average Concentrations
Zone 4 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	439		0.00030	1	5.9	0.015	0.0075	0.18	0.59	1	0.40	0.022	1	6.3	3.9	16	1.6	0.41
Lead	246		0.00030	1	3.3	0.015	0.34	0.18	15	1	10	0.022	1	14	9.4	94	1.4	0.14
Mercury	3.1		0.00030	1	0.042	0.015	1.5	0.18	0.84	1	0.57	0.022	1	0.61	13	0.027	0.046	23
Nickel	201		0.00030	1	2.7	0.015	0.91	0.18	33	1	22	0.022	1	25	47	94	0.53	0.27
Selenium	9.6		0.00030	1	0.13	0.015	2.3	0.18	3.9	1	2.7	0.022	1	2.8	0.19	0.32	14	8.8
Silver	1.9		0.00030	1	0.026	0.015	0.35	0.18	0.12	1	0.081	0.022	1	0.11	21	1.8	0.0050	0.058
Thallium		8.8	0.00030	1	0.12	0.015	0.0040	0.18	0.0063	1	0.0043	0.022	1	0.12	0.013	0.13	9.8	0.98
VOCs																		
Trichloroethene	0.012		0.00030	1	0.00016	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.00016	0.68	6.8	0.00024	0.000024
SVOCs																		
Acenaphthylene	0.71		0.00030	1	0.010	0.015	0.17	0.18	0.022	1	0.015	0.022	1	0.024	357	71	0.000068	0.00034
Anthracene	4.7		0.00030	1	0.064	0.015	0.10	0.18	0.085	1	0.057	0.022	1	0.12	1019	51	0.00012	0.0024
Benzo (a) anthracene	11		0.00030	1	0.15	0.015	0.022	0.18	0.045	1	0.030	0.022	1	0.18	2.4	2.0	0.077	0.090
Benzo (a) pyrene	10		0.00030	1	0.14	0.015	0.0077	0.18	0.014	1	0.010	0.022	1	0.15	1.0	10	0.15	0.015
bis (2-Ethylhexyl) phthalate	2.1		0.00030	1	0.028	0.015	0.074	0.18	0.028	1	0.019	0.022	1	0.047	16	25	0.0031	0.0019
Chrysene	11		0.00030	1	0.15	0.015	0.040	0.18	0.081	1	0.055	0.022	1	0.21	509	51	0.00041	0.0041
Fluoranthene	22		0.00030	1	0.30	0.015	0.057	0.18	0.22	1	0.15	0.022	1	0.45	25	51	0.018	0.0088
Fluorene	1.8		0.00030	1	0.024	0.015	0.15	0.18	0.048	1	0.033	0.022	1	0.057	13	25	0.0045	0.0022
Naphthalene	1.4		0.00030	1	0.019	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.019	8.4	17	0.0023	0.0012
Phenanthrene	17		0.00030	1	0.23	0.015	0.10	0.18	0.31	1	0.21	0.022	1	0.44	509	59	0.00087	0.0075
Pyrene	16		0.00030	1	0.21	0.015	0.059	0.18	0.17	1	0.11	0.022	1	0.33	7.6	13	0.043	0.026

Hazard Index - Detected Compounds	18	33
Hazard Index - Detected Compounds w/Detection Limits	28	34

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-21a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Maximum Concentrations
Zone 5 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	752		0.00030	1	10	0.015	0.0075	0.18	1.0	1	0.69	0.022	1	11	3.9	16	2.8	0.68
Lead	271		0.00030	1	3.7	0.015	0.34	0.18	17	1	11	0.022	1	15	9.4	94	1.6	0.16
Nickel	51		0.00030	1	0.69	0.015	0.91	0.18	8.3	1	5.6	0.022	1	6.3	47	94	0.13	0.067
Selenium	16		0.00030	1	0.22	0.015	2.3	0.18	6.6	1	4.5	0.022	1	4.7	0.19	0.32	25	15
Silver	2.8		0.00030	1	0.038	0.015	0.35	0.18	0.18	1	0.12	0.022	1	0.16	21	1.8	0.0075	0.087
Thallium	28		0.00030	1	0.38	0.015	0.0040	0.18	0.020	1	0.014	0.022	1	0.40	0.013	0.13	31	3.1
VOCs																		
Trichloroethene	0.0075		0.00030	1	0.00010	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.00010	0.68	6.8	0.00015	0.000015
SVOCs																		
Acenaphthylene	0.93		0.00030	1	0.013	0.015	0.17	0.18	0.028	1	0.019	0.022	1	0.032	357	71	0.000089	0.00045
Anthracene	1.6		0.00030	1	0.022	0.015	0.10	0.18	0.029	1	0.020	0.022	1	0.041	1019	51	0.000040	0.00081
Benzo (a) anthracene	3.2		0.00030	1	0.043	0.015	0.022	0.18	0.013	1	0.0086	0.022	1	0.052	2.4	2.0	0.022	0.026
Benzo (a) pyrene	2.7		0.00030	1	0.037	0.015	0.0077	0.18	0.0037	1	0.0025	0.022	1	0.039	1.0	10	0.039	0.0039
bis (2-Ethylhexyl) phthalate	0.061		0.00030	1	0.00083	0.015	0.074	0.18	0.00081	1	0.00055	0.022	1	0.0014	16	25	0.000086	0.000055
Chrysene	3.3		0.00030	1	0.045	0.015	0.040	0.18	0.024	1	0.016	0.022	1	0.061	509	51	0.00012	0.0012
Fluoranthene	2.1		0.00030	1	0.028	0.015	0.057	0.18	0.022	1	0.015	0.022	1	0.043	25	51	0.0017	0.00084
Fluorene	1.8		0.00030	1	0.024	0.015	0.15	0.18	0.049	1	0.033	0.022	1	0.057	13	25	0.0044	0.0023
Naphthalene	0.67		0.00030	1	0.0091	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.0091	8.4	17	0.0011	0.00053
Phenanthrene	1.2		0.00030	1	0.016	0.015	0.10	0.18	0.022	1	0.015	0.022	1	0.031	509	59	0.000061	0.00052
Pyrene	5.7		0.00030	1	0.077	0.015	0.059	0.18	0.061	1	0.041	0.022	1	0.12	7.6	13	0.016	0.0091

Hazard Index - Detected Compounds	60	19
Hazard Index - Detected Compounds w/Detection Limits	60	19

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0687 x body $weight^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table Q-21b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Plants - Deer Mouse
Average Concentrations
Zone 5 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kg/day)	Plant Ingestion Rate (c) (kg/day)	Plant Uptake Factors (PUF) (kg soil, dry weight/kg plant, dry weight) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg plant dry weight per kg plant wet weight) (f)	Concentration of Contaminant in Plant (mg/kg) (g)	Area Use Factor (d)	Dose in Plants (mg/kg/day)	Average Body Weight (h) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (mg/kg/day) (i)		Hazard Quotient	
Metals															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Chromium	652		0.00030	1	8.8	0.015	0.0075	0.18	0.88	1	0.60	0.022	1	9.4	3.9	16	2.4	0.61
Lead	160		0.00030	1	2.2	0.015	0.34	0.18	9.9	1	6.7	0.022	1	8.9	9.4	94	0.94	0.094
Nickel	40		0.00030	1	0.54	0.015	0.91	0.18	6.6	1	4.4	0.022	1	5.0	47	94	0.11	0.053
Selenium	8.3		0.00030	1	0.11	0.015	2.3	0.18	3.4	1	2.3	0.022	1	2.4	0.19	0.32	13	7.6
Silver	2.3		0.00030	1	0.031	0.015	0.35	0.18	0.14	1	0.098	0.022	1	0.13	21	1.8	0.0060	0.070
Thallium	15		0.00030	1	0.20	0.015	0.0040	0.18	0.011	1	0.0073	0.022	1	0.21	0.013	0.13	17	1.7
VOCs																		
Trichloroethene	0.0050		0.00030	1	0.000068	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.000068	0.68	6.8	0.00010	0.000010
SVOCs																		
Acenaphthylene	0.40		0.00030	1	0.0054	0.015	0.17	0.18	0.012	1	0.0082	0.022	1	0.014	357	71	0.000038	0.00019
Anthracene	0.68		0.00030	1	0.0092	0.015	0.10	0.18	0.012	1	0.0083	0.022	1	0.018	1019	51	0.000017	0.00034
Benzo (a) anthracene	1.4		0.00030	1	0.019	0.015	0.022	0.18	0.0057	1	0.0039	0.022	1	0.023	2.4	2.0	0.0099	0.011
Benzo (a) pyrene	1.3		0.00030	1	0.018	0.015	0.0077	0.18	0.0018	1	0.0012	0.022	1	0.019	1.0	10	0.019	0.0019
bis (2-Ethylhexyl) phthalate	0.16		0.00030	1	0.0021	0.015	0.074	0.18	0.0021	1	0.0014	0.022	1	0.0036	16	25	0.00023	0.00014
Chrysene	1.5		0.00030	1	0.021	0.015	0.040	0.18	0.011	1	0.0074	0.022	1	0.028	509	51	0.000055	0.00055
Fluoranthene	1.1		0.00030	1	0.015	0.015	0.057	0.18	0.012	1	0.0079	0.022	1	0.023	25	51	0.00091	0.00045
Fluorene	0.68		0.00030	1	0.0092	0.015	0.15	0.18	0.018	1	0.012	0.022	1	0.022	13	25	0.0017	0.00085
Naphthalene	0.27		0.00030	1	0.0037	0.015	0.0	0.18	0.0	1	0.0	0.022	1	0.0037	8.4	17	0.00044	0.00022
Phenanthrene	0.66		0.00030	1	0.0089	0.015	0.10	0.18	0.012	1	0.0080	0.022	1	0.017	509	59	0.000033	0.00029
Pyrene	2.4		0.00030	1	0.033	0.015	0.059	0.18	0.026	1	0.017	0.022	1	0.050	7.6	13	0.0066	0.0039

Hazard Index - Detected Compounds	33	10
Hazard Index - Detected Compounds w/Detection Limits	33	10

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion rate$_{food}$ = (0.0687 x body weight$^{0.822}$)/0.2) (Assumes 2% of diet is soil (Bayer et al., 1994)

(d) - See Attachment O, Table O-1

(e) - See Table 4-15.

(f) - Salisbury and Ross, 1992.

(g) - Concentration in plants = PUF x concentration of COPC in soil x DW:WW conversion factor.

(h) - USEPA, 1993e.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

ATTACHMENT R

HQ/HI CALCULATIONS FOR SHORT-TAILED SHREW

BETHLEHEM STEEL CORPORATION

LACKAWANNA, NEW YORK

Table R-1a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Maximum Concentrations
SWMU S-1
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
Metals															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Antimony	36		0.0012	1	2.8	0.0090	4.6	0.13	21	1	13	0.015	1	16	0.13	1.3	120	12
Chromium	99		0.0012	1	7.7	0.0090	0.49	0.13	6.3	1	3.8	0.015	1	11	4.0	16	2.9	0.72
Lead	278		0.0012	1	22	0.0090	0.69	0.13	25	1	15	0.015	1	37	9.7	97	3.8	0.38
Mercury	5.6		0.0012	1	0.44	0.0090	1.32	0.13	0.96	1	0.58	0.015	1	1.0	13	0.027	0.078	38
Nickel	139		0.0012	1	11	0.0090	0.78	0.13	14	1	8.5	0.015	1	19	48	97	0.40	0.20
Selenium	11		0.0012	1	0.87	0.0090	10.5	0.13	15	1	9.1	0.015	1	10	0.19	0.32	52	31
Silver	2.1		0.0012	1	0.16	0.0090	4.6	0.13	1.3	1	0.75	0.015	1	0.92	22	1.9	0.042	0.48
Thallium		3.0	0.0012	1	0.23	0.0090	4.6	0.13	1.8	1	1.1	0.015	1	1.3	0.014	0.14	94	9.4
VOCs																		
Benzene	1.6		0.0012	1	0.12	0.0090	0.70	0.13	0.15	1	0.087	0.015	1	0.21	30	299	0.0071	0.00071
Ethylbenzene	2.5		0.0012	1	0.20	0.0090	0.70	0.13	0.23	1	0.14	0.015	1	0.33	101	303	0.0033	0.0011
Methyl ethyl ketone	5.9		0.0012	1	0.46	0.0090	0.70	0.13	0.54	1	0.32	0.015	1	0.78	2139	5522	0.00037	0.00014
Xylenes, total	12		0.0012	1	0.94	0.0090	0.70	0.13	1.1	1	0.66	0.015	1	1.6	2.1	2.6	0.76	0.61
SVOCs																		
Acenaphthene	170		0.0012	1	13	0.0090	0.70	0.13	15	1	9.3	0.015	1	23	365	73	0.062	0.31
Acenaphthylene	200		0.0012	1	16	0.0090	0.70	0.13	18	1	11	0.015	1	27	365	73	0.073	0.36
Anthracene	460		0.0012	1	36	0.0090	0.70	0.13	42	1	25	0.015	1	61	1042	52	0.059	1.2
Benzo (a) anthracene	630		0.0012	1	49	0.0090	0.90	0.13	74	1	44	0.015	1	93	2.4	2.1	39	44
Benzo (a) pyrene	330		0.0012	1	26	0.0090	0.43	0.13	18	1	11	0.015	1	37	1.0	10	37	3.7
Benzo (b) fluoranthene	490		0.0012	1	38	0.0090	0.90	0.13	57	1	34	0.015	1	73	1.0	10	73	7.3
Benzo (ghi) perylene	170		0.0012	1	13	0.0090	0.90	0.13	20	1	12	0.015	1	25	1.0	10	25	2.5
Benzo (k) fluoranthene	150		0.0012	1	12	0.0090	0.90	0.13	18	1	11	0.015	1	22	1.0	10	22	2.2
Chrysene	540		0.0012	1	42	0.0090	0.90	0.13	63	1	38	0.015	1	80	521	52	0.15	1.5
Dibenzo(a,h)anthracene	38		0.0012	1	3.0	0.0090	0.90	0.13	4.4	1	2.7	0.015	1	5.6	0.24	10	23	0.56
Fluoranthene	1500		0.0012	1	117	0.0090	0.70	0.13	137	1	82	0.015	1	199	26	52	7.7	3.8
Fluorene	710		0.0012	1	55	0.0090	0.70	0.13	65	1	39	0.015	1	94	13	26	7.2	3.6
Indeno (1,2,3-cd) pyrene	210		0.0012	1	16	0.0090	0.90	0.13	25	1	15	0.015	1	31	1.0	10	31	3.1
3-/4-Methylphenol	5.3		0.0012	1	0.41	0.0090	0.70	0.13	0.48	1	0.29	0.015	1	0.70	6.0	18	0.12	0.039
Naphthalene	1500		0.0012	1	117	0.0090	0.70	0.13	137	1	82	0.015	1	199	8.6	17	23	12
Phenanthrene	1900		0.0012	1	148	0.0090	0.70	0.13	173	1	104	0.015	1	252	521	60	0.48	4.2
Pyrene	1200		0.0012	1	94	0.0090	0.70	0.13	109	1	66	0.015	1	159	7.8	13	20	12

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Hazard Index - Detected Compounds	490	186
Hazard Index - Detected Compounds w/Detection Limits	584	195

Table R-1b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Average Concentrations
SWMU S-1
Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	67		0.0012	1	5.2	0.0090	4.6	0.13	40	1	24	0.015	1	29	0.13	1.3	225	22
Chromium	99		0.0012	1	7.7	0.0090	0.49	0.13	6.3	1	3.8	0.015	1	12	4.0	16	2.9	0.72
Lead	184		0.0012	1	14	0.0090	0.69	0.13	17	1	9.9	0.015	1	24	9.7	97	2.5	0.25
Mercury	1.9		0.0012	1	0.15	0.0090	1.32	0.13	0.33	1	0.20	0.015	1	0.34	13	0.027	0.026	13
Nickel	98		0.0012	1	7.6	0.0090	0.78	0.13	9.9	1	6.0	0.015	1	14	48	97	0.28	0.14
Selenium	3.9		0.0012	1	0.30	0.0090	10.5	0.13	5.3	1	3.2	0.015	1	3.5	0.19	0.32	18	11
Silver	10		0.0012	1	0.78	0.0090	4.6	0.13	6.0	1	3.6	0.015	1	4.4	22	1.9	0.20	2.3
Thallium		1.4	0.0012	1	0.11	0.0090	4.6	0.13	0.84	1	0.50	0.015	1	0.61	0.014	0.14	45	4.5
VOCs																		
Benzene	0.80		0.0012	1	0.063	0.0090	0.70	0.13	0.073	1	0.044	0.015	1	0.11	30	299	0.0036	0.00036
Ethylbenzene	1.3		0.0012	1	0.098	0.0090	0.70	0.13	0.11	1	0.068	0.015	1	0.17	101	303	0.0016	0.00055
Methyl ethyl ketone	0.30		0.0012	1	0.023	0.0090	0.70	0.13	0.027	1	0.016	0.015	1	0.039	2139	5522	0.000018	0.0000071
Xylenes, total	6.0		0.0012	1	0.47	0.0090	0.70	0.13	0.55	1	0.33	0.015	1	0.80	2.2	2.7	0.36	0.29
SVOCs																		
Acenaphthene	75		0.0012	1	5.8	0.0090	0.70	0.13	6.8	1	4.1	0.015	1	9.9	365	73	0.027	0.14
Acenaphthylene	85		0.0012	1	6.6	0.0090	0.70	0.13	7.7	1	4.6	0.015	1	11	365	73	0.031	0.15
Anthracene	171		0.0012	1	13	0.0090	0.70	0.13	16	1	9.3	0.015	1	23	1042	52	0.022	0.44
Benzo (a) anthracene	228		0.0012	1	18	0.0090	0.90	0.13	27	1	16	0.015	1	34	2.4	2.1	14	16
Benzo (a) pyrene	128		0.0012	1	10	0.0090	0.43	0.13	7.1	1	4.3	0.015	1	14	1.0	10	14	1.4
Benzo (b) fluoranthene	181		0.0012	1	14	0.0090	0.90	0.13	21	1	13	0.015	1	27	1.0	10	26	2.6
Benzo (ghi) perylene	75		0.0012	1	5.8	0.0090	0.90	0.13	8.7	1	5.2	0.015	1	11	1.0	10	11	1.1
Benzo (k) fluoranthene	68		0.0012	1	5.3	0.0090	0.90	0.13	7.9	1	4.8	0.015	1	10	1.0	10	9.6	0.96
Chrysene	198		0.0012	1	15	0.0090	0.90	0.13	23	1	14	0.015	1	29	521	52	0.056	0.56
Dibenzo(a,h)anthracene	31		0.0012	1	2.4	0.0090	0.90	0.13	3.6	1	2.1	0.015	1	4.5	0.24	10	19	0.43
Fluoranthene	518		0.0012	1	40	0.0090	0.70	0.13	47	1	28	0.015	1	69	26	52	2.6	1.3
Fluorene	255		0.0012	1	20	0.0090	0.70	0.13	23	1	14	0.015	1	34	13	26	2.6	1.3
Indeno (1,2,3-cd) pyrene	88		0.0012	1	6.9	0.0090	0.90	0.13	10	1	6.2	0.015	1	13	1.0	10	12	1.2
3-/4-Methylphenol	45		0.0012	1	3.5	0.0090	0.70	0.13	4.1	1	2.5	0.015	1	6.0	6.0	18	0.99	0.33
Naphthalene	518		0.0012	1	40	0.0090	0.70	0.13	47	1	28	0.015	1	69	8.6	17	8.0	4.0
Phenanthrene	651		0.0012	1	51	0.0090	0.70	0.13	59	1	36	0.015	1	86	521	60	0.17	1.4
Pyrene	418		0.0012	1	33	0.0090	0.70	0.13	38	1	23	0.015	1	55	7.8	13	7.1	4.3

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Hazard Index - Detected Compounds	376	88
Hazard Index - Detected Compounds w/Detection Limits	421	92

Table R-2a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Maximum Concentrations
SWMU S-2
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
Metals															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Antimony	62		0.0012	1	4.8	0.0090	4.6	0.13	37	1	22	0.015	1	27	0.13	1.3	207	21
Lead	1120		0.0012	1	87	0.0090	0.69	0.13	100	1	60	0.015	1	148	9.7	97	15	1.5
Silver		17	0.0012	1	1.3	0.0090	4.6	0.13	10	1	6.1	0.015	1	7.4	22	1.9	0.34	3.9
VOCs																		
Methylene chloride	0.0051		0.0012	1	0.00040	0.0090	0.70	0.13	0.00046	1	0.00028	0.015	1	0.00068	11	90	0.000061	0.0000075
SVOCs																		
Benzo (a) anthracene	0.15		0.0012	1	0.012	0.0090	0.90	0.13	0.018	1	0.011	0.015	1	0.022	2.4	2.1	0.0093	0.011
Benzo (b) fluoranthene	0.34		0.0012	1	0.027	0.0090	0.90	0.13	0.040	1	0.024	0.015	1	0.050	1.0	10	0.050	0.0050
Chrysene	0.10		0.0012	1	0.0078	0.0090	0.90	0.13	0.012	1	0.0070	0.015	1	0.015	521	52	0.000028	0.00029
Fluoranthene	0.096		0.0012	1	0.0075	0.0090	0.70	0.13	0.0087	1	0.0052	0.015	1	0.013	26	52	0.00049	0.00024
Indeno (1,2,3-cd) pyrene	0.092		0.0012	1	0.0072	0.0090	0.90	0.13	0.011	1	0.0065	0.015	1	0.014	1.0	10	0.014	0.0014
Pyrene	0.12		0.0012	1	0.0094	0.0090	0.70	0.13	0.011	1	0.0066	0.015	1	0.016	7.8	13	0.0020	0.0012

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Hazard Index - Detected Compounds	222	22
Hazard Index - Detected Compounds w/Detection Limits	222	26

Table R-2b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Average Concentrations
SWMU S-2
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	82		0.0012	1	6.4	0.0090	4.6	0.13	49	1	29	0.015	1	36	0.13	1.3	275	27
Lead	560		0.0012	1	44	0.0090	0.69	0.13	50	1	30	0.015	1	74	9.7	97	7.6	0.76
Silver		8.9	0.0012	1	0.69	0.0090	4.6	0.13	5.3	1	3.2	0.015	1	3.9	22	1.9	0.18	2.1
VOCs																		
Methylene chloride	0.0061		0.0012	1	0.00048	0.0090	0.70	0.13	0.00056	1	0.00033	0.015	1	0.00081	11	90	0.000077	0.0000090
SVOCs																		
Benzo (a) anthracene	0.63		0.0012	1	0.049	0.0090	0.90	0.13	0.073	1	0.044	0.015	1	0.093	2.4	2.1	0.038	0.044
Benzo (b) fluoranthene	0.72		0.0012	1	0.056	0.0090	0.90	0.13	0.084	1	0.051	0.015	1	0.11	1.0	10	0.10	0.010
Chrysene	0.60		0.0012	1	0.047	0.0090	0.90	0.13	0.070	1	0.042	0.015	1	0.089	521	52	0.00017	0.0017
Fluoranthene	0.60		0.0012	1	0.047	0.0090	0.70	0.13	0.054	1	0.033	0.015	1	0.079	26	52	0.0030	0.0015
Indeno (1,2,3-cd) pyrene	0.60		0.0012	1	0.046	0.0090	0.90	0.13	0.070	1	0.042	0.015	1	0.088	1.0	10	0.085	0.0085
Pyrene	0.61		0.0012	1	0.048	0.0090	0.70	0.13	0.056	1	0.033	0.015	1	0.081	7.8	13	0.010	0.0062

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Hazard Index - Detected Compounds	283	28
Hazard Index - Detected Compounds w/Detection Limits	283	30

Table R-3a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Maximum Concentrations
SWMU S-3
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
Metals															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Arsenic	41		0.0012	1	3.2	0.0090	1.16	0.13	6.2	1	3.7	0.015	1	7.0	0.14	1.4	50	5.0
Chromium	118		0.0012	1	9.2	0.0090	0.49	0.13	7.5	1	4.5	0.015	1	14	4.0	16	3.4	0.86
Lead	3960		0.0012	1	309	0.0090	0.69	0.13	355	1	213	0.015	1	522	9.7	97	54	5.4
Nickel	44		0.0012	1	3.5	0.0090	0.78	0.13	4.5	1	2.7	0.015	1	6.2	48	97	0.13	0.063
Selenium	14		0.0012	1	1.1	0.0090	10.5	0.13	19	1	12	0.015	1	13	0.19	0.32	67	40
Silver	6.5		0.0012	1	0.51	0.0090	4.6	0.13	3.9	1	2.3	0.015	1	2.8	22	1.9	0.13	1.5
Thallium	5.6		0.0012	1	0.44	0.0090	4.6	0.13	3.3	1	2.0	0.015	1	2.4	0.014	0.14	175	17
VOCs						0.0090												
Trichloroethene	0.019		0.0012	1	0.0015	0.0090	0.70	0.13	0.0017	1	0.0010	0.015	1	0.0025	0.65	6.5	0.0039	0.00039
SVOCs						0.0090												
Acenaphthylene	0.61		0.0012	1	0.048	0.0090	0.70	0.13	0.056	1	0.033	0.015	1	0.081	365	73	0.00022	0.0011
Anthracene	0.45		0.0012	1	0.035	0.0090	0.70	0.13	0.041	1	0.025	0.015	1	0.060	1042	52	0.000057	0.0011
Benzo (a) anthracene	1.2		0.0012	1	0.094	0.0090	0.90	0.13	0.14	1	0.084	0.015	1	0.18	2.4	2.1	0.074	0.085
Benzo (a) pyrene	0.97		0.0012	1	0.076	0.0090	0.43	0.13	0.054	1	0.033	0.015	1	0.11	1.0	10	0.11	0.011
Chrysene	1.3		0.0012	1	0.10	0.0090	0.90	0.13	0.15	1	0.091	0.015	1	0.19	521	52	0.00037	0.0037
Fluoranthene	3.3		0.0012	1	0.26	0.0090	0.70	0.13	0.30	1	0.18	0.015	1	0.44	26	52	0.017	0.0084
Fluorene	0.14		0.0012	1	0.011	0.0090	0.70	0.13	0.013	1	0.0076	0.015	1	0.019	13	26	0.0014	0.00071
Naphthalene	0.19		0.0012	1	0.015	0.0090	0.70	0.13	0.017	1	0.010	0.015	1	0.025	8.6	17	0.0029	0.0015
Phenanthrene	1.9		0.0012	1	0.15	0.0090	0.70	0.13	0.17	1	0.10	0.015	1	0.25	521	60	0.00048	0.0042
Pyrene	1.5		0.0012	1	0.12	0.0090	0.70	0.13	0.14	1	0.082	0.015	1	0.20	7.8	13	0.026	0.015

Hazard Index - Detected Compounds	349	70
Hazard Index - Detected Compounds w/Detection Limits	349	70

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table R-3b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Average Concentrations
SWMU S-3
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
Metals															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Arsenic	34		0.0012	1	2.7	0.0090	1.16	0.13	5.1	1	3.1	0.015	1	5.7	0.14	1.4	42	4.2
Chromium	99		0.0012	1	7.7	0.0090	0.49	0.13	6.3	1	3.8	0.015	1	12	4.0	16	2.9	0.72
Lead	2520		0.0012	1	197	0.0090	0.69	0.13	226	1	136	0.015	1	332	9.7	97	34	3.4
Nickel	33		0.0012	1	2.6	0.0090	0.78	0.13	3.3	1	2.0	0.015	1	4.6	48	97	0.095	0.047
Selenium	12		0.0012	1	0.94	0.0090	10.5	0.13	16	1	9.8	0.015	1	11	0.19	0.32	56	34
Silver	4.5		0.0012	1	0.35	0.0090	4.6	0.13	2.7	1	1.6	0.015	1	2.0	22	1.9	0.090	1.0
Thallium	4.7		0.0012	1	0.37	0.0090	4.6	0.13	2.8	1	1.7	0.015	1	2.1	0.014	0.14	152	15
VOCs						0.0090												
Trichloroethene	0.016		0.0012	1	0.0012	0.0090	0.70	0.13	0.0015	1	0.00087	0.015	1	0.0021	0.65	6.5	0.0033	0.00033
SVOCs						0.0090												
Acenaphthylene	0.43		0.0012	1	0.034	0.0090	0.70	0.13	0.039	1	0.023	0.015	1	0.057	365	73	0.00016	0.00078
Anthracene	0.35		0.0012	1	0.027	0.0090	0.70	0.13	0.032	1	0.019	0.015	1	0.046	1042	52	0.000045	0.00089
Benzo (a) anthracene	0.66		0.0012	1	0.051	0.0090	0.90	0.13	0.077	1	0.046	0.015	1	0.098	2.4	2.1	0.040	0.047
Benzo (a) pyrene	0.54		0.0012	1	0.042	0.0090	0.43	0.13	0.030	1	0.018	0.015	1	0.060	1.0	10	0.058	0.0058
Chrysene	0.73		0.0012	1	0.057	0.0090	0.90	0.13	0.085	1	0.051	0.015	1	0.11	521	52	0.00021	0.0021
Fluoranthene	1.7		0.0012	1	0.13	0.0090	0.70	0.13	0.16	1	0.094	0.015	1	0.23	26	52	0.0087	0.0044
Fluorene	0.20		0.0012	1	0.015	0.0090	0.70	0.13	0.018	1	0.011	0.015	1	0.026	13	26	0.0020	0.00099
Naphthalene	0.12		0.0012	1	0.0094	0.0090	0.70	0.13	0.011	1	0.0066	0.015	1	0.016	8.6	17	0.0019	0.00094
Phenanthrene	1.0		0.0012	1	0.080	0.0090	0.70	0.13	0.093	1	0.056	0.015	1	0.14	521	60	0.00026	0.0023
Pyrene	0.83		0.0012	1	0.064	0.0090	0.70	0.13	0.075	1	0.045	0.015	1	0.11	7.8	13	0.014	0.0084

Hazard Index - Detected Compounds	287	59
Hazard Index - Detected Compounds w/Detection Limits	287	59

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table R-4a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Maximum Concentrations
SWMU S-4
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
Metals															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Chromium	49		0.0012	1	3.8	0.0090	0.49	0.13	3.1	1	1.9	0.015	1	5.7	4.0	16	1.4	0.36
Lead	415		0.0012	1	32	0.0090	0.69	0.13	37	1	22	0.015	1	55	9.7	97	5.6	0.56
Mercury	1.6		0.0012	1	0.12	0.0090	1.32	0.13	0.27	1	0.16	0.015	1	0.29	13	0.027	0.022	11
Nickel	40		0.0012	1	3.1	0.0090	0.78	0.13	4.0	1	2.4	0.015	1	5.5	48	97	0.12	0.057
SVOCs																		
Benzo (a) anthracene	0.71		0.0012	1	0.055	0.0090	0.90	0.13	0.083	1	0.050	0.015	1	0.11	2.4	4.1	0.044	0.026
Benzo (a) pyrene	0.37		0.0012	1	0.029	0.0090	0.43	0.13	0.021	1	0.012	0.015	1	0.041	1.0	10	0.041	0.0041
Benzo (b) fluoranthene	0.84		0.0012	1	0.066	0.0090	0.90	0.13	0.098	1	0.059	0.015	1	0.12	1.0	10	0.12	0.012
Benzo (ghi) perylene	0.62		0.0012	1	0.048	0.0090	0.90	0.13	0.073	1	0.044	0.015	1	0.092	1.0	10	0.092	0.0092
Benzo (k) fluoranthene	0.34		0.0012	1	0.027	0.0090	0.90	0.13	0.040	1	0.024	0.015	1	0.050	1.0	10	0.050	0.0050
bis (2-Ethylhexyl) phthalate	0.98		0.0012	1	0.076	0.0090	0.70	0.13	0.089	1	0.054	0.015	1	0.13	13	20	0.010	0.0065
Chrysene	0.45		0.0012	1	0.035	0.0090	0.90	0.13	0.053	1	0.032	0.015	1	0.067	521	52	0.00013	0.0013
Fluoranthene	0.85		0.0012	1	0.066	0.0090	0.70	0.13	0.077	1	0.046	0.015	1	0.11	26	52	0.0043	0.0022
Indeno (1,2,3-cd) pyrene	0.46		0.0012	1	0.036	0.0090	0.90	0.13	0.054	1	0.032	0.015	1	0.068	1.0	10	0.068	0.0068
Naphthalene	0.33		0.0012	1	0.026	0.0090	0.70	0.13	0.030	1	0.018	0.015	1	0.044	8.6	17	0.0051	0.0026
Phenanthrene	0.42		0.0012	1	0.033	0.0090	0.70	0.13	0.038	1	0.023	0.015	1	0.056	521	60	0.00011	0.00093
Pyrene	0.79		0.0012	1	0.062	0.0090	0.70	0.13	0.072	1	0.043	0.015	1	0.10	7.8	13	0.013	0.0081

Hazard Index - Detected Compounds	7.7	12
Hazard Index - Detected Compounds w/Detection Limits	7.7	12

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table R-4b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Average Concentrations
SWMU S-4
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	28		0.0012	1	2.2	0.0090	0.49	0.13	1.8	1	1.1	0.015	1	3.3	4.0	16	0.82	0.21
Lead	389		0.0012	1	30	0.0090	0.69	0.13	35	1	21	0.015	1	51	9.7	97	5.3	0.53
Mercury	1.0		0.0012	1	0.078	0.0090	1.32	0.13	0.17	1	0.10	0.015	1	0.18	13	0.027	0.014	6.7
Nickel	37		0.0012	1	2.9	0.0090	0.78	0.13	3.8	1	2.3	0.015	1	5.1	48	97	0.11	0.053
SVOCs																		
Benzo (a) anthracene	0.58		0.0012	1	0.045	0.0090	0.90	0.13	0.068	1	0.041	0.015	1	0.086	2.4	2.1	0.036	0.041
Benzo (a) pyrene	0.30		0.0012	1	0.023	0.0090	0.43	0.13	0.017	1	0.010	0.015	1	0.033	1.0	10	0.032	0.0032
Benzo (b) fluoranthene	0.79		0.0012	1	0.061	0.0090	0.90	0.13	0.092	1	0.055	0.015	1	0.12	1.0	10	0.11	0.011
Benzo (ghi) perylene	0.38		0.0012	1	0.030	0.0090	0.90	0.13	0.044	1	0.027	0.015	1	0.056	1.0	10	0.054	0.0054
Benzo (k) fluoranthene	0.38		0.0012	1	0.030	0.0090	0.90	0.13	0.045	1	0.027	0.015	1	0.057	1.0	10	0.054	0.0054
bis (2-Ethylhexyl) phthalate	0.63		0.0012	1	0.049	0.0090	0.70	0.13	0.057	1	0.034	0.015	1	0.084	13	20	0.0066	0.0041
Chrysene	0.42		0.0012	1	0.033	0.0090	0.90	0.13	0.049	1	0.029	0.015	1	0.062	521	52	0.00012	0.0012
Fluoranthene	0.83		0.0012	1	0.065	0.0090	0.70	0.13	0.076	1	0.045	0.015	1	0.11	26	52	0.0042	0.0021
Indeno (1,2,3-cd) pyrene	0.36		0.0012	1	0.028	0.0090	0.90	0.13	0.042	1	0.025	0.015	1	0.054	1.0	10	0.052	0.0052
Naphthalene	0.31		0.0012	1	0.024	0.0090	0.70	0.13	0.028	1	0.017	0.015	1	0.041	8.6	17	0.0048	0.0024
Phenanthrene	0.40		0.0012	1	0.031	0.0090	0.70	0.13	0.037	1	0.022	0.015	1	0.053	521	60	0.00010	0.00088
Pyrene	0.77		0.0012	1	0.060	0.0090	0.70	0.13	0.070	1	0.042	0.015	1	0.10	7.8	13	0.013	0.0078

Hazard Index - Detected Compounds	6.6	7.6
Hazard Index - Detected Compounds w/Detection Limits	6.6	7.6

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.

LOAEL - Lowest Observable Adverse Effects Level.

HQ - Hazard Quotient.

Table R-5a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Maximum Concentrations
SWMU S-5
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony		89	0.0012	1	6.9	0.0090	4.6	0.13	53	1	32	0.015	1	39	0.13	1.3	297	30
Cadmium		67	0.0012	1	5.2	0.0090	4.6	0.13	40	1	24	0.015	1	29	15	58	2.0	0.50
Lead	241		0.0012	1	19	0.0090	0.69	0.13	22	1	13	0.015	1	32	9.7	97	3.3	0.33
Nickel		59	0.0012	1	4.6	0.0090	0.78	0.13	6.0	1	3.6	0.015	1	8.2	48	97	0.17	0.084
Silver		15	0.0012	1	1.1	0.0090	4.6	0.13	8.8	1	5.3	0.015	1	6.4	22	1.9	0.29	3.4
VOCs																		
Carbon disulfide	0.0022		0.0012	1	0.00017	0.0090	0.70	0.13	0.00020	1	0.00012	0.015	1	0.00029	24	42	0.000012	0.0000069
Methylene chloride	0.0024		0.0012	1	0.00019	0.0090	0.70	0.13	0.00022	1	0.00013	0.015	1	0.00032	11	90	0.000029	0.0000035

Hazard Index - Detected Compounds	3.3	0.33
Hazard Index - Detected Compounds w/Detection Limits	303	34

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table R-5b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Average Concentrations
SWMU S-5
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
Metals															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Antimony		84	0.0012	1	6.6	0.0090	4.6	0.13	50	1	30	0.015	1	37	0.13	1.3	282	28
Cadmium		37	0.0012	1	2.9	0.0090	4.6	0.13	22	1	13	0.015	1	16	15	58	1.1	0.28
Lead	133		0.0012	1	10	0.0090	0.69	0.13	12	1	7.2	0.015	1	18	9.7	97	1.8	0.18
Nickel		56	0.0012	1	4.4	0.0090	0.78	0.13	5.7	1	3.4	0.015	1	7.8	48	97	0.16	0.080
Silver		14	0.0012	1	1.1	0.0090	4.6	0.13	8.4	1	5.0	0.015	1	6.1	22	1.9	0.28	3.2
VOCs																		
Carbon disulfide	0.0026		0.0012	1	0.00020	0.0090	0.70	0.13	0.00024	1	0.00014	0.015	1	0.00034	24	42	0.000014	0.0000083
Methylene chloride	0.0040		0.0012	1	0.00031	0.0090	0.70	0.13	0.00036	1	0.00022	0.015	1	0.00053	11	90	0.000050	0.0000059

Hazard Index - Detected Compounds	1.8	0.18
Hazard Index - Detected Compounds w/Detection Limits	285	32

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.

LOAEL - Lowest Observable Adverse Effects Level.

HQ - Hazard Quotient.

Table R-6a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Maximum Concentrations
SWMU S-6
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	375		0.0012	1	29	0.0090	4.6	0.13	224	1	135	0.015	1	164	0.13	1.3	1260	126
Lead	3670		0.0012	1	286	0.0090	0.69	0.13	329	1	198	0.015	1	484	9.7	97	50	5.0
Nickel		92	0.0012	1	7.1	0.0090	0.78	0.13	9.3	1	5.6	0.015	1	13	48	97	0.26	0.13
Selenium		2.3	0.0012	1	0.18	0.0090	10.5	0.13	3.1	1	1.9	0.015	1	2.1	0.19	0.32	11	6.4
Silver		23	0.0012	1	1.8	0.0090	4.6	0.13	14	1	8.2	0.015	1	10	22	1.9	0.45	5.3
SVOCs																		
Benzo (a) pyrene	0.14		0.0012	1	0.011	0.0090	0.43	0.13	0.0078	1	0.0047	0.015	1	0.016	1.0	10	0.016	0.0016
Benzo (b) fluoranthene	0.30		0.0012	1	0.023	0.0090	0.90	0.13	0.035	1	0.021	0.015	1	0.044	1.0	10	0.044	0.0044
Benzo (ghi) perylene	0.12		0.0012	1	0.0094	0.0090	0.90	0.13	0.014	1	0.0084	0.015	1	0.018	1.0	10	0.018	0.0018
Chrysene	0.34		0.0012	1	0.027	0.0090	0.90	0.13	0.040	1	0.024	0.015	1	0.050	521	52	0.000097	0.00097
Fluoranthene	0.13		0.0012	1	0.010	0.0090	0.70	0.13	0.012	1	0.0071	0.015	1	0.017	26	52	0.00066	0.00033
Fluorene	0.13		0.0012	1	0.010	0.0090	0.70	0.13	0.012	1	0.0071	0.015	1	0.017	13	26	0.0013	0.00066
Indeno (1,2,3-cd) pyrene	0.15		0.0012	1	0.012	0.0090	0.90	0.13	0.018	1	0.011	0.015	1	0.022	1.0	10	0.022	0.0022
Pyrene	0.13		0.0012	1	0.010	0.0090	0.70	0.13	0.012	1	0.0071	0.015	1	0.017	7.8	13	0.0022	0.0013

Hazard Index - Detected Compounds	1310	131
Hazard Index - Detected Compounds w/Detection Limits	1322	143

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.

LOAEL - Lowest Observable Adverse Effects Level.

HQ - Hazard Quotient.

Table R-6b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Average Concentrations
SWMU S-6
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	254		0.0012	1	20	0.0090	4.6	0.13	152	1	91	0.015	1	111	0.13	1.3	851	85
Lead	2315		0.0012	1	181	0.0090	0.69	0 13	208	1	125	0.015	1	305	9.7	97	32	3.2
Nickel		90	0.0012	1	7.0	0.0090	0.78	0.13	9.1	1	5.5	0.015	1	12.5	48	97	0.26	0.13
Selenium		1.4	0.0012	1	0.11	0.0090	10.5	0.13	1.9	1	1.1	0.015	1	1.3	0.19	0.32	6.5	4.0
Silver		23	0.0012	1	1.8	0.0090	4.6	0.13	14	1	8.3	0.015	1	10	22	1.9	0.46	5.3
SVOCs																		
Benzo (a) pyrene	0.22		0.0012	1	0.017	0.0090	0.43	0.13	0.012	1	0.0074	0.015	1	0.025	1.0	10	0.024	0.0024
Benzo (b) fluoranthene	0.22		0.0012	1	0.017	0.0090	0.90	0.13	0.025	1	0.015	0.015	1	0.032	1.0	10	0.031	0.0031
Benzo (ghi) perylene	0.21		0.0012	1	0.016	0.0090	0.90	0.13	0.025	1	0.015	0.015	1	0.031	1.0	10	0.030	0.0030
Chrysene	0.24		0.0012	1	0.018	0.0090	0.90	0.13	0.027	1	0.016	0.015	1	0.035	521	52	0.000067	0.00067
Fluoranthene	0.22		0.0012	1	0.017	0.0090	0.70	0.13	0.020	1	0.012	0.015	1	0.029	26	52	0.0011	0.00055
Fluorene	0.21		0.0012	1	0.017	0.0090	0.70	0.13	0.019	1	0.012	0.015	1	0.028	13	26	0.0022	0.0011
Indeno (1,2,3-cd) pyrene	0.23		0.0012	1	0.018	0.0090	0.90	0.13	0.026	1	0.016	0.015	1	0.033	1.0	10	0.032	0.0032
Pyrene	0.22		0.0012	1	0.017	0.0090	0.70	0.13	0.020	1	0.012	0.015	1	0.029	7.8	13	0.0036	0.0022

Hazard Index - Detected Compounds	883	88
Hazard Index - Detected Compounds w/Detection Limits	890	98

NOTES:

(a) - The averge concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table R-7a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Maximum Concentrations
SWMU S-7/S-20
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	299		0.0012	1	23	0.0090	0.49	0.13	19	1	11	0.015	1	35	4.0	16	8.7	2.2
Lead	968		0.0012	1	76	0.0090	0.69	0.13	87	1	52	0.015	1	128	9.7	97	13	1.3
Mercury	0.71		0.0012	1	0.055	0.0090	1.32	0.13	0.12	1	0.073	0.015	1	0.13	13	0.027	0.0099	4.8
Nickel	62		0.0012	1	4.9	0.0090	0.78	0.13	6.3	1	3.8	0.015	1	8.6	48	97	0.18	0.089
Selenium	8.9		0.0012	1	0.69	0.0090	10.5	0.13	12	1	7.3	0.015	1	8.0	0.19	0.32	42	25
Thallium	7.2		0.0012	1	0.56	0.0090	4.6	0.13	4.3	1	2.6	0.015	1	3.1	0.014	0.14	225	22
VOCs																		
Trichloroethene	0.015		0.0012	1	0.0012	0.0090	0.70	0.13	0.0014	1	0.00082	0.015	1	0.0020	0.65	6.5	0.0031	0.00031
SVOCs																		
bis (2-Ethylhexyl) phthalate	0.048		0.0012	1	0.0037	0.0090	0.70	0.13	0.0044	1	0.0026	0.015	1	0.0064	13	20	0.00049	0.00032
Chrysene	0.060		0.0012	1	0.0047	0.0090	0.90	0.13	0.0070	1	0.0042	0.015	1	0.0089	521	52	0.000017	0.00017
Fluoranthene	0.083		0.0012	1	0.0065	0.0090	0.70	0.13	0.0076	1	0.0045	0.015	1	0.011	26	52	0.00042	0.00021
Naphthalene	0.049		0.0012	1	0.0038	0.0090	0.70	0.13	0.0045	1	0.0027	0.015	1	0.0065	8.6	17	0.00076	0.00038
Phenanthrene	0.054		0.0012	1	0.0042	0.0090	0.70	0.13	0.0049	1	0.0029	0.015	1	0.0072	521	60	0.000014	0.00012
Pyrene	0.053		0.0012	1	0.0041	0.0090	0.70	0.13	0.0048	1	0.0029	0.015	1	0.0070	7.8	13	0.00090	0.00054

Hazard Index - Detected Compounds	289	56
Hazard Index - Detected Compounds w/Detection Limits	289	56

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table R-7b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Average Concentrations
SWMU S-7/S-20
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	269		0.0012	1	21	0.0090	0.49	0.13	17	1	10	0.015	1	31	4.0	16	7.9	2.0
Lead	542		0.0012	1	42	0.0090	0.69	0.13	49	1	29	0.015	1	71	9.7	97	7.4	0.74
Mercury	0.19		0.0012	1	0.015	0.0090	1.32	0.13	0.033	1	0.020	0.015	1	0.034	13	0.027	0.0026	1.3
Nickel	57		0.0012	1	4.4	0.0090	0.78	0.13	5.8	1	3.5	0.015	1	7.9	48	97	0.16	0.082
Selenium	3.8		0.0012	1	0.30	0.0090	10.5	0.13	5.2	1	3.1	0.015	1	3.4	0.19	0.32	18	11
Thallium	3.3		0.0012	1	0.26	0.0090	4.6	0.13	2.0	1	1.2	0.015	1	1.4	0.014	0.14	106	11
VOCs																		
Trichloroethene	0.0078		0.0012	1	0.00061	0.0090	0.70	0.13	0.00071	1	0.00043	0.015	1	0.0010	0.65	6.5	0.0016	0.00016
SVOCs																		
bis (2-Ethylhexyl) phthalate	0.13		0.0012	1	0.010	0.0090	0.70	0.13	0.012	1	0.0071	0.015	1	0.017	13	20	0.0014	0.00084
Chrysene	0.14		0.0012	1	0.011	0.0090	0.90	0.13	0.016	1	0.0099	0.015	1	0.021	521	52	0.000040	0.00040
Fluoranthene	0.11		0.0012	1	0.0085	0.0090	0.70	0.13	0.0099	1	0.0060	0.015	1	0.014	26	52	0.00055	0.00028
Naphthalene	0.18		0.0012	1	0.014	0.0090	0.70	0.13	0.017	1	0.0099	0.015	1	0.024	8.6	17	0.0028	0.0014
Phenanthrene	0.18		0.0012	1	0.014	0.0090	0.70	0.13	0.016	1	0.0097	0.015	1	0.023	521	60	0.000045	0.00039
Pyrene	0.18		0.0012	1	0.014	0.0090	0.70	0.13	0.016	1	0.0097	0.015	1	0.023	7.8	13	0.0030	0.0018

Hazard Index - Detected Compounds	140	25
Hazard Index - Detected Compounds w/Detection Limits	140	25

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table R-8a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Maximum Concentrations
SWMU S-8
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Arsenic	74		0.0012	1	5.8	0.0090	1.16	0.13	11	1	6.7	0.015	1	13	0.14	1.4	90	9.0
Barium	252		0.0012	1	20	0.0090	0.36	0.13	12	1	7.1	0.015	1	27	11	44	2.4	0.61
Cadmium	50		0.0012	1	3.9	0.0090	4.6	0.13	30	1	18	0.015	1	22	15.0	58	1.5	0.38
Chromium	436		0.0012	1	34	0.0090	0.49	0.13	28	1	17	0.015	1	51	4.0	16	13	3.2
Lead	2160		0.0012	1	168	0.0090	0.69	0.13	194	1	116	0.015	1	285	9.7	97	29	2.9
Selenium		1.4	0.0012	1	0.11	0.0090	10.5	0.13	1.8	1	1.1	0.015	1	1.2	0.19	0.32	6.4	3.8
Thallium	23		0.0012	1	1.8	0.0090	4.6	0.13	14	1	8.2	0.015	1	10	0.014	0.14	714	71
VOCs																		
Methylene chloride	0.0060		0.0012	1	0.00047	0.0090	0.70	0.13	0.00055	1	0.00033	0.015	1	0.00080	11	90	0.000072	0.0000088
SVOCs																		
Anthracene	0.80		0.0012	1	0.062	0.0090	0.70	0.13	0.073	1	0.044	0.015	1	0.11	1042	52	0.00010	0.0020
Benzo (a) anthracene	2.1		0.0012	1	0.16	0.0090	0.90	0.13	0.25	1	0.15	0.015	1	0.31	2.4	2.1	0.13	0.15
Benzo (a) pyrene	1.3		0.0012	1	0.10	0.0090	0.43	0.13	0.073	1	0.044	0.015	1	0.15	1.0	10	0.15	0.015
Benzo (b) fluoranthene	1.9		0.0012	1	0.15	0.0090	0.90	0.13	0.22	1	0.13	0.015	1	0.28	1.0	10	0.28	0.028
Benzo (ghi) perylene	0.95		0.0012	1	0.074	0.0090	0.90	0.13	0.11	1	0.067	0.015	1	0.14	1.0	10	0.14	0.014
Benzo (k) fluoranthene	1.9		0.0012	1	0.15	0.0090	0.90	0.13	0.22	1	0.13	0.015	1	0.28	1.0	10	0.28	0.028
Chrysene	2.4		0.0012	1	0.19	0.0090	0.90	0.13	0.28	1	0.17	0.015	1	0.36	521	52	0.00068	0.0068
Dibenzo(a,h)anthracene	0.40		0.0012	1	0.031	0.0090	0.90	0.13	0.047	1	0.028	0.015	1	0.059	0.24	10	0.25	0.0059
Fluoranthene	5.3		0.0012	1	0.41	0.0090	0.70	0.13	0.48	1	0.29	0.015	1	0.70	26	52	0.027	0.014
Indeno (1,2,3-cd) pyrene	1.0		0.0012	1	0.078	0.0090	0.90	0.13	0.12	1	0.070	0.015	1	0.15	1.0	10	0.15	0.015
Naphthalene	0.39		0.0012	1	0.030	0.0090	0.70	0.13	0.035	1	0.021	0.015	1	0.052	8.6	17	0.0060	0.0030
Phenanthrene	3.3		0.0012	1	0.26	0.0090	0.70	0.13	0.30	1	0.18	0.015	1	0.44	521	60	0.00084	0.0073
Pyrene	3.4		0.0012	1	0.27	0.0090	0.70	0.13	0.31	1	0.19	0.015	1	0.45	7.8	13	0.058	0.035

Hazard Index - Detected Compounds	851	88
Hazard Index - Detected Compounds w/Detection Limits	858	92

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table R-8b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Average Concentrations
SWMU S-8
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
Metals															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Arsenic	43		0.0012	1	3.4	0.0090	1.16	0.13	6.5	1	3.9	0.015	1	7.2	0.14	1.4	53	5.3
Barium	146		0.0012	1	11	0.0090	0.36	0.13	6.8	1	4.1	0.015	1	15	11	44	1.4	0.35
Cadmium	29		0.0012	1	2.3	0.0090	4.6	0.13	17	1	10	0.015	1	13	15	58	0.87	0.22
Chromium	372		0.0012	1	29	0.0090	0.49	0.13	24	1	14	0.015	1	43	4.0	16	11	2.7
Lead	1224		0.0012	1	95	0.0090	0.69	0.13	110	1	66	0.015	1	161	9.7	97	17	1.7
Selenium		0.82	0.0012	1	0.064	0.0090	10.5	0.13	1.1	1	0.67	0.015	1	0.74	0.19	0.32	3.8	2.3
Thallium	15		0.0012	1	1.2	0.0090	4.6	0.13	9.0	1	5.4	0.015	1	6.6	0.014	0.14	484	48
VOCs																		
Methylene chloride	0.0058		0.0012	1	0.00045	0.0090	0.70	0.13	0.00053	1	0.00032	0.015	1	0.00077	11	90	0.000073	0.0000085
SVOCs																		
Anthracene	0.50		0.0012	1	0.039	0.0090	0.70	0.13	0.045	1	0.027	0.015	1	0.066	1042	52	0.000063	0.0013
Benzo (a) anthracene	1.2		0.0012	1	0.096	0.0090	0.90	0.13	0.14	1	0.086	0.015	1	0.18	2.4	2.1	0.075	0.087
Benzo (a) pyrene	0.86		0.0012	1	0.067	0.0090	0.43	0.13	0.048	1	0.029	0.015	1	0.095	1.0	10	0.091	0.0091
Benzo (b) fluoranthene	1.2		0.0012	1	0.095	0.0090	0.90	0.13	0.14	1	0.085	0.015	1	0.18	1.0	10	0.17	0.017
Benzo (ghi) perylene	0.66		0.0012	1	0.051	0.0090	0.90	0.13	0.077	1	0.046	0.015	1	0.098	1.0	10	0.094	0.0094
Benzo (k) fluoranthene	1.1		0.0012	1	0.082	0.0090	0.90	0.13	0.12	1	0.074	0.015	1	0.16	1.0	10	0.15	0.015
Chrysene	1.4		0.0012	1	0.11	0.0090	0.90	0.13	0.16	1	0.098	0.015	1	0.21	521	52	0.00040	0.0040
Dibenzo(a,h)anthracene	0.30		0.0012	1	0.023	0.0090	0.90	0.13	0.035	1	0.021	0.015	1	0.044	0.24	10	0.18	0.0042
Fluoranthene	2.9		0.0012	1	0.23	0.0090	0.70	0.13	0.26	1	0.16	0.015	1	0.38	26	52	0.015	0.0074
Indeno (1,2,3-cd) pyrene	0.69		0.0012	1	0.053	0.0090	0.90	0.13	0.080	1	0.048	0.015	1	0.10	1.0	10	0.097	0.0097
Naphthalene	0.29		0.0012	1	0.023	0.0090	0.70	0.13	0.027	1	0.016	0.015	1	0.039	8.6	17	0.0045	0.0023
Phenanthrene	1.8		0.0012	1	0.14	0.0090	0.70	0.13	0.16	1	0.096	0.015	1	0.23	521	60	0.00045	0.0038
Pyrene	1.9		0.0012	1	0.15	0.0090	0.70	0.13	0.17	1	0.10	0.015	1	0.25	7.8	13	0.032	0.019

Hazard Index - Detected Compounds	567	59
Hazard Index - Detected Compounds w/Detection Limits	571	61

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table R-9a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Maximum Concentrations
SWMU S-11
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	203		0.0012	1	16	0.0090	0.49	0.13	13	1	7.8	0.015	1	24	4.0	16	5.9	1.5
Lead	355		0.0012	1	28	0.0090	0.69	0.13	32	1	19	0.015	1	47	9.7	97	4.8	0.48
Nickel	36		0.0012	1	2.8	0.0090	0.78	0.13	3.6	1	2.2	0.015	1	4.9	48	97	0.10	0.051
Selenium	5.7		0.0012	1	0.44	0.0090	10.5	0.13	7.8	1	4.7	0.015	1	5.1	0.19	0.32	27	16
Thallium	7.1		0.0012	1	0.55	0.0090	4.6	0.13	4.2	1	2.5	0.015	1	3.1	0.014	0.14	222	22
VOCs																		
Trichloroethene	0.0080		0.0012	1	0.00062	0.0090	0.70	0.13	0.00073	1	0.00044	0.015	1	0.0011	0.65	6.5	0.0016	0.00016
SVOCs																		
Acenaphthylene	2.4		0.0012	1	0.19	0.0090	0.70	0.13	0.22	1	0.13	0.015	1	0.32	365	73	0.00087	0.0044
Anthracene	2.4		0.0012	1	0.19	0.0090	0.70	0.13	0.22	1	0.13	0.015	1	0.32	1042	52	0.00031	0.0061
Benzo (a) anthracene	8.9		0.0012	1	0.69	0.0090	0.90	0.13	1.0	1	0.62	0.015	1	1.3	2.4	2.1	0.55	0.63
Benzo (a) pyrene	10		0.0012	1	0.78	0.0090	0.43	0.13	0.56	1	0.34	0.015	1	1.1	1.0	10	1.1	0.11
Chrysene	10		0.0012	1	0.78	0.0090	0.90	0.13	1.2	1	0.70	0.015	1	1.5	521	52	0.0028	0.029
Fluoranthene	24		0.0012	1	1.9	0.0090	0.70	0.13	2.2	1	1.3	0.015	1	3.2	26	52	0.12	0.061
Fluorene	1.1		0.0012	1	0.086	0.0090	0.70	0.13	0.10	1	0.060	0.015	1	0.15	13	26	0.011	0.0056
Naphthalene	0.50		0.0012	1	0.039	0.0090	0.70	0.13	0.046	1	0.027	0.015	1	0.066	8.6	17	0.0077	0.0039
Phenanthrene	14		0.0012	1	1.1	0.0090	0.70	0.13	1.3	1	0.76	0.015	1	1.9	521	60	0.0036	0.031
Pyrene	17		0.0012	1	1.3	0.0090	0.70	0.13	1.5	1	0.93	0.015	1	2.3	7.8	13	0.29	0.17

Hazard Index - Detected Compounds	261	41
Hazard Index - Detected Compounds w/Detection Limits	261	41

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table R-9b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Average Concentrations
SWMU S-11
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	203		0.0012	1	16	0.0090	0.49	0.13	13	1	7.8	0.015	1	24	4.0	16	6.0	1.5
Lead	285		0.0012	1	22	0.0090	0.69	0.13	26	1	15	0.015	1	38	9.7	97	3.9	0.39
Nickel	33		0.0012	1	2.6	0.0090	0.78	0.13	3.3	1	2.0	0.015	1	4.6	48	97	0.095	0.047
Selenium	5.2		0.0012	1	0.41	0.0090	10.5	0.13	7.1	1	4.3	0.015	1	4.7	0.19	0.32	24	15
Thallium	6.9		0.0012	1	0.54	0.0090	4.6	0.13	4.1	1	2.5	0.015	1	3.0	0.014	0.14	222	22
VOCs																		
Trichloroethene	0.008		0.0012	1	0.00060	0.0090	0.70	0.13	0.00070	1	0.00042	0.015	1	0.0010	0.65	6.5	0.0016	0.00016
SVOCs																		
Acenaphthylene	1.9		0.0012	1	0.14	0.0090	0.70	0.13	0.17	1	0.10	0.015	1	0.25	365	73	0.00067	0.0034
Anthracene	1.9		0.0012	1	0.14	0.0090	0.70	0.13	0.17	1	0.10	0.015	1	0.25	1042	52	0.00024	0.0047
Benzo (a) anthracene	7.1		0.0012	1	0.55	0.0090	0.90	0.13	0.83	1	0.50	0.015	1	1.1	2.4	2.1	0.44	0.50
Benzo (a) pyrene	8.1		0.0012	1	0.63	0.0090	0.43	0.13	0.45	1	0.27	0.015	1	0.90	1.0	10	0.87	0.087
Chrysene	8.2		0.0012	1	0.64	0.0090	0.90	0.13	0.96	1	0.58	0.015	1	1.2	521	52	0.0023	0.023
Fluoranthene	20		0.0012	1	1.5	0.0090	0.70	0.13	1.8	1	1.1	0.015	1	2.6	26	52	0.099	0.050
Fluorene	0.88		0.0012	1	0.069	0.0090	0.70	0.13	0.080	1	0.048	0.015	1	0.12	13	26	0.0090	0.0045
Naphthalene	1.2		0.0012	1	0.096	0.0090	0.70	0.13	0.11	1	0.067	0.015	1	0.16	8.6	17	0.019	0.0095
Phenanthrene	12		0.0012	1	0.92	0.0090	0.70	0.13	1.1	1	0.65	0.015	1	1.6	521	60	0.0030	0.026
Pyrene	14		0.0012	1	1.1	0.0090	0.70	0.13	1.3	1	0.76	0.015	1	1.9	7.8	13	0.24	0.14

Hazard Index - Detected Compounds	258	40
Hazard Index - Detected Compounds w/Detection Limits	258	40

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table R-10a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Maximum Concentrations
SWMU S-21
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	78		0.0012	0.40	2.4	0.0090	4.6	0.13	47	0.40	11	0.015	1	14	0.13	1.3	105	10
Arsenic	61		0.0012	0.40	1.9	0.0090	1.16	0.13	9.1	0.40	2.2	0.015	1	4.1	0.14	1.4	29	2.9
Barium	124		0.0012	0.40	3.9	0.0090	0.36	0.13	5.8	0.40	1.4	0.015	1	5.3	11	44	0.48	0.12
Chromium	292		0.0012	0.40	9.1	0.0090	0.49	0.13	19	0.40	4.5	0.015	1	14	4.0	16	3.4	0.85
Lead	1650		0.0012	0.40	51	0.0090	0.69	0.13	148	0.40	36	0.015	1	87	9.7	97	9.0	0.90
Mercury	0.34		0.0012	0.40	0.011	0.0090	1.32	0.13	0.058	0.40	0.014	0.015	1	0.025	13	0.027	0.0019	0.91
Nickel	356		0.0012	0.40	11	0.0090	0.78	0.13	36	0.40	8.7	0.015	1	20	48	97	0.41	0.20
Thallium		1.2	0.0012	0.40	0.036	0.0090	4.6	0.13	0.69	0.40	0.17	0.015	1	0.20	0.014	0.14	14	1.4
SVOCs																		
Benzo (a) anthracene	0.80		0.0012	0.40	0.025	0.0090	0.90	0.13	0.094	0.40	0.022	0.015	1	0.047	2.4	2.1	0.020	0.023
Benzo (a) pyrene	0.55		0.0012	0.40	0.017	0.0090	0.43	0.13	0.031	0.40	0.0074	0.015	1	0.025	1.0	10	0.025	0.0025
Benzo (b) fluoranthene	1.1		0.0012	0.40	0.034	0.0090	0.90	0.13	0.13	0.40	0.031	0.015	1	0.065	1.0	10	0.065	0.0065
Benzo (ghi) perylene	0.39		0.0012	0.40	0.012	0.0090	0.90	0.13	0.046	0.40	0.011	0.015	1	0.023	1.0	12	0.023	0.0019
Benzo (k) fluoranthene	0.33		0.0012	0.40	0.010	0.0090	0.90	0.13	0.039	0.40	0.0093	0.015	1	0.020	1.0	10	0.020	0.0020
bis (2-Ethylhexyl) phthalate	0.30		0.0012	0.40	0.0094	0.0090	0.70	0.13	0.027	0.40	0.0066	0.015	1	0.016	13	20	0.0012	0.00080
Chrysene	0.51		0.0012	0.40	0.016	0.0090	0.90	0.13	0.060	0.40	0.014	0.015	1	0.030	521	52	0.000058	0.00058
Fluoranthene	0.81		0.0012	0.40	0.025	0.0090	0.70	0.13	0.074	0.40	0.018	0.015	1	0.043	26	52	0.0017	0.00083
Indeno (1,2,3-cd) pyrene	0.48		0.0012	0.40	0.015	0.0090	0.90	0.13	0.056	0.40	0.013	0.015	1	0.028	1.0	10	0.028	0.0028
Naphthalene	0.27		0.0012	0.40	0.0084	0.0090	0.70	0.13	0.025	0.40	0.0059	0.015	1	0.014	8.6	17	0.0017	0.00084
Phenanthrene	0.40		0.0012	0.40	0.012	0.0090	0.70	0.13	0.036	0.40	0.0087	0.015	1	0.021	509	59	0.000042	0.00036
Pyrene	0.78		0.0012	0.40	0.024	0.0090	0.70	0.13	0.071	0.40	0.017	0.015	1	0.041	7.8	13	0.0053	0.0032

Hazard Index - Detected Compounds	148	16
Hazard Index - Detected Compounds w/Detection Limits	162	18

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criterin.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table R-10b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Average Concentrations
SWMU S-21
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	78		0.0012	0.40	2.4	0.0090	4.6	0.13	47	0.40	11	0.015	1	14	0.13	1.3	105	10
Arsenic	61		0.0012	0.40	1.9	0.0090	1.16	0.13	9.2	0.40	2.2	0.015	1	4.1	0.14	1.4	30	3.0
Barium	124		0.0012	0.40	3.9	0.0090	0.36	0.13	5.8	0.40	1.4	0.015	1	5.3	11	44	0.46	0.12
Chromium	292		0.0012	0.40	9.1	0.0090	0.49	0.13	19	0.40	4.5	0.015	1	14	4.0	16	3.4	0.86
Lead	1650		0.0012	0.40	51	0.0090	0.69	0.13	148	0.40	36	0.015	1	87	9.7	97	9.0	0.90
Mercury	0.34		0.0012	0.40	0.011	0.0090	1.32	0.13	0.058	0.40	0.014	0.015	1	0.025	13	0.027	0.0018	0.92
Nickel	356		0.0012	0.40	11	0.0090	0.78	0.13	36	0.40	8.7	0.015	1	20	48	97	0.41	0.20
Thallium		1.2	0.0012	0.40	0.037	0.0090	4.6	0.13	0.72	0.40	0.17	0.015	1	0.21	0.014	0.14	15	1.5
SVOCs																		
Benzo (a) anthracene	0.80		0.0012	0.40	0.025	0.0090	0.90	0.13	0.094	0.40	0.022	0.015	1	0.047	2.4	2.1	0.020	0.023
Benzo (a) pyrene	0.55		0.0012	0.40	0.017	0.0090	0.43	0.13	0.031	0.40	0.0074	0.015	1	0.025	1.0	10	0.024	0.0024
Benzo (b) fluoranthene	1.1		0.0012	0.40	0.034	0.0090	0.90	0.13	0.13	0.40	0.031	0.015	1	0.065	1.0	10	0.063	0.0063
Benzo (ghi) perylene	0.39		0.0012	0.40	0.012	0.0090	0.90	0.13	0.046	0.40	0.011	0.015	1	0.023	1.0	10	0.022	0.0022
Benzo (k) fluoranthene	0.33		0.0012	0.40	0.010	0.0090	0.90	0.13	0.039	0.40	0.0093	0.015	1	0.020	1.0	10	0.019	0.0019
bis (2-Ethylhexyl) phthalate	0.30		0.0012	0.40	0.0094	0.0090	0.70	0.13	0.027	0.40	0.0066	0.015	1	0.016	13	20	0.0013	0.00078
Chrysene	0.51		0.0012	0.40	0.016	0.0090	0.90	0.13	0.060	0.40	0.014	0.015	1	0.030	521	52	0.000058	0.00058
Fluoranthene	0.81		0.0012	0.40	0.025	0.0090	0.70	0.13	0.074	0.40	0.018	0.015	1	0.043	26	52	0.0016	0.00082
Indeno (1,2,3-cd) pyrene	0.48		0.0012	0.40	0.015	0.0090	0.90	0.13	0.056	0.40	0.013	0.015	1	0.028	1.0	10	0.027	0.0027
Naphthalene	0.27		0.0012	0.40	0.0084	0.0090	0.70	0.13	0.025	0.40	0.0059	0.015	1	0.014	8.6	17	0.0017	0.00083
Phenanthrene	0.40		0.0012	0.40	0.012	0.0090	0.70	0.13	0.036	0.40	0.0087	0.015	1	0.021	521	60	0.000041	0.00035
Pyrene	0.78		0.0012	0.40	0.024	0.0090	0.70	0.13	0.071	0.40	0.017	0.015	1	0.041	7.8	13	0.0053	0.0032

Hazard Index - Detected Compounds	148	16
Hazard Index - Detected Compounds w/Detection Limits	163	18

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.

LOAEL - Lowest Observable Adverse Effects Level.

HQ - Hazard Quotient.

Table R-11a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Maximum Concentrations
SWMU S-22
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Arsenic	47		0.0012	1	3.7	0.0090	1.16	0.13	7.1	1	4.2	0.015	1	7.9	0.14	1.4	56	5.6
Chromium	29		0.0012	1	2.2	0.0090	0.49	0.13	1.8	1	1.1	0.015	1	3.3	4.0	16	0.84	0.21
Lead	140		0.0012	1	11	0.0090	0.69	0.13	13	1	7.5	0.015	1	18	9.7	97	1.9	0.19
Mercury	140		0.0012	1	11	0.0090	1.32	0.13	24	1	14	0.015	1	25	13	0.027	1.9	938
Selenium	37		0.0012	1	2.9	0.0090	10.5	0.13	51	1	31	0.015	1	33	0.19	0.32	176	105
Thallium	1.5		0.0012	1	0.12	0.0090	4.6	0.13	0.90	1	0.54	0.015	1	0.66	0.014	0.14	47	4.7
VOCs																		
Benzene	1.0		0.0012	1	0.078	0.0090	0.70	0.13	0.091	1	0.055	0.015	1	0.13	30	299	0.0044	0.00044
Xylenes, total	1.3		0.0012	1	0.10	0.0090	0.70	0.13	0.12	1	0.071	0.015	1	0.17	2.2	2.7	0.078	0.064
SVOCs																		
Benzo (a) anthracene	2.2		0.0012	1	0.17	0.0090	0.90	0.13	0.26	1	0.15	0.015	1	0.33	2.4	2.1	0.14	0.16
Chrysene	3.1		0.0012	1	0.24	0.0090	0.90	0.13	0.36	1	0.22	0.015	1	0.46	521	52	0.00088	0.0088
Fluoranthene	6.1		0.0012	1	0.48	0.0090	0.70	0.13	0.56	1	0.33	0.015	1	0.81	26	52	0.031	0.016
Fluorene	1.0		0.0012	1	0.078	0.0090	0.70	0.13	0.091	1	0.055	0.015	1	0.13	13	26	0.010	0.0051
Naphthalene	6.7		0.0012	1	0.52	0.0090	0.70	0.13	0.61	1	0.37	0.015	1	0.89	8.6	17	0.10	0.052
Phenanthrene	10		0.0012	1	0.78	0.0090	0.70	0.13	0.91	1	0.55	0.015	1	1.3	509	59	0.0026	0.022
Pyrene	3.1		0.0012	1	0.24	0.0090	0.70	0.13	0.28	1	0.17	0.015	1	0.41	7.8	13	0.053	0.032

Hazard Index - Detected Compounds	284	1054
Hazard Index - Detected Compounds w/Detection Limits	284	1054

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table R-11b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Average Concentrations
SWMU S-22
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Arsenic	45		0.0012	1	3.5	0.0090	1.16	0.13	6.8	1	4.1	0.015	1	7.6	0.14	1.4	55	5.5
Chromium	28		0.0012	1	2.2	0.0090	0.49	0.13	1.8	1	1.1	0.015	1	3.3	4.0	16	0.82	0.21
Lead	118		0.0012	1	9.2	0.0090	0.69	0.13	11	1	6.4	0.015	1	16	9.7	97	1.6	0.16
Mercury	88		0.0012	1	6.9	0.0090	1.32	0.13	15	1	9.1	0.015	1	16	13	0.027	1.2	593
Selenium	36		0.0012	1	2.8	0.0090	10.5	0.13	49	1	29	0.015	1	32	0.19	0.32	168	102
Thallium	1.5		0.0012	1	0.12	0.0090	4.6	0.13	0.90	1	0.54	0.015	1	0.66	0.014	0.14	48	4.8
VOCs																		
Benzene	0.51		0.0012	1	0.040	0.0090	0.70	0.13	0.047	1	0.028	0.015	1	0.068	30	299	0.0023	0.00023
Xylenes, total	0.73		0.0012	1	0.057	0.0090	0.70	0.13	0.066	1	0.040	0.015	1	0.096	2.2	2.7	0.044	0.035
SVOCs																		
Benzo (a) anthracene	2.1		0.0012	1	0.16	0.0090	0.90	0.13	0.25	1	0.15	0.015	1	0.31	2.4	2.1	0.13	0.15
Chrysene	2.9		0.0012	1	0.22	0.0090	0.90	0.13	0.33	1	0.20	0.015	1	0.42	521	52	0.00081	0.0081
Fluoranthene	5.9		0.0012	1	0.46	0.0090	0.70	0.13	0.53	1	0.32	0.015	1	0.78	26	52	0.030	0.015
Fluorene	1.0		0.0012	1	0.078	0.0090	0.70	0.13	0.091	1	0.054	0.015	1	0.13	13	26	0.010	0.0051
Naphthalene	6.4		0.0012	1	0.50	0.0090	0.70	0.13	0.58	1	0.35	0.015	1	0.84	8.6	17	0.098	0.049
Phenanthrene	10		0.0012	1	0.78	0.0090	0.70	0.13	0.91	1	0.55	0.015	1	1.3	521	60	0.0025	0.022
Pyrene	2.9		0.0012	1	0.22	0.0090	0.70	0.13	0.26	1	0.16	0.015	1	0.38	7.8	13	0.048	0.029

Hazard Index - Detected Compounds	276	706
Hazard Index - Detected Compounds w/Detection Limits	276	706

NOTES:
(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.
(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.
(c) - Sample and Suter, 1994.
(d) - See Attachment O, Table O-1.
(e) - See Table 4-15.
(f) - Markwell *et al.*, 1989.
(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.
(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table R-12a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Maximum Concentrations
SWMU S-27
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	158		0.0012	0.61	7.5	0.0090	0.49	0.13	10	0.61	3.7	0.015	1	11	4.0	16	2.8	0.70
Lead	189		0.0012	0.61	9.0	0.0090	0.69	0.13	17	0.61	6.2	0.015	1	15	9.7	97	1.6	0.16
Mercury	0.51		0.0012	0.61	0.024	0.0090	1.32	0.13	0.088	0.61	0.032	0.015	1	0.056	13	0.027	0.0043	2.1
Nickel	101		0.0012	0.61	4.8	0.0090	0.78	0.13	10	0.61	3.7	0.015	1	8.6	48	97	0.18	0.09
Selenium	12		0.0012	0.61	0.57	0.0090	10.5	0.13	16	0.61	5.9	0.015	1	6.5	0.19	0.32	34	20
Thallium		3.4	0.0012	0.61	0.16	0.0090	4.6	0.13	2.0	0.61	0.73	0.015	1	0.89	0.014	0.14	64	6.4
VOCs																		
Trichloroethene	0.0070		0.0012	0.61	0.00033	0.0090	0.70	0.13	0.00064	0.61	0.00023	0.015	1	0.00057	0.65	6.5	0.00087	0.000087
SVOCs																		
Acenaphthylene	2.3		0.0012	0.61	0.11	0.0090	0.70	0.13	0.21	0.61	0.077	0.015	1	0.19	365	73	0.00051	0.0025
Benzo (a) anthracene	5.2		0.0012	0.61	0.25	0.0090	0.90	0.13	0.61	0.61	0.22	0.015	1	0.47	2.4	2.1	0.20	0.22
Benzo (a) pyrene	14		0.0012	0.61	0.67	0.0090	0.43	0.13	0.78	0.61	0.29	0.015	1	0.95	1.0	10	0.95	0.095
Chrysene	7.1		0.0012	0.61	0.34	0.0090	0.90	0.13	0.83	0.61	0.30	0.015	1	0.64	521	52	0.0012	0.012
Fluoranthene	4.8		0.0012	0.61	0.23	0.0090	0.70	0.13	0.44	0.61	0.16	0.015	1	0.39	26	52	0.015	0.0075
Naphthalene	2.0		0.0012	0.61	0.095	0.0090	0.70	0.13	0.18	0.61	0.067	0.015	1	0.16	8.6	17	0.019	0.0095
Pyrene	6.2		0.0012	0.61	0.29	0.0090	0.70	0.13	0.56	0.61	0.21	0.015	1	0.50	7.8	13	0.064	0.039

Hazard Index - Detected Compounds	40	24
Hazard Index - Detected Compounds w/Detection Limits	104	30

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table R-12b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Average Concentrations
SWMU S-27
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	144		0.0012	0.61	6.9	0.0090	0.49	0.13	9.2	0.61	3.4	0.015	1	10	4.0	16	2.6	0.64
Lead	171		0.0012	0.61	8.1	0.0090	0.69	0.13	15	0.61	5.6	0.015	1	14	9.7	97	1.4	0.14
Mercury	0.41		0.0012	0.61	0.020	0.0090	1.32	0.13	0.070	0.61	0.026	0.015	1	0.045	13	0.027	0.0034	1.7
Nickel	43		0.0012	0.61	2.0	0.0090	0.78	0.13	4.4	0.61	1.6	0.015	1	3.6	48	97	0.075	0.038
Selenium	10		0.0012	0.61	0.48	0.0090	10.5	0.13	14	0.61	5.0	0.015	1	5.5	0.19	0.32	29	17
Thallium		3.4	0.0012	0.61	0.16	0.0090	4.6	0.13	2.0	0.61	0.74	0.015	1	0.91	0.014	0.14	67	6.7
VOCs																		
Trichloroethene	0.0050		0.0012	0.61	0.00024	0.0090	0.70	0.13	0.00046	0.61	0.00017	0.015	1	0.00040	0.65	6.5	0.00062	0.000062
SVOCs																		
Acenaphthylene	1.3		0.0012	0.61	0.061	0.0090	0.70	0.13	0.12	0.61	0.042	0.015	1	0.10	365	73	0.00028	0.0014
Benzo (a) anthracene	2.7		0.0012	0.61	0.13	0.0090	0.90	0.13	0.32	0.61	0.12	0.015	1	0.25	2.4	2.1	0.10	0.12
Benzo (a) pyrene	7.2		0.0012	0.61	0.34	0.0090	0.43	0.13	0.40	0.61	0.15	0.015	1	0.49	1.0	10	0.47	0.047
Chrysene	3.7		0.0012	0.61	0.18	0.0090	0.90	0.13	0.43	0.61	0.16	0.015	1	0.34	521	52	0.00064	0.0064
Fluoranthene	2.6		0.0012	0.61	0.13	0.0090	0.70	0.13	0.24	0.61	0.088	0.015	1	0.21	26	52	0.0082	0.0041
Naphthalene	1.5		0.0012	0.61	0.070	0.0090	0.70	0.13	0.13	0.61	0.049	0.015	1	0.12	8.6	17	0.014	0.0070
Pyrene	3.3		0.0012	0.61	0.15	0.0090	0.70	0.13	0.30	0.61	0.11	0.015	1	0.26	7.8	13	0.034	0.020

Hazard Index - Detected Compounds	33	20
Hazard Index - Detected Compounds w/Detection Limits	100	27

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.

LOAEL - Lowest Observable Adverse Effects Level.

HQ - Hazard Quotient.

Table R-13a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Maximum Concentrations
SWMU S-24
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Arsenic	53		0.0012	1	4.2	0.0090	1.16	0.13	8.1	1	4.8	0.015	1	9.0	0.14	1.4	64	6.4
Chromium	54		0.0012	1	4.2	0.0090	0.49	0.13	3.4	1	2.1	0.015	1	6.3	4.0	16	1.6	0.39
Lead	98		0.0012	1	7.7	0.0090	0.69	0.13	8.8	1	5.3	0.015	1	13	9.7	97	1.3	0.13
Mercury	1.6		0.0012	1	0.12	0.0090	1.32	0.13	0.27	1	0.16	0.015	1	0.29	13	0.027	0.022	11
Selenium	20		0.0012	1	1.6	0.0090	10.5	0.13	27	1	16	0.015	1	18	0.19	0.32	94	56
Thallium	2.3		0.0012	1	0.18	0.0090	4.6	0.13	1.4	1	0.83	0.015	1	1.0	0.014	0.14	72	7.2
VOCs																		
Benzene	250		0.0012	1	20	0.0090	0.70	0.13	23	1	14	0.015	1	33	30	299	1.1	0.11
Trichloroethene	0.0094		0.0012	1	0.00073	0.0090	0.70	0.13	0.00086	1	0.00051	0.015	1	0.0012	0.65	6.5	0.0019	0.00019
Xylenes, total	320		0.0012	1	25	0.0090	0.70	0.13	29	1	17	0.015	1	42	2.2	2.7	19	16
SVOCs																		
Acenaphthylene	120		0.0012	1	9.4	0.0090	0.70	0.13	11	1	6.6	0.015	1	16	365	73	0.044	0.22
Anthracene	530		0.0012	1	41	0.0090	0.70	0.13	48	1	29	0.015	1	70	1042	52	0.067	1.4
Benzo (a) anthracene	620		0.0012	1	48	0.0090	0.90	0.13	73	1	44	0.015	1	92	2.4	2.1	38	44
Benzo (a) pyrene	390		0.0012	1	30	0.0090	0.43	0.13	22	1	13	0.015	1	44	1.0	10	44	4.4
Chrysene	560		0.0012	1	44	0.0090	0.90	0.13	66	1	39	0.015	1	83	521	52	0.16	1.6
Fluoranthene	1600		0.0012	1	125	0.0090	0.70	0.13	146	1	87	0.015	1	212	26	52	8.2	4.1
Fluorene	900		0.0012	1	70	0.0090	0.70	0.13	82	1	49	0.015	1	119	13	26	9.2	4.6
Naphthalene	0.36		0.0012	1	0.028	0.0090	0.70	0.13	0.033	1	0.020	0.015	1	0.048	8.6	17	0.0056	0.0028
Phenanthrene	3000		0.0012	1	234	0.0090	0.70	0.13	273	1	164	0.015	1	398	521	60	0.76	6.6
Pyrene	1200		0.0012	1	94	0.0090	0.70	0.13	109	1	66	0.015	1	159	7.8	13	20	12
Pyridine	51		0.0012	1	4.0	0.0090	0.70	0.13	4.6	1	2.8	0.015	1	6.8	1.2	1.2	5.6	5.6

Hazard Index - Detected Compounds	379	181
Hazard Index - Detected Compounds w/Detection Limits	379	181

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.

LOAEL - Lowest Observable Adverse Effects Level.

HQ - Hazard Quotient.

Table R-13b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Average Concentrations
SWMU S-24
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Arsenic	28		0.0012	1	2.2	0.0090	1.16	0.13	4.3	1	2.6	0.015	1	4.8	0.14	1.4	35	3.5
Chromium	14		0.0012	1	1.1	0.0090	0.49	0.13	0.89	1	0.54	0.015	1	1.6	4.0	16	0.41	0.10
Lead	76		0.0012	1	5.9	0.0090	0.69	0.13	6.8	1	4.1	0.015	1	10	9.7	97	1.0	0.10
Mercury	0.87		0.0012	1	0.068	0.0090	1.32	0.13	0.15	1	0.090	0.015	1	0.16	13	0.027	0.012	5.9
Selenium	11		0.0012	1	0.86	0.0090	10.5	0.13	15	1	9.0	0.015	1	9.9	0.19	0.32	51	31
Thallium	2.1		0.0012	1	0.16	0.0090	4.6	0.13	1.3	1	0.75	0.015	1	0.92	0.014	0.14	68	6.8
VOCs																		
Benzene	125		0.0012	1	10	0.0090	0.70	0.13	11	1	6.8	0.015	1	17	30	299	0.55	0.055
Trichloroethene	12		0.0012	1	0.96	0.0090	0.70	0.13	1.1	1	0.67	0.015	1	1.6	0.65	6.5	2.5	0.25
Xylenes, total	160		0.0012	1	12	0.0090	0.70	0.13	15	1	8.7	0.015	1	21	2.2	2.7	9.7	7.8
SVOCs																		
Acenaphthylene	60		0.0012	1	4.7	0.0090	0.70	0.13	5.5	1	3.3	0.015	1	8.0	365	73	0.022	0.11
Anthracene	266		0.0012	1	21	0.0090	0.70	0.13	24	1	15	0.015	1	35	1042	52	0.034	0.68
Benzo (a) anthracene	311		0.0012	1	24	0.0090	0.90	0.13	36	1	22	0.015	1	46	2.4	2.1	19	22
Benzo (a) pyrene	196		0.0012	1	15	0.0090	0.43	0.13	11	1	6.6	0.015	1	22	1.0	10	21	2.1
Chrysene	281		0.0012	1	22	0.0090	0.90	0.13	33	1	20	0.015	1	42	521	52	0.080	0.80
Fluoranthene	803		0.0012	1	63	0.0090	0.70	0.13	73	1	44	0.015	1	106	26	52	4.1	2.0
Fluorene	450		0.0012	1	35	0.0090	0.70	0.13	41	1	25	0.015	1	60	13	26	4.6	2.3
Naphthalene	0.36		0.0012	1	0.028	0.0090	0.70	0.13	0.033	1	0.020	0.015	1	0.048	8.6	17	0.0056	0.0028
Phenanthrene	1503		0.0012	1	117	0.0090	0.70	0.13	137	1	82	0.015	1	199	521	60	0.38	3.3
Pyrene	602		0.0012	1	47	0.0090	0.70	0.13	55	1	33	0.015	1	80	7.8	13	10	6.1
Pyridine	264		0.0012	1	21	0.0090	0.70	0.13	24	1	14	0.015	1	35	1.2	1.2	29	29

Hazard Index - Detected Compounds	257	124
Hazard Index - Detected Compounds w/Detection Limits	257	124

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table R-14a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Maximum Concentrations
Zone 2 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	218		0.0012	1	17	0.0090	0.49	0.13	14	1	8.3	0.015	1	25	4.0	16	6.3	1.6
Lead	1220		0.0012	1	95	0.0090	0.69	0.13	109	1	66	0.015	1	161	9.7	97	17	1.7
Mercury	0.73		0.0012	1	0.057	0.0090	1.32	0.13	0.13	1	0.075	0.015	1	0.13	13	0.027	0.010	4.9
Selenium	11		0.0012	1	0.87	0.0090	10.5	0.13	15	1	9.1	0.015	1	10	0.19	0.32	52	31
Thallium	4.0		0.0012	1	0.31	0.0090	4.6	0.13	2.4	1	1.4	0.015	1	1.7	0.014	0.14	125	12
VOCs																		
Trichloroethene	0.015		0.0012	1	0.0012	0.0090	0.70	0.13	0.0014	1	0.00082	0.015	1	0.0020	0.65	6.5	0.0031	0.00031
SVOCs																		
Acenaphthylene	0.45		0.0012	1	0.035	0.0090	0.70	0.13	0.041	1	0.025	0.015	1	0.060	365	73	0.00016	0.00082
Anthracene	0.60		0.0012	1	0.047	0.0090	0.70	0.13	0.055	1	0.033	0.015	1	0.080	1042	52	0.000076	0.0015
Benzo (a) anthracene	3.7		0.0012	1	0.29	0.0090	0.90	0.13	0.43	1	0.26	0.015	1	0.55	2.4	2.1	0.23	0.26
Benzo (a) pyrene	5.5		0.0012	1	0.43	0.0090	0.43	0.13	0.31	1	0.18	0.015	1	0.61	1.0	10	0.61	0.061
Chrysene	4.5		0.0012	1	0.35	0.0090	0.90	0.13	0.53	1	0.32	0.015	1	0.67	521	52	0.0013	0.013
Fluoranthene	5.8		0.0012	1	0.45	0.0090	0.70	0.13	0.53	1	0.32	0.015	1	0.77	26	52	0.030	0.015
Naphthalene	0.27		0.0012	1	0.021	0.0090	0.70	0.13	0.025	1	0.015	0.015	1	0.036	8.6	17	0.0042	0.0021
Phenanthrene	2.6		0.0012	1	0.20	0.0090	0.70	0.13	0.24	1	0.14	0.015	1	0.34	521	60	0.00066	0.0057
Pyrene	4.9		0.0012	1	0.38	0.0090	0.70	0.13	0.45	1	0.27	0.015	1	0.65	7.8	13	0.083	0.050

Hazard Index - Detected Compounds	201	52
Hazard Index - Detected Compounds w/Detection Limits	201	52

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table R-14b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Average Concentrations
Zone 2 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	168		0.0012	1	13	0.0090	0.49	0.13	11	1	6.4	0.015	1	20	4.0	16	4.9	1.2
Lead	841		0.0012	1	66	0.0090	0.69	0.13	75	1	45	0.015	1	111	9.7	97	11	1.1
Mercury	0.55		0.0012	1	0.043	0.0090	1.32	0.13	0.094	1	0.057	0.015	1	0.10	13	0.027	0.0075	3.7
Selenium	7.6		0.0012	1	0.59	0.0090	10.5	0.13	10	1	6.2	0.015	1	6.8	0.19	0.32	36	22
Thallium	3.8		0.0012	1	0.30	0.0090	4.6	0.13	2.3	1	1.4	0.015	1	1.7	0.014	0.14	123	12
VOCs																		
Trichloroethene	0.011		0.0012	1	0.00086	0.0090	0.70	0.13	0.0010	1	0.00060	0.015	1	0.0015	0.65	6.5	0.0023	0.00023
SVOCs																		
Acenaphthylene	0.36		0.0012	1	0.028	0.0090	0.70	0.13	0.032	1	0.019	0.015	1	0.047	365	73	0.00013	0.00065
Anthracene	0.44		0.0012	1	0.034	0.0090	0.70	0.13	0.040	1	0.024	0.015	1	0.058	1042	52	0.000055	0.0011
Benzo (a) anthracene	2.5		0.0012	1	0.19	0.0090	0.90	0.13	0.29	1	0.17	0.015	1	0.36	2.4	2.1	0.15	0.17
Benzo (a) pyrene	3.4		0.0012	1	0.27	0.0090	0.43	0.13	0.19	1	0.11	0.015	1	0.38	1.0	10	0.36	0.036
Chrysene	3.0		0.0012	1	0.23	0.0090	0.90	0.13	0.35	1	0.21	0.015	1	0.44	521	52	0.00084	0.0084
Fluoranthene	4.0		0.0012	1	0.31	0.0090	0.70	0.13	0.36	1	0.22	0.015	1	0.52	26	52	0.020	0.010
Naphthalene	0.18		0.0012	1	0.014	0.0090	0.70	0.13	0.016	1	0.0096	0.015	1	0.023	8.6	17	0.0027	0.0014
Phenanthrene	1.9		0.0012	1	0.15	0.0090	0.70	0.13	0.17	1	0.10	0.015	1	0.25	521	60	0.00048	0.0042
Pyrene	3.3		0.0012	1	0.26	0.0090	0.70	0.13	0.30	1	0.18	0.015	1	0.44	7.8	13	0.056	0.034

Hazard Index - Detected Compounds	175	40
Hazard Index - Detected Compounds w/Detection Limits	175	40

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table R-15a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Maximum Concentrations
SWMU S-10
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	850		0.0012	1	66	0.0090	0.49	0.13	54	1	32	0.015	1	99	4.0	16	25	6.2
Lead	107		0.0012	1	8.3	0.0090	0.69	0.13	9.6	1	5.8	0.015	1	14	9.7	97	1.5	0.15
Mercury	0.75		0.0012	1	0.059	0.0090	1.32	0.13	0.13	1	0.077	0.015	1	0.14	13	0.027	0.010	5.0
Selenium	15		0.0012	1	1.2	0.0090	10.5	0.13	21	1	12	0.015	1	14	0.19	0.32	72	43
Thallium	35		0.0012	1	2.7	0.0090	4.6	0.13	21	1	12	0.015	1	15	0.014	0.14	1083	108
VOCs																		
Trichloroethene	0.0029		0.0012	1	0.00023	0.0090	0.70	0.13	0.00026	1	0.00016	0.015	1	0.00038	0.65	6.5	0.00059	0.000059
SVOCs																		
Acenaphthylene	0.15		0.0012	1	0.012	0.0090	0.70	0.13	0.014	1	0.0082	0.015	1	0.020	365	73	0.000054	0.00027
Anthracene	0.33		0.0012	1	0.026	0.0090	0.70	0.13	0.030	1	0.018	0.015	1	0.044	1042	52	0.000042	0.00084
Benzo (a) anthracene	1.2		0.0012	1	0.094	0.0090	0.90	0.13	0.14	1	0.084	0.015	1	0.18	2.4	2.1	0.074	0.085
Benzo (a) pyrene	1.1		0.0012	1	0.086	0.0090	0.43	0.13	0.061	1	0.037	0.015	1	0.12	1.0	10	0.12	0.012
bis (2-Ethylhexyl) phthalate	0.10		0.0012	1	0.0078	0.0090	0.70	0.13	0.0091	1	0.0055	0.015	1	0.013	13	20	0.0010	0.00066
Chrysene	1.2		0.0012	1	0.094	0.0090	0.90	0.13	0.14	1	0.084	0.015	1	0.18	521	52	0.00034	0.0034
Fluoranthene	22		0.0012	1	1.7	0.0090	0.70	0.13	2.0	1	1.2	0.015	1	2.9	26	52	0.11	0.056
Fluorene	0.068		0.0012	1	0.0053	0.0090	0.70	0.13	0.0062	1	0.0037	0.015	1	0.0090	13	26	0.00069	0.00035
Naphthalene	0.041		0.0012	1	0.0032	0.0090	0.70	0.13	0.0037	1	0.0022	0.015	1	0.0054	8.6	17	0.00063	0.00032
Phenanthrene	1.3		0.0012	1	0.10	0.0090	0.70	0.13	0.12	1	0.071	0.015	1	0.17	521	60	0.00033	0.0029
Pyrene	1.4		0.0012	1	0.11	0.0090	0.70	0.13	0.13	1	0.076	0.015	1	0.19	7.8	13	0.024	0.014

Hazard Index - Detected Compounds	1181	162
Hazard Index - Detected Compounds w/Detection Limits	1181	162

NOTES:
(a) - The maximum concentration is the maximum detected concentration per SWMU.
(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.
(c) - Sample and Suter, 1994.
(d) - See Attachment O, Table O-1.
(e) - See Table 4-15.
(f) - Markwell *et al.*, 1989.
(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.
(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table R-15b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Average Concentrations
SWMU S-10
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	637		0.0012	1	50	0.0090	0.49	0.13	41	1	24	0.015	1	74	4.0	16	19	4.7
Lead	103		0.0012	1	8.0	0.0090	0.69	0.13	9.2	1	5.5	0.015	1	14	9.7	97	1.4	0.14
Mercury	0.46		0.0012	1	0.036	0.0090	1.32	0.13	0.079	1	0.047	0.015	1	0.083	13	0.027	0.0062	3.1
Selenium	10		0.0012	1	0.78	0.0090	10.5	0.13	14	1	8.2	0.015	1	9.0	0.19	0.32	47	28
Thallium	23		0.0012	1	1.8	0.0090	4.6	0.13	14	1	8.3	0.015	1	10	0.014	0.14	742	74
VOCs																		
Trichloroethene	0.0030		0.0012	1	0.00023	0.0090	0.70	0.13	0.00027	1	0.00016	0.015	1	0.00040	0.65	6.5	0.00061	0.000061
SVOCs																		
Acenaphthylene	0.14		0.0012	1	0.011	0.0090	0.70	0.13	0.013	1	0.0076	0.015	1	0.019	365	73	0.000051	0.00025
Anthracene	0.24		0.0012	1	0.019	0.0090	0.70	0.13	0.022	1	0.013	0.015	1	0.032	1042	52	0.000031	0.00061
Benzo (a) anthracene	1.0		0.0012	1	0.074	0.0090	0.90	0.13	0.11	1	0.067	0.015	1	0.14	2.4	2.1	0.058	0.068
Benzo (a) pyrene	0.88		0.0012	1	0.068	0.0090	0.43	0.13	0.049	1	0.029	0.015	1	0.098	1.0	10	0.094	0.0094
bis (2-Ethylhexyl) phthalate	0.088		0.0012	1	0.0069	0.0090	0.70	0.13	0.0080	1	0.0048	0.015	1	0.012	13	20	0.00092	0.00057
Chrysene	0.98		0.0012	1	0.076	0.0090	0.90	0.13	0.11	1	0.069	0.015	1	0.15	521	52	0.00028	0.0028
Fluoranthene	1.6		0.0012	1	0.12	0.0090	0.70	0.13	0.15	1	0.087	0.015	1	0.21	26	52	0.0081	0.0041
Fluorene	0.13		0.0012	1	0.010	0.0090	0.70	0.13	0.012	1	0.0073	0.015	1	0.018	13	26	0.0014	0.00068
Naphthalene	0.12		0.0012	1	0.010	0.0090	0.70	0.13	0.011	1	0.0067	0.015	1	0.016	8.6	17	0.0019	0.00095
Phenanthrene	0.94		0.0012	1	0.073	0.0090	0.70	0.13	0.085	1	0.051	0.015	1	0.12	521	60	0.00024	0.0021
Pyrene	1.2		0.0012	1	0.091	0.0090	0.70	0.13	0.11	1	0.064	0.015	1	0.15	7.8	13	0.020	0.012

Hazard Index - Detected Compounds	809	110
Hazard Index - Detected Compounds w/Detection Limits	809	110

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.

LOAEL - Lowest Observable Adverse Effects Level.

HQ - Hazard Quotient.

Table R-16a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Maximum Concentrations
Zone 3 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
Metals															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Barium	125		0.0012	1	9.8	0.0090	0.36	0.13	5.9	1	3.5	0.015	1	13	11	44	1.2	0.30
Chromium	721		0.0012	1	56	0.0090	0.49	0.13	46	1	28	0.015	1	84	4.0	16	21	5.2
Lead	208		0.0012	1	16	0.0090	0.69	0.13	19	1	11	0.015	1	27	9.7	97	2.8	0.28
Mercury	4.3		0.0012	1	0.34	0.0090	1.32	0.13	0.74	1	0.44	0.015	1	0.78	13	0.027	0.060	29
Nickel	134		0.0012	1	10	0.0090	0.78	0.13	14	1	8.2	0.015	1	19	48	97	0.39	0.19
Selenium	9.7		0.0012	1	0.76	0.0090	10.5	0.13	13	1	7.9	0.015	1	8.7	0.19	0.32	46	27
Thallium	18		0.0012	1	1.4	0.0090	4.6	0.13	11	1	6.6	0.015	1	8.0	0.014	0.14	574	57
VOCs																		
Trichloroethene	0.015		0.0012	1	0.0012	0.0090	0.70	0.13	0.0014	1	0.00082	0.015	1	0.0020	0.65	6.5	0.0031	0.00031
SVOCs																		
Acenaphthylene	0.16		0.0012	1	0.012	0.0090	0.70	0.13	0.015	1	0.0087	0.015	1	0.021	365	73	0.000058	0.00029
Anthracene	0.13		0.0012	1	0.010	0.0090	0.70	0.13	0.012	1	0.0071	0.015	1	0.017	1042	52	0.000017	0.00033
Benzo (a) anthracene	0.56		0.0012	1	0.044	0.0090	0.90	0.13	0.066	1	0.039	0.015	1	0.083	2.4	2.1	0.035	0.040
Benzo (a) pyrene	1.0		0.0012	1	0.078	0.0090	0.43	0.13	0.056	1	0.034	0.015	1	0.11	1.0	10	0.11	0.011
bis (2-Ethylhexyl) phthalate	0.11		0.0012	1	0.0086	0.0090	0.70	0.13	0.010	1	0.0060	0.015	1	0.015	13	20	0.0011	0.00073
Chrysene	0.72		0.0012	1	0.056	0.0090	0.90	0.13	0.084	1	0.051	0.015	1	0.11	521	52	0.00020	0.0021
Fluoranthene	0.85		0.0012	1	0.066	0.0090	0.70	0.13	0.077	1	0.046	0.015	1	0.11	26	52	0.0043	0.0022
Naphthalene	0.046		0.0012	1	0.0036	0.0090	0.70	0.13	0.0042	1	0.0025	0.015	1	0.0061	8.6	17	0.00071	0.00036
Phenanthrene	0.31		0.0012	1	0.024	0.0090	7.00	0.13	0.28	1	0.17	0.015	1	0.19	521	60	0.00037	0.0032
Pyrene	0.73		0.0012	1	0.057	0.0090	0.70	0.13	0.066	1	0.040	0.015	1	0.097	7.8	13	0.012	0.0074

Hazard Index - Detected Compounds	645	119
Hazard Index - Detected Compounds w/Detection Limits	645	119

NOTES:
(a) - The maximum concentration is the maximum detected concentration per SWMU.
(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.
(c) - Sample and Suter, 1994.
(d) - See Attachment O, Table O-1.
(e) - See Table 4-15.
(f) - Markwell *et al.*, 1989.
(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.
(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table R-16b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Average Concentrations
Zone 3 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Barium	104		0.0012	1	8.1	0.0090	0.36	0.13	4.9	1	2.9	0.015	1	11	11	44	0.97	0.25
Chromium	312		0.0012	1	24	0.0090	0.49	0.13	20	1	12	0.015	1	36	4.0	16	9.2	2.3
Lead	145		0.0012	1	11	0.0090	0.69	0.13	13	1	7.8	0.015	1	19	9.7	97	2.0	0.20
Mercury	1.1		0.0012	1	0.086	0.0090	1.32	0.13	0.19	1	0.11	0.015	1	0.20	13	0.027	0.015	7.4
Nickel	53		0.0012	1	4.1	0.0090	0.78	0.13	5.4	1	3.2	0.015	1	7.4	48	97	0.15	0.076
Selenium	4.5		0.0012	1	0.35	0.0090	10.5	0.13	6.1	1	3.7	0.015	1	4.0	0.19	0.32	21	13
Thallium	11		0.0012	1	0.86	0.0090	4.6	0.13	6.6	1	3.9	0.015	1	4.8	0.014	0.14	355	35
VOCs																		
Trichloroethene	0.0063		0.0012	1	0.00049	0.0090	0.70	0.13	0.00057	1	0.00034	0.015	1	0.00084	0.65	6.5	0.0013	0.00013
SVOCs																		
Acenaphthylene	0.10		0.0012	1	0.0074	0.0090	0.70	0.13	0.0086	1	0.0052	0.015	1	0.013	365	73	0.000035	0.00017
Anthracene	0.19		0.0012	1	0.015	0.0090	0.70	0.13	0.017	1	0.010	0.015	1	0.025	1042	52	0.000024	0.00048
Benzo (a) anthracene	0.42		0.0012	1	0.033	0.0090	0.90	0.13	0.049	1	0.029	0.015	1	0.062	2.4	2.1	0.026	0.030
Benzo (a) pyrene	0.61		0.0012	1	0.047	0.0090	0.43	0.13	0.034	1	0.020	0.015	1	0.067	1.0	10	0.065	0.0065
bis (2-Ethylhexyl) phthalate	0.09		0.0012	1	0.0066	0.0090	0.70	0.13	0.0077	1	0.0046	0.015	1	0.011	13	20	0.00089	0.00055
Chrysene	0.49		0.0012	1	0.038	0.0090	0.90	0.13	0.057	1	0.034	0.015	1	0.072	521	52	0.00014	0.0014
Fluoranthene	0.61		0.0012	1	0.048	0.0090	0.70	0.13	0.056	1	0.033	0.015	1	0.081	26	52	0.0031	0.0016
Naphthalene	0.20		0.0012	1	0.015	0.0090	0.70	0.13	0.018	1	0.011	0.015	1	0.026	8.6	17	0.0031	0.0015
Phenanthrene	0.22		0.0012	1	0.017	0.0090	7.00	0.13	0.20	1	0.12	0.015	1	0.13	521	60	0.00026	0.0022
Pyrene	0.54		0.0012	1	0.042	0.0090	0.70	0.13	0.049	1	0.029	0.015	1	0.071	7.8	13	0.0091	0.0054

Hazard Index - Detected Compounds	388	58
Hazard Index - Detected Compounds w/Detection Limits	388	58

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.

LOAEL - Lowest Observable Adverse Effects Level.

HQ - Hazard Quotient.

Table R-17a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Maximum Concentrations
SWMU S-14
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	45		0.0012	1	3.5	0.0090	4.6	0.13	27	1	16	0.015	1	20	0.13	1.3	150	15
Barium	2.8		0.0012	1	0.22	0.0090	0.36	0.13	0.13	1	0.079	0.015	1	0.30	11	44	0.027	0.0068
Lead	911		0.0012	1	71	0.0090	0.69	0.13	82	1	49	0.015	1	120	9.7	97	12	1.2
Nickel	130		0.0012	1	10	0.0090	0.78	0.13	13	1	7.9	0.015	1	18	48	97	0.38	0.19
Selenium		1.5	0.0012	1	0.12	0.0090	10.5	0.13	2.0	1	1.2	0.015	1	1.3	0.19	0.32	7.1	4.2
Silver	3.3		0.0012	1	0.26	0.0090	4.60	0.13	2.0	1	1.2	0.015	1	1.4	22	1.9	0.066	0.76
Thallium	1.2		0.0012	1	0.094	0.0090	4.60	0.13	0.72	1	0.43	0.015	1	0.52	0.014	0.14	37	3.7
VOCs																		
Methylene chloride	0.043		0.0012	1	0.0034	0.0090	0.70	0.13	0.0039	1	0.0023	0.015	1	0.0057	11	90	0.00052	0.000063
SVOCs																		
Anthracene	1.2		0.0012	1	0.094	0.0090	0.70	0.13	0.11	1	0.066	0.015	1	0.16	1042	52	0.00015	0.0031
Benzo (a) anthracene	2.9		0.0012	1	0.23	0.0090	0.90	0.13	0.34	1	0.20	0.015	1	0.43	2.4	2.1	0.18	0.20
Benzo (a) pyrene	1.9		0.0012	1	0.15	0.0090	0.43	0.13	0.11	1	0.064	0.015	1	0.21	1.0	10	0.21	0.021
Benzo (b) fluoranthene	3.5		0.0012	1	0.27	0.0090	0.90	0.13	0.41	1	0.25	0.015	1	0.52	1.0	10	0.52	0.052
Benzo (ghi) perylene	1.3		0.0012	1	0.10	0.0090	0.90	0.13	0.15	1	0.091	0.015	1	0.19	1.0	10	0.19	0.019
Benzo (k) fluoranthene	0.73		0.0012	1	0.057	0.0090	0.90	0.13	0.085	1	0.051	0.015	1	0.11	1.0	10	0.11	0.011
bis (2-Ethylhexyl) phthalate	0.33		0.0012	1	0.026	0.0090	0.70	0.13	0.030	1	0.018	0.015	1	0.044	13	20	0.0034	0.0022
Chrysene	2.5		0.0012	1	0.20	0.0090	0.90	0.13	0.29	1	0.18	0.015	1	0.37	521	52	0.00071	0.0071
Dibenzo(a,h)anthracene	0.27		0.0012	1	0.021	0.0090	0.90	0.13	0.032	1	0.019	0.015	1	0.040	0.24	10	0.17	0.0040
Fluoranthene	4.1		0.0012	1	0.32	0.0090	0.70	0.13	0.37	1	0.22	0.015	1	0.54	26	52	0.021	0.010
Fluorene	0.55		0.0012	1	0.043	0.0090	0.70	0.13	0.050	1	0.030	0.015	1	0.073	13	26	0.0056	0.0028
Indeno (1,2,3-cd) pyrene	1.4		0.0012	1	0.11	0.0090	0.90	0.13	0.16	1	0.098	0.015	1	0.21	1.0	10	0.21	0.021
Naphthalene	0.75		0.0012	1	0.059	0.0090	0.70	0.13	0.068	1	0.041	0.015	1	0.099	8.6	17	0.012	0.0059
Phenanthrene	3.1		0.0012	1	0.24	0.0090	0.70	0.13	0.28	1	0.17	0.015	1	0.41	521	60	0.00079	0.0069
Pyrene	3.4		0.0012	1	0.27	0.0090	0.70	0.13	0.31	1	0.19	0.015	1	0.45	7.8	13	0.058	0.035

Hazard Index - Detected Compounds	202	21
Hazard Index - Detected Compounds w/Detection Limits	209	26

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table R-17b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Average Concentrations
SWMU S-14
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	28		0.0012	1	2.2	0.0090	4.6	0.13	17	1	10	0.015	1	12	0.13	1.3	94	9.4
Barium	84		0.0012	1	6.6	0.0090	0.36	0.13	3.9	1	2.4	0.015	1	8.9	11	44	0.79	0.20
Lead	299		0.0012	1	23	0.0090	0.69	0.13	27	1	16	0.015	1	39	9.7	97	4.1	0.41
Nickel	57		0.0012	1	4.4	0.0090	0.78	0.13	5.8	1	3.5	0.015	1	7.9	48	97	0.16	0.082
Selenium		0.61	0.0012	1	0.048	0.0090	10.5	0.13	0.83	1	0.50	0.015	1	0.55	0.19	0.32	2.9	1.7
Silver	1.3		0.0012	1	0.10	0.0090	4.60	0.13	0.78	1	0.47	0.015	1	0.57	22	1.9	0.026	0.30
Thallium	0.76		0.0012	1	0.059	0.0090	4.60	0.13	0.45	1	0.27	0.015	1	0.33	0.014	0.14	25	2.5
VOCs																		
Methylene chloride	0.017		0.0012	1	0.0013	0.0090	0.70	0.13	0.0015	1	0.00093	0.015	1	0.0023	11	90	0.00021	0.000025
SVOCs																		
Anthracene	0.41		0.0012	1	0.032	0.0090	0.70	0.13	0.038	1	0.023	0.015	1	0.055	1042	52	0.000053	0.00105
Benzo (a) anthracene	1.0		0.0012	1	0.079	0.0090	0.90	0.13	0.12	1	0.071	0.015	1	0.15	2.4	2.1	0.062	0.072
Benzo (a) pyrene	0.72		0.0012	1	0.056	0.0090	0.43	0.13	0.040	1	0.024	0.015	1	0.081	1.0	10	0.077	0.0077
Benzo (b) fluoranthene	1.3		0.0012	1	0.10	0.0090	0.90	0.13	0.16	1	0.094	0.015	1	0.20	1.0	10	0.19	0.019
Benzo (ghi) perylene	0.56		0.0012	1	0.043	0.0090	0.90	0.13	0.065	1	0.039	0.015	1	0.082	1.0	10	0.079	0.0079
Benzo (k) fluoranthene	0.35		0.0012	1	0.027	0.0090	0.90	0.13	0.041	1	0.024	0.015	1	0.052	1.0	10	0.049	0.0049
bis (2-Ethylhexyl) phthalate	0.24		0.0012	1	0.018	0.0090	0.70	0.13	0.021	1	0.013	0.015	1	0.031	13	20	0.0025	0.00153
Chrysene	0.95		0.0012	1	0.074	0.0090	0.90	0.13	0.11	1	0.067	0.015	1	0.14	521	52	0.00027	0.0027
Dibenzo(a,h)anthracene	0.19		0.0012	1	0.015	0.0090	0.90	0.13	0.023	1	0.014	0.015	1	0.029	0.24	10	0.12	0.0028
Fluoranthene	1.4		0.0012	1	0.11	0.0090	0.70	0.13	0.13	1	0.077	0.015	1	0.19	26	52	0.0072	0.0036
Fluorene	0.29		0.0012	1	0.022	0.0090	0.70	0.13	0.026	1	0.016	0.015	1	0.038	13	26	0.0029	0.0015
Indeno (1,2,3-cd) pyrene	0.55		0.0012	1	0.043	0.0090	0.90	0.13	0.065	1	0.039	0.015	1	0.082	1.0	10	0.079	0.0079
Naphthalene	0.32		0.0012	1	0.025	0.0090	0.70	0.13	0.029	1	0.017	0.015	1	0.042	8.6	17	0.0049	0.0024
Phenanthrene	1.1		0.0012	1	0.088	0.0090	0.70	0.13	0.10	1	0.061	0.015	1	0.15	521	60	0.00029	0.0025
Pyrene	1.2		0.0012	1	0.093	0.0090	0.70	0.13	0.11	1	0.065	0.015	1	0.16	7.8	13	0.020	0.012

Hazard Index - Detected Compounds	124	13
Hazard Index - Detected Compounds w/Detection Limits	127	15

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table R-18a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Maximum Concentrations
SWMU S-15
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	43		0.0012	0.21	0.70	0.0090	4.6	0.13	26	0.21	3.2	0.015	1	3.9	0.13	1.3	30	3.0
Lead	53		0.0012	0.21	0.86	0.0090	0.69	0.13	4.7	0.21	0.60	0.015	1	1.5	9.7	97	0.15	0.015
Nickel	38		0.0012	0.21	0.62	0.0090	0.78	0.13	3.8	0.21	0.48	0.015	1	1.1	48	97	0.023	0.011
SVOCs												0.015						
Anthracene	0.40		0.0012	0.21	0.0066	0.0090	0.70	0.13	0.036	0.21	0.0046	0.015	1	0.011	1042	52	0.000011	0.00021
Benzo (a) anthracene	1.5		0.0012	0.21	0.025	0.0090	0.90	0.13	0.18	0.21	0.022	0.015	1	0.047	2.4	2.1	0.019	0.022
Benzo (a) pyrene	0.55		0.0012	0.21	0.0090	0.0090	0.43	0.13	0.031	0.21	0.0039	0.015	1	0.013	1.0	10	0.013	0.0013
Benzo (b) fluoranthene	1.5		0.0012	0.21	0.025	0.0090	0.90	0.13	0.18	0.21	0.022	0.015	1	0.047	1.0	10	0.047	0.0047
Benzo (ghi) perylene	0.40		0.0012	0.21	0.0066	0.0090	0.90	0.13	0.047	0.21	0.0059	0.015	1	0.012	1.0	10	0.012	0.0012
Benzo (k) fluoranthene	0.26		0.0012	0.21	0.0043	0.0090	0.90	0.13	0.030	0.21	0.0038	0.015	1	0.0081	1.0	10	0.0081	0.00081
Chrysene	0.64		0.0012	0.21	0.010	0.0090	0.90	0.13	0.075	0.21	0.0094	0.015	1	0.020	521	52	0.000038	0.00038
Fluoranthene	1.7		0.0012	0.21	0.028	0.0090	0.70	0.13	0.15	0.21	0.019	0.015	1	0.047	26	52	0.0018	0.00091
Fluorene	0.11		0.0012	0.21	0.0018	0.0090	0.70	0.13	0.010	0.21	0.0013	0.015	1	0.0031	13	26	0.00024	0.00012
Indeno (1,2,3-cd) pyrene	0.77		0.0012	0.21	0.013	0.0090	0.90	0.13	0.090	0.21	0.011	0.015	1	0.024	1.0	10	0.024	0.0024
Naphthalene	0.63		0.0012	0.21	0.010	0.0090	0.70	0.13	0.057	0.21	0.0072	0.015	1	0.018	8.6	17	0.0020	0.0010
Phenanthrene	1.1		0.0012	0.21	0.018	0.0090	0.70	0.13	0.10	0.21	0.013	0.015	1	0.031	521	60	0.000059	0.00051
Pyrene	1.5		0.0012	0.21	0.025	0.0090	0.70	0.13	0.14	0.21	0.017	0.015	1	0.042	7.8	13	0.0054	0.0032

Hazard Index - Detected Compounds	30	3.1
Hazard Index - Detected Compounds w/Detection Limits	30	3.1

NOTES:
(a) - The maximum concentration is the maximum detected concentration per SWMU.
(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.
(c) - Sample and Suter, 1994.
(d) - See Attachment O, Table O-1.
(e) - See Table 4-15.
(f) - Markwell *et al.*, 1989.
(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.
(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table R-18b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Average Concentrations
SWMU S-15
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals												0.015						
Antimony	37		0.0012	0.21	0.61	0.0090	4.6	0.13	22	0.21	2.8	0.015	1	3.4	0.13	1.3	26	2.6
Lead	50		0.0012	0.21	0.82	0.0090	0.69	0.13	4.5	0.21	0.57	0.015	1	1.4	9.7	97	0.14	0.014
Nickel	32		0.0012	0.21	0.52	0.0090	0.78	0.13	3.2	0.21	0.41	0.015	1	0.93	48	97	0.019	0.0097
SVOCs												0.015						
Anthracene	0.29		0.0012	0.21	0.0047	0.0090	0.70	0.13	0.026	0.21	0.0033	0.015	1	0.0080	1042	52	0.0000077	0.00015
Benzo (a) anthracene	0.87		0.0012	0.21	0.014	0.0090	0.90	0.13	0.10	0.21	0.013	0.015	1	0.027	2.4	2.1	0.011	0.013
Benzo (a) pyrene	0.39		0.0012	0.21	0.0063	0.0090	0.43	0.13	0.022	0.21	0.0027	0.015	1	0.0090	1.0	10	0.0087	0.00087
Benzo (b) fluoranthene	0.95		0.0012	0.21	0.016	0.0090	0.90	0.13	0.11	0.21	0.014	0.015	1	0.030	1.0	10	0.028	0.0028
Benzo (ghi) perylene	0.27		0.0012	0.21	0.0044	0.0090	0.90	0.13	0.032	0.21	0.0040	0.015	1	0.0084	1.0	10	0.0081	0.00081
Benzo (k) fluoranthene	0.18		0.0012	0.21	0.0029	0.0090	0.90	0.13	0.021	0.21	0.0027	0.015	1	0.0056	1.0	10	0.0054	0.00054
Chrysene	0.43		0.0012	0.21	0.0070	0.0090	0.90	0.13	0.050	0.21	0.0063	0.015	1	0.013	521	52	0.000025	0.00025
Fluoranthene	1.0		0.0012	0.21	0.017	0.0090	0.70	0.13	0.093	0.21	0.012	0.015	1	0.029	26	52	0.0011	0.00055
Fluorene	0.14		0.0012	0.21	0.0023	0.0090	0.70	0.13	0.013	0.21	0.0016	0.015	1	0.0040	13	26	0.00031	0.00015
Indeno (1,2,3-cd) pyrene	0.48		0.0012	0.21	0.0078	0.0090	0.90	0.13	0.056	0.21	0.0070	0.015	1	0.015	1.0	10	0.014	0.0014
Naphthalene	0.35		0.0012	0.21	0.0058	0.0090	0.70	0.13	0.032	0.21	0.0041	0.015	1	0.0099	8.6	17	0.0011	0.00057
Phenanthrene	0.64		0.0012	0.21	0.010	0.0090	0.70	0.13	0.058	0.21	0.0073	0.015	1	0.018	521	60	0.000034	0.00030
Pyrene	0.90		0.0012	0.21	0.015	0.0090	0.70	0.13	0.082	0.21	0.010	0.015	1	0.025	7.8	13	0.0032	0.0019

Hazard Index - Detected Compounds	26	2.7
Hazard Index - Detected Compounds w/Detection Limits	26	2.7

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.

LOAEL - Lowest Observable Adverse Effects Level.

HQ - Hazard Quotient.

Table R-19a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Maximum Concentrations
SWMU S-23
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	609		0.0012	0.84	40	0.0090	0.49	0.13	39	0.84	20	0.015	1	59	4.0	16	15	3.7
Lead	124		0.0012	0.84	8.1	0.0090	0.69	0.13	11	0.84	5.6	0.015	1	14	9.7	97	1.4	0.14
Mercury	1.1		0.0012	0.84	0.072	0.0090	1.32	0.13	0.19	0.84	0.095	0.015	1	0.17	13	0.027	0.013	6.2
Nickel	46		0.0012	0.84	3.0	0.0090	0.78	0.13	4.7	0.84	2.4	0.015	1	5.4	48	97	0.11	0.055
Selenium		4.5	0.0012	0.84	0.29	0.0090	10.5	0.13	6.1	0.84	3.1	0.015	1	3.4	0.19	0.32	18	10
Silver	2.1		0.0012	0.84	0.14	0.0090	4.6	0.13	1.3	0.84	0.63	0.015	1	0.77	22	1.9	0.035	0.41
Thallium	23		0.0012	0.84	1.5	0.0090	4.6	0.13	14	0.84	7.1	0.015	1	8.6	0.014	0.14	613	61
SVOCs				0.84						0.84								
Acenaphthylene	13		0.0012	0.84	0.85	0.0090	0.70	0.13	1.2	0.84	0.60	0.015	1	1.4	365	73	0.0040	0.020
Anthracene	11		0.0012	0.84	0.72	0.0090	0.70	0.13	1.0	0.84	0.50	0.015	1	1.2	1042	52	0.0012	0.024
Benzo (a) anthracene	57		0.0012	0.84	3.7	0.0090	0.90	0.13	6.7	0.84	3.4	0.015	1	7.1	2.4	2.1	3.0	3.4
Benzo (a) pyrene	1.7		0.0012	0.84	0.11	0.0090	0.43	0.13	0.095	0.84	0.048	0.015	1	0.16	1.0	10	0.16	0.016
Chrysene	54		0.0012	0.84	3.5	0.0090	0.90	0.13	6.3	0.84	3.2	0.015	1	6.7	521	52	0.013	0.13
Fluoranthene	2.8		0.0012	0.84	0.18	0.0090	0.70	0.13	0.25	0.84	0.13	0.015	1	0.31	26	52	0.012	0.0060
Fluorene	1.7		0.0012	0.84	0.11	0.0090	0.70	0.13	0.15	0.84	0.078	0.015	1	0.19	13	26	0.015	0.0073
Naphthalene	2.7		0.0012	0.84	0.18	0.0090	0.70	0.13	0.25	0.84	0.12	0.015	1	0.30	8.6	17	0.035	0.018
Phenanthrene	25		0.0012	0.84	1.6	0.0090	0.70	0.13	2.3	0.84	1.1	0.015	1	2.8	521	60	0.0053	0.046
Pyrene	2.7		0.0012	0.84	0.18	0.0090	0.70	0.13	0.25	0.84	0.12	0.015	1	0.30	7.8	13	0.039	0.023

Hazard Index - Detected Compounds	633	76
Hazard Index - Detected Compounds w/Detection Limits	651	86

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.

LOAEL - Lowest Observable Adverse Effects Level.

HQ - Hazard Quotient.

Table R-19b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Average Concentrations
SWMU S-23
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	592		0.0012	0.84	39	0.0090	0.49	0.13	38	0.84	19	0.015	1	58	4.0	16	15	3.6
Lead	130		0.0012	0.84	8.5	0.0090	0.69	0.13	12	0.84	5.9	0.015	1	14	9.7	97	1.5	0.15
Mercury	0.55		0.0012	0.84	0.036	0.0090	1.32	0.13	0.094	0.84	0.048	0.015	1	0.084	13	0.027	0.0063	3.1
Nickel	44		0.0012	0.84	2.9	0.0090	0.78	0.13	4.5	0.84	2.2	0.015	1	5.1	48	97	0.11	0.053
Selenium		4.4	0.0012	0.84	0.29	0.0090	10.5	0.13	6.0	0.84	3.0	0.015	1	3.3	0.19	0.32	17	10
Silver	2.0		0.0012	0.84	0.13	0.0090	4.6	0.13	1.2	0.84	0.60	0.015	1	0.73	22	1.9	0.034	0.39
Thallium	20		0.0012	0.84	1.3	0.0090	4.6	0.13	12	0.84	6.0	0.015	1	7.3	0.014	0.14	542	54
SVOCs				0.84						0.84								
Acenaphthylene	6.6		0.0012	0.84	0.43	0.0090	0.70	0.13	0.60	0.84	0.30	0.015	1	0.74	365	73	0.0020	0.010
Anthracene	5.7		0.0012	0.84	0.37	0.0090	0.70	0.13	0.52	0.84	0.26	0.015	1	0.64	1042	52	0.00061	0.012
Benzo (a) anthracene	29		0.0012	0.84	1.9	0.0090	0.90	0.13	3.4	0.84	1.7	0.015	1	3.6	2.4	2.1	1.5	1.7
Benzo (a) pyrene	1.7		0.0012	0.84	0.11	0.0090	0.43	0.13	0.095	0.84	0.048	0.015	1	0.16	1.0	10	0.15	0.015
Chrysene	28		0.0012	0.84	1.8	0.0090	0.90	0.13	3.3	0.84	1.6	0.015	1	3.5	521	52	0.0066	0.066
Fluoranthene	2.8		0.0012	0.84	0.18	0.0090	0.70	0.13	0.25	0.84	0.13	0.015	1	0.31	26	52	0.012	0.0060
Fluorene	0.93		0.0012	0.84	0.061	0.0090	0.70	0.13	0.085	0.84	0.043	0.015	1	0.10	13	26	0.0079	0.0040
Naphthalene	1.4		0.0012	0.84	0.093	0.0090	0.70	0.13	0.13	0.84	0.065	0.015	1	0.16	8.6	17	0.018	0.0092
Phenanthrene	13		0.0012	0.84	0.88	0.0090	0.70	0.13	1.2	0.84	0.62	0.015	1	1.5	521	60	0.0029	0.025
Pyrene	2.7		0.0012	0.84	0.18	0.0090	0.70	0.13	0.25	0.84	0.12	0.015	1	0.30	7.8	13	0.038	0.023

Hazard Index - Detected Compounds	560	63
Hazard Index - Detected Compounds w/Detection Limits	577	74

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table R-20a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Maximum Concentrations
Zone 4 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals															4.0	16	15	3.7
Chromium	515		0.0012	1	40	0.0090	0.49	0.13	33	1	20	0.015	1	60	9.7	97	5.5	0.55
Lead	408		0.0012	1	32	0.0090	0.69	0.13	37	1	22	0.015	1	54	13	0.027	0.079	38
Mercury	5.7		0.0012	1	0.44	0.0090	1.32	0.13	0.98	1	0.59	0.015	1	1.0	48	97	1.1	0.53
Nickel	373		0.0012	1	29	0.0090	0.78	0.13	38	1	23	0.015	1	52	0.19	0.32	49	29
Selenium	10		0.0012	1	0.81	0.0090	10.5	0.13	14	1	8.5	0.015	1	9.3	22	1.9	0.071	0.83
Silver	3.6		0.0012	1	0.28	0.0090	4.6	0.13	2.2	1	1.3	0.015	1	1.6	0.014	0.14	493	49
Thallium		16	0.0012	1	1.2	0.0090	4.6	0.13	9.4	1	5.7	0.015	1	6.9				
VOCs															0.65	6.5	0.0033	0.00033
Trichloroethene	0.016		0.0012	1	0.0012	0.0090	0.70	0.13	0.0015	1	0.00087	0.015	1	0.0021				
SVOCs															365	73	0.00047	0.0024
Acenaphthylene	1.3		0.0012	1	0.10	0.0090	0.70	0.13	0.12	1	0.071	0.015	1	0.17	1042	52	0.0012	0.024
Anthracene	9.3		0.0012	1	0.73	0.0090	0.70	0.13	0.85	1	0.51	0.015	1	1.2	2.4	2.1	1.4	1.6
Benzo (a) anthracene	22		0.0012	1	1.7	0.0090	0.90	0.13	2.6	1	1.5	0.015	1	3.3	1.0	10	2.2	0.22
Benzo (a) pyrene	20		0.0012	1	1.6	0.0090	0.43	0.13	1.1	1	0.67	0.015	1	2.2	13	20	0.00050	0.00032
bis (2-Ethylhexyl) phthalate	0.049		0.0012	1	0.0038	0.0090	0.70	0.13	0.0045	1	0.0027	0.015	1	0.0065	521	52	0.0063	0.063
Chrysene	22		0.0012	1	1.7	0.0090	0.90	0.13	2.6	1	1.5	0.015	1	3.3	26	52	0.22	0.11
Fluoranthene	43		0.0012	1	3.4	0.0090	0.70	0.13	3.9	1	2.3	0.015	1	5.7	13	26	0.035	0.017
Fluorene	3.4		0.0012	1	0.27	0.0090	0.70	0.13	0.31	1	0.19	0.015	1	0.45	8.6	17	0.039	0.020
Naphthalene	2.5		0.0012	1	0.20	0.0090	0.70	0.13	0.23	1	0.14	0.015	1	0.33	521	60	0.0087	0.075
Phenanthrene	34		0.0012	1	2.7	0.0090	0.70	0.13	3.1	1	1.9	0.015	1	4.5	7.8	13	0.53	0.32
Pyrene	31		0.0012	1	2.4	0.0090	0.70	0.13	2.8	1	1.7	0.015	1	4.1				

Hazard Index - Detected Compounds	75	75
Hazard Index - Detected Compounds w/Detection Limits	568	125

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table R-20b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Average Concentrations
Zone 4 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	439		0.0012	1	34	0.0090	0.49	0.13	28	1	17	0.015	1	51	4.0	16	13	3.2
Lead	246		0.0012	1	19	0.0090	0.69	0.13	22	1	13	0.015	1	32	9.7	97	3.4	0.34
Mercury	3.1		0.0012	1	0.24	0.0090	1.32	0.13	0.53	1	0.32	0.015	1	0.56	13	0.027	0.042	21
Nickel	201		0.0012	1	16	0.0090	0.78	0.13	20	1	12	0.015	1	28	48	97	0.58	0.29
Selenium	9.6		0.0012	1	0.75	0.0090	10.5	0.13	13	1	7.9	0.015	1	8.6	0.19	0.32	45	27
Silver	1.9		0.0012	1	0.15	0.0090	4.6	0.13	1.1	1	0.68	0.015	1	0.83	22	1.9	0.038	0.44
Thallium		8.8	0.0012	1	0.69	0.0090	4.6	0.13	5.3	1	3.2	0.015	1	3.8	0.014	0.14	284	28
VOCs																		
Trichloroethene	0.012		0.0012	1	0.00094	0.0090	0.70	0.13	0.0011	1	0.00066	0.015	1	0.0016	0.65	6.5	0.0025	0.00025
SVOCs																		
Acenaphthylene	0.71		0.0012	1	0.055	0.0090	0.70	0.13	0.064	1	0.038	0.015	1	0.093	365	73	0.00026	0.0013
Anthracene	4.7		0.0012	1	0.37	0.0090	0.70	0.13	0.43	1	0.26	0.015	1	0.62	1042	52	0.00060	0.012
Benzo (a) anthracene	11		0.0012	1	0.88	0.0090	0.90	0.13	1.3	1	0.79	0.015	1	1.7	2.4	2.1	0.69	0.80
Benzo (a) pyrene	10		0.0012	1	0.81	0.0090	0.43	0.13	0.58	1	0.35	0.015	1	1.2	1.0	10	1.1	0.11
bis (2-Ethylhexyl) phthalate	2.1		0.0012	1	0.16	0.0090	0.70	0.13	0.19	1	0.11	0.015	1	0.28	13	20	0.022	0.0136
Chrysene	11		0.0012	1	0.88	0.0090	0.90	0.13	1.3	1	0.79	0.015	1	1.7	521	52	0.0032	0.032
Fluoranthene	22		0.0012	1	1.7	0.0090	0.70	0.13	2.0	1	1.2	0.015	1	2.9	26	52	0.11	0.056
Fluorene	1.8		0.0012	1	0.14	0.0090	0.70	0.13	0.16	1	0.098	0.015	1	0.24	13	26	0.018	0.0091
Naphthalene	1.4		0.0012	1	0.11	0.0090	0.70	0.13	0.13	1	0.078	0.015	1	0.19	8.6	17	0.022	0.011
Phenanthrene	17		0.0012	1	1.3	0.0090	0.70	0.13	1.6	1	0.94	0.015	1	2.3	521	60	0.0044	0.038
Pyrene	16		0.0012	1	1.2	0.0090	0.70	0.13	1.4	1	0.86	0.015	1	2.1	7.8	13	0.27	0.16

Hazard Index - Detected Compounds	64	54
Hazard Index - Detected Compounds w/Detection Limits	348	82

NOTES:
(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.
(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.
(c) - Sample and Suter, 1994.
(d) - See Attachment O, Table O-1.
(e) - See Table 4-15.
(f) - Markwell *et al.*, 1989.
(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.
(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table R-21a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Maximum Concentrations
Zone 5 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	752		0.0012	1	59	0.0090	0.49	0.13	48	1	29	0.015	1	87	4.0	16	22	5.5
Lead	271		0.0012	1	21	0.0090	0.69	0.13	24	1	15	0.015	1	36	9.7	97	3.7	0.37
Nickel	51		0.0012	1	4.0	0.0090	0.78	0.13	5.2	1	3.1	0.015	1	7.1	48	97	0.15	0.073
Selenium	16		0.0012	1	1.3	0.0090	10.5	0.13	22	1	13	0.015	1	14	0.19	0.32	76	45
Silver	2.8		0.0012	1	0.22	0.0090	4.6	0.13	1.7	1	1.0	0.015	1	1.2	22	1.9	0.056	0.64
Thallium	28		0.0012	1	2.2	0.0090	4.6	0.13	17	1	10	0.015	1	12	0.014	0.14	883	88
VOCs																		
Trichloroethene	0.0075		0.0012	1	0.00059	0.0090	0.70	0.13	0.00068	1	0.00041	0.015	1	0.00099	0.65	6.5	0.0015	0.00015
SVOCs																		
Acenaphthylene	0.93		0.0012	1	0.073	0.0090	0.70	0.13	0.085	1	0.051	0.015	1	0.12	365	73	0.00034	0.0017
Anthracene	1.6		0.0012	1	0.12	0.0090	0.70	0.13	0.15	1	0.087	0.015	1	0.21	1042	52	0.00020	0.0041
Benzo (a) anthracene	3.2		0.0012	1	0.25	0.0090	0.90	0.13	0.37	1	0.22	0.015	1	0.47	2.4	2.1	0.20	0.23
Benzo (a) pyrene	2.7		0.0012	1	0.21	0.0090	0.43	0.13	0.15	1	0.091	0.015	1	0.30	1.0	10	0.30	0.030
bis (2-Ethylhexyl) phthalate	0.061		0.0012	1	0.0048	0.0090	0.70	0.13	0.0056	1	0.0033	0.015	1	0.0081	13	20	0.00062	0.00040
Chrysene	3.3		0.0012	1	0.26	0.0090	0.90	0.13	0.39	1	0.23	0.015	1	0.49	521	52	0.00094	0.0094
Fluoranthene	2.1		0.0012	1	0.16	0.0090	0.70	0.13	0.19	1	0.11	0.015	1	0.28	26	52	0.011	0.0054
Fluorene	1.8		0.0012	1	0.14	0.0090	0.70	0.13	0.16	1	0.098	0.015	1	0.24	13	26	0.018	0.0092
Naphthalene	0.67		0.0012	1	0.052	0.0090	0.70	0.13	0.061	1	0.037	0.015	1	0.089	8.6	17	0.010	0.0052
Phenanthrene	1.2		0.0012	1	0.094	0.0090	0.70	0.13	0.11	1	0.066	0.015	1	0.16	521	60	0.00031	0.0027
Pyrene	5.7		0.0012	1	0.44	0.0090	0.70	0.13	0.52	1	0.31	0.015	1	0.76	7.8	13	0.097	0.058

Hazard Index - Detected Compounds	985	140
Hazard Index - Detected Compounds w/Detection Limits	985	140

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table R-21b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - Short-tailed Shrew
Average Concentrations
Zone 5 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (h)		Hazard Quotient	
Metals															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Chromium	652		0.0012	1	51	0.0090	0.49	0.13	42	1	25	0.015	1	76	4.0	16	19	4.8
Lead	160		0.0012	1	12	0.0090	0.69	0.13	14	1	8.6	0.015	1	21	9.7	97	2.2	0.22
Nickel	40		0.0012	1	3.1	0.0090	0.78	0.13	4.1	1	2.4	0.015	1	5.6	48	97	0.11	0.057
Selenium	8.3		0.0012	1	0.65	0.0090	10.5	0.13	11	1	6.8	0.015	1	7.4	0.19	0.32	39	24
Silver	2.3		0.0012	1	0.18	0.0090	4.6	0.13	1.4	1	0.83	0.015	1	1.0	22	1.9	0.046	0.53
Thallium	15		0.0012	1	1.2	0.0090	4.6	0.13	9.0	1	5.4	0.015	1	6.6	0.014	0.14	484	48
VOCs																		
Trichloroethene	0.0050		0.0012	1	0.00039	0.0090	0.70	0.13	0.00046	1	0.00027	0.015	1	0.00066	0.65	6.5	0.0010	0.00010
SVOCs																		
Acenaphthylene	0.40		0.0012	1	0.031	0.0090	0.70	0.13	0.036	1	0.022	0.015	1	0.053	365	73	0.00014	0.00072
Anthracene	0.68		0.0012	1	0.053	0.0090	0.70	0.13	0.062	1	0.037	0.015	1	0.090	1042	52	0.000087	0.0017
Benzo (a) anthracene	1.4		0.0012	1	0.11	0.0090	0.90	0.13	0.17	1	0.10	0.015	1	0.21	2.4	2.1	0.088	0.10
Benzo (a) pyrene	1.3		0.0012	1	0.10	0.0090	0.43	0.13	0.073	1	0.044	0.015	1	0.15	1.0	10	0.14	0.014
bis (2-Ethylhexyl) phthalate	0.16		0.0012	1	0.012	0.0090	0.70	0.13	0.014	1	0.0086	0.015	1	0.021	13	20	0.0017	0.0010
Chrysene	1.5		0.0012	1	0.12	0.0090	0.90	0.13	0.18	1	0.11	0.015	1	0.23	521	52	0.00043	0.0043
Fluoranthene	1.1		0.0012	1	0.088	0.0090	0.70	0.13	0.10	1	0.062	0.015	1	0.15	26	52	0.0057	0.0029
Fluorene	0.68		0.0012	1	0.053	0.0090	0.70	0.13	0.062	1	0.037	0.015	1	0.090	13	26	0.0069	0.0034
Naphthalene	0.27		0.0012	1	0.021	0.0090	0.70	0.13	0.025	1	0.015	0.015	1	0.036	8.6	17	0.0042	0.0021
Phenanthrene	0.66		0.0012	1	0.051	0.0090	0.70	0.13	0.060	1	0.036	0.015	1	0.087	521	60	0.00017	0.0014
Pyrene	2.4		0.0012	1	0.19	0.0090	0.70	0.13	0.22	1	0.13	0.015	1	0.32	7.8	13	0.041	0.025

Hazard Index - Detected Compounds	544	78
Hazard Index - Detected Compounds w/Detection Limits	544	78

NOTES:

(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.

(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

ATTACHMENT S

HQ/HI CALCULATIONS FOR AMERICAN ROBIN

BETHLEHEM STEEL CORPORATION

LACKAWANNA, NEW YORK

Table S-1a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Maximum Concentrations
SWMU S-1
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	36		0.0019	1	0.88	0.093	4.6	0.13	21	1	26	0.077	0.67	18	0.015	0.15	1194	119
Chromium	99		0.0019	1	2.4	0.093	0.49	0.13	6.3	1	7.6	0.077	0.67	6.7	0.58	0.97	12	6.9
Lead	278		0.0019	1	6.9	0.093	0.69	0.13	25	1	30	0.077	0.67	25	0.88	9.4	28	2.6
Mercury	5.6		0.0019	1	0.14	0.093	1.32	0.13	0.96	1	1.2	0.077	0.67	0.87	0.37	0.75	2.4	1.2
Nickel	139		0.0019	1	3.4	0.093	0.78	0.13	14	1	17	0.077	0.67	14	18	62	0.76	0.22
Selenium	11		0.0019	1	0.27	0.093	10.5	0.13	15	1	18	0.077	0.67	12	0.29	0.58	43	21
Silver	2.1		0.0019	1	0.052	0.093	4.6	0.13	1.3	1	1.5	0.077	0.67	1.1	104	0.22	0.010	4.8
Thallium		3.0	0.0019	1	0.074	0.093	4.6	0.13	1.8	1	2.2	0.077	0.67	1.5	0.34	0.0045	4.4	334
VOCs																		
Benzene	1.6		0.0019	1	0.039	0.093	0.70	0.13	0.15	1	0.18	0.077	0.67	0.14	3.2	32	0.045	0.0045
Ethylbenzene	2.5		0.0019	1	0.062	0.093	0.70	0.13	0.23	1	0.27	0.077	0.67	0.23	7.2	35	0.031	0.0064
Methyl ethyl ketone	5.9		0.0019	1	0.15	0.093	0.70	0.13	0.54	1	0.65	0.077	0.67	0.53	131	338	0.0041	0.0016
Xylenes, total	12		0.0019	1	0.30	0.093	0.70	0.13	1.1	1	1.3	0.077	0.67	1.1	0.25	0.31	4.3	3.5
SVOCs																		
Acenaphthene	170		0.0019	1	4.2	0.093	0.70	0.13	15	1	19	0.077	0.67	15	1.1	8.5	14	1.8
Acenaphthylene	200		0.0019	1	4.9	0.093	0.70	0.13	18	1	22	0.077	0.67	18	1.1	8.5	16	2.1
Anthracene	460		0.0019	1	11	0.093	0.70	0.13	42	1	51	0.077	0.67	41	1.1	6.0	38	6.9
Benzo (a) anthracene	630		0.0019	1	16	0.093	0.90	0.13	74	1	89	0.077	0.67	70	0.86	0.24	81	292
Benzo (a) pyrene	330		0.0019	1	8.1	0.093	0.43	0.13	18	1	22	0.077	0.67	20	1.1	1.2	19	17
Benzo (b) fluoranthene	490		0.0019	1	12	0.093	0.90	0.13	57	1	69	0.077	0.67	54	1.1	1.2	50	45
Benzo (ghi) perylene	170		0.0019	1	4.2	0.093	0.90	0.13	20	1	24	0.077	0.67	19	1.1	1.2	17	16
Benzo (k) fluoranthene	150		0.0019	1	3.7	0.093	0.90	0.13	18	1	21	0.077	0.67	17	0.15	1.2	111	14
Chrysene	540		0.0019	1	13	0.093	0.90	0.13	63	1	76	0.077	0.67	60	1.1	6.0	55	10
Dibenzo(a,h)anthracene	38		0.0019	1	0.94	0.093	0.90	0.13	4.4	1	5.4	0.077	0.67	4.2	0.42	1.2	10	3.5
Fluoranthene	1500		0.0019	1	37	0.093	0.70	0.13	137	1	165	0.077	0.67	135	1.1	6.0	123	23
Fluorene	710		0.0019	1	18	0.093	0.70	0.13	65	1	78	0.077	0.67	64	1.1	3.0	58	21
Indeno (1,2,3-cd) pyrene	210		0.0019	1	5.2	0.093	0.90	0.13	25	1	30	0.077	0.67	23	1.1	1.2	21	19
3-/4-Methylphenol	5.3		0.0019	1	0.13	0.093	0.70	0.13	0.48	1	0.58	0.077	0.67	0.48	0.37	1.1	1.3	0.43
Naphthalene	1500		0.0019	1	37	0.093	0.70	0.13	137	1	165	0.077	0.67	135	1.1	1.0	123	135
Phenanthrene	1900		0.0019	1	47	0.093	0.70	0.13	173	1	209	0.077	0.67	171	1.1	1.5	156	114
Pyrene	1200		0.0019	1	30	0.093	0.70	0.13	109	1	132	0.077	0.67	108	1.1	1.5	98	72

Hazard Index - Detected Compounds	2276	954
Hazard Index - Detected Compounds w/Detection Limits	2280	1288

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - Based on site use from March through November.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-1b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Average Concentrations
SWMU S-1
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
Metals															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Antimony	67		0.0019	1	1.7	0.093	4.6	0.13	40	1	48	0.077	0.67	34	0.015	0.15	2235	224
Chromium	99		0.0019	1	2.4	0.093	0.49	0.13	6.3	1	7.6	0.077	0.67	6.7	0.58	0.97	12	6.9
Lead	184		0.0019	1	4.5	0.093	0.69	0.13	17	1	20	0.077	0.67	16	0.88	9.4	19	1.7
Mercury	1.9		0.0019	1	0.047	0.093	1.32	0.13	0.33	1	0.39	0.077	0.67	0.30	0.37	0.75	0.80	0.39
Nickel	98		0.0019	1	2.4	0.093	0.78	0.13	9.9	1	12	0.077	0.67	9.7	18	62	0.54	0.16
Selenium	3.9		0.0019	1	0.096	0.093	10.5	0.13	5.3	1	6.4	0.077	0.67	4.4	0.29	0.58	15	7.5
Silver	10		0.0019	1	0.25	0.093	4.6	0.13	6.0	1	7.2	0.077	0.67	5.0	104	0.22	0.048	23
Thallium		1.4	0.0019	1	0.035	0.093	4.6	0.13	0.84	1	1.0	0.077	0.67	0.70	0.34	0.0045	2.1	156
VOCs																		
Benzene	0.80		0.0019	1	0.020	0.093	0.70	0.13	0.073	1	0.088	0.077	0.67	0.072	3.2	32	0.023	0.0023
Ethylbenzene	1.3		0.0019	1	0.031	0.093	0.70	0.13	0.11	1	0.14	0.077	0.67	0.11	7.2	35	0.016	0.0032
Methyl ethyl ketone	0.30		0.0019	1	0.0073	0.093	0.70	0.13	0.027	1	0.033	0.077	0.67	0.027	131	338	0.00020	0.00008
Xylenes, total	6.0		0.0019	1	0.15	0.093	0.70	0.13	0.55	1	0.66	0.077	0.67	0.54	0.25	0.31	2.2	1.7
SVOCs																		
Acenaphthene	75		0.0019	1	1.8	0.093	0.70	0.13	6.8	1	8.2	0.077	0.67	6.7	1.1	8.5	6.1	0.79
Acenaphthylene	85		0.0019	1	2.1	0.093	0.70	0.13	7.7	1	9.3	0.077	0.67	7.6	1.1	8.5	6.9	0.90
Anthracene	171		0.0019	1	4.2	0.093	0.70	0.13	16	1	19	0.077	0.67	15	1.1	6.0	14	2.6
Benzo (a) anthracene	228		0.0019	1	5.6	0.093	0.90	0.13	27	1	32	0.077	0.67	25	0.86	0.24	29	106
Benzo (a) pyrene	128		0.0019	1	3.2	0.093	0.43	0.13	7.1	1	8.6	0.077	0.67	7.9	1.1	1.2	7.2	6.6
Benzo (b) fluoranthene	181		0.0019	1	4.5	0.093	0.90	0.13	21	1	26	0.077	0.67	20	1.1	1.2	18	17
Benzo (ghi) perylene	75		0.0019	1	1.8	0.093	0.90	0.13	8.7	1	11	0.077	0.67	8.3	1.1	1.2	7.5	6.9
Benzo (k) fluoranthene	68		0.0019	1	1.7	0.093	0.90	0.13	7.9	1	9.6	0.077	0.67	7.5	0.15	1.2	50	6.3
Chrysene	198		0.0019	1	4.9	0.093	0.90	0.13	23	1	28	0.077	0.67	22	1.1	6	20	3.7
Dibenzo(a,h)anthracene	31		0.0019	1	0.75	0.093	0.90	0.13	3.6	1	4.3	0.077	0.67	3.4	0.42	1.2	8.1	2.8
Fluoranthene	518		0.0019	1	13	0.093	0.70	0.13	47	1	57	0.077	0.67	47	1.1	6.0	42	7.8
Fluorene	255		0.0019	1	6.3	0.093	0.70	0.13	23	1	28	0.077	0.67	23	1.1	3.0	21	7.6
Indeno (1,2,3-cd) pyrene	88		0.0019	1	2.2	0.093	0.90	0.13	10	1	12	0.077	0.67	9.8	1.1	1.2	8.9	8.1
3-/4-Methylphenol	45		0.0019	1	1.1	0.093	0.70	0.13	4.1	1	5.0	0.077	0.67	4.1	0.37	1.1	11	3.7
Naphthalene	518		0.0019	1	13	0.093	0.70	0.13	47	1	57	0.077	0.67	47	1.1	1.0	42	47
Phenanthrene	651		0.0019	1	16	0.093	0.70	0.13	59	1	72	0.077	0.67	59	1.1	1.5	53	39
Pyrene	418		0.0019	1	10	0.093	0.70	0.13	38	1	46	0.077	0.67	38	1.1	1.5	34	25

NOTES:
(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.
(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.
(c) - Sample and Suter, 1994.
(d) - See Attachment O, Table O-1.
(e) - See Table 4-15.
(f) - Markwell *et al.*, 1989.
(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.
(h) - Based on site use from March through November.
(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Hazard Index - Detected Compounds	2665	556
Hazard Index - Detected Compounds w/Detection Limits	2668	712

Table S-2a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Maximum Concentrations
SWMU S-2
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	62		0.0019	1	1.5	0.093	4.6	0.13	37	1	44	0.077	0.67	31	0.015	0.15	2052	205
Lead	1120		0.0019	1	28	0.093	0.69	0.13	100	1	121	0.077	0.67	100	0.88	9.4	113	11
Silver		17	0.0019	1	0.42	0.093	4.6	0.13	10	1	12	0.077	0.67	8.5	104	0.22	0.082	39
VOCs																		
Methylene chloride	0.0051		0.0019	1	0.00013	0.093	0.70	0.13	0.00046	1	0.00056	0.077	0.67	0.00046	0.43	3.7	0.0011	0.00012
SVOCs																		
Benzo (a) anthracene	0.15		0.0019	1	0.0037	0.093	0.90	0.13	0.018	1	0.021	0.077	0.67	0.017	0.86	0.24	0.019	0.1
Benzo (b) fluoranthene	0.34		0.0019	1	0.0084	0.093	0.90	0.13	0.040	1	0.048	0.077	0.67	0.038	1.1	1.2	0.034	0.032
Chrysene	0.10		0.0019	1	0.0025	0.093	0.90	0.13	0.012	1	0.014	0.077	0.67	0.011	1.1	6.0	0.010	0.0019
Fluoranthene	0.096		0.0019	1	0.0024	0.093	0.70	0.13	0.0087	1	0.011	0.077	0.67	0.0087	1.1	6.0	0.0079	0.0014
Indeno (1,2,3-cd) pyrene	0.092		0.0019	1	0.0023	0.093	0.90	0.13	0.011	1	0.013	0.077	0.67	0.010	1.1	1.2	0.0093	0.0085
Pyrene	0.12		0.0019	1	0.0030	0.093	0.70	0.13	0.011	1	0.013	0.077	0.67	0.011	1.1	1.5	0.010	0.0072

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - Based on site use from March through November.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.

LOAEL - Lowest Observable Adverse Effects Level.

HQ - Hazard Quotient.

Hazard Index - Detected Compounds	2165	216
Hazard Index - Detected Compounds w/Detection Limits	2165	255

Table S-2b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Average Concentrations
SWMU S-2
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	82		0.0019	1	2.0	0.093	4.6	0.13	49	1	59	0.077	0.67	41	0.015	0.15	2719	272
Lead	560		0.0019	1	14	0.093	0.69	0.13	50	1	61	0.077	0.67	50	0.88	9.4	57	5.3
Silver		8.9	0.0019	1	0.22	0.093	4.6	0.13	5.3	1	6.4	0.077	0.67	4.5	104	0.22	0.043	20
VOCs																		
Methylene chloride	0.0061		0.0019	1	0.00015	0.093	0.70	0.13	0.00056	1	0.00067	0.077	0.67	0.00055	0.43	3.7	0.0013	0.00015
SVOCs																		
Benzo (a) anthracene	0.63		0.0019	1	0.015	0.093	0.90	0.13	0.073	1	0.088	0.077	0.67	0.070	0.86	0.24	0.081	0.29
Benzo (b) fluoranthene	0.72		0.0019	1	0.018	0.093	0.90	0.13	0.084	1	0.10	0.077	0.67	0.080	1.1	1.2	0.074	0.066
Chrysene	0.60		0.0019	1	0.015	0.093	0.90	0.13	0.070	1	0.085	0.077	0.67	0.067	1.1	6.0	0.061	0.011
Fluoranthene	0.60		0.0019	1	0.015	0.093	0.70	0.13	0.054	1	0.066	0.077	0.67	0.054	1.1	6.0	0.050	0.009
Indeno (1,2,3-cd) pyrene	0.60		0.0019	1	0.015	0.093	0.90	0.13	0.070	1	0.084	0.077	0.67	0.066	1.1	1.2	0.061	0.055
Pyrene	0.61		0.0019	1	0.015	0.093	0.70	0.13	0.056	1	0.067	0.077	0.67	0.055	1.1	1.5	0.051	0.036

NOTES:
(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.
(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.
(c) - Sample and Suter, 1994.
(d) - See Attachment O, Table O-1.
(e) - See Table 4-15.
(f) - Markwell *et al.*, 1989.
(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.
(h) - Based on site use from March through November.
(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Hazard Index - Detected Compounds	2776	278
Hazard Index - Detected Compounds w/Detection Limits	2776	298

Table S-3a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Maximum Concentrations
SWMU S-3
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
Metals															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Arsenic	41		0.0019	1	1.0	0.093	1.16	0.13	6.2	1	7.5	0.077	0.67	5.7	0.28	0.70	20	8.2
Chromium	118		0.0019	1	2.9	0.093	0.49	0.13	7.5	1	9.1	0.077	0.67	8.0	0.58	0.97	14	8.3
Lead	3960		0.0019	1	98	0.093	0.69	0.13	355	1	429	0.077	0.67	353	0.88	9.4	401	38
Nickel	44		0.0019	1	1.1	0.093	0.78	0.13	4.5	1	5.4	0.077	0.67	4.4	18	62	0.24	0.070
Selenium	14		0.0019	1	0.35	0.093	10.5	0.13	19	1	23	0.077	0.67	16	0.29	0.58	55	27
Silver	6.5		0.0019	1	0.16	0.093	4.6	0.13	3.9	1	4.7	0.077	0.67	3.3	104	0.22	0.031	15
Thallium	5.6		0.0019	1	0.14	0.093	4.6	0.13	3.3	1	4.0	0.077	0.67	2.8	0.34	0.0045	8.2	623
VOCs																		
Trichloroethene	0.019		0.0019	1	0.00047	0.093	0.70	0.13	0.0017	1	0.0021	0.077	0.67	0.0017	0.085	0.85	0.020	0.0020
SVOCs																		
Acenaphthylene	0.61		0.0019	1	0.015	0.093	0.70	0.13	0.056	1	0.067	0.077	0.67	0.055	1.1	8.5	0.050	0.0065
Anthracene	0.45		0.0019	1	0.011	0.093	0.70	0.13	0.041	1	0.049	0.077	0.67	0.041	1.1	6.0	0.037	0.0068
Benzo (a) anthracene	1.2		0.0019	1	0.030	0.093	0.90	0.13	0.14	1	0.17	0.077	0.67	0.13	0.86	0.24	0.16	0.56
Benzo (a) pyrene	0.97		0.0019	1	0.024	0.093	0.43	0.13	0.054	1	0.065	0.077	0.67	0.060	1.1	1.2	0.054	0.050
Chrysene	1.3		0.0019	1	0.032	0.093	0.90	0.13	0.15	1	0.18	0.077	0.67	0.14	1.1	6.0	0.13	0.024
Fluoranthene	3.3		0.0019	1	0.081	0.093	0.70	0.13	0.30	1	0.36	0.077	0.67	0.30	1.1	6.0	0.27	0.050
Fluorene	0.14		0.0019	1	0.0035	0.093	0.70	0.13	0.013	1	0.015	0.077	0.67	0.013	1.1	3.0	0.011	0.0042
Naphthalene	0.19		0.0019	1	0.0047	0.093	0.70	0.13	0.017	1	0.021	0.077	0.67	0.017	1.1	1.0	0.016	0.017
Phenanthrene	1.9		0.0019	1	0.047	0.093	0.70	0.13	0.17	1	0.21	0.077	0.67	0.17	1.1	1.5	0.16	0.11
Pyrene	1.5		0.0019	1	0.037	0.093	0.70	0.13	0.14	1	0.16	0.077	0.67	0.14	1.1	1.5	0.12	0.090

Hazard Index - Detected Compounds	500	720
Hazard Index - Detected Compounds w/Detection Limits	500	720

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - Based on site use from March through November.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-3b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Average Concentrations
SWMU S-3
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Arsenic	34		0.0019	1	0.84	0.093	1.16	0.13	5.1	1	6.2	0.077	0.67	4.7	0.28	0.70	17	6.7
Chromium	99		0.0019	1	2.4	0.093	0.49	0.13	6.3	1	7.6	0.077	0.67	6.7	0.58	0.97	12	6.9
Lead	2520		0.0019	1	62	0.093	0.69	0.13	226	1	273	0.077	0.67	225	0.88	9.4	256	24
Nickel	33		0.0019	1	0.81	0.093	0.78	0.13	3.3	1	4.0	0.077	0.67	3.3	18	62	0.18	0.052
Selenium	12		0.0019	1	0.30	0.093	10.5	0.13	16	1	20	0.077	0.67	13	0.29	0.58	46	23
Silver	4.5		0.0019	1	0.11	0.093	4.6	0.13	2.7	1	3.3	0.077	0.67	2.3	104	0.22	0.022	10
Thallium	4.7		0.0019	1	0.12	0.093	4.6	0.13	2.8	1	3.4	0.077	0.67	2.4	0.34	0.0045	7.0	521
VOCs																		
Trichloroethene	0.016		0.0019	1	0.00039	0.093	0.70	0.13	0.0015	1	0.0018	0.077	0.67	0.0014	0.085	0.85	0.017	0.0017
SVOCs																		
Acenaphthylene	0.43		0.0019	1	0.011	0.093	0.70	0.13	0.039	1	0.047	0.077	0.67	0.039	1.1	8.5	0.036	0.0046
Anthracene	0.35		0.0019	1	0.0086	0.093	0.70	0.13	0.032	1	0.038	0.077	0.67	0.032	1.1	6.0	0.029	0.0052
Benzo (a) anthracene	0.66		0.0019	1	0.016	0.093	0.90	0.13	0.077	1	0.093	0.077	0.67	0.073	0.86	0.24	0.086	0.30
Benzo (a) pyrene	0.54		0.0019	1	0.013	0.093	0.43	0.13	0.030	1	0.036	0.077	0.67	0.033	1.1	1.2	0.031	0.028
Chrysene	0.73		0.0019	1	0.018	0.093	0.90	0.13	0.085	1	0.10	0.077	0.67	0.081	1.1	6.0	0.075	0.013
Fluoranthene	1.7		0.0019	1	0.042	0.093	0.70	0.13	0.16	1	0.19	0.077	0.67	0.15	1.1	6.0	0.14	0.026
Fluorene	0.20		0.0019	1	0.0048	0.093	0.70	0.13	0.018	1	0.021	0.077	0.67	0.018	1.1	3.0	0.016	0.0058
Naphthalene	0.12		0.0019	1	0.0030	0.093	0.70	0.13	0.011	1	0.013	0.077	0.67	0.011	1.1	1.0	0.010	0.010
Phenanthrene	1.0		0.0019	1	0.025	0.093	0.70	0.13	0.093	1	0.11	0.077	0.67	0.092	1.1	1.5	0.085	0.063
Pyrene	0.83		0.0019	1	0.020	0.093	0.70	0.13	0.075	1	0.091	0.077	0.67	0.074	1.1	1.5	0.069	0.049

Hazard Index - Detected Compounds	338	592
Hazard Index - Detected Compounds w/Detection Limits	338	592

NOTES:
(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.
(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.
(c) - Sample and Suter, 1994.
(d) - See Attachment O, Table O-1.
(e) - See Table 4-15.
(f) - Markwell *et al.*, 1989.
(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.
(h) - Based on site use from March through November.
(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-4a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Maximum Concentrations
SWMU S-4
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	49		0.0019	1	1.2	0.093	0.49	0.13	3.1	1	3.8	0.077	0.67	3.3	0.58	0.97	5.8	3.4
Lead	415		0.0019	1	10	0.093	0.69	0.13	37	1	45	0.077	0.67	37	0.88	9.4	42	3.9
Mercury	1.6		0.0019	1	0.039	0.093	1.32	0.13	0.27	1	0.33	0.077	0.67	0.25	0.37	0.75	0.67	0.33
Nickel	40		0.0019	1	0.98	0.093	0.78	0.13	4.0	1	4.9	0.077	0.67	3.9	18	62	0.22	0.063
SVOCs																		
Benzo (a) anthracene	0.71		0.0019	1	0.018	0.093	0.90	0.13	0.083	1	0.10	0.077	0.67	0.079	0.86	0.24	0.092	0.33
Benzo (a) pyrene	0.37		0.0019	1	0.0091	0.093	0.43	0.13	0.021	1	0.025	0.077	0.67	0.023	1.1	1.2	0.021	0.019
Benzo (b) fluoranthene	0.84		0.0019	1	0.021	0.093	0.90	0.13	0.098	1	0.12	0.077	0.67	0.093	1.1	1.2	0.085	0.078
Benzo (ghi) perylene	0.62		0.0019	1	0.015	0.093	0.90	0.13	0.073	1	0.088	0.077	0.67	0.069	1.1	1.2	0.063	0.057
Benzo (k) fluoranthene	0.34		0.0019	1	0.0084	0.093	0.90	0.13	0.040	1	0.048	0.077	0.67	0.038	0.15	1.2	0.25	0.032
bis (2-Ethylhexyl) phthalate	0.98		0.0019	1	0.024	0.093	0.70	0.13	0.089	1	0.11	0.077	0.67	0.088	0.64	0.74	0.14	0.12
Chrysene	0.45		0.0019	1	0.011	0.093	0.90	0.13	0.053	1	0.064	0.077	0.67	0.050	1.1	6.0	0.045	0.0083
Fluoranthene	0.85		0.0019	1	0.021	0.093	0.70	0.13	0.077	1	0.093	0.077	0.67	0.077	1.1	6.0	0.070	0.013
Indeno (1,2,3-cd) pyrene	0.46		0.0019	1	0.011	0.093	0.90	0.13	0.054	1	0.065	0.077	0.67	0.051	1.1	1.2	0.047	0.043
Naphthalene	0.33		0.0019	1	0.0081	0.093	0.70	0.13	0.030	1	0.036	0.077	0.67	0.030	1.1	1.0	0.027	0.030
Phenanthrene	0.42		0.0019	1	0.010	0.093	0.70	0.13	0.038	1	0.046	0.077	0.67	0.038	1.1	1.5	0.034	0.025
Pyrene	0.79		0.0019	1	0.019	0.093	0.70	0.13	0.072	1	0.087	0.077	0.67	0.071	1.1	1.5	0.065	0.047

Hazard Index - Detected Compounds	50	8.6
Hazard Index - Detected Compounds w/Detection Limits	50	8.6

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - Based on site use from March through November.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-4b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Average Concentrations
SWMU S-4
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
Metals															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Chromium	28		0.0019	1	0.69	0.093	0.49	0.13	1.8	1	2.2	0.077	0.67	1.9	0.58	0.97	3.3	2.0
Lead	389		0.0019	1	10	0.093	0.69	0.13	35	1	42	0.077	0.67	35	0.88	9.4	39	3.7
Mercury	1.0		0.0019	1	0.025	0.093	1.32	0.13	0.17	1	0.21	0.077	0.67	0.16	0.37	0.75	0.42	0.21
Nickel	37		0.0019	1	0.91	0.093	0.78	0.13	3.8	1	4.5	0.077	0.67	3.6	18	62	0.21	0.058
SVOCs																		
Benzo (a) anthracene	0.58		0.0019	1	0.014	0.093	0.90	0.13	0.068	1	0.082	0.077	0.67	0.065	0.86	0.24	0.076	0.27
Benzo (a) pyrene	0.30		0.0019	1	0.0074	0.093	0.43	0.13	0.017	1	0.020	0.077	0.67	0.019	1.1	1.2	0.017	0.015
Benzo (b) fluoranthene	0.79		0.0019	1	0.019	0.093	0.90	0.13	0.092	1	0.11	0.077	0.67	0.088	1.1	1.2	0.081	0.072
Benzo (ghi) perylene	0.38		0.0019	1	0.0094	0.093	0.90	0.13	0.044	1	0.054	0.077	0.67	0.042	1.1	1.2	0.039	0.035
Benzo (k) fluoranthene	0.38		0.0019	1	0.0095	0.093	0.90	0.13	0.045	1	0.054	0.077	0.67	0.043	0.15	1.2	0.28	0.035
bis (2-Ethylhexyl) phthalate	0.63		0.0019	1	0.016	0.093	0.70	0.13	0.057	1	0.069	0.077	0.67	0.057	0.64	0.74	0.088	0.077
Chrysene	0.42		0.0019	1	0.010	0.093	0.90	0.13	0.049	1	0.059	0.077	0.67	0.046	1.1	6.0	0.043	0.008
Fluoranthene	0.83		0.0019	1	0.021	0.093	0.70	0.13	0.076	1	0.092	0.077	0.67	0.075	1.1	6.0	0.069	0.012
Indeno (1,2,3-cd) pyrene	0.36		0.0019	1	0.0090	0.093	0.90	0.13	0.042	1	0.051	0.077	0.67	0.040	1.1	1.2	0.037	0.033
Naphthalene	0.31		0.0019	1	0.0076	0.093	0.70	0.13	0.028	1	0.034	0.077	0.67	0.028	1.1	1.0	0.026	0.027
Phenanthrene	0.40		0.0019	1	0.0099	0.093	0.70	0.13	0.037	1	0.044	0.077	0.67	0.036	1.1	1.5	0.033	0.025
Pyrene	0.77		0.0019	1	0.019	0.093	0.70	0.13	0.070	1	0.084	0.077	0.67	0.069	1.1	1.5	0.064	0.046

Hazard Index - Detected Compounds	44	6.6
Hazard Index - Detected Compounds w/Detection Limits	44	6.6

NOTES:
(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.
(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.
(c) - Sample and Suter, 1994.
(d) - See Attachment O, Table O-1.
(e) - See Table 4-15.
(f) - Markwell *et al.*, 1989.
(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.
(h) - Based on site use from March through November.
(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-5a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Maximum Concentrations
SWMU S-5
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony		89	0.0019	1	2.2	0.093	4.6	0.13	53	1	64	0.077	0.67	44	0.015	0.15	2953	295
Cadmium		67	0.0019	1	1.7	0.093	4.6	0.13	40	1	48	0.077	0.67	34	0.85	12	39	2.8
Lead	241		0.0019	1	5.9	0.093	0.69	0.13	22	1	26	0.077	0.67	21	0.88	9.4	24	2.3
Nickel		59	0.0019	1	1.5	0.093	0.78	0.13	6.0	1	7.2	0.077	0.67	5.8	18	62	0.32	0.094
Silver		15	0.0019	1	0.36	0.093	4.6	0.13	8.8	1	11	0.077	0.67	7.4	104	0.22	0.071	33
VOCs																		
Carbon disulfide	0.0022		0.0019	1	0.000054	0.093	0.70	0.13	0.00020	1	0.00024	0.077	0.67	0.00020	1.5	3.0	0.00013	0.000066
Methylene chloride	0.0024		0.0019	1	0.000059	0.093	0.70	0.13	0.00022	1	0.00026	0.077	0.67	0.00022	0.43	3.7	0.00050	0.000058

Hazard Index - Detected Compounds	24	2.3
Hazard Index - Detected Compounds w/Detection Limits	3017	334

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - Based on site use from March through November.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-5b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Average Concentrations
SWMU S-5
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony		84	0.0019	1	2.1	0.093	4.6	0.13	50	1	61	0.077	0.67	42	0.015	0.15	2785	279
Cadmium		37	0.0019	1	0.91	0.093	4.6	0.13	22	1	27	0.077	0.67	19	0.85	12	22	1.6
Lead	133		0.0019	1	3.3	0.093	0.69	0.13	12	1	14	0.077	0.67	12	0.88	9.4	13	1.3
Nickel		56	0.0019	1	1.4	0.093	0.78	0.13	5.7	1	6.9	0.077	0.67	5.5	18	62	0.31	0.088
Silver		14	0.0019	1	0.35	0.093	4.6	0.13	8.4	1	10	0.077	0.67	7.0	104	0.22	0.067	32
VOCs																		
Carbon disulfide	0.0026		0.0019	1	0.000064	0.093	0.70	0.13	0.00024	1	0.00029	0.077	0.67	0.00023	1.5	3.0	0.00016	0.000079
Methylene chloride	0.0040		0.0019	1	0.000099	0.093	0.70	0.13	0.00036	1	0.00044	0.077	0.67	0.00036	0.43	3.7	0.00083	0.000098

Hazard Index - Detected Compounds	13	1.3
Hazard Index - Detected Compounds w/Detection Limits	2821	314

NOTES:
(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.
(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.
(c) - Sample and Suter, 1994.
(d) - See Attachment O, Table O-1.
(e) - See Table 4-15.
(f) - Markwell *et al.*, 1989.
(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.
(h) - Based on site use from March through November.
(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-6a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Maximum Concentrations
SWMU S- 6
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/dny)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	375		0.0019	0.98	9.1	0.093	4.6	0.13	224	0.98	265	0.077	0.67	184	0.015	0.15	12261	1226
Lead	3670		0.0019	0.98	89	0.093	0.69	0.13	329	0.98	390	0.077	0.67	321	0.88	9.4	364	34
Nickel		92	0.0019	0.98	2.2	0.093	0.78	0.13	9.3	0.98	11	0.077	0.67	8.8	18	62	0.49	0.14
Selenium		2.3	0.0019	0.98	0.056	0.093	10.5	0.13	3.1	0.98	3.7	0.077	0.67	2.5	0.29	0.58	8.7	4.4
Silver		23	0.0019	0.98	0.55	0.093	4.6	0.13	14	0.98	16	0.077	0.67	11	104	0.22	0.11	51
SVOCs																		
Benzo (a) pyrene	0.14		0.0019	0.98	0.0034	0.093	0.43	0.13	0.0078	0.98	0.0093	0.077	0.67	0.0085	1.1	1.2	0.0077	0.0071
Benzo (b) fluoranthene	0.30		0.0019	0.98	0.0073	0.093	0.90	0.13	0.035	0.98	0.042	0.077	0.67	0.033	1.1	1.2	0.030	0.027
Benzo (ghi) perylene	0.12		0.0019	0.98	0.0029	0.093	0.90	0.13	0.014	0.98	0.017	0.077	0.67	0.013	1.1	1.2	0.012	0.011
Chrysene	0.34		0.0019	0.98	0.0082	0.093	0.90	0.13	0.040	0.98	0.047	0.077	0.67	0.037	1.1	6.0	0.034	0.0062
Fluoranthene	0.13		0.0019	0.98	0.0031	0.093	0.70	0.13	0.012	0.98	0.014	0.077	0.67	0.011	1.1	6.0	0.010	0.0019
Fluorene	0.13		0.0019	0.98	0.0031	0.093	0.70	0.13	0.012	0.98	0.014	0.077	0.67	0.011	1.1	3.0	0.010	0.0038
Indeno (1,2,3-cd) pyrene	0.15		0.0019	0.98	0.0036	0.093	0.90	0.13	0.018	0.98	0.021	0.077	0.67	0.016	1.1	1.2	0.015	0.014
Pyrene	0.13		0.0019	0.98	0.0031	0.093	0.70	0.13	0.012	0.98	0.014	0.077	0.67	0.011	1.1	1.5	0.010	0.0077

Hazard Index - Detected Compounds	12625	1260
Hazard Index - Detected Compounds w/Detection Limits	12635	1316

NOTES:
(a) - The maximum concentration is the maximum detected concentration per SWMU.
(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.
(c) - Sample and Suter, 1994.
(d) - See Attachment O, Table O-1.
(e) - See Table 4-15.
(f) - Markwell *et al.*, 1989.
(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.
(h) - Based on site use from March through November.
(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-6b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Average Concentrations
SWMU S- 6
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	254		0.0019	0.98	6.1	0.093	4.6	0.13	152	0.98	180	0.077	0.67	125	0.015	0.15	8253	825
Lead	2315		0.0019	0.98	56	0.093	0.69	0.13	208	0.98	246	0.077	0.67	202	0.88	9.4	230	22
Nickel		90	0.0019	0.98	2.2	0.093	0.78	0.13	9.1	0.98	11	0.077	0.67	8.7	18	62	0.49	0.14
Selenium		1.4	0.0019	0.98	0.034	0.093	10.5	0.13	1.9	0.98	2.3	0.077	0.67	1.5	0.29	0.58	5.3	2.6
Silver		23	0.0019	0.98	0.56	0.093	4.6	0.13	14	0.98	16	0.077	0.67	11	104	0.22	0.11	52
SVOCs																		
Benzo (a) pyrene	0.22		0.0019	0.98	0.0053	0.093	0.43	0.13	0.012	0.98	0.015	0.077	0.67	0.013	1.1	1.2	0.012	0.011
Benzo (b) fluoranthene	0.22		0.0019	0.98	0.0052	0.093	0.90	0.13	0.025	0.98	0.030	0.077	0.67	0.023	1.1	1.2	0.022	0.019
Benzo (ghi) perylene	0.21		0.0019	0.98	0.0051	0.093	0.90	0.13	0.025	0.98	0.029	0.077	0.67	0.023	1.1	1.2	0.021	0.019
Chrysene	0.24		0.0019	0.98	0.0057	0.093	0.90	0.13	0.027	0.98	0.033	0.077	0.67	0.026	1.1	6.0	0.024	0.0042
Fluoranthene	0.22		0.0019	0.98	0.0052	0.093	0.70	0.13	0.020	0.98	0.023	0.077	0.67	0.019	1.1	6.0	0.017	0.0031
Fluorene	0.21		0.0019	0.98	0.0052	0.093	0.70	0.13	0.019	0.98	0.023	0.077	0.67	0.019	1.1	3.0	0.017	0.0062
Indeno (1,2,3-cd) pyrene	0.23		0.0019	0.98	0.0054	0.093	0.90	0.13	0.026	0.98	0.031	0.077	0.67	0.025	1.1	1.2	0.023	0.020
Pyrene	0.22		0.0019	0.98	0.0052	0.093	0.70	0.13	0.020	0.98	0.023	0.077	0.67	0.019	1.1	1.5	0.017	0.013

Hazard Index - Detected Compounds	8484	847
Hazard Index - Detected Compounds w/Detection Limits	8490	901

NOTES:
(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.
(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.
(c) - Sample and Suter, 1994.
(d) - See Attachment O, Table O-1.
(e) - See Table 4-15.
(f) - Markwell *et al.*, 1989.
(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.
(h) - Based on site use from March through November.
(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-7a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Maximum Concentrations
SWMU S-7/S-20
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
Metals															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Chromium	299		0.0019	1	7.4	0.093	0.49	0.13	19	1	23	0.077	0.67	20	0.58	0.97	35	21
Lead	968		0.0019	1	24	0.093	0.69	0.13	87	1	105	0.077	0.67	86	0.88	9.4	98	9.2
Mercury	0.71		0.0019	1	0.018	0.093	1.32	0.13	0.12	1	0.15	0.077	0.67	0.11	0.37	0.75	0.30	0.15
Nickel	62		0.0019	1	1.5	0.093	0.78	0.13	6.3	1	7.6	0.077	0.67	6.1	18	62	0.34	0.099
Selenium	8.9		0.0019	1	0.22	0.093	10.5	0.13	12	1	15	0.077	0.67	10	0.29	0.58	34	17
Thallium	7.2		0.0019	1	0.18	0.093	4.6	0.13	4.3	1	5.2	0.077	0.67	3.6	0.34	0.0045	11	801
VOCs																		
Trichloroethene	0.015		0.0019	1	0.00037	0.093	0.70	0.13	0.0014	1	0.0016	0.077	0.67	0.0014	0.085	0.85	0.016	0.0016
SVOCs																		
bis (2-Ethylhexyl) phthalate	0.048		0.0019	1	0.0012	0.093	0.70	0.13	0.0044	1	0.0053	0.077	0.67	0.0043	0.64	0.74	0.0068	0.0058
Chrysene	0.060		0.0019	1	0.0015	0.093	0.90	0.13	0.0070	1	0.0085	0.077	0.67	0.0067	1.1	6.0	0.0061	0.0011
Fluoranthene	0.083		0.0019	1	0.0020	0.093	0.70	0.13	0.0076	1	0.0091	0.077	0.67	0.0075	1.1	6.0	0.0068	0.0012
Naphthalene	0.049		0.0019	1	0.0012	0.093	0.70	0.13	0.0045	1	0.0054	0.077	0.67	0.0044	1.1	1.0	0.0040	0.0044
Phenanthrene	0.054		0.0019	1	0.0013	0.093	0.70	0.13	0.0049	1	0.0059	0.077	0.67	0.0049	1.1	1.5	0.0044	0.0032
Pyrene	0.053		0.0019	1	0.0013	0.093	0.70	0.13	0.0048	1	0.0058	0.077	0.67	0.0048	1.1	1.5	0.0043	0.0032

Hazard Index - Detected Compounds	179	848
Hazard Index - Detected Compounds w/Detection Limits	179	848

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - Based on site use from March through November.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-7b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Average Concentrations
SWMU S-7/S-20
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	269		0.0019	1	6.6	0.093	0.49	0.13	17	1	21	0.077	0.67	18	0.58	0.97	31	19
Lead	542		0.0019	1	13	0.093	0.69	0.13	49	1	59	0.077	0.67	48	0.88	9.4	55	5.2
Mercury	0.19		0.0019	1	0.0047	0.093	1.32	0.13	0.033	1	0.039	0.077	0.67	0.030	0.37	0.75	0.079	0.040
Nickel	57		0.0019	1	1.4	0.093	0.78	0.13	5.8	1	7.0	0.077	0.67	5.6	18	62	0.32	0.090
Selenium	3.8		0.0019	1	0.094	0.093	10.5	0.13	5.2	1	6.3	0.077	0.67	4.3	0.29	0.58	15	7.3
Thallium	3.3		0.0019	1	0.081	0.093	4.6	0.13	2.0	1	2.4	0.077	0.67	1.7	0.34	0.0045	4.9	366
VOCs																		
Trichloroethene	0.0078		0.0019	1	0.00019	0.093	0.70	0.13	0.00071	1	0.00086	0.077	0.67	0.00070	0.085	0.85	0.0083	0.00083
SVOCs																		
bis (2-Ethylhexyl) phthalate	0.13		0.0019	1	0.0032	0.093	0.70	0.13	0.012	1	0.014	0.077	0.67	0.012	0.64	0.74	0.018	0.016
Chrysene	0.14		0.0019	1	0.0035	0.093	0.90	0.13	0.016	1	0.020	0.077	0.67	0.016	1.1	6.0	0.014	0.0026
Fluoranthene	0.11		0.0019	1	0.0027	0.093	0.70	0.13	0.0099	1	0.012	0.077	0.67	0.0098	1.1	6.0	0.0091	0.0016
Naphthalene	0.18		0.0019	1	0.0045	0.093	0.70	0.13	0.017	1	0.020	0.077	0.67	0.016	1.1	1.0	0.015	0.016
Phenanthrene	0.18		0.0019	1	0.0044	0.093	0.70	0.13	0.016	1	0.019	0.077	0.67	0.016	1.1	1.5	0.015	0.011
Pyrene	0.18		0.0019	1	0.0044	0.093	0.70	0.13	0.016	1	0.019	0.077	0.67	0.016	1.1	1.5	0.015	0.011

Hazard Index - Detected Compounds	106	397
Hazard Index - Detected Compounds w/Detection Limits	106	397

NOTES:
(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.
(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.
(c) - Sample and Suter, 1994.
(d) - See Attachment O, Table O-1.
(e) - See Table 4-15.
(f) - Markwell *et al.*, 1989.
(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.
(h) - Based on site use from March through November.
(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-8a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Maximum Concentrations
SWMU S-8
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
Metals															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Arsenic	74		0.0019	1	1.8	0.093	1.16	0.13	11	1	14	0.077	0.67	10	0.28	0.70	37	15
Barium	252		0.0019	1	6.2	0.093	0.36	0.13	12	1	14	0.077	0.67	14	23	45	0.60	0.30
Cadmium	50		0.0019	1	1.2	0.093	4.6	0.13	30	1	36	0.077	0.67	25	0.85	12	29	2.1
Chromium	436		0.0019	1	11	0.093	0.49	0.13	28	1	34	0.077	0.67	30	0.58	0.97	51	31
Lead	2160		0.0019	1	53	0.093	0.69	0.13	194	1	234	0.077	0.67	192	0.88	9.4	219	20
Selenium		1.4	0.0019	1	0.033	0.093	10.5	0.13	1.8	1	2.2	0.077	0.67	1.5	0.29	0.58	5.2	2.6
Thallium	23		0.0019	1	0.57	0.093	4.6	0.13	14	1	17	0.077	0.67	11	0.34	0.0045	34	2547
VOCs																		
Methylene chloride	0.0060		0.0019	1	0.00015	0.093	0.70	0.13	0.00055	1	0.00066	0.077	0.67	0.00054	0.43	3.7	0.00126	0.000146
SVOCs																		
Anthracene	0.80		0.0019	1	0.020	0.093	0.70	0.13	0.073	1	0.088	0.077	0.67	0.072	1.1	6.0	0.066	0.012
Benzo (a) anthracene	2.1		0.0019	1	0.052	0.093	0.90	0.13	0.25	1	0.30	0.077	0.67	0.23	0.86	0.24	0.27	1.0
Benzo (a) pyrene	1.3		0.0019	1	0.032	0.093	0.43	0.13	0.073	1	0.088	0.077	0.67	0.080	1.1	1.2	0.073	0.067
Benzo (b) fluoranthene	1.9		0.0019	1	0.047	0.093	0.90	0.13	0.22	1	0.27	0.077	0.67	0.21	1.1	1.2	0.19	0.18
Benzo (ghi) perylene	0.95		0.0019	1	0.023	0.093	0.90	0.13	0.11	1	0.13	0.077	0.67	0.11	1.1	1.2	0.10	0.088
Benzo (k) fluoranthene	1.9		0.0019	1	0.047	0.093	0.90	0.13	0.22	1	0.27	0.077	0.67	0.21	0.15	1.2	1.4	0.18
Chrysene	2.4		0.0019	1	0.059	0.093	0.90	0.13	0.28	1	0.34	0.077	0.67	0.27	1.1	6.0	0.24	0.044
Dibenzo(a,h)anthracene	0.40		0.0019	1	0.0099	0.093	0.90	0.13	0.047	1	0.057	0.077	0.67	0.044	0.42	1.2	0.11	0.037
Fluoranthene	5.3		0.0019	1	0.13	0.093	0.70	0.13	0.48	1	0.58	0.077	0.67	0.48	1.1	6.0	0.43	0.080
Indeno (1,2,3-cd) pyrene	1.0		0.0019	1	0.025	0.093	0.90	0.13	0.12	1	0.14	0.077	0.67	0.11	1.1	1.2	0.10	0.093
Naphthalene	0.39		0.0019	1	0.0096	0.093	0.70	0.13	0.035	1	0.043	0.077	0.67	0.035	1.1	1.0	0.032	0.035
Phenanthrene	3.3		0.0019	1	0.081	0.093	0.70	0.13	0.30	1	0.36	0.077	0.67	0.30	1.1	1.5	0.27	0.20
Pyrene	3.4		0.0019	1	0.084	0.093	0.70	0.13	0.31	1	0.37	0.077	0.67	0.31	1.1	1.5	0.28	0.20

Hazard Index - Detected Compounds	374	2617
Hazard Index - Detected Compounds w/Detection Limits	379	2620

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - Based on site use from March through November.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-8b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Average Concentrations
SWMU S-8
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Arsenic	43		0.0019	1	1.1	0.093	1.16	0.13	6.5	1	7.8	0.077	0.67	6.0	0.28	0.70	21	8.5
Barium	146		0.0019	1	3.6	0.093	0.36	0.13	6.8	1	8.3	0.077	0.67	7.9	23	45	0.35	0.18
Cadmium	29		0.0019	1	0.72	0.093	4.6	0.13	17	1	21	0.077	0.67	15	0.85	12	17	1.2
Chromium	372		0.0019	1	9.2	0.093	0.49	0.13	24	1	29	0.077	0.67	25	0.58	0.97	43	26
Lead	1224		0.0019	1	30	0.093	0.69	0.13	110	1	133	0.077	0.67	109	0.88	9.4	124	12
Selenium		0.82	0.0019	1	0.020	0.093	10.5	0.13	1.1	1	1.4	0.077	0.67	0.92	0.29	0.58	3.1	1.6
Thallium	15		0.0019	1	0.37	0.093	4.6	0.13	9.0	1	11	0.077	0.67	7.5	0.34	0.0045	22	1662
VOCs																		
Methylene chloride	0.0058		0.0019	1	0.00014	0.093	0.70	0.13	0.00053	1	0.00064	0.077	0.67	0.00052	0.43	3.7	0.0012	0.000142
SVOCs																		
Anthracene	0.50		0.0019	1	0.012	0.093	0.70	0.13	0.045	1	0.055	0.077	0.67	0.045	1.1	6.0	0.041	0.0074
Benzo (a) anthracene	1.2		0.0019	1	0.030	0.093	0.90	0.13	0.14	1	0.17	0.077	0.67	0.14	0.86	0.24	0.16	0.56
Benzo (a) pyrene	0.86		0.0019	1	0.021	0.093	0.43	0.13	0.048	1	0.058	0.077	0.67	0.053	1.1	1.2	0.049	0.044
Benzo (b) fluoranthene	1.2		0.0019	1	0.030	0.093	0.90	0.13	0.14	1	0.17	0.077	0.67	0.14	1.1	1.2	0.12	0.11
Benzo (ghi) perylene	0.66		0.0019	1	0.016	0.093	0.90	0.13	0.077	1	0.093	0.077	0.67	0.073	1.1	1.2	0.068	0.061
Benzo (k) fluoranthene	1.1		0.0019	1	0.026	0.093	0.90	0.13	0.12	1	0.15	0.077	0.67	0.12	0.15	1.2	0.77	0.10
Chrysene	1.4		0.0019	1	0.034	0.093	0.90	0.13	0.16	1	0.20	0.077	0.67	0.16	1.1	6.0	0.14	0.026
Dibenzo(a,h)anthracene	0.30		0.0019	1	0.0074	0.093	0.90	0.13	0.035	1	0.042	0.077	0.67	0.033	0.42	1.2	0.078	0.027
Fluoranthene	2.9		0.0019	1	0.072	0.093	0.70	0.13	0.26	1	0.32	0.077	0.67	0.26	1.1	6.0	0.24	0.043
Indeno (1,2,3-cd) pyrene	0.69		0.0019	1	0.017	0.093	0.90	0.13	0.080	1	0.097	0.077	0.67	0.076	1.1	1.2	0.070	0.063
Naphthalene	0.29		0.0019	1	0.0072	0.093	0.70	0.13	0.027	1	0.032	0.077	0.67	0.026	1.1	1.0	0.024	0.025
Phenanthrene	1.8		0.0019	1	0.043	0.093	0.70	0.13	0.16	1	0.19	0.077	0.67	0.16	1.1	1.5	0.15	0.11
Pyrene	1.9		0.0019	1	0.047	0.093	0.70	0.13	0.17	1	0.21	0.077	0.67	0.17	1.1	1.5	0.16	0.11

Hazard Index - Detected Compounds	231	1711
Hazard Index - Detected Compounds w/Detection Limits	234	1712

NOTES:
(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.
(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.
(c) - Sample and Suter, 1994.
(d) - See Attachment O, Table O-1.
(e) - See Table 4-15.
(f) - Markwell *et al.*, 1989.
(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.
(h) - Based on site use from March through November.
(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient

Table S-9a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Maximum Concentrations
SWMU S-11
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (e) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	203		0.0019	1	5.0	0.093	0.49	0.13	13	1	16	0.077	0.67	14	0.58	0.97	24	14
Lead	355		0.0019	1	8.8	0.093	0.69	0.13	32	1	38	0.077	0.67	32	0.88	9.4	36	3.4
Nickel	36		0.0019	1	0.88	0.093	0.78	0.13	3.6	1	4.3	0.077	0.67	3.5	18	62	0.19	0.056
Selenium	5.7		0.0019	1	0.14	0.093	10.5	0.13	7.8	1	9.4	0.077	0.67	6.4	0.29	0.58	22	11
Thallium	7.1		0.0019	1	0.18	0.093	4.6	0.13	4.2	1	5.1	0.077	0.67	3.6	0.34	0.0045	10	790
VOCs																		
Trichloroethene	0.0080		0.0019	1	0.00020	0.093	0.70	0.13	0.00073	1	0.00088	0.077	0.67	0.00072	0.085	0.85	0.0085	0.00085
SVOCs																		
Acenaphthylene	2.4		0.0019	1	0.059	0.093	0.70	0.13	0.22	1	0.26	0.077	0.67	0.22	1.1	8.5	0.20	0.025
Anthracene	2.4		0.0019	1	0.059	0.093	0.70	0.13	0.22	1	0.26	0.077	0.67	0.22	1.1	6.0	0.20	0.036
Benzo (a) anthracene	8.9		0.0019	1	0.22	0.093	0.90	0.13	1.0	1	1.3	0.077	0.67	0.99	0.86	0.24	1.2	4.1
Benzo (a) pyrene	10		0.0019	1	0.25	0.093	0.43	0.13	0.56	1	0.68	0.077	0.67	0.62	1.1	1.2	0.56	0.51
Chrysene	10		0.0019	1	0.25	0.093	0.90	0.13	1.2	1	1.4	0.077	0.67	1.1	1.1	6.0	1.0	0.19
Fluoranthene	24		0.0019	1	0.59	0.093	0.70	0.13	2.2	1	2.6	0.077	0.67	2.2	1.1	6.0	2.0	0.36
Fluorene	1.1		0.0019	1	0.027	0.093	0.70	0.13	0.10	1	0.12	0.077	0.67	0.099	1.1	3.0	0.090	0.033
Naphthalene	0.50		0.0019	1	0.012	0.093	0.70	0.13	0.046	1	0.055	0.077	0.67	0.045	1.1	1.0	0.041	0.045
Phenanthrene	14		0.0019	1	0.35	0.093	0.70	0.13	1.3	1	1.5	0.077	0.67	1.3	1.1	1.5	1.1	0.84
Pyrene	17		0.0019	1	0.42	0.093	0.70	0.13	1.5	1	1.9	0.077	0.67	1.5	1.1	1.5	1.4	1.0

Hazard Index - Detected Compounds	100	825
Hazard Index - Detected Compounds w/Detection Limits	100	825

NOTES:
(a) - The maximum concentration is the maximum detected concentration per SWMU.
(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.
(c) - Sample and Suter, 1994.
(d) - See Attachment O, Table O-1.
(e) - See Table 4-15.
(f) - Markwell *et al.*, 1989.
(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.
(h) - Based on site use from March through November.
(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-9b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Average Concentrations
SWMU S-11
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
Metals															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Chromium	203		0.0019	1	5.0	0.093	0.49	0.13	13	1	16	0.077	0.67	14	0.58	0.97	24	14
Lead	285		0.0019	1	7.0	0.093	0.69	0.13	26	1	31	0.077	0.67	25	0.88	9.4	29	2.7
Nickel	33		0.0019	1	0.81	0.093	0.78	0.13	3.3	1	4.0	0.077	0.67	3.3	18	62	0.18	0.052
Selenium	5.2		0.0019	1	0.13	0.093	10.5	0.13	7.1	1	8.6	0.077	0.67	5.8	0.29	0.58	20	10
Thallium	6.9		0.0019	1	0.17	0.093	4.6	0.13	4.1	1	5.0	0.077	0.67	3.5	0.34	0.0045	10	764
VOCs																		
Trichloroethene	0.008		0.0019	1	0.00019	0.093	0.70	0.13	0.00070	1	0.00085	0.077	0.67	0.00069	0.085	0.85	0.0082	0.00082
SVOCs																		
Acenaphthylene	1.9		0.0019	1	0.046	0.093	0.70	0.13	0.17	1	0.20	0.077	0.67	0.17	1.1	8.5	0.15	0.020
Anthracene	1.9		0.0019	1	0.046	0.093	0.70	0.13	0.17	1	0.20	0.077	0.67	0.17	1.1	6.0	0.15	0.028
Benzo (a) anthracene	7.1		0.0019	1	0.18	0.093	0.90	0.13	0.83	1	1.0	0.077	0.67	0.79	0.86	0.24	0.92	3.3
Benzo (a) pyrene	8.1		0.0019	1	0.20	0.093	0.43	0.13	0.45	1	0.55	0.077	0.67	0.50	1.1	1.2	0.46	0.41
Chrysene	8.2		0.0019	1	0.20	0.093	0.90	0.13	0.96	1	1.2	0.077	0.67	0.91	1.1	6.0	0.84	0.15
Fluoranthene	20		0.0019	1	0.48	0.093	0.70	0.13	1.8	1	2.1	0.077	0.67	1.8	1.1	6.0	1.6	0.29
Fluorene	0.88		0.0019	1	0.022	0.093	0.70	0.13	0.080	1	0.097	0.077	0.67	0.079	1.1	3.0	0.073	0.026
Naphthalene	1.2		0.0019	1	0.030	0.093	0.70	0.13	0.11	1	0.13	0.077	0.67	0.11	1.1	1.0	0.10	0.11
Phenanthrene	12		0.0019	1	0.29	0.093	0.70	0.13	1.1	1	1.3	0.077	0.67	1.1	1.1	1.5	1.0	0.72
Pyrene	14		0.0019	1	0.35	0.093	0.70	0.13	1.3	1	1.5	0.077	0.67	1.3	1.1	1.5	1.2	0.84

Hazard Index - Detected Compounds	90	797
Hazard Index - Detected Compounds w/Detection Limits	90	797

NOTES:
(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.
(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.
(c) - Sample and Suter, 1994.
(d) - See Attachment O, Table O-1.
(e) - See Table 4-15.
(f) - Markwell *et al.*, 1989.
(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.
(h) - Based on site use from March through November.
(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-10a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Maximum Concentrations
SWMU S-21
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
Metals															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Antimony	78		0.0019	0.37	0.71	0.093	4.6	0.13	47	0.37	21	0.077	0.67	14	0.015	0.15	964	96
Arsenic	61		0.0019	0.37	0.55	0.093	1.16	0.13	9.1	0.37	4.1	0.077	0.67	3.1	0.28	0.70	11	4.4
Barium	124		0.0019	0.37	1.1	0.093	0.36	0.13	5.8	0.37	2.6	0.077	0.67	2.5	23	45	0.11	0.055
Chromium	292		0.0019	0.37	2.7	0.093	0.49	0.13	19	0.37	8.3	0.077	0.67	7.4	0.58	0.97	13	7.6
Lead	1650		0.0019	0.37	15	0.093	0.69	0.13	148	0.37	66	0.077	0.67	54	0.88	9.4	62	5.8
Mercury	0.34		0.0019	0.37	0.0031	0.093	1.32	0.13	0.058	0.37	0.026	0.077	0.67	0.020	0.37	0.75	0.053	0.026
Nickel	356		0.0019	0.37	3.3	0.093	0.78	0.13	36	0.37	16	0.077	0.67	13	18	62	0.72	0.21
Thallium		1.2	0.0019	0.37	0.010	0.093	4.6	0.13	0.69	0.37	0.31	0.077	0.67	0.21	0.34	0.0045	0.63	47
SVOCs																		
Benzo (a) anthracene	0.80		0.0019	0.37	0.0073	0.093	0.90	0.13	0.094	0.37	0.042	0.077	0.67	0.033	0.86	0.24	0.038	0.14
Benzo (a) pyrene	0.55		0.0019	0.37	0.0050	0.093	0.43	0.13	0.031	0.37	0.014	0.077	0.67	0.013	1.1	1.2	0.011	0.010
Benzo (b) fluoranthene	1.1		0.0019	0.37	0.010	0.093	0.90	0.13	0.13	0.37	0.058	0.077	0.67	0.045	1.1	1.2	0.04	0.038
Benzo (ghi) perylene	0.39		0.0019	0.37	0.0036	0.093	0.90	0.13	0.046	0.37	0.020	0.077	0.67	0.016	1.1	1.2	0.015	0.013
Benzo (k) fluoranthene	0.33		0.0019	0.37	0.0030	0.093	0.90	0.13	0.039	0.37	0.017	0.077	0.67	0.014	0.15	1.2	0.09	0.011
bis (2-Ethylhexyl) phthalate	0.30		0.0019	0.37	0.0027	0.093	0.70	0.13	0.027	0.37	0.012	0.077	0.67	0.010	0.64	0.74	0.016	0.014
Chrysene	0.51		0.0019	0.37	0.0047	0.093	0.90	0.13	0.060	0.37	0.027	0.077	0.67	0.021	1.1	6.0	0.019	0.0035
Fluoranthene	0.81		0.0019	0.37	0.0074	0.093	0.70	0.13	0.074	0.37	0.033	0.077	0.67	0.027	1.1	6.0	0.025	0.0045
Indeno (1,2,3-cd) pyrene	0.48		0.0019	0.37	0.0044	0.093	0.90	0.13	0.056	0.37	0.025	0.077	0.67	0.020	1.1	1.2	0.018	0.016
Naphthalene	0.27		0.0019	0.37	0.0025	0.093	0.70	0.13	0.025	0.37	0.011	0.077	0.67	0.0090	1.1	1.0	0.008	0.0090
Phenanthrene	0.40		0.0019	0.37	0.0037	0.093	0.70	0.13	0.036	0.37	0.016	0.077	0.67	0.013	1.1	1.5	0.012	0.0089
Pyrene	0.78		0.0019	0.37	0.0071	0.093	0.70	0.13	0.071	0.37	0.032	0.077	0.67	0.026	1.1	1.5	0.024	0.017

Hazard Index - Detected Compounds	1051	115
Hazard Index - Detected Compounds w/Detection Limits	1052	162

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - Based on site use from March through November.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-10b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Average Concentrations
SWMU S-21
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/dny)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	78		0.0019	0.37	0.71	0.093	4.6	0.13	47	0.37	21	0.077	0.67	14	0.015	0.15	957	96
Arsenic	61		0.0019	0.37	0.56	0.093	1.16	0.13	9.2	0.37	4.1	0.077	0.67	3.1	0.28	0.70	11	4.4
Barium	124		0.0019	0.37	1.1	0.093	0.36	0.13	5.8	0.37	2.6	0.077	0.67	2.5	23	45	0.11	0.055
Chromium	292		0.0019	0.37	2.7	0.093	0.49	0.13	19	0.37	8.3	0.077	0.67	7.4	0.58	0.97	13	7.6
Lead	1650		0.0019	0.37	15	0.093	0.69	0.13	148	0.37	66	0.077	0.67	54	0.88	9.4	62	5.8
Mercury	0.34		0.0019	0.37	0.0031	0.093	1.32	0.13	0.058	0.37	0.026	0.077	0.67	0.020	0.37	0.75	0.052	0.026
Nickel	356		0.0019	0.37	3.3	0.093	0.78	0.13	36	0.37	16	0.077	0.67	13	18	62	0.74	0.21
Thallium		1.2	0.0019	0.37	0.011	0.093	4.6	0.13	0.72	0.37	0.32	0.077	0.67	0.22	0.34	0.0045	0.66	49
SVOCs																		
Benzo (a) anthracene	0.80		0.0019	0.37	0.0073	0.093	0.90	0.13	0.094	0.37	0.042	0.077	0.67	0.033	0.86	0.24	0.038	0.14
Benzo (a) pyrene	0.55		0.0019	0.37	0.0050	0.093	0.43	0.13	0.031	0.37	0.014	0.077	0.67	0.013	1.1	1.2	0.012	0.010
Benzo (b) fluoranthene	1.1		0.0019	0.37	0.010	0.093	0.90	0.13	0.13	0.37	0.058	0.077	0.67	0.045	1.1	1.2	0.042	0.037
Benzo (ghi) perylene	0.39		0.0019	0.37	0.0036	0.093	0.90	0.13	0.046	0.37	0.020	0.077	0.67	0.016	1.1	1.2	0.015	0.013
Benzo (k) fluoranthene	0.33		0.0019	0.37	0.0030	0.093	0.90	0.13	0.039	0.37	0.017	0.077	0.67	0.014	0.15	1.2	0.089	0.011
bis (2-Ethylhexyl) phthalate	0.30		0.0019	0.37	0.0027	0.093	0.70	0.13	0.027	0.37	0.012	0.077	0.67	0.010	0.64	0.74	0.016	0.013
Chrysene	0.51		0.0019	0.37	0.0047	0.093	0.90	0.13	0.060	0.37	0.027	0.077	0.67	0.021	1.1	6.0	0.019	0.0035
Fluoranthene	0.81		0.0019	0.37	0.0074	0.093	0.70	0.13	0.074	0.37	0.033	0.077	0.67	0.027	1.1	6.0	0.025	0.0045
Indeno (1,2,3-cd) pyrene	0.48		0.0019	0.37	0.0044	0.093	0.90	0.13	0.056	0.37	0.025	0.077	0.67	0.020	1.1	1.2	0.018	0.016
Naphthalene	0.27		0.0019	0.37	0.0025	0.093	0.70	0.13	0.025	0.37	0.011	0.077	0.67	0.0090	1.1	1.0	0.0083	0.0086
Phenanthrene	0.40		0.0019	0.37	0.0037	0.093	0.70	0.13	0.036	0.37	0.016	0.077	0.67	0.013	1.1	1.5	0.012	0.0090
Pyrene	0.78		0.0019	0.37	0.0071	0.093	0.70	0.13	0.071	0.37	0.032	0.077	0.67	0.026	1.1	1.5	0.024	0.017

Hazard Index - Detected Compounds	1044	114
Hazard Index - Detected Compounds w/Detection Limits	1045	163

NOTES:
(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.
(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.
(c) - Sample and Suter, 1994.
(d) - See Attachment O, Table O-1.
(e) - See Table 4-15.
(f) - Markwell *et al.*, 1989.
(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.
(h) - Based on site use from March through November.
(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient

Table S-11a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Maximum Concentrations
SWMU S-22
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Arsenic	47		0.0019	1	1.2	0.093	1.16	0.13	7.1	1	8.5	0.077	0.67	6.5	0.28	0.70	23	9.3
Chromium	29		0.0019	1	0.71	0.093	0.49	0.13	1.8	1	2.2	0.077	0.67	2.0	0.58	0.97	3.4	2.0
Lead	140		0.0019	1	3.5	0.093	0.69	0.13	13	1	15	0.077	0.67	12	0.88	9.4	14	1.3
Mercury	140		0.0019	1	3.5	0.093	1.32	0.13	24	1	29	0.077	0.67	22	0.37	0.75	59	29
Selenium	37		0.0019	1	0.92	0.093	10.5	0.13	51	1	61	0.077	0.67	42	0.29	0.58	144	72
Thallium	1.5		0.0019	1	0.037	0.093	4.6	0.13	0.90	1	1.1	0.077	0.67	0.75	0.34	0.0045	2.2	167
VOCs																		
Benzene	1.0		0.0019	1	0.025	0.093	0.70	0.13	0.091	1	0.11	0.077	0.67	0.090	3.2	32	0.028	0.0028
Xylenes, total	1.3		0.0019	1	0.032	0.093	0.70	0.13	0.12	1	0.14	0.077	0.67	0.12	0.25	0.31	0.47	0.38
SVOCs																		
Benzo (a) anthracene	2.2		0.0019	1	0.054	0.093	0.90	0.13	0.26	1	0.31	0.077	0.67	0.24	0.86	0.24	0.28	1.0
Chrysene	3.1		0.0019	1	0.076	0.093	0.90	0.13	0.36	1	0.44	0.077	0.67	0.34	1.1	6.0	0.31	0.057
Fluoranthene	6.1		0.0019	1	0.15	0.093	0.70	0.13	0.56	1	0.67	0.077	0.67	0.55	1.1	6.0	0.50	0.092
Fluorene	1.0		0.0019	1	0.025	0.093	0.70	0.13	0.091	1	0.11	0.077	0.67	0.090	1.10	3.0	0.082	0.030
Naphthalene	6.7		0.0019	1	0.17	0.093	0.70	0.13	0.61	1	0.74	0.077	0.67	0.60	1.1	1.0	0.55	0.60
Phenanthrene	10		0.0019	1	0.25	0.093	0.70	0.13	0.91	1	1.1	0.077	0.67	0.90	1.1	1.5	0.82	0.60
Pyrene	3.1		0.0019	1	0.076	0.093	0.70	0.13	0.28	1	0.34	0.077	0.67	0.28	1.1	1.5	0.25	0.19

Hazard Index - Detected Compounds	249	284
Hazard Index - Detected Compounds w/Detection Limits	249	284

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - Based on site use from March through November.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-11b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Average Concentrations
SWMU S-22
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Arsenic	45		0.0019	1	1.1	0.093	1.16	0.13	6.8	1	8.2	0.077	0.67	6.2	0.28	0.70	22	8.9
Chromium	28		0.0019	1	0.69	0.093	0.49	0.13	1.8	1	2.2	0.077	0.67	1.9	0.58	0.97	3.3	2.0
Lead	118		0.0019	1	2.9	0.093	0.69	0.13	11	1	13	0.077	0.67	11	0.88	9.4	12	1.1
Mercury	88		0.0019	1	2.2	0.093	1.32	0.13	15	1	18	0.077	0.67	14	0.37	0.75	37	18
Selenium	36		0.0019	1	0.89	0.093	10.5	0.13	49	1	59	0.077	0.67	40	0.29	0.58	138	69
Thallium	1.5		0.0019	1	0.037	0.093	4.6	0.13	0.90	1	1.1	0.077	0.67	0.75	0.34	0.0045	2.2	166
VOCs																		
Benzene	0.51		0.0019	1	0.013	0.093	0.70	0.13	0.047	1	0.056	0.077	0.67	0.046	3.2	32	0.015	0.0015
Xylenes, total	0.73		0.0019	1	0.018	0.093	0.70	0.13	0.066	1	0.080	0.077	0.67	0.065	0.25	0.31	0.26	0.21
SVOCs																		
Benzo (a) anthracene	2.1		0.0019	1	0.052	0.093	0.90	0.13	0.25	1	0.30	0.077	0.67	0.23	0.86	0.24	0.27	1.0
Chrysene	2.9		0.0019	1	0.070	0.093	0.90	0.13	0.33	1	0.40	0.077	0.67	0.32	1.1	6.0	0.29	0.052
Fluoranthene	5.9		0.0019	1	0.14	0.093	0.70	0.13	0.53	1	0.64	0.077	0.67	0.53	1.1	6.0	0.49	0.087
Fluorene	1.0		0.0019	1	0.025	0.093	0.70	0.13	0.091	1	0.11	0.077	0.67	0.090	1.1	3.0	0.083	0.030
Naphthalene	6.4		0.0019	1	0.16	0.093	0.70	0.13	0.58	1	0.70	0.077	0.67	0.57	1.1	1.0	0.53	0.55
Phenanthrene	10		0.0019	1	0.25	0.093	0.70	0.13	0.91	1	1.1	0.077	0.67	0.90	1.1	1.5	0.83	0.61
Pyrene	2.9		0.0019	1	0.070	0.093	0.70	0.13	0.26	1	0.31	0.077	0.67	0.26	1.1	1.5	0.24	0.17

Hazard Index - Detected Compounds	218	268
Hazard Index - Detected Compounds w/Detection Limits	218	268

NOTES:
(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.
(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.
(c) - Sample and Suter, 1994.
(d) - See Attachment O, Table O-1.
(e) - See Table 4-15.
(f) - Markwell *et al.*, 1989.
(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.
(h) - Based on site use from March through November.
(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-12a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Maximum Concentrations
SWMU S-27
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	158		0.0019	0.57	2.2	0.093	0.49	0.13	10	0.57	6.9	0.077	0.67	6.1	0.58	0.97	11	6.3
Lead	189		0.0019	0.57	2.7	0.093	0.69	0.13	17	0.57	12	0.077	0.67	9.6	0.88	9.4	11	1.0
Mercury	0.51		0.0019	0.57	0.0072	0.093	1.32	0.13	0.088	0.57	0.060	0.077	0.67	0.045	0.37	0.75	0.12	0.060
Nickel	101		0.0019	0.57	1.4	0.093	0.78	0.13	10	0.57	7.1	0.077	0.67	5.7	18	62	0.32	0.092
Selenium	12		0.0019	0.57	0.17	0.093	10.5	0.13	16	0.57	11	0.077	0.67	7.6	0.29	0.58	26	13
Thallium		3.4	0.0019	0.57	0.047	0.093	4.6	0.13	2.0	0.57	1.4	0.077	0.67	0.96	0.34	0.0045	2.8	212
VOCs																		
Trichloroethene	0.0070		0.0019	0.57	0.000098	0.093	0.70	0.13	0.00064	0.57	0.00044	0.077	0.67	0.00036	0.085	0.85	0.0042	0.00042
SVOCs																		
Acenaphthylene	2.3		0.0019	0.57	0.032	0.093	0.70	0.13	0.21	0.57	0.14	0.077	0.67	0.12	1.1	8.5	0.11	0.014
Benzo (a) anthracene	5.2		0.0019	0.57	0.073	0.093	0.90	0.13	0.61	0.57	0.42	0.077	0.67	0.33	0.86	0.24	0.38	1.4
Benzo (a) pyrene	14		0.0019	0.57	0.20	0.093	0.43	0.13	0.78	0.57	0.54	0.077	0.67	0.49	1.1	1.2	0.45	0.41
Chrysene	7.1		0.0019	0.57	0.10	0.093	0.90	0.13	0.83	0.57	0.57	0.077	0.67	0.45	1.1	6.0	0.41	0.075
Fluoranthene	4.8		0.0019	0.57	0.068	0.093	0.70	0.13	0.44	0.57	0.30	0.077	0.67	0.25	1.1	6.0	0.22	0.041
Naphthalene	2.0		0.0019	0.57	0.028	0.093	0.70	0.13	0.18	0.57	0.13	0.077	0.67	0.10	1.1	1.0	0.093	0.10
Pyrene	6.2		0.0019	0.57	0.087	0.093	0.70	0.13	0.56	0.57	0.39	0.077	0.67	0.32	1.1	1.5	0.29	0.21

Hazard Index - Detected Compounds	50	23
Hazard Index - Detected Compounds w/Detection Limits	53	235

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - Based on site use from March through November.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-12b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Average Concentrations
SWMU S-27
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	144		0.0019	0.57	2.0	0.093	0.49	0.13	9.2	0.57	6.3	0.077	0.67	5.6	0.58	0.97	9.6	5.8
Lead	171		0.0019	0.57	2.4	0.093	0.69	0.13	15	0.57	11	0.077	0.67	8.7	0.88	9.4	9.9	0.93
Mercury	0.41		0.0019	0.57	0.0058	0.093	1.32	0.13	0.070	0.57	0.048	0.077	0.67	0.036	0.37	0.75	0.097	0.049
Nickel	43		0.0019	0.57	0.60	0.093	0.78	0.13	4.4	0.57	3.0	0.077	0.67	2.4	18	62	0.14	0.039
Selenium	10		0.0019	0.57	0.14	0.093	10.5	0.13	14	0.57	9.4	0.077	0.67	6.4	0.29	0.58	22	11
Thallium		3.4	0.0019	0.57	0.048	0.093	4.6	0.13	2.0	0.57	1.4	0.077	0.67	0.97	0.34	0.0045	2.9	215
VOCs																		
Trichloroethene	0.0050		0.0019	0.57	0.000070	0.093	0.70	0.13	0.00046	0.57	0.00031	0.077	0.67	0.00026	0.085	0.85	0.0030	0.00030
SVOCs																		
Acenaphthylene	1.3		0.0019	0.57	0.018	0.093	0.70	0.13	0.12	0.57	0.080	0.077	0.67	0.066	1.1	8.5	0.060	0.0078
Benzo (a) anthracene	2.7		0.0019	0.57	0.039	0.093	0.90	0.13	0.32	0.57	0.22	0.077	0.67	0.17	0.86	0.24	0.20	0.72
Benzo (a) pyrene	7.2		0.0019	0.57	0.10	0.093	0.43	0.13	0.40	0.57	0.28	0.077	0.67	0.25	1.1	1.2	0.23	0.21
Chrysene	3.7		0.0019	0.57	0.052	0.093	0.90	0.13	0.43	0.57	0.30	0.077	0.67	0.24	1.1	6.0	0.22	0.039
Fluoranthene	2.6		0.0019	0.57	0.037	0.093	0.70	0.13	0.24	0.57	0.17	0.077	0.67	0.14	1.1	6.0	0.12	0.022
Naphthalene	1.5		0.0019	0.57	0.021	0.093	0.70	0.13	0.13	0.57	0.092	0.077	0.67	0.076	1.1	1.0	0.070	0.072
Pyrene	3.3		0.0019	0.57	0.046	0.093	0.70	0.13	0.30	0.57	0.20	0.077	0.67	0.17	1.1	1.5	0.15	0.11

Hazard Index - Detected Compounds	43	19
Hazard Index - Detected Compounds w/Detection Limits	46	234

NOTES:
(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.
(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.
(c) - Sample and Suter, 1994.
(d) - See Attachment O, Table O-1.
(e) - See Table 4-15.
(f) - Markwell *et al.*, 1989.
(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.
(h) - Based on site use from March through November.
(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-13a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Maximum Concentrations
SWMU S-24
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Arsenic	53		0.0019	1	1.3	0.093	1.16	0.13	8.1	1	9.7	0.077	0.67	7.4	0.28	0.70	26	11
Chromium	54		0.0019	1	1.3	0.093	0.49	0.13	3.4	1	4.2	0.077	0.67	3.7	0.58	0.97	6.4	3.8
Lead	98		0.0019	1	2.4	0.093	0.69	0.13	8.8	1	11	0.077	0.67	8.7	0.88	9.4	9.9	0.93
Mercury	1.6		0.0019	1	0.039	0.093	1.32	0.13	0.27	1	0.33	0.077	0.67	0.25	0.37	0.75	0.67	0.33
Selenium	20		0.0019	1	0.49	0.093	10.5	0.13	27	1	33	0.077	0.67	22	0.29	0.58	77	38
Thallium	2.3		0.0019	1	0.057	0.093	4.6	0.13	1.4	1	1.7	0.077	0.67	1.2	0.34	0.0045	3.4	256
VOCs																		
Benzene	250		0.0019	1	6.2	0.093	0.70	0.13	23	1	27	0.077	0.67	23	3.2	32	7.0	0.70
Trichloroethene	0.0094		0.0019	1	0.00023	0.093	0.70	0.13	0.00086	1	0.0010	0.077	0.67	0.00085	0.085	0.85	0.010	0.0010
Xylenes, total	320		0.0019	1	7.9	0.093	0.70	0.13	29	1	35	0.077	0.67	29	0.25	0.31	115	93
SVOCs																		
Acenaphthylene	120		0.0019	1	3.0	0.093	0.70	0.13	11	1	13	0.077	0.67	11	1.1	8.5	10	1.3
Anthracene	530		0.0019	1	13	0.093	0.70	0.13	48	1	58	0.077	0.67	48	1.1	6.0	43	8.0
Benzo (a) anthracene	620		0.0019	1	15	0.093	0.90	0.13	73	1	88	0.077	0.67	69	0.86	0.24	80	287
Benzo (a) pyrene	390		0.0019	1	9.6	0.093	0.43	0.13	22	1	26	0.077	0.67	24	1.1	1.2	22	20
Chrysene	560		0.0019	1	14	0.093	0.90	0.13	66	1	79	0.077	0.67	62	1.1	6.0	57	10
Fluoranthene	1600		0.0019	1	39	0.093	0.70	0.13	146	1	176	0.077	0.67	144	1.1	6.0	131	24
Fluorene	900		0.0019	1	22	0.093	0.70	0.13	82	1	99	0.077	0.67	81	1.1	3.0	74	27
Naphthalene	0.36		0.0019	1	0.0089	0.093	0.70	0.13	0.033	1	0.040	0.077	0.67	0.032	1.1	1.0	0.030	0.032
Phenanthrene	3000		0.0019	1	74	0.093	0.70	0.13	273	1	330	0.077	0.67	271	1.1	1.5	246	180
Pyrene	1200		0.0019	1	30	0.093	0.70	0.13	109	1	132	0.077	0.67	108	1.1	1.5	98	72
Pyridine	51		0.0019	1	1.3	0.093	0.70	0.13	4.6	1	5.6	0.077	0.67	4.6	0.074	0.074	62	62

Hazard Index - Detected Compounds	1070	1096
Hazard Index - Detected Compounds w/Detection Limits	1070	1096

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - Based on site use from March through November.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-13b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Average Concentrations
SWMU S-24
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Arsenic	28		0.0019	1	0.70	0.093	1.16	0.13	4.3	1	5.2	0.077	0.67	3.9	0.28	0.70	14	5.6
Chromium	14		0.0019	1	0.35	0.093	0.49	0.13	0.89	1	1.1	0.077	0.67	0.95	0.58	0.97	1.6	0.98
Lead	76		0.0019	1	1.9	0.093	0.69	0.13	6.8	1	8.2	0.077	0.67	6.8	0.88	9.4	7.7	0.72
Mercury	0.87		0.0019	1	0.021	0.093	1.32	0.13	0.15	1	0.18	0.077	0.67	0.14	0.37	0.75	0.36	0.18
Selenium	11		0.0019	1	0.27	0.093	10.5	0.13	15	1	18	0.077	0.67	12	0.29	0.58	42	21
Thallium	2.1		0.0019	1	0.052	0.093	4.6	0.13	1.3	1	1.5	0.077	0.67	1.1	0.34	0.0045	3.1	233
VOCs																		
Benzene	125		0.0019	1	3.1	0.093	0.70	0.13	11	1	14	0.077	0.67	11	3.2	32	3.5	0.35
Trichloroethene	12		0.0019	1	0.30	0.093	0.70	0.13	1.1	1	1.3	0.077	0.67	1.1	0.085	0.85	13	1.3
Xylenes, total	160		0.0019	1	3.9	0.093	0.70	0.13	15	1	18	0.077	0.67	14	0.25	0.31	57	46
SVOCs																		
Acenaphthylene	60		0.0019	1	1.5	0.093	0.70	0.13	5.5	1	6.6	0.077	0.67	5.4	1.1	8.5	5.0	0.64
Anthracene	266		0.0019	1	6.6	0.093	0.70	0.13	24	1	29	0.077	0.67	24	1.1	6.0	22	4.0
Benzo (a) anthracene	311		0.0019	1	7.7	0.093	0.90	0.13	36	1	44	0.077	0.67	35	0.86	0.24	40	143
Benzo (a) pyrene	196		0.0019	1	4.8	0.093	0.43	0.13	11	1	13	0.077	0.67	12	1.1	1.2	11	10
Chrysene	281		0.0019	1	6.9	0.093	0.90	0.13	33	1	40	0.077	0.67	31	1.1	6.0	29	5.2
Fluoranthene	803		0.0019	1	20	0.093	0.70	0.13	73	1	88	0.077	0.67	72	1.1	6.0	67	12
Fluorene	450		0.0019	1	11	0.093	0.70	0.13	41	1	49	0.077	0.67	41	1.1	3.0	37	13
Naphthalene	0.36		0.0019	1	0.0089	0.093	0.70	0.13	0.033	1	0.040	0.077	0.67	0.032	1.1	1.0	0.030	0.031
Phenanthrene	1503		0.0019	1	37	0.093	0.70	0.13	137	1	165	0.077	0.67	135	1.1	1.5	125	92
Pyrene	602		0.0019	1	15	0.093	0.70	0.13	55	1	66	0.077	0.67	54	1.1	1.5	50	36
Pyridine	264		0.0019	1	6.5	0.093	0.70	0.13	24	1	29	0.077	0.67	24	0.074	0.074	322	322

Hazard Index - Detected Compounds	851	947
Hazard Index - Detected Compounds w/Detection Limits	851	947

NOTES:
(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.
(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.
(c) - Sample and Suter, 1994.
(d) - See Attachment O, Table O-1.
(e) - See Table 4-15.
(f) - Markwell *et al.*, 1989.
(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.
(h) - Based on site use from March through November.
(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-14a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Maximum Concentrations
Zone 2 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Sensonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
Metals															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Chromium	218		0.0019	1	5.4	0.093	0.49	0.13	14	1	17	0.077	0.67	15	0.58	0.97	26	15
Lead	1220		0.0019	1	30	0.093	0.69	0.13	109	1	132	0.077	0.67	109	0.88	9.4	124	12
Mercury	0.73		0.0019	1	0.018	0.093	1.32	0.13	0.13	1	0.15	0.077	0.67	0.11	0.37	0.75	0.31	0.15
Selenium	11		0.0019	1	0.27	0.093	10.5	0.13	15	1	18	0.077	0.67	12	0.29	0.58	43	21
Thallium	4.0		0.0019	1	0.099	0.093	4.6	0.13	2.4	1	2.9	0.077	0.67	2.0	0.34	0.0045	5.9	445
VOCs																		
Trichloroethene	0.015		0.0019	1	0.00037	0.093	0.70	0.13	0.0014	1	0.0016	0.077	0.67	0.0014	0.085	0.85	0.016	0.0016
SVOCs																		
Acenaphthylene	0.45		0.0019	1	0.011	0.093	0.70	0.13	0.041	1	0.049	0.077	0.67	0.041	1.10	8.5	0.037	0.0048
Anthracene	0.60		0.0019	1	0.015	0.093	0.70	0.13	0.055	1	0.066	0.077	0.67	0.054	1.1	6.0	0.049	0.0090
Benzo (a) anthracene	3.7		0.0019	1	0.091	0.093	0.90	0.13	0.43	1	0.52	0.077	0.67	0.41	0.86	0.24	0.48	1.7
Benzo (a) pyrene	5.5		0.0019	1	0.14	0.093	0.43	0.13	0.31	1	0.37	0.077	0.67	0.34	1.1	1.2	0.31	0.28
Chrysene	4.5		0.0019	1	0.11	0.093	0.90	0.13	0.53	1	0.64	0.077	0.67	0.50	1.1	6.0	0.45	0.083
Fluoranthene	5.8		0.0019	1	0.14	0.093	0.70	0.13	0.53	1	0.64	0.077	0.67	0.52	1.1	6.0	0.48	0.087
Naphthalene	0.27		0.0019	1	0.0067	0.093	0.70	0.13	0.025	1	0.030	0.077	0.67	0.024	1.1	1.0	0.022	0.024
Phenanthrene	2.6		0.0019	1	0.064	0.093	0.70	0.13	0.24	1	0.29	0.077	0.67	0.23	1.1	1.5	0.21	0.16
Pyrene	4.9		0.0019	1	0.12	0.093	0.70	0.13	0.45	1	0.54	0.077	0.67	0.44	1.1	1.5	0.40	0.29

Hazard Index - Detected Compounds	201	496
Hazard Index - Detected Compounds w/Detection Limits	201	496

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - Based on site use from March through November.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-14b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Average Concentrations
Zone 2 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	168		0.0019	1	4.1	0.093	0.49	0.13	11	1	13	0.077	0.67	11	0.58	0.97	20	12
Lead	841		0.0019	1	21	0.093	0.69	0.13	75	1	91	0.077	0.67	75	0.88	9.4	85	8.0
Mercury	0.55		0.0019	1	0.014	0.093	1.32	0.13	0.094	1	0.11	0.077	0.67	0.085	0.37	0.75	0.23	0.11
Selenium	7.6		0.0019	1	0.19	0.093	10.5	0.13	10	1	13	0.077	0.67	8.5	0.29	0.58	29	15
Thallium	3.8		0.0019	1	0.094	0.093	4.6	0.13	2.3	1	2.7	0.077	0.67	1.9	0.34	0.0045	5.7	421
VOCs																		
Trichloroethene	0.011		0.0019	1	0.00027	0.093	0.70	0.13	0.0010	1	0.0012	0.077	0.67	0.0010	0.085	0.85	0.012	0.0012
SVOCs																		
Acenaphthylene	0.36		0.0019	1	0.0088	0.093	0.70	0.13	0.032	1	0.039	0.077	0.67	0.032	1.1	8.5	0.029	0.0038
Anthracene	0.44		0.0019	1	0.011	0.093	0.70	0.13	0.040	1	0.048	0.077	0.67	0.039	1.1	6.0	0.036	0.0065
Benzo (a) anthracene	2.5		0.0019	1	0.060	0.093	0.90	0.13	0.29	1	0.35	0.077	0.67	0.27	0.86	0.24	0.32	1.1
Benzo (a) pyrene	3.4		0.0019	1	0.084	0.093	0.43	0.13	0.19	1	0.23	0.077	0.67	0.21	1.1	1.2	0.19	0.17
Chrysene	3.0		0.0019	1	0.073	0.093	0.90	0.13	0.35	1	0.42	0.077	0.67	0.33	1.1	6.0	0.30	0.054
Fluoranthene	4.0		0.0019	1	0.097	0.093	0.70	0.13	0.36	1	0.43	0.077	0.67	0.36	1.1	6.0	0.33	0.059
Naphthalene	0.18		0.0019	1	0.0043	0.093	0.70	0.13	0.016	1	0.019	0.077	0.67	0.016	1.1	1.0	0.015	0.015
Phenanthrene	1.9		0.0019	1	0.047	0.093	0.70	0.13	0.17	1	0.21	0.077	0.67	0.17	1.1	1.5	0.16	0.12
Pyrene	3.3		0.0019	1	0.081	0.093	0.70	0.13	0.30	1	0.36	0.077	0.67	0.30	1.1	1.5	0.27	0.20

Hazard Index - Detected Compounds	142	457
Hazard Index - Detected Compounds w/Detection Limits	142	457

NOTES:
(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.
(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.
(c) - Sample and Suter, 1994.
(d) - See Attachment O, Table O-1.
(e) - See Table 4-15.
(f) - Markwell *et al.*, 1989.
(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.
(h) - Based on site use from March through November.
(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-15a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Maximum Concentrations
SWMU S-10
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
Metals															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Chromium	850		0.0019	1	21	0.093	0.49	0.13	54	1	65	0.077	0.67	58	0.58	0.97	100	60
Lead	107		0.0019	1	2.6	0.093	0.69	0.13	9.6	1	12	0.077	0.67	9.5	0.88	9.4	11	1.0
Mercury	0.75		0.0019	1	0.019	0.093	1.32	0.13	0.13	1	0.16	0.077	0.67	0.12	0.37	0.75	0.31	0.16
Selenium	15		0.0019	1	0.38	0.093	10.5	0.13	21	1	25	0.077	0.67	17	0.29	0.58	59	29
Thallium	35		0.0019	1	0.86	0.093	4.6	0.13	21	1	25	0.077	0.67	17	0.34	0.0045	51	3859
VOCs																		
Trichloroethene	0.0029		0.0019	1	0.000072	0.093	0.70	0.13	0.00026	1	0.00032	0.077	0.67	0.00026	0.085	0.85	0.0031	0.00031
SVOCs																		
Acenaphthylene	0.15		0.0019	1	0.0037	0.093	0.70	0.13	0.014	1	0.016	0.077	0.67	0.014	1.1	8.5	0.012	0.0016
Anthracene	0.33		0.0019	1	0.0081	0.093	0.70	0.13	0.030	1	0.036	0.077	0.67	0.030	1.1	6.0	0.027	0.0050
Benzo (a) anthracene	1.2		0.0019	1	0.030	0.093	0.90	0.13	0.14	1	0.17	0.077	0.67	0.13	0.86	0.24	0.16	0.56
Benzo (a) pyrene	1.1		0.0019	1	0.027	0.093	0.43	0.13	0.061	1	0.074	0.077	0.67	0.068	1.1	1.2	0.062	0.057
bis (2-Ethylhexyl) phthalate	0.10		0.0019	1	0.0025	0.093	0.70	0.13	0.0091	1	0.011	0.077	0.67	0.0090	0.64	0.74	0.014	0.012
Chrysene	1.2		0.0019	1	0.030	0.093	0.90	0.13	0.14	1	0.17	0.077	0.67	0.13	1.1	6.0	0.12	0.022
Fluoranthene	22		0.0019	1	0.55	0.093	0.70	0.13	2.0	1	2.4	0.077	0.67	2.0	1.1	6.0	1.8	0.33
Fluorene	0.068		0.0019	1	0.0017	0.093	0.70	0.13	0.0062	1	0.0075	0.077	0.67	0.0061	1.1	3.0	0.0056	0.0020
Naphthalene	0.041		0.0019	1	0.0010	0.093	0.70	0.13	0.0037	1	0.0045	0.077	0.67	0.0037	1.1	1.0	0.0034	0.0037
Phenanthrene	1.3		0.0019	1	0.032	0.093	0.70	0.13	0.12	1	0.14	0.077	0.67	0.12	1.1	1.5	0.11	0.078
Pyrene	1.4		0.0019	1	0.035	0.093	0.70	0.13	0.13	1	0.15	0.077	0.67	0.13	1.1	1.5	0.11	0.084

Hazard Index - Detected Compounds	223	3950
Hazard Index - Detected Compounds w/Detection Limits	223	3950

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - Based on site use from March through November.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-15b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Average Concentrations
SWMU S-10
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	637		0.0019	1	16	0.093	0.49	0.13	41	1	49	0.077	0.67	43	0.58	0.97	74	45
Lead	103		0.0019	1	2.5	0.093	0.69	0.13	9.2	1	11	0.077	0.67	9.2	0.88	9.4	10	0.98
Mercury	0.46		0.0019	1	0.011	0.093	1.32	0.13	0.079	1	0.095	0.077	0.67	0.071	0.37	0.75	0.19	0.096
Selenium	10		0.0019	1	0.25	0.093	10.5	0.13	14	1	16	0.077	0.67	11	0.29	0.58	38	19
Thallium	23		0.0019	1	0.57	0.093	4.6	0.13	14	1	17	0.077	0.67	12	0.34	0.0045	34	2548
VOCs																		
Trichloroethene	0.0030		0.0019	1	0.000074	0.093	0.70	0.13	0.00027	1	0.00033	0.077	0.67	0.00027	0.085	0.85	0.0032	0.00032
SVOCs																		
Acenaphthylene	0.14		0.0019	1	0.0035	0.093	0.70	0.13	0.013	1	0.015	0.077	0.67	0.013	1.1	8.5	0.012	0.0015
Anthracene	0.24		0.0019	1	0.0059	0.093	0.70	0.13	0.022	1	0.026	0.077	0.67	0.022	1.1	6.0	0.020	0.0036
Benzo (a) anthracene	1.0		0.0019	1	0.023	0.093	0.90	0.13	0.11	1	0.13	0.077	0.67	0.11	0.86	0.24	0.12	0.44
Benzo (a) pyrene	0.88		0.0019	1	0.022	0.093	0.43	0.13	0.049	1	0.059	0.077	0.67	0.054	1.1	1.2	0.050	0.045
bis (2-Ethylhexyl) phthalate	0.088		0.0019	1	0.0022	0.093	0.70	0.13	0.0080	1	0.0097	0.077	0.67	0.0079	0.64	0.74	0.012	0.011
Chrysene	0.98		0.0019	1	0.024	0.093	0.90	0.13	0.11	1	0.14	0.077	0.67	0.11	1.1	6.0	0.10	0.018
Fluoranthene	1.6		0.0019	1	0.039	0.093	0.70	0.13	0.15	1	0.18	0.077	0.67	0.14	1.1	6.0	0.13	0.024
Fluorene	0.13		0.0019	1	0.0033	0.093	0.70	0.13	0.012	1	0.015	0.077	0.67	0.012	1.1	3.0	0.011	0.0040
Naphthalene	0.12		0.0019	1	0.0030	0.093	0.70	0.13	0.011	1	0.014	0.077	0.67	0.011	1.1	1.0	0.010	0.011
Phenanthrene	0.94		0.0019	1	0.023	0.093	0.70	0.13	0.085	1	0.10	0.077	0.67	0.084	1.1	1.5	0.078	0.057
Pyrene	1.2		0.0019	1	0.029	0.093	0.70	0.13	0.11	1	0.13	0.077	0.67	0.11	1.1	1.5	0.10	0.07

Hazard Index - Detected Compounds	158	2614
Hazard Index - Detected Compounds w/Detection Limits	158	2614

NOTES:
(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.
(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.
(c) - Sample and Suter, 1994.
(d) - See Attachment O, Table O-1.
(e) - See Table 4-15.
(f) - Markwell *et al.*, 1989.
(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.
(h) - Based on site use from March through November.
(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-16a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Maximum Concentrations
Zone 3 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
Metals															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Barium	125		0.0019	1	3.1	0.093	0.36	0.13	5.9	1	7.1	0.077	0.67	6.8	23	45	0.30	0.15
Chromium	721		0.0019	1	18	0.093	0.49	0.13	46	1	55	0.077	0.67	49	0.58	0.97	85	51
Lead	208		0.0019	1	5.1	0.093	0.69	0.13	19	1	23	0.077	0.67	19	0.88	9.4	21	2.0
Mercury	4.3		0.0019	1	0.11	0.093	1.32	0.13	0.74	1	0.89	0.077	0.67	0.67	0.37	0.75	1.8	0.89
Nickel	134		0.0019	1	3.3	0.093	0.78	0.13	14	1	16	0.077	0.67	13	18	62	0.73	0.21
Selenium	9.7		0.0019	1	0.24	0.093	10.5	0.13	13	1	16	0.077	0.67	11	0.29	0.58	37	19
Thallium	18		0.0019	1	0.45	0.093	4.6	0.13	11	1	13	0.077	0.67	9.2	0.34	0.0045	27	2046
VOCs																		
Trichloroethene	0.015		0.0019	1	0.00037	0.093	0.70	0.13	0.0014	1	0.0016	0.077	0.67	0.0014	0.085	0.85	0.016	0.0016
SVOCs																		
Acenaphthylene	0.16		0.0019	1	0.0039	0.093	0.70	0.13	0.015	1	0.018	0.077	0.67	0.014	1.1	8.5	0.013	0.0017
Anthracene	0.13		0.0019	1	0.0032	0.093	0.70	0.13	0.012	1	0.014	0.077	0.67	0.012	1.1	6.0	0.011	0.0020
Benzo (a) anthracene	0.56		0.0019	1	0.014	0.093	0.90	0.13	0.066	1	0.079	0.077	0.67	0.062	0.86	0.24	0.072	0.26
Benzo (a) pyrene	1.0		0.0019	1	0.025	0.093	0.43	0.13	0.056	1	0.068	0.077	0.67	0.062	1.1	1.2	0.056	0.051
bis (2-Ethylhexyl) phthalate	0.11		0.0019	1	0.0027	0.093	0.70	0.13	0.010	1	0.012	0.077	0.67	0.0099	0.64	0.74	0.015	0.013
Chrysene	0.72		0.0019	1	0.018	0.093	0.90	0.13	0.084	1	0.10	0.077	0.67	0.080	1.1	6.0	0.073	0.013
Fluoranthene	0.85		0.0019	1	0.021	0.093	0.70	0.13	0.077	1	0.093	0.077	0.67	0.077	1.1	6.0	0.070	0.013
Naphthalene	0.046		0.0019	1	0.0011	0.093	0.70	0.13	0.0042	1	0.0051	0.077	0.67	0.0041	1.1	1.0	0.0038	0.0041
Phenanthrene	0.31		0.0019	1	0.0076	0.093	7.00	0.13	0.28	1	0.34	0.077	0.67	0.23	1.1	1.5	0.21	0.16
Pyrene	0.73		0.0019	1	0.018	0.093	0.70	0.13	0.066	1	0.080	0.077	0.67	0.066	1.1	1.5	0.060	0.044

Hazard Index - Detected Compounds	174	2119
Hazard Index - Detected Compounds w/Detection Limits	174	2119

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - Based on site use from March through November.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-16b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Average Concentrations
Zone 3 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Barium	104		0.0019	1	2.6	0.093	0.36	0.13	4.9	1	5.9	0.077	0.67	5.7	23	45	0.25	0.12
Chromium	312		0.0019	1	7.7	0.093	0.49	0.13	20	1	24	0.077	0.67	21	0.58	0.97	36	22
Lead	145		0.0019	1	3.6	0.093	0.69	0.13	13	1	16	0.077	0.67	13	0.88	9.4	15	1.4
Mercury	1.1		0.0019	1	0.027	0.093	1.32	0.13	0.19	1	0.23	0.077	0.67	0.17	0.37	0.75	0.46	0.23
Nickel	53		0.0019	1	1.3	0.093	0.78	0.13	5.4	1	6.5	0.077	0.67	5.2	18	62	0.30	0.084
Selenium	4.5		0.0019	1	0.11	0.093	10.5	0.13	6.1	1	7.4	0.077	0.67	5.0	0.29	0.58	17	8.6
Thallium	11		0.0019	1	0.27	0.093	4.6	0.13	6.6	1	7.9	0.077	0.67	5.5	0.34	0.0045	16	1219
VOCs																		
Trichloroethene	0.0063		0.0019	1	0.00016	0.093	0.70	0.13	0.00057	1	0.00069	0.077	0.67	0.00057	0.085	0.85	0.0067	0.00067
SVOCs																		
Acenaphthylene	0.10		0.0019	1	0.0023	0.093	0.70	0.13	0.0086	1	0.010	0.077	0.67	0.0086	1.1	8.5	0.0079	0.0010
Anthracene	0.19		0.0019	1	0.0047	0.093	0.70	0.13	0.017	1	0.021	0.077	0.67	0.017	1.1	6.0	0.016	0.0028
Benzo (a) anthracene	0.42		0.0019	1	0.010	0.093	0.90	0.13	0.049	1	0.059	0.077	0.67	0.047	0.86	0.24	0.054	0.19
Benzo (a) pyrene	0.61		0.0019	1	0.015	0.093	0.43	0.13	0.034	1	0.041	0.077	0.67	0.037	1.1	1.2	0.034	0.031
bis (2-Ethylhexyl) phthalate	0.09		0.0019	1	0.0021	0.093	0.70	0.13	0.0077	1	0.0093	0.077	0.67	0.0077	0.64	0.74	0.012	0.0103
Chrysene	0.49		0.0019	1	0.012	0.093	0.90	0.13	0.057	1	0.069	0.077	0.67	0.054	1.1	6.0	0.050	0.0090
Fluoranthene	0.61		0.0019	1	0.015	0.093	0.70	0.13	0.056	1	0.067	0.077	0.67	0.055	1.1	6.0	0.051	0.0091
Naphthalene	0.20		0.0019	1	0.0049	0.093	0.70	0.13	0.018	1	0.022	0.077	0.67	0.018	1.1	1.0	0.016	0.017
Phenanthrene	0.22		0.0019	1	0.0053	0.093	7.00	0.13	0.20	1	0.24	0.077	0.67	0.16	1.1	1.5	0.15	0.11
Pyrene	0.54		0.0019	1	0.013	0.093	0.70	0.13	0.049	1	0.059	0.077	0.67	0.048	1.1	1.5	0.044	0.032

Hazard Index - Detected Compounds	86	1251
Hazard Index - Detected Compounds w/Detection Limits	86	1251

NOTES:
(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.
(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.
(c) - Sample and Suter, 1994.
(d) - See Attachment O, Table O-1.
(e) - See Table 4-15.
(f) - Markwell *et al.*, 1989.
(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.
(h) - Based on site use from March through November.
(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-17a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Maximum Concentrations
SWMU S-14
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	45		0.0019	1	1.1	0.093	4.6	0.13	27	1	32	0.077	0.67	22	0.015	0.15	1491	149
Barium	2.8		0.0019	1	0.069	0.093	0.36	0.13	0.13	1	0.16	0.077	0.67	0.15	23	45	0.0066	0.0034
Lead	911		0.0019	1	22	0.093	0.69	0.13	82	1	99	0.077	0.67	81	0.88	9.4	92	8.6
Nickel	130		0.0019	1	3.2	0.093	0.78	0.13	13	1	16	0.077	0.67	13	18	62	0.71	0.21
Selenium		1.5	0.0019	1	0.037	0.093	10.5	0.13	2.0	1	2.5	0.077	0.67	1.7	0.29	0.58	5.8	2.9
Silver	3.3		0.0019	1	0.081	0.093	4.60	0.13	2.0	1	2.4	0.077	0.67	1.7	104	0.22	0.016	7.5
Thallium	1.2		0.0019	1	0.030	0.093	4.60	0.13	0.72	1	0.87	0.077	0.67	0.60	0.34	0.0045	1.8	133
VOCs																		
Methylene chloride	0.043		0.0019	1	0.0011	0.093	0.70	0.13	0.0039	1	0.0047	0.077	0.67	0.0039	0.43	3.7	0.0090	0.00105
SVOCs																		
Anthracene	1.2		0.0019	1	0.030	0.093	0.70	0.13	0.11	1	0.13	0.077	0.67	0.11	1.1	6.0	0.10	0.018
Benzo (a) anthracene	2.9		0.0019	1	0.072	0.093	0.90	0.13	0.34	1	0.41	0.077	0.67	0.32	0.86	0.24	0.38	1.3
Benzo (a) pyrene	1.9		0.0019	1	0.047	0.093	0.43	0.13	0.11	1	0.13	0.077	0.67	0.12	1.1	1.2	0.11	0.10
Benzo (b) fluoranthene	3.5		0.0019	1	0.086	0.093	0.90	0.13	0.41	1	0.49	0.077	0.67	0.39	1.1	1.2	0.35	0.32
Benzo (ghi) perylene	1.3		0.0019	1	0.032	0.093	0.90	0.13	0.15	1	0.18	0.077	0.67	0.14	1.1	1.2	0.13	0.12
Benzo (k) fluoranthene	0.73		0.0019	1	0.018	0.093	0.90	0.13	0.085	1	0.10	0.077	0.67	0.081	0.15	1.2	0.54	0.068
bis (2-Ethylhexyl) phthalate	0.33		0.0019	1	0.0081	0.093	0.70	0.13	0.030	1	0.036	0.077	0.67	0.030	0.64	0.74	0.046	0.040
Chrysene	2.5		0.0019	1	0.062	0.093	0.90	0.13	0.29	1	0.35	0.077	0.67	0.28	1.1	6.0	0.25	0.046
Dibenzo(a,h)anthracene	0.27		0.0019	1	0.0067	0.093	0.90	0.13	0.032	1	0.038	0.077	0.67	0.030	0.42	1.2	0.071	0.025
Fluoranthene	4.1		0.0019	1	0.10	0.093	0.70	0.13	0.37	1	0.45	0.077	0.67	0.37	1.1	6.0	0.34	0.062
Fluorene	0.55		0.0019	1	0.014	0.093	0.70	0.13	0.050	1	0.060	0.077	0.67	0.050	1.1	3.0	0.045	0.017
Indeno (1,2,3-cd) pyrene	1.4		0.0019	1	0.035	0.093	0.90	0.13	0.16	1	0.20	0.077	0.67	0.16	1.1	1.2	0.14	0.13
Naphthalene	0.75		0.0019	1	0.019	0.093	0.70	0.13	0.068	1	0.082	0.077	0.67	0.068	1.1	1.0	0.061	0.068
Phenanthrene	3.1		0.0019	1	0.076	0.093	0.70	0.13	0.28	1	0.34	0.077	0.67	0.28	1.1	1.5	0.25	0.19
Pyrene	3.4		0.0019	1	0.084	0.093	0.70	0.13	0.31	1	0.37	0.077	0.67	0.31	1.1	1.5	0.28	0.20

Hazard Index - Detected Compounds	1589	302
Hazard Index - Detected Compounds w/Detection Limits	1595	305

NOTES:
(a) - The maximum concentration is the maximum detected concentration per SWMU.
(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.
(c) - Sample and Suter, 1994.
(d) - See Attachment O, Table O-1.
(e) - See Table 4-15.
(f) - Markwell *et al.*, 1989.
(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.
(h) - Based on site use from March through November.
(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient

Table S-17b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Average Concentrations
SWMU S-14
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	28		0.0019	1	0.69	0.093	4.6	0.13	17	1	20	0.077	0.67	14	0.015	0.15	928	93
Barium	84		0.0019	1	2.1	0.093	0.36	0.13	3.9	1	4.7	0.077	0.67	4.6	23	45	0.20	0.10
Lead	299		0.0019	1	7.4	0.093	0.69	0.13	27	1	32	0.077	0.67	27	0.88	9.4	30	2.8
Nickel	57		0.0019	1	1.4	0.093	0.78	0.13	5.8	1	7.0	0.077	0.67	5.6	18	62	0.32	0.090
Selenium		0.61	0.0019	1	0.015	0.093	10.5	0.13	0.83	1	1.0	0.077	0.67	0.68	0.29	0.58	2.3	1.2
Silver	1.3		0.0019	1	0.032	0.093	4.60	0.13	0.78	1	0.94	0.077	0.67	0.65	104	0.22	0.0063	3.0
Thallium	0.76		0.0019	1	0.019	0.093	4.60	0.13	0.45	1	0.55	0.077	0.67	0.38	0.34	0.0045	1.1	84
VOCs																		
Methylene chloride	0.017		0.0019	1	0.00042	0.093	0.70	0.13	0.0015	1	0.0019	0.077	0.67	0.0015	0.43	3.7	0.0035	0.00042
SVOCs																		
Anthracene	0.41		0.0019	1	0.010	0.093	0.70	0.13	0.038	1	0.046	0.077	0.67	0.037	1.1	6.0	0.034	0.0062
Benzo (a) anthracene	1.0		0.0019	1	0.025	0.093	0.90	0.13	0.12	1	0.14	0.077	0.67	0.11	0.86	0.24	0.13	0.47
Benzo (a) pyrene	0.72		0.0019	1	0.018	0.093	0.43	0.13	0.040	1	0.049	0.077	0.67	0.045	1.1	1.2	0.041	0.037
Benzo (b) fluoranthene	1.3		0.0019	1	0.033	0.093	0.90	0.13	0.16	1	0.19	0.077	0.67	0.15	1.1	1.2	0.14	0.12
Benzo (ghi) perylene	0.56		0.0019	1	0.014	0.093	0.90	0.13	0.065	1	0.078	0.077	0.67	0.062	1.1	1.2	0.057	0.051
Benzo (k) fluoranthene	0.35		0.0019	1	0.0086	0.093	0.90	0.13	0.041	1	0.049	0.077	0.67	0.039	0.15	1.2	0.25	0.032
bis (2-Ethylhexyl) phthalate	0.24		0.0019	1	0.0058	0.093	0.70	0.13	0.021	1	0.026	0.077	0.67	0.021	0.64	0.74	0.033	0.029
Chrysene	0.95		0.0019	1	0.024	0.093	0.90	0.13	0.11	1	0.13	0.077	0.67	0.11	1.1	6.0	0.10	0.018
Dibenzo(a,h)anthracene	0.19		0.0019	1	0.0048	0.093	0.90	0.13	0.023	1	0.027	0.077	0.67	0.022	0.42	1.2	0.051	0.018
Fluoranthene	1.4		0.0019	1	0.035	0.093	0.70	0.13	0.13	1	0.15	0.077	0.67	0.13	1.1	6.0	0.12	0.021
Fluorene	0.29		0.0019	1	0.0071	0.093	0.70	0.13	0.026	1	0.032	0.077	0.67	0.026	1.1	3.0	0.024	0.0086
Indeno (1,2,3-cd) pyrene	0.55		0.0019	1	0.014	0.093	0.90	0.13	0.065	1	0.078	0.077	0.67	0.061	1.1	1.2	0.057	0.051
Naphthalene	0.32		0.0019	1	0.0078	0.093	0.70	0.13	0.029	1	0.035	0.077	0.67	0.028	1.1	1.0	0.026	0.027
Phenanthrene	1.1		0.0019	1	0.028	0.093	0.70	0.13	0.10	1	0.12	0.077	0.67	0.10	1.1	1.5	0.093	0.069
Pyrene	1.2		0.0019	1	0.029	0.093	0.70	0.13	0.11	1	0.13	0.077	0.67	0.11	1.1	1.5	0.10	0.071

Hazard Index - Detected Compounds	962	184
Hazard Index - Detected Compounds w/Detection Limits	964	185

NOTES:
(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.
(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.
(c) - Sample and Suter, 1994.
(d) - See Attachment O, Table O-1.
(e) - See Table 4-15.
(f) - Markwell *et al.*, 1989.
(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.
(h) - Based on site use from March through November.
(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-18a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Maximum Concentrations
SWMU S-15
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	43		0.0019	0.20	0.21	0.093	4.6	0.13	26	0.20	6.2	0.077	0.67	4.3	0.015	0.15	285	28
Lead	53		0.0019	0.20	0.26	0.093	0.69	0.13	4.7	0.20	1.1	0.077	0.67	0.94	0.88	9.4	1.1	0.10
Nickel	38		0.0019	0.20	0.19	0.093	0.78	0.13	3.8	0.20	0.92	0.077	0.67	0.74	18	62	0.041	0.012
SVOCs																		
Anthracene	0.40		0.0019	0.20	0.0020	0.093	0.70	0.13	0.036	0.20	0.0088	0.077	0.67	0.0072	1.1	6.0	0.0066	0.0012
Benzo (a) anthracene	1.5		0.0019	0.20	0.0074	0.093	0.90	0.13	0.18	0.20	0.042	0.077	0.67	0.033	0.86	0.24	0.039	0.14
Benzo (a) pyrene	0.55		0.0019	0.20	0.0027	0.093	0.43	0.13	0.031	0.20	0.0074	0.077	0.67	0.0068	1.1	1.2	0.0062	0.0057
Benzo (b) fluoranthene	1.5		0.0019	0.20	0.0074	0.093	0.90	0.13	0.18	0.20	0.042	0.077	0.67	0.033	1.1	1.2	0.030	0.028
Benzo (ghi) perylene	0.40		0.0019	0.20	0.0020	0.093	0.90	0.13	0.047	0.20	0.011	0.077	0.67	0.0089	1.1	1.2	0.0081	0.0074
Benzo (k) fluoranthene	0.26		0.0019	0.20	0.0013	0.093	0.90	0.13	0.030	0.20	0.0073	0.077	0.67	0.0058	0.15	1.2	0.039	0.0048
Chrysene	0.64		0.0019	0.20	0.0032	0.093	0.90	0.13	0.075	0.20	0.018	0.077	0.67	0.014	1.1	6.0	0.013	0.0024
Fluoranthene	1.7		0.0019	0.20	0.0084	0.093	0.70	0.13	0.15	0.20	0.037	0.077	0.67	0.031	1.1	6.0	0.028	0.0051
Fluorene	0.11		0.0019	0.20	0.00054	0.093	0.70	0.13	0.010	0.20	0.0024	0.077	0.67	0.0020	1.1	3.0	0.0018	0.00066
Indeno (1,2,3-cd) pyrene	0.77		0.0019	0.20	0.0038	0.093	0.90	0.13	0.090	0.20	0.022	0.077	0.67	0.017	1.1	1.2	0.016	0.014
Naphthalene	0.63		0.0019	0.20	0.0031	0.093	0.70	0.13	0.057	0.20	0.014	0.077	0.67	0.011	1.1	1.0	0.010	0.011
Phenanthrene	1.1		0.0019	0.20	0.0054	0.093	0.70	0.13	0.10	0.20	0.024	0.077	0.67	0.020	1.1	1.5	0.018	0.013
Pyrene	1.5		0.0019	0.20	0.0074	0.093	0.70	0.13	0.14	0.20	0.033	0.077	0.67	0.027	1.1	1.5	0.025	0.018

Hazard Index - Detected Compounds	286	29
Hazard Index - Detected Compounds w/Detection Limits	286	29

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - Based on site use from March through November.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-18b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Average Concentrations
SWMU S-15
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Antimony	37		0.0019	0.20	0.18	0.093	4.6	0.13	22	0.20	5.3	0.077	0.67	3.7	0.015	0.15	245	25
Lead	50		0.0019	0.20	0.25	0.093	0.69	0.13	4.5	0.20	1.1	0.077	0.67	0.89	0.88	9.4	1.0	0.095
Nickel	32		0.0019	0.20	0.16	0.093	0.78	0.13	3.2	0.20	0.78	0.077	0.67	0.63	18	62	0.036	0.010
SVOCs																		
Anthracene	0.29		0.0019	0.20	0.0014	0.093	0.70	0.13	0.026	0.20	0.0063	0.077	0.67	0.0052	1.1	6.0	0.0048	0.00086
Benzo (a) anthracene	0.87		0.0019	0.20	0.0043	0.093	0.90	0.13	0.10	0.20	0.025	0.077	0.67	0.019	0.86	0.24	0.023	0.080
Benzo (a) pyrene	0.39		0.0019	0.20	0.0019	0.093	0.43	0.13	0.022	0.20	0.0052	0.077	0.67	0.0048	1.1	1.2	0.0044	0.0039
Benzo (b) fluoranthene	0.95		0.0019	0.20	0.0047	0.093	0.90	0.13	0.11	0.20	0.027	0.077	0.67	0.021	1.1	1.2	0.019	0.017
Benzo (ghi) perylene	0.27		0.0019	0.20	0.0013	0.093	0.90	0.13	0.032	0.20	0.0076	0.077	0.67	0.0060	1.1	1.2	0.0055	0.0050
Benzo (k) fluoranthene	0.18		0.0019	0.20	0.00089	0.093	0.90	0.13	0.021	0.20	0.0051	0.077	0.67	0.0040	0.15	1.2	0.026	0.0033
Chrysene	0.43		0.0019	0.20	0.0021	0.093	0.90	0.13	0.050	0.20	0.012	0.077	0.67	0.0095	1.1	6.0	0.0087	0.0016
Fluoranthene	1.0		0.0019	0.20	0.0051	0.093	0.70	0.13	0.093	0.20	0.023	0.077	0.67	0.018	1.1	6.0	0.017	0.0031
Fluorene	0.14		0.0019	0.20	0.00071	0.093	0.70	0.13	0.013	0.20	0.0031	0.077	0.67	0.0026	1.1	3.0	0.0024	0.00085
Indeno (1,2,3-cd) pyrene	0.48		0.0019	0.20	0.0023	0.093	0.90	0.13	0.056	0.20	0.013	0.077	0.67	0.011	1.1	1.2	0.010	0.0087
Naphthalene	0.35		0.0019	0.20	0.0017	0.093	0.70	0.13	0.032	0.20	0.0078	0.077	0.67	0.0064	1.1	1.0	0.0059	0.0061
Phenanthrene	0.64		0.0019	0.20	0.0032	0.093	0.70	0.13	0.058	0.20	0.014	0.077	0.67	0.012	1.1	1.5	0.011	0.0078
Pyrene	0.90		0.0019	0.20	0.0044	0.093	0.70	0.13	0.082	0.20	0.020	0.077	0.67	0.016	1.1	1.5	0.015	0.011

Hazard Index - Detected Compounds	247	25
Hazard Index - Detected Compounds w/Detection Limits	247	25

NOTES:
(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.
(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.
(c) - Sample and Suter, 1994.
(d) - See Attachment O, Table O-1.
(e) - See Table 4-15.
(f) - Markwell *et al.*, 1989.
(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.
(h) - Based on site use from March through November.
(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-19a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Maximum Concentrations
SWMU S-23
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
Metals															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Chromium	609		0.0019	0.78	12	0.093	0.49	0.13	39	0.78	37	0.077	0.67	32	0.58	0.97	56	33
Lead	124		0.0019	0.78	2.4	0.093	0.69	0.13	11	0.78	10	0.077	0.67	8.6	0.88	9.4	9.8	0.92
Mercury	1.1		0.0019	0.78	0.021	0.093	1.32	0.13	0.19	0.78	0.18	0.077	0.67	0.13	0.37	0.75	0.36	0.18
Nickel	46		0.0019	0.78	0.89	0.093	0.78	0.13	4.7	0.78	4.4	0.077	0.67	3.5	18	62	0.20	0.057
Selenium		4.5	0.0019	0.78	0.086	0.093	10.5	0.13	6.1	0.78	5.7	0.077	0.67	3.9	0.29	0.58	13	6.7
Silver	2.1		0.0019	0.78	0.040	0.093	4.6	0.13	1.3	0.78	1.2	0.077	0.67	0.82	104	0.22	0.0079	3.7
Thallium	23		0.0019	0.78	0.45	0.093	4.6	0.13	14	0.78	13	0.077	0.67	9.1	0.34	0.0045	27	2030
SVOCs																		
Acenaphthylene	13		0.0019	0.78	0.25	0.093	0.70	0.13	1.2	0.78	1.1	0.077	0.67	0.91	1.1	8.5	0.83	0.11
Anthracene	11		0.0019	0.78	0.21	0.093	0.70	0.13	1.0	0.78	0.94	0.077	0.67	0.77	1.1	6.0	0.70	0.13
Benzo (a) anthracene	57		0.0019	0.78	1.1	0.093	0.90	0.13	6.7	0.78	6.3	0.077	0.67	4.9	0.86	0.24	5.7	21
Benzo (a) pyrene	1.7		0.0019	0.78	0.033	0.093	0.43	0.13	0.095	0.78	0.090	0.077	0.67	0.082	1.1	1.2	0.074	0.068
Chrysene	54		0.0019	0.78	1.0	0.093	0.90	0.13	6.3	0.78	6.0	0.077	0.67	4.7	1.1	6.0	4.3	0.78
Fluoranthene	2.8		0.0019	0.78	0.054	0.093	0.70	0.13	0.25	0.78	0.24	0.077	0.67	0.20	1.1	6.0	0.18	0.033
Fluorene	1.7		0.0019	0.78	0.033	0.093	0.70	0.13	0.15	0.78	0.15	0.077	0.67	0.12	1.1	3.0	0.11	0.040
Naphthalene	2.7		0.0019	0.78	0.052	0.093	0.70	0.13	0.25	0.78	0.23	0.077	0.67	0.19	1.1	1.0	0.17	0.19
Phenanthrene	25		0.0019	0.78	0.48	0.093	0.70	0.13	2.3	0.78	2.1	0.077	0.67	1.8	1.1	1.5	1.6	1.2
Pyrene	2.7		0.0019	0.78	0.052	0.093	0.70	0.13	0.25	0.78	0.23	0.077	0.67	0.19	1.1	1.5	0.17	0.13

Hazard Index - Detected Compounds	107	2091
Hazard Index - Detected Compounds w/Detection Limits	120	2098

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - Based on site use from March through November.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-19b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Average Concentrations
SWMU S-23
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	592		0.0019	0.78	11	0.093	0.49	0.13	38	0.78	36	0.077	0.67	31	0.58	0.97	54	32
Lead	130		0.0019	0.78	2.5	0.093	0.69	0.13	12	0.78	11	0.077	0.67	9.0	0.88	9.4	10	0.96
Mercury	0.55		0.0019	0.78	0.011	0.093	1.32	0.13	0.094	0.78	0.089	0.077	0.67	0.067	0.37	0.75	0.18	0.089
Nickel	44		0.0019	0.78	0.85	0.093	0.78	0.13	4.5	0.78	4.2	0.077	0.67	3.4	18	62	0.19	0.054
Selenium		4.4	0.0019	0.78	0.085	0.093	10.5	0.13	6.0	0.78	5.7	0.077	0.67	3.8	0.29	0.58	13	6.6
Silver	2.0		0.0019	0.78	0.038	0.093	4.6	0.13	1.2	0.78	1.1	0.077	0.67	0.78	104	0.22	0.0075	3.6
Thallium	20		0.0019	0.78	0.38	0.093	4.6	0.13	12	0.78	11	0.077	0.67	7.8	0.34	0.0045	23	1728
SVOCs																		
Acenaphthylene	6.6		0.0019	0.78	0.13	0.093	0.70	0.13	0.60	0.78	0.57	0.077	0.67	0.46	1.1	8.5	0.43	0.055
Anthracene	5.7		0.0019	0.78	0.11	0.093	0.70	0.13	0.52	0.78	0.49	0.077	0.67	0.40	1.1	6.0	0.37	0.07
Benzo (a) anthracene	29		0.0019	0.78	0.56	0.093	0.90	0.13	3.4	0.78	3.2	0.077	0.67	2.5	0.86	0.24	3.0	11
Benzo (a) pyrene	1.7		0.0019	0.78	0.033	0.093	0.43	0.13	0.095	0.78	0.090	0.077	0.67	0.082	1.1	1.2	0.075	0.068
Chrysene	28		0.0019	0.78	0.54	0.093	0.90	0.13	3.3	0.78	3.1	0.077	0.67	2.4	1.1	6.0	2.2	0.40
Fluoranthene	2.8		0.0019	0.78	0.054	0.093	0.70	0.13	0.25	0.78	0.24	0.077	0.67	0.20	1.1	6.0	0.18	0.033
Fluorene	0.93		0.0019	0.78	0.018	0.093	0.70	0.13	0.085	0.78	0.080	0.077	0.67	0.065	1.1	3.0	0.060	0.022
Naphthalene	1.4		0.0019	0.78	0.027	0.093	0.70	0.13	0.13	0.78	0.12	0.077	0.67	0.10	1.1	1.0	0.092	0.095
Phenanthrene	13		0.0019	0.78	0.26	0.093	0.70	0.13	1.2	0.78	1.2	0.077	0.67	0.95	1.1	1.5	0.87	0.64
Pyrene	2.7		0.0019	0.78	0.052	0.093	0.70	0.13	0.25	0.78	0.23	0.077	0.67	0.19	1.1	1.5	0.17	0.13

Hazard Index - Detected Compounds	95	1777
Hazard Index - Detected Compounds w/Detection Limits	108	1784

NOTES:
(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.
(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.
(c) - Sample and Suter, 1994.
(d) - See Attachment O, Table O-1.
(e) - See Table 4-15.
(f) - Markwell *et al.*, 1989.
(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.
(h) - Based on site use from March through November.
(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-20a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Maximum Concentrations
Zone 4 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
Metals															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Chromium	515		0.0019	1	13	0.093	0.49	0.13	33	1	40	0.077	0.67	35	0.58	0.97	60	36
Lead	408		0.0019	1	10	0.093	0.69	0.13	37	1	44	0.077	0.67	36	0.88	9.4	41	3.9
Mercury	5.7		0.0019	1	0.14	0.093	1.32	0.13	0.98	1	1.2	0.077	0.67	0.89	0.37	0.75	2.4	1.2
Nickel	373		0.0019	1	9.2	0.093	0.78	0.13	38	1	46	0.077	0.67	37	18	62	2.0	0.59
Selenium	10		0.0019	1	0.26	0.093	10.5	0.13	14	1	17	0.077	0.67	12	0.29	0.58	40	20
Silver	3.6		0.0019	1	0.089	0.093	4.6	0.13	2.2	1	2.6	0.077	0.67	1.8	104	0.22	0.017	8.2
Thallium		16	0.0019	1	0.39	0.093	4.6	0.13	9.4	1	11	0.077	0.67	7.9	0.34	0.0045	23	1757
VOCs																		
Trichloroethene	0.016		0.0019	1	0.00039	0.093	0.70	0.13	0.0015	1	0.0018	0.077	0.67	0.0014	0.085	0.85	0.017	0.0017
SVOCs																		
Acenaphthylene	1.3		0.0019	1	0.032	0.093	0.70	0.13	0.12	1	0.14	0.077	0.67	0.12	1.1	8.5	0.11	0.014
Anthracene	9.3		0.0019	1	0.23	0.093	0.70	0.13	0.85	1	1.0	0.077	0.67	0.84	1.1	6.0	0.76	0.14
Benzo (a) anthracene	22		0.0019	1	0.54	0.093	0.90	0.13	2.6	1	3.1	0.077	0.67	2.4	0.86	0.24	2.8	10
Benzo (a) pyrene	20		0.0019	1	0.49	0.093	0.43	0.13	1.1	1	1.4	0.077	0.67	1.2	1.1	1.2	1.1	1.0
bis (2-Ethylhexyl) phthalate	0.049		0.0019	1	0.0012	0.093	0.70	0.13	0.0045	1	0.0054	0.077	0.67	0.0044	0.64	0.74	0.0069	0.0060
Chrysene	22		0.0019	1	0.54	0.093	0.90	0.13	2.6	1	3.1	0.077	0.67	2.4	1.1	6.0	2.2	0.41
Fluoranthene	43		0.0019	1	1.1	0.093	0.70	0.13	3.9	1	4.7	0.077	0.67	3.9	1.1	6.0	3.5	0.65
Fluorene	3.4		0.0019	1	0.084	0.093	0.70	0.13	0.31	1	0.37	0.077	0.67	0.31	1.1	3.0	0.28	0.10
Naphthalene	2.5		0.0019	1	0.062	0.093	0.70	0.13	0.23	1	0.27	0.077	0.67	0.23	1.1	1.0	0.20	0.23
Phenanthrene	34		0.0019	1	0.84	0.093	0.70	0.13	3.1	1	3.7	0.077	0.67	3.1	1.1	1.5	2.8	2.0
Pyrene	31		0.0019	1	0.76	0.093	0.70	0.13	2.8	1	3.4	0.077	0.67	2.8	1.1	1.5	2.5	1.9

Hazard Index - Detected Compounds	163	87
Hazard Index - Detected Compounds w/Detection Limits	186	1844

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - Based on site use from March through November.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-20b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Average Concentrations
Zone 4 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	439		0.0019	1	11	0.093	0.49	0.13	28	1	34	0.077	0.67	30	0.58	0.97	51	31
Lead	246		0.0019	1	6.1	0.093	0.69	0.13	22	1	27	0.077	0.67	22	0.88	9.4	25	2.3
Mercury	3.1		0.0019	1	0.076	0.093	1.32	0.13	0.53	1	0.64	0.077	0.67	0.48	0.37	0.75	1.3	0.65
Nickel	201		0.0019	1	5.0	0.093	0.78	0.13	20	1	25	0.077	0.67	20	18	62	1.1	0.32
Selenium	9.6		0.0019	1	0.24	0.093	10.5	0.13	13	1	16	0.077	0.67	11	0.29	0.58	37	18
Silver	1.9		0.0019	1	0.047	0.093	4.6	0.13	1.1	1	1.4	0.077	0.67	0.95	104	0.22	0.0091	4.4
Thallium		8.8	0.0019	1	0.22	0.093	4.6	0.13	5.3	1	6.4	0.077	0.67	4.4	0.34	0.0045	13	975
VOCs																		
Trichloroethene	0.012		0.0019	1	0.00030	0.093	0.70	0.13	0.0011	1	0.0013	0.077	0.67	0.0011	0.085	0.85	0.013	0.0013
SVOCs																		
Acenaphthylene	0.71		0.0019	1	0.017	0.093	0.70	0.13	0.064	1	0.077	0.077	0.67	0.064	1.1	8.5	0.059	0.0075
Anthracene	4.7		0.0019	1	0.12	0.093	0.70	0.13	0.43	1	0.52	0.077	0.67	0.42	1.1	6.0	0.39	0.070
Benzo (a) anthracene	11		0.0019	1	0.28	0.093	0.90	0.13	1.3	1	1.6	0.077	0.67	1.3	0.86	0.24	1.5	5.2
Benzo (a) pyrene	10		0.0019	1	0.26	0.093	0.43	0.13	0.58	1	0.70	0.077	0.67	0.64	1.1	1.2	0.59	0.53
bis (2-Ethylhexyl) phthalate	2.1		0.0019	1	0.052	0.093	0.70	0.13	0.19	1	0.23	0.077	0.67	0.19	0.64	0.74	0.29	0.26
Chrysene	11		0.0019	1	0.28	0.093	0.90	0.13	1.3	1	1.6	0.077	0.67	1.3	1.1	6.0	1.2	0.21
Fluoranthene	22		0.0019	1	0.54	0.093	0.70	0.13	2.0	1	2.4	0.077	0.67	2.0	1.1	6.0	1.8	0.33
Fluorene	1.8		0.0019	1	0.044	0.093	0.70	0.13	0.16	1	0.20	0.077	0.67	0.16	1.1	3.0	0.15	0.053
Naphthalene	1.4		0.0019	1	0.035	0.093	0.70	0.13	0.13	1	0.16	0.077	0.67	0.13	1.1	1.0	0.12	0.12
Phenanthrene	17		0.0019	1	0.42	0.093	0.70	0.13	1.6	1	1.9	0.077	0.67	1.6	1.1	1.5	1.4	1.0
Pyrene	16		0.0019	1	0.39	0.093	0.70	0.13	1.4	1	1.7	0.077	0.67	1.4	1.1	1.5	1.3	0.94

Hazard Index - Detected Compounds	124	66
Hazard Index - Detected Compounds w/Detection Limits	137	1041

NOTES:
(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.
(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.
(c) - Sample and Suter, 1994.
(d) - See Attachment O, Table O-1.
(e) - See Table 4-15.
(f) - Markwell *et al.*, 1989.
(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.
(h) - Based on site use from March through November.
(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-21a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Maximum Concentrations
Zone 5 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Maximum Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																		
Chromium	752		0.0019	1	19	0.093	0.49	0.13	48	1	58	0.077	0.67	51	0.58	0.97	88	53
Lead	271		0.0019	1	6.7	0.093	0.69	0.13	24	1	29	0.077	0.67	24	0.88	9.4	27	2.6
Nickel	51		0.0019	1	1.3	0.093	0.78	0.13	5.2	1	6.2	0.077	0.67	5.0	18	62	0.28	0.081
Selenium	16		0.0019	1	0.40	0.093	10.5	0.13	22	1	27	0.077	0.67	18	0.29	0.58	62	31
Silver	2.8		0.0019	1	0.069	0.093	4.6	0.13	1.7	1	2.0	0.077	0.67	1.4	104	0.22	0.013	6.4
Thallium	28		0.0019	1	0.70	0.093	4.6	0.13	17	1	20	0.077	0.67	14	0.34	0.0045	42	3147
VOCs																		
Trichloroethene	0.0075		0.0019	1	0.00019	0.093	0.70	0.13	0.00068	1	0.00082	0.077	0.67	0.00068	0.085	0.85	0.0080	0.00080
SVOCs																		
Acenaphthylene	0.93		0.0019	1	0.023	0.093	0.70	0.13	0.085	1	0.10	0.077	0.67	0.084	1.1	8.5	0.076	0.010
Anthracene	1.6		0.0019	1	0.039	0.093	0.70	0.13	0.15	1	0.18	0.077	0.67	0.14	1.1	6.0	0.13	0.024
Benzo (a) anthracene	3.2		0.0019	1	0.079	0.093	0.90	0.13	0.37	1	0.45	0.077	0.67	0.36	0.86	0.24	0.41	1.5
Benzo (a) pyrene	2.7		0.0019	1	0.067	0.093	0.43	0.13	0.15	1	0.18	0.077	0.67	0.17	1.1	1.2	0.15	0.14
bis (2-Ethylhexyl) phthalate	0.061		0.0019	1	0.0015	0.093	0.70	0.13	0.0056	1	0.0067	0.077	0.67	0.0055	0.64	0.74	0.0086	0.0074
Chrysene	3.3		0.0019	1	0.081	0.093	0.90	0.13	0.39	1	0.47	0.077	0.67	0.37	1.1	6.0	0.33	0.061
Fluoranthene	2.1		0.0019	1	0.052	0.093	0.70	0.13	0.19	1	0.23	0.077	0.67	0.19	1.1	6.0	0.17	0.032
Fluorene	1.8		0.0019	1	0.044	0.093	0.70	0.13	0.16	1	0.20	0.077	0.67	0.16	1.1	3.0	0.15	0.054
Naphthalene	0.67		0.0019	1	0.017	0.093	0.70	0.13	0.061	1	0.074	0.077	0.67	0.060	1.1	1.0	0.055	0.060
Phenanthrene	1.2		0.0019	1	0.030	0.093	0.70	0.13	0.11	1	0.13	0.077	0.67	0.11	1.1	1.5	0.10	0.072
Pyrene	5.7		0.0019	1	0.14	0.093	0.70	0.13	0.52	1	0.63	0.077	0.67	0.51	1.1	1.5	0.47	0.34

Hazard Index - Detected Compounds	222	3242
Hazard Index - Detected Compounds w/Detection Limits	222	3242

NOTES:

(a) - The maximum concentration is the maximum detected concentration per SWMU.

(b) - The 1/2 detection limit was used for risk calculations only if all samples for the SWMU were non-detects and 1/2 the detection limit exceeded the screening criteria.

(c) - Sample and Suter, 1994.

(d) - See Attachment O, Table O-1.

(e) - See Table 4-15.

(f) - Markwell *et al.*, 1989.

(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.

(h) - Based on site use from March through November.

(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table S-21b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Earthworms - American Robin
Average Concentrations
Zone 5 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Concentration in Soil (a) (mg/kg)	Not Detected: 1/2 Detection Limit (b) (mg/kg)	Soil Ingestion Rate (c) (kg/day)	Area Use Factor (d)	Dose in Soil (mg/kd/day)	Dietary Ingestion Rate (c) (kg/day)	Earthworm Bioaccumulation Factor ((mg/kg worm)/(mg/kg soil)) (BAF) (e)	Dry Weight to Wet Weight Conversion Factor DW:WW (kg earthworm dry weight per kg earthworm wet weight) (f)	Concentration of Contaminant in Earthworm (mg/kg) (g)	Area Use Factor (d)	Dose in Earthworm (mg/kd/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (h)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (i)		Hazard Quotient	
Metals															(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Chromium	652		0.0019	1	16	0.093	0.49	0.13	42	1	50	0.077	0.67	44	0.58	0.97	76	46
Lead	160		0.0019	1	3.9	0.093	0.69	0.13	14	1	17	0.077	0.67	14	0.88	9.4	16	1.5
Nickel	40		0.0019	1	0.99	0.093	0.78	0.13	4.1	1	4.9	0.077	0.67	3.9	18	62	0.22	0.063
Selenium	8.3		0.0019	1	0.20	0.093	10.5	0.13	11	1	14	0.077	0.67	9.3	0.29	0.58	32	16
Silver	2.3		0.0019	1	0.057	0.093	4.6	0.13	1.4	1	1.7	0.077	0.67	1.2	104	0.22	0.011	5.3
Thallium	15		0.0019	1	0.37	0.093	4.6	0.13	9.0	1	11	0.077	0.67	7.5	0.34	0.0045	22	1662
VOCs																		
Trichloroethene	0.0050		0.0019	1	0.00012	0.093	0.70	0.13	0.00046	1	0.00055	0.077	0.67	0.00045	0.085	0.85	0.0053	0.00053
SVOCs																		
Acenaphthylene	0.40		0.0019	1	0.0098	0.093	0.70	0.13	0.036	1	0.044	0.077	0.67	0.036	1.1	8.5	0.033	0.0042
Anthracene	0.68		0.0019	1	0.017	0.093	0.70	0.13	0.062	1	0.075	0.077	0.67	0.061	1.1	6.0	0.057	0.010
Benzo (a) anthracene	1.4		0.0019	1	0.035	0.093	0.90	0.13	0.17	1	0.20	0.077	0.67	0.16	0.86	0.24	0.19	0.66
Benzo (a) pyrene	1.3		0.0019	1	0.032	0.093	0.43	0.13	0.073	1	0.088	0.077	0.67	0.081	1.1	1.2	0.074	0.067
bis (2-Ethylhexyl) phthalate	0.16		0.0019	1	0.0039	0.093	0.70	0.13	0.014	1	0.017	0.077	0.67	0.014	0.64	0.74	0.022	0.019
Chrysene	1.5		0.0019	1	0.038	0.093	0.90	0.13	0.18	1	0.22	0.077	0.67	0.17	1.1	6.0	0.16	0.028
Fluoranthene	1.1		0.0019	1	0.028	0.093	0.70	0.13	0.10	1	0.12	0.077	0.67	0.10	1.1	6.0	0.094	0.017
Fluorene	0.68		0.0019	1	0.017	0.093	0.70	0.13	0.062	1	0.074	0.077	0.67	0.061	1.1	3.0	0.056	0.020
Naphthalene	0.27		0.0019	1	0.0068	0.093	0.70	0.13	0.025	1	0.030	0.077	0.67	0.025	1.1	1.0	0.023	0.024
Phenanthrene	0.66		0.0019	1	0.016	0.093	0.70	0.13	0.060	1	0.072	0.077	0.67	0.059	1.1	1.5	0.054	0.040
Pyrene	2.4		0.0019	1	0.060	0.093	0.70	0.13	0.22	1	0.27	0.077	0.67	0.22	1.1	1.5	0.20	0.14

Hazard Index - Detected Compounds	148	1731
Hazard Index - Detected Compounds w/Detection Limits	148	1731

NOTES:
(a) - The average concentration was calculated using 1/2 detection limits for samples that were non-detected.
(b) - The average of the 1/2 detection limits was used for risk calculations only if all samples were non-detected and 1/2 the detection limit exceeded screening criteria.
(c) - Sample and Suter, 1994.
(d) - See Attachment O, Table O-1.
(e) - See Table 4-15.
(f) - Markwell *et al.*, 1989.
(g) - Concentration in earthworms = BAF x concentration of COPC in soil x DW:WW conversion factor.
(h) - Based on site use from March through November.
(i) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

ATTACHMENT T

HQ/HI CALCULATIONS FOR RED-TAILED HAWK

BETHLEHEM STEEL CORPORATION

LACKAWANNA, NEW YORK

Table T-1a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Maximum Concentrations
SWMU S-1
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Antimony	25	1.0	25	0.11	1	2.4	1.126	0.67	1.6	0.026	0.26	63	6.3
Chromium	67	1.0	67	0.11	1	6.5	1.126	0.67	4.3	1.0	1.7	4.3	2.6
Lead	200	1.0	200	0.11	1	19	1.126	0.67	13	1.5	16	8.6	0.81
Mercury	4.8	1.0	4.8	0.11	1	0.47	1.126	0.67	0.31	0.64	1.3	0.49	0.24
Nickel	110	1.0	110	0.11	1	11	1.126	0.67	7.1	35	124	0.20	0.057
Selenium	10.6	1.0	11	0.11	1	1.0	1.126	0.67	0.69	0.50	1.0	1.4	0.69
Silver	1.5	1.0	1.5	0.11	1	0.15	1.126	0.67	0.098	178	0.37	0.00055	0.27
Thallium	2.0	1.0	2.0	0.11	1	0.20	1.126	0.67	0.13	0.80	0.011	0.16	12
VOCs													
Benzene	1.1	1.0	1.1	0.11	1	0.10	1.126	0.67	0.070	5.4	54	0.013	0.0013
Ethylbenzene	1.7	1.0	1.7	0.11	1	0.16	1.126	0.67	0.11	12	60	0.0092	0.0018
Methyl ethyl ketone	4.0	1.0	4.0	0.11	1	0.39	1.126	0.67	0.26	224	577	0.0012	0.00045
Xylenes, total	8.1	1.0	8.1	0.11	1	0.79	1.126	0.67	0.53	0.43	0.54	1.2	1.0
SVOCs													
Acenaphthene	115	1.0	115	0.11	1	11	1.126	0.67	7.5	1.9	14	3.9	0.53
Acenaphthylene	140	1.0	140	0.11	1	14	1.126	0.67	9.1	1.9	14	4.8	0.65
Anthracene	317	1.0	317	0.11	1	31	1.126	0.67	21	1.9	10	11	2.1
Benzo (a) anthracene	428	1.0	428	0.11	1	41	1.126	0.67	28	1.5	0.41	19	68
Benzo (a) pyrene	224	1.0	224	0.11	1	22	1.126	0.67	15	1.9	2.1	7.6	6.9
Benzo (b) fluoranthene	333	1.0	333	0.11	1	32	1.126	0.67	22	1.9	2.1	11	10
Benzo (ghi) perylene	115	1.0	115	0.11	1	11	1.126	0.67	7.5	1.9	2.1	3.9	3.6
Benzo (k) fluoranthene	102	1.0	102	0.11	1	9.9	1.126	0.67	6.6	0.26	2.1	25	3.1
Chrysene	368	1.0	368	0.11	1	36	1.126	0.67	24	1.9	10	13	2.4
Dibenzo(a,h)anthracene	26	1.0	26	0.11	1	2.5	1.126	0.67	1.7	0.72	2.1	2.3	0.80
Fluoranthene	1026	1.0	1026	0.11	1	99	1.126	0.67	67	1.9	10	35	6.7
Fluorene	494	1.0	494	0.11	1	48	1.126	0.67	32	1.9	5.2	17	6.2
Indeno (1,2,3-cd) pyrene	142	1.0	142	0.11	1	14	1.126	0.67	9.2	1.9	2.1	4.9	4.4
3-/4-Methylphenol	3.6	1.0	3.6	0.11	1	0.35	1.126	0.67	0.23	0.63	1.9	0.37	0.12
Naphthalene	1016	1.0	1016	0.11	1	98	1.126	0.67	66	1.9	1.8	35	37
Phenanthrene	1310	1.0	1310	0.11	1	127	1.126	0.67	85	1.9	2.5	45	34
Pyrene	821	1.0	821	0.11	1	80	1.126	0.67	53	1.9	2.6	28	20

Hazard Index - Detected Compounds	345	218
Hazard Index - Detected Compounds w/Detection Limits	345	230

NOTES:
(a) - See Attachment Q Table Q-1b.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table T-1b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Average Concentrations
SWMU S-1
ISG-FormerBethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
Metals										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Antimony	2.5	1.0	3	0.11	1	0.2	1.126	0.67	0.16	0.026	0.26	6.4	0.64
Chromium	1.4	1.0	1	0.11	1	0.1	1.126	0.67	0.093	1.0	1.7	0.093	0.056
Lead	10	1.0	10	0.11	1	1	1.126	0.67	0.66	1.5	16	0.44	0.041
Mercury	0.38	1.0	0.4	0.11	1	0.04	1.126	0.67	0.024	0.64	1.3	0.038	0.019
Nickel	12	1.0	12	0.11	1	1.2	1.126	0.67	0.79	30	107	0.026	0.0074
Selenium	1.1	1.0	1.1	0.11	1	0.11	1.126	0.67	0.074	0.50	1.0	0.15	0.074
Silver	0.56	1.0	0.6	0.11	1	0.05	1.126	0.67	0.036	178	0.37	0.00021	0.098
Thallium	0.020	1.0	0.02	0.11	1	0.002	1.126	0.67	0.0013	0.80	0.011	0.0016	0.12
VOCs													
Benzene	0.011	1.0	0.01	0.11	1	0.001	1.126	0.67	0.00070	5.4	54	0.00013	0.000013
Ethylbenzene	0.017	1.0	0.02	0.11	1	0.002	1.126	0.67	0.0011	12	60	0.000090	0.000018
Methyl ethyl ketone	0.0040	1.0	0.00	0.11	1	0.000	1.126	0.67	0.00026	224	577	0.0000012	0.00000045
Xylenes, total	0.081	1.0	0.1	0.11	1	0.01	1.126	0.67	0.0053	0.43	0.54	0.012	0.0098
SVOCs													
Acenaphthene	1.0	1.0	1	0.11	1	0.1	1.126	0.67	0.065	1.9	14	0.035	0.0045
Acenaphthylene	2.9	1.0	3	0.11	1	0.3	1.126	0.67	0.19	1.9	14	0.10	0.013
Anthracene	4.4	1.0	4	0.11	1	0	1.126	0.67	0.29	1.9	10	0.15	0.028
Benzo (a) anthracene	3.7	1.0	4	0.11	1	0	1.126	0.67	0.24	1.5	0.41	0.16	0.58
Benzo (a) pyrene	1.9	1.0	2	0.11	1	0.2	1.126	0.67	0.12	1.9	2.1	0.065	0.058
Benzo (b) fluoranthene	2.7	1.0	3	0.11	1	0	1.126	0.67	0.18	1.9	2.1	0.095	0.085
Benzo (ghi) perylene	1.1	1.0	1	0.11	1	0.1	1.126	0.67	0.069	1.9	2.1	0.037	0.034
Benzo (k) fluoranthene	1.0	1.0	1	0.11	1	0.1	1.126	0.67	0.066	0.26	2.1	0.25	0.032
Chrysene	3.6	1.0	4	0.11	1	0	1.126	0.67	0.24	1.9	10	0.13	0.023
Dibenzo(a,h)anthracene	0.43	1.0	0	0.11	1	0.0	1.126	0.67	0.028	0.72	2.1	0.038	0.013
Fluoranthene	11	1.0	11	0.11	1	1	1.126	0.67	0.69	1.9	10	0.37	0.067
Fluorene	8.1	1.0	8	0.11	1	1	1.126	0.67	0.53	1.9	5.2	0.28	0.10
Indeno (1,2,3-cd) pyrene	1.3	1.0	1	0.11	1	0.1	1.126	0.67	0.081	1.9	2.1	0.044	0.039
3-/4-Methylphenol	0.61	1.0	1	0.11	1	0.1	1.126	0.67	0.040	0.63	1.9	0.063	0.021
Naphthalene	7.0	1.0	7	0.11	1	1	1.126	0.67	0.45	1.9	1.8	0.24	0.25
Phenanthrene	17	1.0	17	0.11	1	2	1.126	0.67	1.1	1.9	2.5	0.59	0.43
Pyrene	8.7	1.0	9	0.11	1	1	1.126	0.67	0.56	1.9	2.6	0.30	0.22

NOTES:
(a) - See Attachment Q Table Q-1a.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Hazard Index - Detected Compounds	10	2.9
Hazard Index - Detected Compounds w/Detection Limits	10	3.1

Table T-2a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Maximum Concentrations
SWMU S-2
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Antimony	43	1.0	43	0.11	1	4.2	1.126	0.67	2.8	0.026	0.26	108	11
Lead	805	1.0	805	0.11	1	78	1.126	0.67	52	1.5	16	35	3.3
Silver	12	1.0	12	0.11	1	1.2	1.126	0.67	0.79	178	0.37	0.0045	2.1
VOCs													
Methylene chloride	0.0035	1.0	0.0035	0.11	1	0.00033	1.126	0.67	0.00022	0.74	6.3	0.00030	0.000036
SVOCs													
Benzo (a) anthracene	0.10	1.0	0.10	0.11	1	0.0099	1.126	0.67	0.0066	1.5	0.41	0.0044	0.016
Benzo (b) fluoranthene	0.23	1.0	0.23	0.11	1	0.022	1.126	0.67	0.015	1.9	2.1	0.0079	0.0071
Chrysene	0.068	1.0	0.068	0.11	1	0.0066	1.126	0.67	0.0044	1.9	10	0.0023	0.00044
Fluoranthene	0.066	1.0	0.066	0.11	1	0.0064	1.126	0.67	0.0043	1.9	10	0.0022	0.00043
Indeno (1,2,3-cd) pyrene	0.062	1.0	0.062	0.11	1	0.0060	1.126	0.67	0.0040	1.9	2.1	0.0021	0.0019
Pyrene	0.082	1.0	0.082	0.11	1	0.0080	1.126	0.67	0.0053	1.9	2.6	0.0028	0.0020

NOTES:
(a) - See Attachment Q Table Q-2b.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Hazard Index - Detected Compounds	142	14
Hazard Index - Detected Compounds w/Detection Limits	142	16

Table T-2b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Average Concentrations
SWMU S-2
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Antimony	3.1	1.0	3.1	0.11	1	0.30	1.126	0.67	0.20	0.026	0.26	7.8	0.78
Lead	31	1.0	31	0.11	1	3.0	1.126	0.67	2.0	1.5	16	1.3	0.13
Silver	0.50	1.0	0.50	0.11	1	0.048	1.126	0.67	0.032	178	0.37	0.00018	0.087
VOCs													
Methylene chloride	0.000083	1.0	0.000083	0.11	1	0.0000080	1.126	0.67	0.0000054	0.74	6.3	0.0000073	0.00000085
SVOCs													
Benzo (a) anthracene	0.010	1.0	0.010	0.11	1	0.00098	1.126	0.67	0.00066	1.5	0.41	0.00045	0.0016
Benzo (b) fluoranthene	0.011	1.0	0.011	0.11	1	0.0010	1.126	0.67	0.00070	1.9	2.1	0.00038	0.00034
Chrysene	0.011	1.0	0.011	0.11	1	0.0011	1.126	0.67	0.00072	1.9	10	0.00039	0.000069
Fluoranthene	0.012	1.0	0.012	0.11	1	0.0012	1.126	0.67	0.00079	1.9	10	0.00043	0.000077
Indeno (1,2,3-cd) pyrene	0.0085	1.0	0.0085	0.11	1	0.00082	1.126	0.67	0.00055	1.9	2.1	0.00030	0.00027
Pyrene	0.013	1.0	0.013	0.11	1	0.0012	1.126	0.67	0.00082	1.9	2.6	0.00044	0.00032

NOTES:
(a) - See Attachment Q Table Q-2a.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Hazard Index - Detected Compounds	9.2	0.91
Hazard Index - Detected Compounds w/Detection Limits	9.2	1.0

Table T-3a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Maximum Concentrations
SWMU S-3
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Arsenic	31	1.0	31	0.11	1	3.0	1.126	0.67	2.0	5.1	13	0.39	0.15
Chromium	80	1.0	80	0.11	1	7.7	1.126	0.67	5.2	1.0	1.7	5.2	3.1
Lead	2848	1.0	2848	0.11	1	276	1.126	0.67	185	1.5	16	123	12
Nickel	35	1.0	35	0.11	1	3.4	1.126	0.67	2.3	35	124	0.065	0.018
Selenium	14	1.0	14	0.11	1	1.3	1.126	0.67	0.88	0.50	1.0	1.8	0.88
Silver	4.7	1.0	4.7	0.11	1	0.45	1.126	0.67	0.30	178	0.37	0.0017	0.82
Thallium	3.8	1.0	3.8	0.11	1	0.37	1.126	0.67	0.25	0.80	0.011	0.31	22
VOCs													
Trichloroethene	0.013	1.0	0.013	0.11	1	0.0012	1.126	0.67	0.00083	0.14	1.4	0.0060	0.00060
SVOCs													
Acenaphthylene	0.43	1.0	0.43	0.11	1	0.041	1.126	0.67	0.028	1.9	14	0.015	0.0020
Anthracene	0.31	1.0	0.31	0.11	1	0.030	1.126	0.67	0.020	1.9	10	0.011	0.0020
Benzo (a) anthracene	0.82	1.0	0.82	0.11	1	0.079	1.126	0.67	0.053	1.5	0.41	0.035	0.13
Benzo (a) pyrene	0.66	1.0	0.66	0.11	1	0.064	1.126	0.67	0.043	1.9	2.1	0.022	0.020
Chrysene	0.89	1.0	0.89	0.11	1	0.086	1.126	0.67	0.058	1.9	10	0.030	0.0058
Fluoranthene	2.3	1.0	2.3	0.11	1	0.22	1.126	0.67	0.15	1.9	10	0.077	0.015
Fluorene	0.097	1.0	0.097	0.11	1	0.0094	1.126	0.67	0.0063	1.9	5.2	0.0033	0.0012
Naphthalene	0.13	1.0	0.13	0.11	1	0.012	1.126	0.67	0.0083	1.9	1.8	0.0044	0.0046
Phenanthrene	1.3	1.0	1.3	0.11	1	0.13	1.126	0.67	0.085	1.9	2.5	0.045	0.034
Pyrene	1.0	1.0	1.0	0.11	1	0.099	1.126	0.67	0.067	1.9	2.6	0.035	0.026

Hazard Index - Detected Compounds	131	39
Hazard Index - Detected Compounds w/Detection Limits	131	39

NOTES:
(a) - See Attachment Q Table Q-3b.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table T-3b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Average Concentrations
SWMU S-3
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Arsenic	2.8	1.0	2.8	0.11	1	0.27	1.126	0.67	0.18	5.1	13	0.035	0.014
Chromium	1.4	1.0	1.4	0.11	1	0.14	1.126	0.67	0.093	1.0	1.7	0.093	0.056
Lead	140	1.0	140	0.11	1	14	1.126	0.67	9.0	1.5	16	6.0	0.56
Nickel	4.1	1.0	4.1	0.11	1	0.40	1.126	0.67	0.27	30	107	0.0088	0.0025
Selenium	3.5	1.0	3.5	0.11	1	0.34	1.126	0.67	0.23	0.50	1.0	0.45	0.23
Silver	0.25	1.0	0.25	0.11	1	0.024	1.126	0.67	0.016	178	0.37	0.000092	0.044
Thallium	0.066	1.0	0.066	0.11	1	0.0064	1.126	0.67	0.0043	0.80	0.011	0.0053	0.39
VOCs													
Trichloroethene	0.00022	1.0	0.00022	0.11	1	0.000021	1.126	0.67	0.000014	0.14	1.4	0.000097	0.0000097
SVOCs													
Acenaphthylene	0.015	1.0	0.015	0.11	1	0.0014	1.126	0.67	0.00096	1.9	14	0.00051	0.000066
Anthracene	0.0090	1.0	0.0090	0.11	1	0.00087	1.126	0.67	0.00058	1.9	10	0.00031	0.000057
Benzo (a) anthracene	0.011	1.0	0.011	0.11	1	0.0010	1.126	0.67	0.00069	1.5	0.41	0.00047	0.0017
Benzo (a) pyrene	0.0078	1.0	0.0078	0.11	1	0.00076	1.126	0.67	0.00051	1.9	2.1	0.00027	0.00025
Chrysene	0.013	1.0	0.013	0.11	1	0.0013	1.126	0.67	0.00087	1.9	10	0.00047	0.000084
Fluoranthene	0.035	1.0	0.035	0.11	1	0.0034	1.126	0.67	0.0023	1.9	10	0.0012	0.00022
Fluorene	0.0062	1.0	0.0062	0.11	1	0.00060	1.126	0.67	0.00040	1.9	5.2	0.00022	0.000078
Naphthalene	0.0016	1.0	0.0016	0.11	1	0.00016	1.126	0.67	0.00011	1.9	1.8	0.000057	0.000059
Phenanthrene	0.026	1.0	0.026	0.11	1	0.0026	1.126	0.67	0.0017	1.9	2.5	0.00092	0.00068
Pyrene	0.017	1.0	0.017	0.11	1	0.0017	1.126	0.67	0.0011	1.9	2.6	0.00060	0.00043

Hazard Index - Detected Compounds	6.6	1.3
Hazard Index - Detected Compounds w/Detection Limits	6.6	1.3

NOTES:
(a) - See Attachment Q Table Q-3a.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table T-4a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Maximum Concentrations
SWMU S-4
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Chromium	33	1.0	33	0.11	1	3.2	1.126	0.67	2.2	1.0	1.7	2.2	1.3
Lead	298	1.0	298	0.11	1	29	1.126	0.67	19	1.5	16	13	1.2
Mercury	1.4	1.0	1.4	0.11	1	0.13	1.126	0.67	0.089	0.64	1.3	0.14	0.069
Nickel	31	1.0	31	0.11	1	3.0	1.126	0.67	2.0	35	124	0.058	0.016
SVOCs													
Benzo (a) anthracene	0.48	1.0	0.48	0.11	1	0.047	1.126	0.67	0.031	1.5	0.41	0.021	0.076
Benzo (a) pyrene	0.25	1.0	0.25	0.11	1	0.024	1.126	0.67	0.016	1.9	2.1	0.0086	0.0078
Benzo (b) fluoranthene	0.57	1.0	0.57	0.11	1	0.055	1.126	0.67	0.037	1.9	2.1	0.019	0.018
Benzo (ghi) perylene	0.42	1.0	0.42	0.11	1	0.041	1.126	0.67	0.027	1.9	2.1	0.014	0.013
Benzo (k) fluoranthene	0.23	1.0	0.23	0.11	1	0.022	1.126	0.67	0.015	0.26	2.1	0.058	0.0071
bis (2-Ethylhexyl) phthalate	0.67	1.0	0.67	0.11	1	0.065	1.126	0.67	0.044	1.1	1.3	0.040	0.034
Chrysene	0.31	1.0	0.31	0.11	1	0.030	1.126	0.67	0.020	1.9	10	0.010	0.0020
Fluoranthene	0.58	1.0	0.58	0.11	1	0.056	1.126	0.67	0.038	1.9	10	0.020	0.0038
Indeno (1,2,3-cd) pyrene	0.31	1.0	0.31	0.11	1	0.030	1.126	0.67	0.020	1.9	2.1	0.011	0.010
Naphthalene	0.22	1.0	0.22	0.11	1	0.022	1.126	0.67	0.014	1.9	1.8	0.0076	0.0081
Phenanthrene	0.29	1.0	0.29	0.11	1	0.028	1.126	0.67	0.019	1.9	2.5	0.010	0.0075
Pyrene	0.54	1.0	0.54	0.11	1	0.052	1.126	0.67	0.035	1.9	2.6	0.018	0.013

Hazard Index - Detected Compounds	15	2.8
Hazard Index - Detected Compounds w/Detection Limits	15	2.8

NOTES:
(a) - See Attachment Q Table Q-4b.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table T-4b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Average Concentrations
SWMU S-4
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Chromium	0.40	1.0	0.40	0.11	1	0.039	1.126	0.67	0.026	1.0	1.7	0.026	0.016
Lead	22	1.0	22	0.11	1	2.1	1.126	0.67	1.4	1.5	16	0.93	0.087
Mercury	0.20	1.0	0.20	0.11	1	0.019	1.126	0.67	0.013	0.64	1.3	0.020	0.010
Nickel	4.6	1.0	4.6	0.11	1	0.45	1.126	0.67	0.30	30	107	0.0099	0.0028
SVOCs													
Benzo (a) anthracene	0.0095	1.0	0.0095	0.11	1	0.00092	1.126	0.67	0.00061	1.5	0.41	0.00042	0.0015
Benzo (a) pyrene	0.0043	1.0	0.0043	0.11	1	0.00042	1.126	0.67	0.00028	1.9	2.1	0.00015	0.00014
Benzo (b) fluoranthene	0.012	1.0	0.012	0.11	1	0.0011	1.126	0.67	0.00077	1.9	2.1	0.00041	0.00037
Benzo (ghi) perylene	0.0055	1.0	0.0055	0.11	1	0.00053	1.126	0.67	0.00035	1.9	2.1	0.00019	0.00017
Benzo (k) fluoranthene	0.0057	1.0	0.0057	0.11	1	0.00056	1.126	0.67	0.00037	0.26	2.1	0.0014	0.00018
bis (2-Ethylhexyl) phthalate	0.014	1.0	0.014	0.11	1	0.0014	1.126	0.67	0.00092	1.1	1.3	0.00084	0.00073
Chrysene	0.0077	1.0	0.0077	0.11	1	0.00074	1.126	0.67	0.00050	1.9	10	0.00027	0.000048
Fluoranthene	0.017	1.0	0.017	0.11	1	0.0017	1.126	0.67	0.0011	1.9	10	0.00060	0.00011
Indeno (1,2,3-cd) pyrene	0.0052	1.0	0.0052	0.11	1	0.00050	1.126	0.67	0.00034	1.9	2.1	0.00018	0.00016
Naphthalene	0.0042	1.0	0.0042	0.11	1	0.00041	1.126	0.67	0.00027	1.9	1.8	0.00015	0.00015
Phenanthrene	0.010	1.0	0.010	0.11	1	0.0010	1.126	0.67	0.00067	1.9	2.5	0.00036	0.00027
Pyrene	0.016	1.0	0.016	0.11	1	0.0015	1.126	0.67	0.0010	1.9	2.6	0.00056	0.00040

Hazard Index - Detected Compounds	0.99	0.12
Hazard Index - Detected Compounds w/Detection Limits	0.99	0.12

NOTES:

(a) - See Attachment Q Table Q-4a.

(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.

(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.

(d) - Sample and Suter, 1994.

(e) - See Attachment O, Table O-1.

(f) - Based on site use from March through November.

(g) - See Table 4-23.

Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.

LOAEL - Lowest Observable Adverse Effects Level.

HQ - Hazard Quotient.

Table T-5a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Maximum Concentrations
SWMU S-5
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
Metals										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Antimony	62	1.0	62	0.11	1	6.0	1.126	0.67	4.0	0.026	0.26	155	15
Cadmium	59	1.0	59	0.11	1	5.7	1.126	0.67	3.8	1.4	20	2.7	0.19
Lead	173	1.0	173	0.11	1	17	1.126	0.67	11	1.5	16	7.5	0.70
Nickel	47	1.0	47	0.11	1	4.5	1.126	0.67	3.0	35	124	0.086	0.024
Silver	11	1.0	11	0.11	1	1.0	1.126	0.67	0.69	178	0.37	0.0039	1.9
VOCs													
Carbon disulfide	0.0015	1.0	0.0015	0.11	1	0.00014	1.126	0.67	0.00010	2.5	5.1	0.000039	0.000019
Methylene chloride	0.0016	1.0	0.0016	0.11	1	0.00016	1.126	0.67	0.00011	0.74	6.3	0.00014	0.000017

NOTES:
(a) - See Attachment Q Table Q-5b.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

Hazard Index - Detected Compounds	7.5	0.70
Hazard Index - Detected Compounds w/Detection Limits	165	18

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table T-5b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Average Concentrations
SWMU S-5
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Antimony	3.2	1.0	3.2	0.11	1	0.31	1.126	0.67	0.21	0.026	0.26	8.0	0.80
Cadmium	8.2	1.0	8.2	0.11	1	0.79	1.126	0.67	0.53	1.4	20	0.37	0.027
Lead	7.4	1.0	7.4	0.11	1	0.71	1.126	0.67	0.48	1.5	16	0.32	0.030
Nickel	7.0	1.0	7.0	0.11	1	0.68	1.126	0.67	0.45	30	107	0.015	0.0042
Silver	0.79	1.0	0.79	0.11	1	0.076	1.126	0.67	0.051	178	0.37	0.00029	0.14
VOCs													
Carbon disulfide	0.000035	1.0	0.000035	0.11	1	0.0000034	1.126	0.67	0.0000023	2.5	5.1	0.00000090	0.00000045
Methylene chloride	0.000054	1.0	0.000054	0.11	1	0.0000052	1.126	0.67	0.0000035	0.74	6.3	0.0000048	0.00000056

Hazard Index - Detected Compounds	0.32	0.030
Hazard Index - Detected Compounds w/Detection Limits	8.7	1.0

NOTES:
(a) - See Attachment Q Table Q-5a.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table T-6a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Maximum Concentrations
SWMU S-6
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Antimony	263	1.0	263	0.11	1	25	1.126	0.67	17	0.026	0.26	656	66
Lead	2639	1.0	2639	0.11	1	255	1.126	0.67	171	1.5	16	114	11
Nickel	72	1.0	72	0.11	1	7.0	1.126	0.67	4.7	35	124	0.13	0.038
Selenium	2.2	1.0	2.2	0.11	1	0.21	1.126	0.67	0.14	0.50	1.0	0.28	0.14
Silver	16	1.0	16	0.11	1	1.6	1.126	0.67	1.1	178	0.37	0.0060	2.9
SVOCs													
Benzo (a) pyrene	0.095	1.0	0.095	0.11	1	0.0092	1.126	0.67	0.0062	1.9	2.1	0.0032	0.0029
Benzo (b) fluoranthene	0.20	1.0	0.20	0.11	1	0.020	1.126	0.67	0.013	1.9	2.1	0.0070	0.0063
Benzo (ghi) perylene	0.081	1.0	0.081	0.11	1	0.0079	1.126	0.67	0.0053	1.9	2.1	0.0028	0.0025
Chrysene	0.23	1.0	0.23	0.11	1	0.022	1.126	0.67	0.015	1.9	10	0.0079	0.0015
Fluoranthene	0.089	1.0	0.089	0.11	1	0.0086	1.126	0.67	0.0058	1.9	10	0.0030	0.0006
Fluorene	0.090	1.0	0.090	0.11	1	0.0088	1.126	0.67	0.0059	1.9	5.2	0.0031	0.0011
Indeno (1,2,3-cd) pyrene	0.10	1.0	0.10	0.11	1	0.0098	1.126	0.67	0.0066	1.9	2.1	0.0035	0.0031
Pyrene	0.089	1.0	0.089	0.11	1	0.0086	1.126	0.67	0.0058	1.9	2.6	0.0030	0.0022

Hazard Index - Detected Compounds	771	76
Hazard Index - Detected Compounds w/Detection Limits	771	79

NOTES:
(a) - See Attachment Q Table Q-6b.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table T-6b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Average Concentrations
SWMU S-6
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Antimony	10	1.0	10	0.11	1	0.93	1.126	0.67	0.62	0.026	0.26	24	2.4
Lead	128	1.0	128	0.11	1	12	1.126	0.67	8.3	1.5	16	5.5	0.52
Nickel	11	1.0	11	0.11	1	1.1	1.126	0.67	0.73	30	107	0.024	0.0068
Selenium	0.41	1.0	0.41	0.11	1	0.039	1.126	0.67	0.026	0.50	1.0	0.053	0.026
Silver	1.3	1.0	1.3	0.11	1	0.13	1.126	0.67	0.084	178	0.37	0.00047	0.22
SVOCs													
Benzo (a) pyrene	0.0032	1.0	0.0032	0.11	1	0.00031	1.126	0.67	0.00021	1.9	2.1	0.00011	0.00010
Benzo (b) fluoranthene	0.0032	1.0	0.0032	0.11	1	0.00031	1.126	0.67	0.00021	1.9	2.1	0.00011	0.00010
Benzo (ghi) perylene	0.0030	1.0	0.0030	0.11	1	0.00029	1.126	0.67	0.00020	1.9	2.1	0.00011	0.000095
Chrysene	0.0043	1.0	0.0043	0.11	1	0.00042	1.126	0.67	0.00028	1.9	10	0.00015	0.000027
Fluoranthene	0.0044	1.0	0.0044	0.11	1	0.00043	1.126	0.67	0.00029	1.9	10	0.00015	0.000028
Fluorene	0.0068	1.0	0.0068	0.11	1	0.00066	1.126	0.67	0.00044	1.9	5.2	0.00024	0.000085
Indeno (1,2,3-cd) pyrene	0.0032	1.0	0.0032	0.11	1	0.00031	1.126	0.67	0.00021	1.9	2.1	0.00011	0.00010
Pyrene	0.0045	1.0	0.0045	0.11	1	0.00043	1.126	0.67	0.00029	1.9	2.6	0.00016	0.00011

Hazard Index - Detected Compounds	30	2.9
Hazard Index - Detected Compounds w/Detection Limits	30	3.2

NOTES:
(a) - See Attachment Q Table Q-6a.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table T-7a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Maximum Concentrations
SWMU S-7/S-20
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
Metals										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Chromium	203	1.0	203	0.11	1	20	1.126	0.67	13	1.0	1.7	13	7.7
Lead	696	1.0	696	0.11	1	67	1.126	0.67	45	1.5	16	30	2.8
Mercury	0.61	1.0	0.61	0.11	1	0.059	1.126	0.67	0.040	0.64	1.3	0.062	0.031
Nickel	49	1.0	49	0.11	1	4.7	1.126	0.67	3.2	35	124	0.091	0.026
Selenium	8.5	1.0	8.5	0.11	1	0.82	1.126	0.67	0.55	0.50	1.0	1.1	0.55
Thallium	4.9	1.0	4.9	0.11	1	0.47	1.126	0.67	0.32	0.80	0.011	0.40	29
VOCs													
Trichloroethene	0.010	1.0	0.010	0.11	1	0.00098	1.126	0.67	0.00066	0.14	1.4	0.0047	0.00047
SVOCs													
bis (2-Ethylhexyl) phthalate	0.033	1.0	0.033	0.11	1	0.0032	1.126	0.67	0.0021	1.1	1.3	0.0019	0.0016
Chrysene	0.041	1.0	0.041	0.11	1	0.0040	1.126	0.67	0.0027	1.9	10	0.0014	0.00027
Fluoranthene	0.057	1.0	0.057	0.11	1	0.0055	1.126	0.67	0.0037	1.9	10	0.0019	0.00037
Naphthalene	0.033	1.0	0.033	0.11	1	0.0032	1.126	0.67	0.0022	1.9	1.8	0.0011	0.0012
Phenanthrene	0.037	1.0	0.037	0.11	1	0.0036	1.126	0.67	0.0024	1.9	2.5	0.0013	0.0010
Pyrene	0.036	1.0	0.036	0.11	1	0.0035	1.126	0.67	0.0024	1.9	2.6	0.0012	0.00090

Hazard Index - Detected Compounds	45	40
Hazard Index - Detected Compounds w/Detection Limits	45	40

NOTES:
(a) - See Attachment Q Table Q-7b.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table T-7b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Average Concentrations
SWMU S-7/S-20
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Chromium	3.9	1.0	3.9	0.11	1	0.38	1.126	0.67	0.25	1.0	1.7	0.25	0.15
Lead	30	1.0	30	0.11	1	2.9	1.126	0.67	1.9	1.5	16	1.3	0.12
Mercury	0.038	1.0	0.038	0.11	1	0.0036	1.126	0.67	0.0024	0.64	1.3	0.0038	0.0019
Nickel	7.1	1.0	7.1	0.11	1	0.69	1.126	0.67	0.46	30	107	0.015	0.0043
Selenium	1.1	1.0	1.1	0.11	1	0.11	1.126	0.67	0.072	0.50	1.0	0.14	0.072
Thallium	0.046	1.0	0.046	0.11	1	0.0045	1.126	0.67	0.0030	0.80	0.011	0.0037	0.28
VOCs													
Trichloroethene	0.00011	1.0	0.00011	0.11	1	0.000010	1.126	0.67	0.0000069	0.14	1.4	0.000047	0.0000047
SVOCs													
bis (2-Ethylhexyl) phthalate	0.0029	1.0	0.0029	0.11	1	0.00028	1.126	0.67	0.00019	1.1	1.3	0.00017	0.00015
Chrysene	0.0026	1.0	0.0026	0.11	1	0.00025	1.126	0.67	0.00017	1.9	10	0.000091	0.000016
Fluoranthene	0.0022	1.0	0.0022	0.11	1	0.00022	1.126	0.67	0.00014	1.9	10	0.000078	0.000014
Naphthalene	0.0025	1.0	0.0025	0.11	1	0.00024	1.126	0.67	0.00016	1.9	1.8	0.000086	0.000089
Phenanthrene	0.0046	1.0	0.0046	0.11	1	0.00044	1.126	0.67	0.00030	1.9	2.5	0.00016	0.00012
Pyrene	0.0037	1.0	0.0037	0.11	1	0.00036	1.126	0.67	0.00024	1.9	2.6	0.00013	0.000092

NOTES:
(a) - See Attachment Q Table Q-7a.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Hazard Index - Detected Compounds	1.7	0.63
Hazard Index - Detected Compounds w/Detection Limits	1.7	0.63

Table T-8a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Maximum Concentrations
SWMU S-8
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Arsenic	55	1.0	55	0.11	1	5.4	1.126	0.67	3.6	5.1	13	0.70	0.28
Barium	175	1.0	175	0.11	1	17	1.126	0.67	11	39	77	0.29	0.15
Cadmium	44	1.0	44	0.11	1	4.3	1.126	0.67	2.9	1.4	20	2.0	0.14
Chromium	296	1.0	296	0.11	1	29	1.126	0.67	19	1.0	1.7	19	11
Lead	1553	1.0	1553	0.11	1	150	1.126	0.67	101	1.5	16	67	6.3
Selenium	1.3	1.0	1.3	0.11	1	0.12	1.126	0.67	0.084	0.50	1.0	0.17	0.084
Thallium	16	1.0	16	0.11	1	1.5	1.126	0.67	1.0	0.80	0.011	1.3	92
VOCs													
Methylene chloride	0.0041	1.0	0.0041	0.11	1	0.00039	1.126	0.67	0.00026	0.74	6.3	0.00036	0.000042
SVOCs													
Anthracene	0.55	1.0	0.55	0.11	1	0.053	1.126	0.67	0.036	1.9	10	0.019	0.004
Benzo (a) anthracene	1.4	1.0	1.4	0.11	1	0.14	1.126	0.67	0.093	1.5	0.41	0.062	0.23
Benzo (a) pyrene	0.88	1.0	0.88	0.11	1	0.085	1.126	0.67	0.057	1.9	2.1	0.030	0.027
Benzo (b) fluoranthene	1.3	1.0	1.3	0.11	1	0.12	1.126	0.67	0.084	1.9	2.1	0.044	0.040
Benzo (ghi) perylene	0.64	1.0	0.64	0.11	1	0.062	1.126	0.67	0.042	1.9	2.1	0.022	0.020
Benzo (k) fluoranthene	1.3	1.0	1.3	0.11	1	0.12	1.126	0.67	0.084	0.26	2.1	0.32	0.040
Chrysene	1.6	1.0	1.6	0.11	1	0.16	1.126	0.67	0.11	1.9	10	0.056	0.011
Dibenzo(a,h)anthracene	0.27	1.0	0.27	0.11	1	0.026	1.126	0.67	0.018	0.72	2.1	0.024	0.01
Fluoranthene	3.6	1.0	3.6	0.11	1	0.35	1.126	0.67	0.24	1.9	10	0.12	0.024
Indeno (1,2,3-cd) pyrene	0.68	1.0	0.68	0.11	1	0.066	1.126	0.67	0.044	1.9	2.1	0.023	0.021
Naphthalene	0.26	1.0	0.26	0.11	1	0.026	1.126	0.67	0.017	1.9	1.8	0.0090	0.010
Phenanthrene	2.3	1.0	2.3	0.11	1	0.22	1.126	0.67	0.15	1.9	2.5	0.078	0.059
Pyrene	2.3	1.0	2.3	0.11	1	0.23	1.126	0.67	0.15	1.9	2.6	0.079	0.06

Hazard Index - Detected Compounds	92	110
Hazard Index - Detected Compounds w/Detection Limits	92	110

NOTES:
(a) - See Attachment Q Table Q-8b.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table T-8b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Average Concentrations
SWMU S-8
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Arsenic	3.5	1.0	3.5	0.11	1	0.34	1.126	0.67	0.23	5.1	13	0.045	0.018
Barium	4.6	1.0	4.6	0.11	1	0.45	1.126	0.67	0.30	39	77	0.0078	0.0039
Cadmium	6.4	1.0	6.4	0.11	1	0.62	1.126	0.67	0.42	1.4	20	0.29	0.021
Chromium	5.4	1.0	5.4	0.11	1	0.52	1.126	0.67	0.35	1.0	1.7	0.35	0.21
Lead	68	1.0	68	0.11	1	6.6	1.126	0.67	4.4	1.5	16	2.9	0.27
Selenium	0.24	1.0	0.24	0.11	1	0.023	1.126	0.67	0.015	0.50	1.0	0.031	0.015
Thallium	0.21	1.0	0.21	0.11	1	0.020	1.126	0.67	0.014	0.80	0.011	0.017	1.3
VOCs													
Methylene chloride	0.000079	1.0	0.000079	0.11	1	0.0000076	1.126	0.67	0.0000051	0.74	6.3	0.0000069	0.00000081
SVOCs													
Anthracene	0.013	1.0	0.013	0.11	1	0.0012	1.126	0.67	0.00083	1.9	10	0.00045	0.000081
Benzo (a) anthracene	0.020	1.0	0.020	0.11	1	0.0019	1.126	0.67	0.0013	1.5	0.41	0.00088	0.0031
Benzo (a) pyrene	0.012	1.0	0.012	0.11	1	0.0012	1.126	0.67	0.00080	1.9	2.1	0.00043	0.00039
Benzo (b) fluoranthene	0.018	1.0	0.018	0.11	1	0.0018	1.126	0.67	0.0012	1.9	2.1	0.00064	0.00057
Benzo (ghi) perylene	0.0095	1.0	0.0095	0.11	1	0.00092	1.126	0.67	0.00062	1.9	2.1	0.00033	0.00030
Benzo (k) fluoranthene	0.016	1.0	0.016	0.11	1	0.0015	1.126	0.67	0.0010	0.26	2.1	0.0040	0.00050
Chrysene	0.026	1.0	0.026	0.11	1	0.0025	1.126	0.67	0.0017	1.9	10	0.00090	0.00016
Dibenzo(a,h)anthracene	0.0042	1.0	0.0042	0.11	1	0.00041	1.126	0.67	0.00027	0.72	2.1	0.00038	0.00013
Fluoranthene	0.059	1.0	0.059	0.11	1	0.0058	1.126	0.67	0.0039	1.9	10	0.0021	0.00037
Indeno (1,2,3-cd) pyrene	0.0098	1.0	0.0098	0.11	1	0.00095	1.126	0.67	0.00063	1.9	2.1	0.00034	0.00031
Naphthalene	0.0040	1.0	0.0040	0.11	1	0.00038	1.126	0.67	0.00026	1.9	1.8	0.00014	0.00014
Phenanthrene	0.045	1.0	0.045	0.11	1	0.0044	1.126	0.67	0.0029	1.9	2.5	0.0016	0.0012
Pyrene	0.040	1.0	0.040	0.11	1	0.0038	1.126	0.67	0.0026	1.9	2.6	0.0014	0.0010

Hazard Index - Detected Compounds	3.6	1.8
Hazard Index - Detected Compounds w/Detection Limits	3.7	1.8

NOTES:
(a) - See Attachment Q Table Q-8a.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table T-9a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Maximum Concentrations
SWMU S-11
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Chromium	138	1.0	138	0.11	1	13	1.126	0.67	8.9	1.0	1.7	8.9	5.3
Lead	255	1.0	255	0.11	1	25	1.126	0.67	17	1.5	16	11	1.0
Nickel	28	1.0	28	0.11	1	2.7	1.126	0.67	1.8	30	107	0.061	0.017
Selenium	5.4	1.0	5.4	0.11	1	0.53	1.126	0.67	0.35	0.50	1.0	0.71	0.35
Thallium	4.8	1.0	4.8	0.11	1	0.47	1.126	0.67	0.31	0.80	0.011	0.39	28
VOCs													
Trichloroethene	0.0054	1.0	0.0054	0.11	1	0.00052	1.126	0.67	0.00035	0.14	1.4	0.003	0.0003
SVOCs													
Acenaphthylene	1.7	1.0	1.7	0.11	1	0.16	1.126	0.67	0.11	1.90	14	0.057	0.0078
Anthracene	1.7	1.0	1.7	0.11	1	0.16	1.126	0.67	0.11	0.46	2.0	0.23	0.054
Benzo (a) anthracene	6.1	1.0	6.1	0.11	1	0.59	1.126	0.67	0.39	1.9	10	0.21	0.039
Benzo (a) pyrene	6.8	1.0	6.8	0.11	1	0.66	1.126	0.67	0.44	1.5	0.41	0.29	1.1
Chrysene	6.8	1.0	6.8	0.11	1	0.66	1.126	0.67	0.44	1.9	2.1	0.23	0.21
Fluoranthene	16	1.0	16	0.11	1	1.6	1.126	0.67	1.1	1.9	10	0.56	0.11
Fluorene	0.77	1.0	0.77	0.11	1	0.074	1.126	0.67	0.050	1.90	5.2	0.026	0.010
Naphthalene	0.34	1.0	0.34	0.11	1	0.033	1.126	0.67	0.022	1.9	1.8	0.012	0.012
Phenanthrene	9.7	1.0	9.7	0.11	1	0.93	1.126	0.67	0.63	1.9	2.5	0.33	0.25
Pyrene	12	1.0	12	0.11	1	1.1	1.126	0.67	0.75	1.9	2.6	0.40	0.29

NOTES:
(a) - See Attachment Q Table Q-9b.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Hazard Index - Detected Compounds	23	37
Hazard Index - Detected Compounds w/Detection Limits	23	37

Table T-9b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Average Concentrations
SWMU S-11
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Chromium	2.9	1.0	2.9	0.11	1	0.28	1.126	0.67	0.19	1.0	1.7	0.19	0.11
Lead	16	1.0	16	0.11	1	1.5	1.126	0.67	1.0	1.5	16	0.68	0.064
Nickel	4.1	1.0	4.1	0.11	1	0.40	1.126	0.67	0.27	30	107	0.0088	0.0025
Selenium	1.5	1.0	1.5	0.11	1	0.15	1.126	0.67	0.098	0.50	1.0	0.20	0.098
Thallium	0.097	1.0	0.097	0.11	1	0.0094	1.126	0.67	0.0063	0.80	0.011	0.0078	0.58
VOCs													
Trichloroethene	0.00010	1.0	0.00010	0.11	1	0.000010	1.126	0.67	0.0000068	0.14	1.4	0.000047	0.0000047
SVOCs													
Acenaphthylene	0.063	1.0	0.063	0.11	1	0.0061	1.126	0.67	0.0041	1.9	14	0.0022	0.00028
Anthracene	0.048	1.0	0.048	0.11	1	0.0046	1.126	0.67	0.0031	1.9	10	0.0017	0.00030
Benzo (a) anthracene	0.12	1.0	0.12	0.11	1	0.011	1.126	0.67	0.0075	1.5	0.41	0.0051	0.018
Benzo (a) pyrene	0.12	1.0	0.12	0.11	1	0.011	1.126	0.67	0.0076	1.9	2.1	0.0041	0.0037
Chrysene	0.15	1.0	0.15	0.11	1	0.015	1.126	0.67	0.0098	1.9	10	0.0053	0.00095
Fluoranthene	0.40	1.0	0.40	0.11	1	0.039	1.126	0.67	0.026	1.9	10	0.014	0.0025
Fluorene	0.028	1.0	0.028	0.11	1	0.0027	1.126	0.67	0.0018	1.9	5.2	0.00098	0.00035
Naphthalene	0.017	1.0	0.017	0.11	1	0.0016	1.126	0.67	0.0011	1.9	1.8	0.00058	0.00060
Phenanthrene	0.30	1.0	0.30	0.11	1	0.030	1.126	0.67	0.020	1.9	2.5	0.011	0.0078
Pyrene	0.29	1.0	0.29	0.11	1	0.028	1.126	0.67	0.019	1.9	2.6	0.010	0.0073

Hazard Index - Detected Compounds	1.1	0.90
Hazard Index - Detected Compounds w/Detection Limits	1.1	0.90

NOTES:
(a) - See Attachment Q Table Q-9a.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table T-10a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Maximum Concentrations
SWMU S-21
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
Metals										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Antimony	55	1.0	55	0.11	0.68	3.6	1.126	0.67	2.4	0.039	0.30	62	8.1
Arsenic	45	1.0	45	0.11	0.68	3.0	1.126	0.67	2.0	5.1	13	0.39	0.15
Barium	86	1.0	86	0.11	0.68	5.7	1.126	0.67	3.8	39	77	0.10	0.049
Chromium	198	1.0	198	0.11	0.68	13	1.126	0.67	8.7	1.0	1.7	8.7	5.1
Lead	1186	1.0	1186	0.11	0.68	78	1.126	0.67	52	1.5	16	35	3.3
Mercury	0.29	1.0	0.29	0.11	0.68	0.019	1.126	0.67	0.013	0.64	1.3	0.020	0.0099
Nickel	281	1.0	281	0.11	0.68	18	1.126	0.67	12	30	107	0.41	0.12
Thallium	0.78	1.0	0.78	0.11	0.68	0.051	1.126	0.67	0.034	0.80	0.011	0.043	3.1
SVOCs													
Benzo (a) anthracene	0.54	1.0	0.54	0.11	0.68	0.036	1.126	0.67	0.024	1.5	0.41	0.016	0.059
Benzo (a) pyrene	0.37	1.0	0.37	0.11	0.68	0.025	1.126	0.67	0.016	1.9	2.1	0.0087	0.0078
Benzo (b) fluoranthene	0.75	1.0	0.75	0.11	0.68	0.049	1.126	0.67	0.033	1.9	2.1	0.017	0.016
Benzo (ghi) perylene	0.26	1.0	0.26	0.11	0.68	0.017	1.126	0.67	0.012	1.9	2.1	0.0061	0.0056
Benzo (k) fluoranthene	0.22	1.0	0.22	0.11	0.68	0.015	1.126	0.67	0.0099	0.26	2.1	0.038	0.0047
bis (2-Ethylhexyl) phthalate	0.21	1.0	0.21	0.11	0.68	0.014	1.126	0.67	0.0091	1.1	1.3	0.0083	0.0070
Chrysene	0.35	1.0	0.35	0.11	0.68	0.023	1.126	0.67	0.015	1.9	10	0.0081	0.0015
Fluoranthene	0.55	1.0	0.55	0.11	0.68	0.036	1.126	0.67	0.024	1.9	10	0.013	0.0024
Indeno (1,2,3-cd) pyrene	0.33	1.0	0.33	0.11	0.68	0.021	1.126	0.67	0.014	1.9	2.1	0.0076	0.0068
Naphthalene	0.18	1.0	0.18	0.11	0.68	0.012	1.126	0.67	0.0081	1.9	1.8	0.0042	0.0045
Phenanthrene	0.28	1.0	0.28	0.11	0.68	0.018	1.126	0.67	0.012	1.9	2.5	0.0064	0.0049
Pyrene	0.53	1.0	0.53	0.11	0.68	0.035	1.126	0.67	0.024	1.9	2.6	0.012	0.0091

NOTES:
(a) - See Attachment Q Table Q-10b.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Hazard Index - Detected Compounds	107	17
Hazard Index - Detected Compounds w/Detection Limits	107	20

Table T-10b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Average Concentrations
SWMU S-21
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Antimony	3.0 *	1.0	3.0	0.11	0.68	0.19	1.126	0.67	0.13	0.026	0.26	5.1	0.51
Arsenic	5.0	1.0	5.0	0.11	0.68	0.33	1.126	0.67	0.22	5.1	13	0.043	0.017
Barium	3.9	1.0	3.9	0.11	0.68	0.26	1.126	0.67	0.17	39	77	0.0045	0.0022
Chromium	4.2	1.0	4.2	0.11	0.68	0.28	1.126	0.67	0.19	1.0	1.7	0.19	0.11
Lead	91	1.0	91	0.11	0.68	6.0	1.126	0.67	4.0	1.5	16	2.7	0.25
Mercury	0.067	1.0	0.067	0.11	0.68	0.0044	1.126	0.67	0.0030	0.64	1.3	0.0046	0.0023
Nickel	44	1.0	44	0.11	0.68	2.9	1.126	0.67	2.0	30	107	0.065	0.018
Thallium	0.017	1.0	0.017	0.11	0.68	0.0011	1.126	0.67	0.00074	0.80	0.011	0.00092	0.069
SVOCs													
Benzo (a) anthracene	0.013	1.0	0.013	0.11	0.68	0.00085	1.126	0.67	0.00057	1.5	0.41	0.00039	0.0014
Benzo (a) pyrene	0.0080	1.0	0.0080	0.11	0.68	0.00052	1.126	0.67	0.00035	1.9	2.1	0.00019	0.00017
Benzo (b) fluoranthene	0.017	1.0	0.017	0.11	0.68	0.0011	1.126	0.67	0.00073	1.9	2.1	0.00039	0.00035
Benzo (ghi) perylene	0.0056	1.0	0.0056	0.11	0.68	0.00037	1.126	0.67	0.00025	1.9	2.1	0.00013	0.00012
Benzo (k) fluoranthene	0.0050	1.0	0.0050	0.11	0.68	0.00033	1.126	0.67	0.00022	0.26	2.1	0.00084	0.00011
bis (2-Ethylhexyl) phthalate	0.0068	1.0	0.0068	0.11	0.68	0.00045	1.126	0.67	0.00030	1.1	1.3	0.00027	0.00024
Chrysene	0.0094	1.0	0.0094	0.11	0.68	0.00062	1.126	0.67	0.00041	1.9	10	0.00022	0.000040
Fluoranthene	0.017	1.0	0.017	0.11	0.68	0.0011	1.126	0.67	0.00073	1.9	10	0.00039	0.000071
Indeno (1,2,3-cd) pyrene	0.007	1.0	0.0069	0.11	0.68	0.00045	1.126	0.67	0.00030	1.9	2.1	0.00016	0.00015
Naphthalene	0.0037	1.0	0.0037	0.11	0.68	0.00024	1.126	0.67	0.00016	1.9	1.8	0.000087	0.000090
Phenanthrene	0.010	1.0	0.010	0.11	0.68	0.00068	1.126	0.67	0.00045	1.9	2.5	0.00024	0.00018
Pyrene	0.016	1.0	0.016	0.11	0.68	0.0011	1.126	0.67	0.00071	1.9	2.6	0.00038	0.00028

NOTES:

(a) - See Attachment Q Table Q-10a.

(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.

(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.

(d) - Sample and Suter, 1994.

(e) - See Attachment O, Table O-1.

(f) - Based on site use from March through November.

(g) - See Table 4-23.

Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.

LOAEL - Lowest Observable Adverse Effects Level.

HQ - Hazard Quotient.

Hazard Index - Detected Compounds	8.0	0.91
Hazard Index - Detected Compounds w/Detection Limits	8.0	0.98

Table T-11a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Maximum Concentrations
SWMU S-22
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
Metals										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Arsenic	35	1.0	35	0.11	1	3.4	1.126	0.67	2.3	5.1	13	0.44	0.17
Chromium	20	1.0	20	0.11	1	1.9	1.126	0.67	1.3	1.0	1.7	1.3	0.75
Lead	101	1.0	101	0.11	1	9.7	1.126	0.67	6.5	1.5	16	4.4	0.41
Mercury	121	1.0	121	0.11	1	12	1.126	0.67	7.8	0.64	1.3	12	6.0
Selenium	36	1.0	36	0.11	1	3.4	1.126	0.67	2.3	0.50	1.0	4.6	2.3
Thallium	1.0	1.0	1.0	0.11	1	0.098	1.126	0.67	0.066	0.80	0.011	0.082	6.0
VOCs													
Benzene	0.68	1.0	0.68	0.11	1	0.066	1.126	0.67	0.044	5.4	54	0.0081	0.00081
Xylenes, total	0.88	1.0	0.88	0.11	1	0.085	1.126	0.67	0.057	0.43	0.54	0.13	0.11
SVOCs													
Benzo (a) anthracene	1.5	1.0	1.5	0.11	1	0.14	1.126	0.67	0.097	1.5	0.41	0.065	0.24
Chrysene	2.1	1.0	2.1	0.11	1	0.20	1.126	0.67	0.14	1.9	10	0.072	0.014
Fluoranthene	4.2	1.0	4.2	0.11	1	0.40	1.126	0.67	0.27	1.9	10	0.14	0.027
Fluorene	0.70	1.0	0.70	0.11	1	0.067	1.126	0.67	0.045	1.90	5.2	0.024	0.0087
Naphthalene	4.5	1.0	4.5	0.11	1	0.44	1.126	0.67	0.29	1.9	1.8	0.15	0.16
Phenanthrene	6.9	1.0	6.9	0.11	1	0.67	1.126	0.67	0.45	1.9	2.5	0.24	0.18
Pyrene	2.1	1.0	2.1	0.11	1	0.21	1.126	0.67	0.14	1.9	2.6	0.072	0.053

Hazard Index - Detected Compounds	24	16
Hazard Index - Detected Compounds w/Detection Limits	24	16

NOTES:
(a) - See Attachment Q Table Q-11b.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table T-11b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Average Concentrations
SWMU S-22
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Arsenic	3.7	1.0	3.7	0.11	1	0.35	1.126	0.67	0.24	5.1	13	0.047	0.019
Chromium	0.40	1.0	0.40	0.11	1	0.039	1.126	0.67	0.026	1.0	1.7	0.026	0.016
Lead	6.5	1.0	6.5	0.11	1	0.63	1.126	0.67	0.42	1.5	16	0.28	0.026
Mercury	17	1.0	17	0.11	1	1.7	1.126	0.67	1.1	0.64	1.3	1.8	0.88
Selenium	10	1.0	10	0.11	1	1.0	1.126	0.67	0.68	0.50	1.0	1.4	0.68
Thallium	0.021	1.0	0.021	0.11	1	0.0020	1.126	0.67	0.0014	0.80	0.011	0.0017	0.13
VOCs													
Benzene	0.0069	1.0	0.0069	0.11	1	0.00067	1.126	0.67	0.00045	5.4	54	0.000083	0.0000083
Xylenes, total	0.0098	1.0	0.0098	0.11	1	0.00095	1.126	0.67	0.00064	0.43	0.54	0.0015	0.0012
SVOCs													
Benzo (a) anthracene	0.034	1.0	0.034	0.11	1	0.0033	1.126	0.67	0.0022	1.5	0.41	0.0015	0.0054
Chrysene	0.053	1.0	0.053	0.11	1	0.0051	1.126	0.67	0.0034	1.9	10	0.0018	0.00033
Fluoranthene	0.12	1.0	0.12	0.11	1	0.012	1.126	0.67	0.0078	1.9	10	0.0042	0.00075
Fluorene	0.032	1.0	0.032	0.11	1	0.0031	1.126	0.67	0.0021	1.9	5.2	0.0011	0.00040
Naphthalene	0.086	1.0	0.086	0.11	1	0.0083	1.126	0.67	0.0056	1.9	1.8	0.0030	0.0031
Phenanthrene	0.26	1.0	0.26	0.11	1	0.025	1.126	0.67	0.017	1.9	2.5	0.0090	0.0066
Pyrene	0.059	1.0	0.059	0.11	1	0.0057	1.126	0.67	0.0038	1.9	2.6	0.0021	0.0015

Hazard Index - Detected Compounds	3.5	1.8
Hazard Index - Detected Compounds w/Detection Limits	3.5	1.8

NOTES:

(a) - See Attachment Q Table Q-11a.

(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.

(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.

(d) - Sample and Suter, 1994.

(e) - See Attachment O, Table O-1.

(f) - Based on site use from March through November.

(g) - See Table 4-23.

Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.

LOAEL - Lowest Observable Adverse Effects Level.

HQ - Hazard Quotient.

Table T-12a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Maximum Concentrations
SWMU S-27
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Chromium	107	1.0	107	0.11	1	10	1.126	0.67	6.9	1.0	1.7	6.9	4.1
Lead	136	1.0	136	0.11	1	13	1.126	0.67	8.8	1.5	16	5.9	0.55
Mercury	0.44	1.0	0.44	0.11	1	0.043	1.126	0.67	0.028	0.64	1.3	0.045	0.022
Nickel	80	1.0	80	0.11	1	7.7	1.126	0.67	5.2	30	107	0.17	0.048
Selenium	11	1.0	11	0.11	1	1.1	1.126	0.67	0.74	0.50	1.0	1.5	0.74
Thallium	2.3	1.0	2.3	0.11	1	0.22	1.126	0.67	0.15	0.80	0.011	0.18	13
VOCs													
Trichloroethene	0.0047	1.0	0.0047	0.11	1	0.00046	1.126	0.67	0.00031	0.14	1.4	0.0022	0.00022
SVOCs													
Acenaphthylene	1.6	1.0	1.6	0.11	1	0.16	1.126	0.67	0.10	1.90	14	0.055	0.0074
Benzo (a) anthracene	3.5	1.0	3.5	0.11	1	0.34	1.126	0.67	0.23	1.5	0.41	0.15	0.56
Benzo (a) pyrene	9.5	1.0	9.5	0.11	1	0.92	1.126	0.67	0.62	1.9	2.1	0.32	0.29
Chrysene	4.8	1.0	4.8	0.11	1	0.47	1.126	0.67	0.31	1.9	10	0.17	0.031
Fluoranthene	3.3	1.0	3.3	0.11	1	0.32	1.126	0.67	0.21	1.9	10	0.11	0.021
Naphthalene	1.4	1.0	1.4	0.11	1	0.13	1.126	0.67	0.088	1.9	1.8	0.046	0.049
Pyrene	4.2	1.0	4.2	0.11	1	0.41	1.126	0.67	0.28	1.9	2.6	0.14	0.11

Hazard Index - Detected Compounds	16	6.5
Hazard Index - Detected Compounds w/Detection Limits	16	20

NOTES:
(a) - See Attachment Q Table Q-12b.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table T-12b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Average Concentrations
SWMU S-27
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Chromium	2.1	1.0	2.1	0.11	1	0.20	1.126	0.67	0.14	1.0	1.7	0.14	0.081
Lead	9.5	1.0	9.5	0.11	1	0.92	1.126	0.67	0.61	1.5	16	0.41	0.038
Mercury	0.081	1.0	0.081	0.11	1	0.0078	1.126	0.67	0.0052	0.64	1.3	0.0082	0.0041
Nickel	5.4	1.0	5.4	0.11	1	0.52	1.126	0.67	0.35	30	107	0.012	0.0033
Selenium	2.9	1.0	2.9	0.11	1	0.28	1.126	0.67	0.19	0.50	1.0	0.38	0.19
Thallium	0.048	1.0	0.048	0.11	1	0.0046	1.126	0.67	0.0031	0.80	0.011	0.0039	0.29
VOCs													
Trichloroethene	0.000068	1.0	0.000068	0.11	1	0.0000066	1.126	0.67	0.0000044	0.14	1.4	0.000030	0.0000030
SVOCs													
Acenaphthylene	0.044	1.0	0.044	0.11	1	0.0042	1.126	0.67	0.0028	1.9	14	0.0015	0.00020
Benzo (a) anthracene	0.044	1.0	0.044	0.11	1	0.0043	1.126	0.67	0.0029	1.5	0.41	0.0020	0.0070
Benzo (a) pyrene	0.10	1.0	0.10	0.11	1	0.010	1.126	0.67	0.0068	1.9	2.1	0.0036	0.0033
Chrysene	0.068	1.0	0.068	0.11	1	0.0066	1.126	0.67	0.0044	1.9	10	0.0024	0.00043
Fluoranthene	0.054	1.0	0.054	0.11	1	0.0052	1.126	0.67	0.0035	1.9	10	0.0019	0.00034
Naphthalene	0.020	1.0	0.020	0.11	1	0.0019	1.126	0.67	0.0013	1.9	1.8	0.00070	0.00072
Pyrene	0.068	1.0	0.068	0.11	1	0.0065	1.126	0.67	0.0044	1.9	2.6	0.0024	0.0017

NOTES:

(a) - See Attachment Q Table Q-12a.

(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.

(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.

(d) - Sample and Suter, 1994.

(e) - See Attachment O, Table O-1.

(f) - Based on site use from March through November.

(g) - See Table 4-23.

Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.

LOAEL - Lowest Observable Adverse Effects Level.

HQ - Hazard Quotient.

Hazard Index - Detected Compounds	0.96	0.33
Hazard Index - Detected Compounds w/Detection Limits	0.96	0.62

Table T-13a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Maximum Concentrations
SWMU S-24
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Arsenic	40	1.0	40	0.11	1	3.9	1.126	0.67	2.6	5.1	13	0.51	0.20
Chromium	37	1.0	37	0.11	1	3.6	1.126	0.67	2.4	1.0	1.7	2.4	1.4
Lead	71	1.0	71	0.11	1	6.8	1.126	0.67	4.6	1.5	16	3.1	0.29
Mercury	1.4	1.0	1.4	0.11	1	0.13	1.126	0.67	0.089	0.64	1.3	0.14	0.069
Selenium	19	1.0	19	0.11	1	1.8	1.126	0.67	1.2	0.50	1.0	2.5	1.2
Thallium	1.6	1.0	1.6	0.11	1	0.15	1.126	0.67	0.10	0.80	0.011	0.13	9.2
VOCs													
Benzene	169	1.0	169	0.11	1	16	1.126	0.67	11	5.4	54	2.0	0.2
Trichloroethene	0.0064	1.0	0.0064	0.11	1	0.00062	1.126	0.67	0.00041	0.14	1.4	0.003	0.0003
Xylenes, total	217	1.0	217	0.11	1	21	1.126	0.67	14	0.43	0.54	33	26
SVOCs													
Acenaphthylene	84	1.0	84	0.11	1	8.1	1.126	0.67	5.4	1.9	14	2.9	0.39
Anthracene	365	1.0	365	0.11	1	35	1.126	0.67	24	1.9	10	12	2.37
Benzo (a) anthracene	422	1.0	422	0.11	1	41	1.126	0.67	27	1.5	0.41	18	67
Benzo (a) pyrene	265	1.0	265	0.11	1	26	1.126	0.67	17	1.9	2.1	9.0	8.17
Chrysene	382	1.0	382	0.11	1	37	1.126	0.67	25	1.9	10	13	2.48
Fluoranthene	1095	1.0	1095	0.11	1	106	1.126	0.67	71	1.9	10	37	7.10
Fluorene	626	1.0	626	0.11	1	61	1.126	0.67	41	1.90	5.2	21	7.81
Naphthalene	0.24	1.0	0.24	0.11	1	0.024	1.126	0.67	0.016	1.9	1.8	0.0083	0.0088
Phenanthrene	2068	1.0	2068	0.11	1	200	1.126	0.67	134	1.9	2.5	71	54
Pyrene	821	1.0	821	0.11	1	80	1.126	0.67	53	1.9	2.6	28	20
Pyridine	35	1.0	35	0.11	1	3.3	1.126	0.67	2.2	0.13	0.13	17	17

NOTES:
(a) - See Attachment Q Table Q-13b.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Hazard Index - Detected Compounds	274	225
Hazard Index - Detected Compounds w/Detection Limits	274	225

Table T-13b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Average Concentrations
SWMU S-24
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Arsenic	2.3	1.0	2.3	0.11	1	0.22	1.126	0.67	0.15	5.1	13	0.030	0.012
Chromium	0.20	1.0	0.20	0.11	1	0.020	1.126	0.67	0.013	1.0	1.7	0.013	0.0079
Lead	4.2	1.0	4.2	0.11	1	0.41	1.126	0.67	0.27	1.5	16	0.18	0.017
Mercury	0.17	1.0	0.17	0.11	1	0.017	1.126	0.67	0.011	0.64	1.3	0.017	0.0087
Selenium	3.2	1.0	3.2	0.11	1	0.31	1.126	0.67	0.21	0.50	1.0	0.42	0.21
Thallium	0.029	1.0	0.029	0.11	1	0.0029	1.126	0.67	0.0019	0.80	0.011	0.0024	0.18
VOCs													
Benzene	1.7	1.0	1.7	0.11	1	0.16	1.126	0.67	0.11	5.4	54	0.020	0.0020
Trichloroethene	0.17	1.0	0.17	0.11	1	0.016	1.126	0.67	0.011	0.14	1.4	0.074	0.0074
Xylenes, total	2.2	1.0	2.2	0.11	1	0.21	1.126	0.67	0.14	0.43	0.54	0.32	0.26
SVOCs													
Acenaphthylene	2.1	1.0	2.1	0.11	1	0.20	1.126	0.67	0.13	1.9	14	0.072	0.0093
Anthracene	6.8	1.0	6.8	0.11	1	0.66	1.126	0.67	0.44	1.9	10	0.24	0.043
Benzo (a) anthracene	5.1	1.0	5.1	0.11	1	0.49	1.126	0.67	0.33	1.5	0.41	0.22	0.79
Benzo (a) pyrene	2.8	1.0	2.8	0.11	1	0.27	1.126	0.67	0.18	1.9	2.1	0.099	0.089
Chrysene	5.2	1.0	5.2	0.11	1	0.50	1.126	0.67	0.34	1.9	10	0.18	0.033
Fluoranthene	16	1.0	16	0.11	1	1.6	1.126	0.67	1.1	1.9	10	0.57	0.10
Fluorene	14	1.0	14	0.11	1	1.4	1.126	0.67	0.93	1.9	5.2	0.50	0.18
Naphthalene	0.0049	1.0	0.0049	0.11	1	0.00047	1.126	0.67	0.00032	1.9	1.8	0.00017	0.00018
Phenanthrene	39	1.0	39	0.11	1	3.7	1.126	0.67	2.5	1.9	2.5	1.4	0.99
Pyrene	12	1.0	12	0.11	1	1.2	1.126	0.67	0.81	1.9	2.6	0.44	0.31
Pyridine	3.6	1.0	3.6	0.11	1	0.35	1.126	0.67	0.23	0.13	0.13	1.8	1.8

Hazard Index - Detected Compounds	6.6	5.1
Hazard Index - Detected Compounds w/Detection Limits	6.6	5.1

NOTES:
(a) - See Attachment Q Table Q-13a.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table T-14a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Maximum Concentrations
Zone 2 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Chromium	148	1.0	148	0.11	1	14	1.126	0.67	9.6	1.0	1.7	9.6	5.6
Lead	877	1.0	877	0.11	1	85	1.126	0.67	57	1.5	16	38	3.6
Mercury	0.63	1.0	0.63	0.11	1	0.061	1.126	0.67	0.041	0.64	1.3	0.064	0.031
Selenium	11	1.0	11	0.11	1	1.0	1.126	0.67	0.69	0.50	1.0	1.4	0.69
Thallium	2.7	1.0	2.7	0.11	1	0.26	1.126	0.67	0.18	0.80	0.011	0.22	16
VOCs													
Trichloroethene	0.010	1.0	0.0102	0.11	1	0.00098	1.126	0.67	0.00066	0.14	1.4	0.0047	0.00047
SVOCs													
Acenaphthylene	0.31	1.0	0.31	0.11	1	0.030	1.126	0.67	0.020	1.9	14	0.011	0.0015
Anthracene	0.41	1.0	0.41	0.11	1	0.040	1.126	0.67	0.027	1.9	10	0.014	0.0027
Benzo (a) anthracene	2.5	1.0	2.5	0.11	1	0.24	1.126	0.67	0.16	1.5	0.41	0.11	0.40
Benzo (a) pyrene	3.7	1.0	3.7	0.11	1	0.36	1.126	0.67	0.24	1.9	2.1	0.13	0.12
Chrysene	3.1	1.0	3.1	0.11	1	0.30	1.126	0.67	0.20	1.9	10	0.10	0.020
Fluoranthene	4.0	1.0	4.0	0.11	1	0.38	1.126	0.67	0.26	1.9	10	0.14	0.026
Naphthalene	0.18	1.0	0.18	0.11	1	0.018	1.126	0.67	0.012	1.9	1.8	0.0062	0.0066
Phenanthrene	1.8	1.0	1.8	0.11	1	0.17	1.126	0.67	0.12	1.9	2.5	0.061	0.047
Pyrene	3.4	1.0	3.4	0.11	1	0.32	1.126	0.67	0.22	0.13	0.13	1.67	1.67

Hazard Index - Detected Compounds	51	28
Hazard Index - Detected Compounds w/Detection Limits	51	28

NOTES:
(a) - See Attachment Q Table Q-14b.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table T-14b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Average Concentrations
Zone 2 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Chromium	2.4	1.0	2.4	0.11	1	0.24	1.126	0.67	0.16	1.0	1.7	0.16	0.095
Lead	47	1.0	47	0.11	1	4.5	1.126	0.67	3.0	1.5	16	2.0	0.19
Mercury	0.11	1.0	0.11	0.11	1	0.011	1.126	0.67	0.0070	0.64	1.3	0.011	0.0055
Selenium	2.2	1.0	2.2	0.11	1	0.21	1.126	0.67	0.14	0.50	1.0	0.29	0.14
Thallium	0.053	1.0	0.053	0.11	1	0.0052	1.126	0.67	0.0035	0.80	0.011	0.0043	0.32
VOCs													
Trichloroethene	0.00015	1.0	0.00015	0.11	1	0.000014	1.126	0.67	0.0000097	0.14	1.4	0.000067	0.0000067
SVOCs													
Acenaphthylene	0.012	1.0	0.012	0.11	1	0.0012	1.126	0.67	0.00079	1.9	14	0.00042	0.000055
Anthracene	0.011	1.0	0.011	0.11	1	0.0011	1.126	0.67	0.00073	1.9	10	0.00039	0.000070
Benzo (a) anthracene	0.040	1.0	0.040	0.11	1	0.0038	1.126	0.67	0.0026	1.5	0.41	0.0018	0.0062
Benzo (a) pyrene	0.049	1.0	0.049	0.11	1	0.0048	1.126	0.67	0.0032	1.9	2.1	0.0017	0.0015
Chrysene	0.054	1.0	0.054	0.11	1	0.0053	1.126	0.67	0.0035	1.9	10	0.0019	0.00034
Fluoranthene	0.081	1.0	0.081	0.11	1	0.0078	1.126	0.67	0.0053	1.9	10	0.0028	0.00051
Naphthalene	0.0024	1.0	0.0024	0.11	1	0.00023	1.126	0.67	0.00015	1.9	1.8	0.000083	0.000086
Phenanthrene	0.049	1.0	0.049	0.11	1	0.0047	1.126	0.67	0.0032	1.9	2.5	0.0017	0.0013
Pyrene	0.068	1.0	0.068	0.11	1	0.0066	1.126	0.67	0.0044	1.9	2.6	0.0024	0.0017

NOTES:
(a) - See Attachment Q Table Q-14a.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Hazard Index - Detected Compounds	2.5	0.76
Hazard Index - Detected Compounds w/Detection Limits	2.5	0.76

Table T-15a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Maximum Concentrations
SWMU S-10
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Chromium	576	1.0	576	0.11	1	56	1.126	0.67	37	1.0	1.7	37	22
Lead	77	1.0	77	0.11	1	7.4	1.126	0.67	5.0	1.5	16	3.3	0.31
Mercury	0.65	1.0	0.65	0.11	1	0.063	1.126	0.67	0.042	0.64	1.3	0.065	0.032
Selenium	15	1.0	15	0.11	1	1.4	1.126	0.67	0.94	0.50	1.0	1.9	0.94
Thallium	24	1.0	24	0.11	1	2.3	1.126	0.67	1.5	0.80	0.011	1.9	139
VOCs													
Trichloroethene	0.0020	1.0	0.0020	0.11	1	0.00019	1.126	0.67	0.00013	0.14	1.4	0.00091	0.000091
SVOCs													
Acenaphthylene	0.10	1.0	0.10	0.11	1	0.010	1.126	0.67	0.0068	1.9	14	0.0036	0.00049
Anthracene	0.23	1.0	0.23	0.11	1	0.022	1.126	0.67	0.015	1.9	10	0.0078	0.0015
Benzo (a) anthracene	0.82	1.0	0.82	0.11	1	0.079	1.126	0.67	0.053	1.5	0.41	0.035	0.13
Benzo (a) pyrene	0.75	1.0	0.75	0.11	1	0.072	1.126	0.67	0.048	1.9	2.1	0.025	0.023
bis (2-Ethylhexyl) phthalate	0.069	1.0	0.069	0.11	1	0.0066	1.126	0.67	0.0045	1.1	1.3	0.0040	0.0034
Chrysene	0.82	1.0	0.82	0.11	1	0.079	1.126	0.67	0.053	1.9	10	0.028	0.0053
Fluoranthene	15	1.0	15	0.11	1	1.5	1.126	0.67	0.98	1.9	10	0.52	0.10
Fluorene	0.047	1.0	0.047	0.11	1	0.0046	1.126	0.67	0.0031	1.9	5.2	0.0016	0.00059
Naphthalene	0.028	1.0	0.028	0.11	1	0.0027	1.126	0.67	0.0018	1.9	1.8	0.00095	0.0010
Phenanthrene	0.90	1.0	0.90	0.11	1	0.087	1.126	0.67	0.058	1.9	2.5	0.031	0.023
Pyrene	0.96	1.0	0.96	0.11	1	0.093	1.126	0.67	0.062	1.9	2.6	0.033	0.024

Hazard Index - Detected Compounds	45	162
Hazard Index - Detected Compounds w/Detection Limits	45	162

NOTES:
(a) - See Attachment Q Table Q-15b.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table T-15b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Average Concentrations
SWMU S-10
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Chromium	9.2	1.0	9.2	0.11	1	0.89	1.126	0.67	0.60	1.0	1.7	0.60	0.36
Lead	5.7	1.0	5.7	0.11	1	0.55	1.126	0.67	0.37	1.5	16	0.25	0.023
Mercury	0.091	1.0	0.091	0.11	1	0.0088	1.126	0.67	0.0059	0.64	1.3	0.0092	0.0046
Selenium	2.9	1.0	2.9	0.11	1	0.28	1.126	0.67	0.19	0.50	1.0	0.38	0.19
Thallium	0.32	1.0	0.32	0.11	1	0.031	1.126	0.67	0.021	0.80	0.011	0.026	1.9
VOCs													
Trichloroethene	0.000041	1.0	0.000041	0.11	1	0.0000039	1.126	0.67	0.0000026	0.14	1.4	0.000018	0.0000018
SVOCs													
Acenaphthylene	0.0048	1.0	0.0048	0.11	1	0.00046	1.126	0.67	0.00031	1.9	14	0.00017	0.000022
Anthracene	0.0062	1.0	0.0062	0.11	1	0.00060	1.126	0.67	0.00040	1.9	10	0.00022	0.000039
Benzo (a) anthracene	0.015	1.0	0.015	0.11	1	0.0015	1.126	0.67	0.0010	1.5	0.41	0.00068	0.0024
Benzo (a) pyrene	0.013	1.0	0.013	0.11	1	0.0012	1.126	0.67	0.00082	1.9	2.1	0.00044	0.00040
bis (2-Ethylhexyl) phthalate	0.0020	1.0	0.0020	0.11	1	0.00019	1.126	0.67	0.00013	1.1	1.3	0.00012	0.00010
Chrysene	0.018	1.0	0.018	0.11	1	0.0017	1.126	0.67	0.0012	1.9	10	0.00063	0.00011
Fluoranthene	0.033	1.0	0.033	0.11	1	0.0032	1.126	0.67	0.0021	1.9	10	0.0011	0.00021
Fluorene	0.0043	1.0	0.0043	0.11	1	0.00041	1.126	0.67	0.00028	1.9	5.2	0.00015	0.000054
Naphthalene	0.0017	1.0	0.0017	0.11	1	0.00016	1.126	0.67	0.00011	1.9	1.8	0.000058	0.000060
Phenanthrene	0.024	1.0	0.024	0.11	1	0.0023	1.126	0.67	0.0016	1.9	2.5	0.00084	0.00062
Pyrene	0.024	1.0	0.024	0.11	1	0.0023	1.126	0.67	0.0016	1.9	2.6	0.00084	0.00061

NOTES:
(a) - See Attachment Q Table Q-15a.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Hazard Index - Detected Compounds	1.3	2.5
Hazard Index - Detected Compounds w/Detection Limits	1.3	2.5

Table T-16a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Maximum Concentrations
Zone 3 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Barium	87	1.0	87	0.11	1	8.4	1.126	0.67	5.6	39	77	0.14	0.073
Chromium	489	1.0	489	0.11	1	47	1.126	0.67	32	1.0	1.7	32	19
Lead	150	1.0	150	0.11	1	14	1.126	0.67	9.7	1.5	16	6.5	0.61
Mercury	3.7	1.0	3.7	0.11	1	0.36	1.126	0.67	0.24	0.64	1.3	0.38	0.18
Nickel	106	1.0	106	0.11	1	10	1.126	0.67	6.9	30	107	0.23	0.064
Selenium	9.3	1.0	9.3	0.11	1	0.90	1.126	0.67	0.60	0.50	1.0	1.2	0.60
Thallium	12	1.0	12	0.11	1	1.2	1.126	0.67	0.81	0.80	0.011	1.0	74
VOCs													
Trichloroethene	0.010	1.0	0.010	0.11	1	0.00098	1.126	0.67	0.00066	0.14	1.4	0.0047	0.00047
SVOCs													
Acenaphthylene	0.11	1.0	0.11	0.11	1	0.011	1.126	0.67	0.0072	1.9	14	0.0038	0.00052
Anthracene	0.090	1.0	0.090	0.11	1	0.0087	1.126	0.67	0.0058	1.9	10	0.0031	0.00058
Benzo (a) anthracene	0.38	1.0	0.38	0.11	1	0.037	1.126	0.67	0.025	1.5	0.41	0.016	0.060
Benzo (a) pyrene	0.68	1.0	0.68	0.11	1	0.066	1.126	0.67	0.044	1.9	2.1	0.023	0.021
bis (2-Ethylhexyl) phthalate	0.075	1.0	0.075	0.11	1	0.0073	1.126	0.67	0.0049	1.1	1.3	0.0045	0.0038
Chrysene	0.49	1.0	0.49	0.11	1	0.048	1.126	0.67	0.032	1.9	10	0.017	0.0032
Fluoranthene	0.58	1.0	0.58	0.11	1	0.056	1.126	0.67	0.038	1.9	10	0.020	0.0038
Naphthalene	0.031	1.0	0.031	0.11	1	0.0030	1.126	0.67	0.0020	1.9	1.8	0.0011	0.0011
Phenanthrene	0.21	1.0	0.21	0.11	1	0.021	1.126	0.67	0.014	1.9	2.5	0.0073	0.0055
Pyrene	0.50	1.0	0.50	0.11	1	0.048	1.126	0.67	0.032	1.9	2.6	0.017	0.012

Hazard Index - Detected Compounds	41	94
Hazard Index - Detected Compounds w/Detection Limits	41	94

NOTES:
(a) - See Attachment Q Table Q-16b.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table T-16b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Average Concentrations
Zone 3 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Barium	3.3	1.0	3.3	0.11	1	0.32	1.126	0.67	0.21	39	77	0.0056	0.0028
Chromium	4.5	1.0	4.5	0.11	1	0.44	1.126	0.67	0.29	1.0	1.7	0.29	0.18
Lead	8.0	1.0	8.0	0.11	1	0.78	1.126	0.67	0.52	1.5	16	0.35	0.032
Mercury	0.22	1.0	0.22	0.11	1	0.021	1.126	0.67	0.014	0.64	1.3	0.022	0.011
Nickel	6.6	1.0	6.6	0.11	1	0.64	1.126	0.67	0.43	30	107	0.014	0.0040
Selenium	1.3	1.0	1.3	0.11	1	0.13	1.126	0.67	0.085	0.50	1.0	0.17	0.085
Thallium	0.15	1.0	0.15	0.11	1	0.015	1.126	0.67	0.010	0.80	0.011	0.012	0.92
VOCs													
Trichloroethene	0.000085	1.0	0.000085	0.11	1	0.0000083	1.126	0.67	0.0000055	0.14	1.4	0.000038	0.0000038
SVOCs													
Acenaphthylene	0.0033	1.0	0.0033	0.11	1	0.00032	1.126	0.67	0.00021	1.9	14	0.00011	0.000015
Anthracene	0.0049	1.0	0.0049	0.11	1	0.00047	1.126	0.67	0.00032	1.9	10	0.00017	0.000031
Benzo (a) anthracene	0.0068	1.0	0.0068	0.11	1	0.00066	1.126	0.67	0.00044	1.5	0.41	0.00030	0.0011
Benzo (a) pyrene	0.0088	1.0	0.0088	0.11	1	0.00085	1.126	0.67	0.00057	1.9	2.1	0.00031	0.00028
bis (2-Ethylhexyl) phthalate	0.0019	1.0	0.0019	0.11	1	0.00019	1.126	0.67	0.00012	1.1	1.3	0.00011	0.000098
Chrysene	0.0090	1.0	0.0090	0.11	1	0.00087	1.126	0.67	0.00058	1.9	10	0.00031	0.000056
Fluoranthene	0.013	1.0	0.013	0.11	1	0.0012	1.126	0.67	0.00081	1.9	10	0.00044	0.000079
Naphthalene	0.0027	1.0	0.0027	0.11	1	0.00026	1.126	0.67	0.00017	1.9	1.8	0.000094	0.000097
Phenanthrene	0.0055	1.0	0.0055	0.11	1	0.00054	1.126	0.67	0.00036	1.9	2.5	0.00019	0.00014
Pyrene	0.011	1.0	0.011	0.11	1	0.0011	1.126	0.67	0.00072	1.9	2.6	0.00039	0.00028

NOTES:
(a) - See Attachment Q Table Q-16a.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

Hazard Index - Detected Compounds	0.87	1.2
Hazard Index - Detected Compounds w/Detection Limits	0.87	1.2

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table T-17a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Maximum Concentrations
SWMU S-14
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Antimony	31	1.0	31	0.11	1	3.0	1.126	0.67	2.0	0.026	0.26	78	7.8
Barium	1.9	1.0	1.9	0.11	1	0.19	1.126	0.67	0.13	39	77	0.0032	0.0016
Lead	655	1.0	655	0.11	1	63	1.126	0.67	42	1.5	16	28	2.7
Nickel	102	1.0	102	0.11	1	9.9	1.126	0.67	6.6	30	107	0.22	0.062
Selenium	1.4	1.0	1.4	0.11	1	0.14	1.126	0.67	0.093	0.50	1.0	0.19	0.093
Silver	2.4	1.0	2.4	0.11	1	0.23	1.126	0.67	0.15	178	0.37	0.00087	0.42
Thallium	0.81	1.0	0.81	0.11	1	0.079	1.126	0.67	0.053	0.8	0.011	0.066	4.8
VOCs													
Methylene chloride	0.029	1.0	0.029	0.11	1	0.0028	1.126	0.67	0.0019	0.74	6.3	0.0026	0.00030
SVOCs													
Anthracene	0.83	1.0	0.83	0.11	1	0.080	1.126	0.67	0.054	1.9	10	0.028	0.0054
Benzo (a) anthracene	2.0	1.0	2.0	0.11	1	0.19	1.126	0.67	0.13	1.5	0.41	0.085	0.31
Benzo (a) pyrene	1.3	1.0	1.3	0.11	1	0.12	1.126	0.67	0.084	1.9	2.1	0.044	0.04
Benzo (b) fluoranthene	2.4	1.0	2.4	0.11	1	0.23	1.126	0.67	0.15	1.9	2.1	0.081	0.073
Benzo (ghi) perylene	0.88	1.0	0.88	0.11	1	0.085	1.126	0.67	0.057	1.9	2.1	0.030	0.027
Benzo (k) fluoranthene	0.50	1.0	0.50	0.11	1	0.048	1.126	0.67	0.032	0.26	2.1	0.12	0.015
bis (2-Ethylhexyl) phthalate	0.23	1.0	0.23	0.11	1	0.022	1.126	0.67	0.015	1.1	1.3	0.013	0.011
Chrysene	1.7	1.0	1.7	0.11	1	0.17	1.126	0.67	0.11	1.9	10	0.058	0.011
Dibenzo(a,h)anthracene	0.18	1.0	0.18	0.11	1	0.018	1.126	0.67	0.012	0.72	2.1	0.016	0.0057
Fluoranthene	2.8	1.0	2.8	0.11	1	0.27	1.126	0.67	0.18	1.9	10	0.10	0.018
Fluorene	0.38	1.0	0.38	0.11	1	0.037	1.126	0.67	0.025	1.9	5.2	0.013	0.0048
Indeno (1,2,3-cd) pyrene	0.95	1.0	0.95	0.11	1	0.092	1.126	0.67	0.062	1.9	2.1	0.032	0.029
Naphthalene	0.51	1.0	0.51	0.11	1	0.049	1.126	0.67	0.033	1.9	1.8	0.017	0.018
Phenanthrene	2.1	1.0	2.1	0.11	1	0.21	1.126	0.67	0.14	1.9	2.5	0.073	0.055
Pyrene	2.3	1.0	2.3	0.11	1	0.23	1.126	0.67	0.15	1.9	2.6	0.079	0.058

NOTES:
(a) - See Attachment Q Table Q-17b.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Hazard Index - Detected Compounds	108	16
Hazard Index - Detected Compounds w/Detection Limits	108	17

Table T-17b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Average Concentrations
SWMU S-14
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Antimony	1.1	1.0	1.1	0.11	1	0.10	1.126	0.67	0.069	0.026	0.26	2.7	0.27
Barium	2.7	1.0	2.7	0.11	1	0.26	1.126	0.67	0.17	39	77	0.0045	0.0022
Lead	17	1.0	17	0.11	1	1.6	1.126	0.67	1.1	1.5	16	0.71	0.067
Nickel	7.1	1.0	7.1	0.11	1	0.69	1.126	0.67	0.46	30	107	0.015	0.0043
Selenium	0.18	1.0	0.18	0.11	1	0.017	1.126	0.67	0.012	0.50	1.0	0.023	0.012
Silver	0.073	1.0	0.073	0.11	1	0.0071	1.126	0.67	0.0047	178	0.37	0.000027	0.013
Thallium	0.011	1.0	0.011	0.11	1	0.0010	1.126	0.67	0.00069	0.80	0.011	0.00086	0.064
VOCs													
Methylene chloride	0.00023	1.0	0.00023	0.11	1	0.000022	1.126	0.67	0.000015	0.74	6.3	0.000020	0.0000024
SVOCs													
Anthracene	0.011	1.0	0.011	0.11	1	0.0010	1.126	0.67	0.00069	1.9	10	0.00037	0.000067
Benzo (a) anthracene	0.016	1.0	0.016	0.11	1	0.0016	1.126	0.67	0.0011	1.5	0.41	0.00073	0.0026
Benzo (a) pyrene	0.010	1.0	0.010	0.11	1	0.0010	1.126	0.67	0.00068	1.9	2.1	0.00037	0.00033
Benzo (b) fluoranthene	0.020	1.0	0.020	0.11	1	0.0020	1.126	0.67	0.0013	1.9	2.1	0.00071	0.00063
Benzo (ghi) perylene	0.0080	1.0	0.0080	0.11	1	0.00077	1.126	0.67	0.00052	1.9	2.1	0.00028	0.00025
Benzo (k) fluoranthene	0.0052	1.0	0.0052	0.11	1	0.00051	1.126	0.67	0.00034	0.26	2.1	0.0013	0.00016
bis (2-Ethylhexyl) phthalate	0.0053	1.0	0.0053	0.11	1	0.00052	1.126	0.67	0.00035	1.1	1.3	0.00031	0.00027
Chrysene	0.018	1.0	0.018	0.11	1	0.0017	1.126	0.67	0.0011	1.9	10	0.00061	0.00011
Dibenzo(a,h)anthracene	0.0027	1.0	0.0027	0.11	1	0.00026	1.126	0.67	0.00018	0.72	2.1	0.00024	0.000086
Fluoranthene	0.029	1.0	0.029	0.11	1	0.0028	1.126	0.67	0.0019	1.9	10	0.0010	0.00018
Fluorene	0.0092	1.0	0.0092	0.11	1	0.00089	1.126	0.67	0.00059	1.9	5.2	0.00032	0.00012
Indeno (1,2,3-cd) pyrene	0.0079	1.0	0.0079	0.11	1	0.00076	1.126	0.67	0.00051	1.9	2.1	0.00028	0.00025
Naphthalene	0.0043	1.0	0.0043	0.11	1	0.00041	1.126	0.67	0.00028	1.9	1.8	0.00015	0.00015
Phenanthrene	0.029	1.0	0.029	0.11	1	0.0028	1.126	0.67	0.0019	1.9	2.5	0.0010	0.00074
Pyrene	0.025	1.0	0.025	0.11	1	0.0024	1.126	0.67	0.0016	1.9	2.6	0.00086	0.00062

NOTES:
(a) - See Attachment Q Table Q-17a.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Hazard Index - Detected Compounds	3.4	0.42
Hazard Index - Detected Compounds w/Detection Limits	3.4	0.44

Table T-18a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Maximum Concentrations
SWMU S-15
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Antimony	30	1.0	30	0.11	1	2.9	1.126	0.67	1.9	0.026	0.26	75	7.5
Lead	38	1.0	38	0.11	1	3.7	1.126	0.67	2.5	1.5	16	1.6	0.15
Nickel	30	1.0	30	0.11	1	2.9	1.126	0.67	1.9	30	107	0.064	0.018
SVOCs													
Anthracene	0.28	1.0	0.28	0.11	1	0.027	1.126	0.67	0.018	1.9	10	0.0094	0.0018
Benzo (a) anthracene	1.0	1.0	1.0	0.11	1	0.099	1.126	0.67	0.066	1.5	0.41	0.044	0.16
Benzo (a) pyrene	0.37	1.0	0.37	0.11	1	0.036	1.126	0.67	0.024	1.9	2.1	0.013	0.012
Benzo (b) fluoranthene	1.0	1.0	1.0	0.11	1	0.099	1.126	0.67	0.066	1.9	2.1	0.035	0.031
Benzo (ghi) perylene	0.27	1.0	0.27	0.11	1	0.026	1.126	0.67	0.018	1.9	2.1	0.0093	0.0084
Benzo (k) fluoranthene	0.18	1.0	0.18	0.11	1	0.017	1.126	0.67	0.011	0.26	2.1	0.044	0.0055
Chrysene	0.44	1.0	0.44	0.11	1	0.042	1.126	0.67	0.028	1.9	10	0.015	0.0028
Fluoranthene	1.2	1.0	1.2	0.11	1	0.11	1.126	0.67	0.075	1.9	10	0.040	0.0075
Fluorene	0.077	1.0	0.077	0.11	1	0.0074	1.126	0.67	0.0050	1.9	5.2	0.0026	0.0010
Indeno (1,2,3-cd) pyrene	0.52	1.0	0.52	0.11	1	0.051	1.126	0.67	0.034	1.9	2.1	0.018	0.016
Naphthalene	0.43	1.0	0.43	0.11	1	0.041	1.126	0.67	0.028	1.9	1.8	0.015	0.015
Phenanthrene	0.76	1.0	0.76	0.11	1	0.073	1.126	0.67	0.049	1.9	2.5	0.026	0.020
Pyrene	1.0	1.0	1.0	0.11	1	0.099	1.126	0.67	0.067	1.9	2.6	0.035	0.026

NOTES:
(a) - See Attachment Q Table Q-18b.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Hazard Index - Detected Compounds	77	8.0
Hazard Index - Detected Compounds w/Detection Limits	77	8.0

Table T-18b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Average Concentrations
SWMU S-15
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Antimony	1.4	1.0	1.4	0.11	1	0.14	1.126	0.67	0.091	0.026	0.26	3.5	0.35
Lead	2.8	1.0	2.8	0.11	1	0.27	1.126	0.67	0.18	1.5	16	0.12	0.011
Nickel	4.0	1.0	4.0	0.11	1	0.39	1.126	0.67	0.26	30	107	0.0086	0.0024
SVOCs													
Anthracene	0.0074	1.0	0.0074	0.11	1	0.00072	1.126	0.67	0.00048	1.9	10	0.00026	0.000047
Benzo (a) anthracene	0.014	1.0	0.014	0.11	1	0.0014	1.126	0.67	0.00092	1.5	0.41	0.00062	0.0022
Benzo (a) pyrene	0.0056	1.0	0.0056	0.11	1	0.00054	1.126	0.67	0.00036	1.9	2.1	0.00019	0.00018
Benzo (b) fluoranthene	0.014	1.0	0.014	0.11	1	0.0014	1.126	0.67	0.00092	1.9	2.1	0.00050	0.00045
Benzo (ghi) perylene	0.0039	1.0	0.0039	0.11	1	0.00038	1.126	0.67	0.00025	1.9	2.1	0.00014	0.00012
Benzo (k) fluoranthene	0.0027	1.0	0.0027	0.11	1	0.00026	1.126	0.67	0.00018	0.26	2.1	0.00067	0.000085
Chrysene	0.0078	1.0	0.0078	0.11	1	0.00076	1.126	0.67	0.00051	1.9	10	0.00027	0.000049
Fluoranthene	0.021	1.0	0.021	0.11	1	0.0020	1.126	0.67	0.0014	1.9	10	0.00073	0.00013
Fluorene	0.0046	1.0	0.0046	0.11	1	0.00044	1.126	0.67	0.00030	1.9	5.2	0.00016	0.000057
Indeno (1,2,3-cd) pyrene	0.0068	1.0	0.0068	0.11	1	0.00066	1.126	0.67	0.00044	1.9	2.1	0.00024	0.00021
Naphthalene	0.0048	1.0	0.0048	0.11	1	0.00046	1.126	0.67	0.00031	1.9	1.8	0.00017	0.00017
Phenanthrene	0.016	1.0	0.016	0.11	1	0.0016	1.126	0.67	0.0011	1.9	2.5	0.00058	0.00042
Pyrene	0.019	1.0	0.019	0.11	1	0.0018	1.126	0.67	0.0012	1.9	2.6	0.00065	0.00047

Hazard Index - Detected Compounds	3.7	0.37
Hazard Index - Detected Compounds w/Detection Limits	3.7	0.37

NOTES:

(a) - See Attachment Q Table Q-18a.

(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.

(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.

(d) - Sample and Suter, 1994.

(e) - See Attachment O, Table O-1.

(f) - Based on site use from March through November.

(g) - See Table 4-23.

Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.

LOAEL - Lowest Observable Adverse Effects Level.

HQ - Hazard Quotient.

Table T-19a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Maximum Concentrations
SWMU S-23
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Chromium	413	1.0	413	0.11	1	40	1.126	0.67	27	1.0	1.7	27	16
Lead	89	1.0	89	0.11	1	8.6	1.126	0.67	5.8	1.5	16	3.9	0.36
Mercury	0.95	1.0	0.95	0.11	1	0.092	1.126	0.67	0.061	0.64	1.3	0.096	0.047
Nickel	36	1.0	36	0.11	1	3.5	1.126	0.67	2.4	30	107	0.079	0.022
Selenium	4.2	1.0	4.2	0.11	1	0.41	1.126	0.67	0.28	0.50	1.0	0.55	0.28
Silver	1.5	1.0	1.5	0.11	1	0.15	1.126	0.67	0.098	178	0.37	0.00055	0.27
Thallium	16	1.0	16	0.11	1	1.5	1.126	0.67	1.0	0.80	0.011	1.3	94
SVOCs													
Acenaphthylene	9.1	1.0	9.1	0.11	1	0.88	1.126	0.67	0.59	1.9	14	0.31	0.042
Anthracene	7.6	1.0	7.6	0.11	1	0.73	1.126	0.67	0.49	1.9	10	0.26	0.049
Benzo (a) anthracene	39	1.0	39	0.11	1	3.8	1.126	0.67	2.5	1.5	0.41	1.7	6.1
Benzo (a) pyrene	1.2	1.0	1.2	0.11	1	0.11	1.126	0.67	0.075	1.9	2.1	0.039	0.036
Chrysene	37	1.0	37	0.11	1	3.6	1.126	0.67	2.4	1.9	10	1.3	0.24
Fluoranthene	1.9	1.0	1.9	0.11	1	0.19	1.126	0.67	0.12	1.9	10	0.065	0.012
Fluorene	1.2	1.0	1.2	0.11	1	0.11	1.126	0.67	0.077	1.9	5.2	0.040	0.015
Naphthalene	1.8	1.0	1.8	0.11	1	0.18	1.126	0.67	0.12	1.9	1.8	0.062	0.066
Phenanthrene	17	1.0	17	0.11	1	1.7	1.126	0.67	1.1	1.9	2.5	0.59	0.45
Pyrene	1.8	1.0	1.8	0.11	1	0.18	1.126	0.67	0.12	1.9	2.6	0.063	0.046

Hazard Index - Detected Compounds	36	117
Hazard Index - Detected Compounds w/Detection Limits	37	117

NOTES:
(a) - See Attachment Q Table Q-19b.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table T-19b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Average Concentrations
SWMU S-23
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Chromium	8.6	1.0	8.6	0.11	1	0.83	1.126	0.67	0.56	1.0	1.7	0.56	0.33
Lead	7.2	1.0	7.2	0.11	1	0.70	1.126	0.67	0.47	1.5	16	0.31	0.029
Mercury	0.11	1.0	0.11	0.11	1	0.011	1.126	0.67	0.0070	0.64	1.3	0.011	0.0055
Nickel	5.5	1.0	5.5	0.11	1	0.53	1.126	0.67	0.36	30	107	0.012	0.0033
Selenium	1.3	1.0	1.3	0.11	1	0.12	1.126	0.67	0.083	0.50	1.0	0.17	0.083
Silver	0.11	1.0	0.11	0.11	1	0.011	1.126	0.67	0.0073	178	0.37	0.000041	0.020
Thallium	0.28	1.0	0.28	0.11	1	0.027	1.126	0.67	0.018	0.80	0.011	0.023	1.7
SVOCs													
Acenaphthylene	0.23	1.0	0.23	0.11	1	0.022	1.126	0.67	0.015	1.9	14	0.0079	0.0010
Anthracene	0.15	1.0	0.15	0.11	1	0.014	1.126	0.67	0.0095	1.9	10	0.0051	0.00092
Benzo (a) anthracene	0.47	1.0	0.47	0.11	1	0.046	1.126	0.67	0.031	1.5	0.41	0.021	0.075
Benzo (a) pyrene	0.025	1.0	0.025	0.11	1	0.0024	1.126	0.67	0.0016	1.9	2.1	0.00086	0.00077
Chrysene	0.51	1.0	0.51	0.11	1	0.050	1.126	0.67	0.033	1.9	10	0.018	0.0032
Fluoranthene	0.057	1.0	0.057	0.11	1	0.0056	1.126	0.67	0.0037	1.9	10	0.0020	0.00036
Fluorene	0.030	1.0	0.030	0.11	1	0.0029	1.126	0.67	0.0019	1.9	5.2	0.0010	0.00037
Naphthalene	0.019	1.0	0.019	0.11	1	0.0019	1.126	0.67	0.0012	1.9	1.8	0.00067	0.00070
Phenanthrene	0.35	1.0	0.35	0.11	1	0.034	1.126	0.67	0.022	1.9	2.5	0.012	0.0089
Pyrene	0.056	1.0	0.056	0.11	1	0.0054	1.126	0.67	0.0036	1.9	2.6	0.0020	0.0014

NOTES:
(a) - See Attachment Q Table Q-19a.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

Hazard Index - Detected Compounds	1.0	2.2
Hazard Index - Detected Compounds w/Detection Limits	1.1	2.2

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table T-20a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Maximum Concentrations
Zone 4 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Chromium	349	1.0	349	0.11	1	34	1.126	0.67	23	1.0	1.7	23	13
Lead	293	1.0	293	0.11	1	28	1.126	0.67	19	1.5	16	13	1.2
Mercury	4.9	1.0	4.9	0.11	1	0.48	1.126	0.67	0.32	0.64	1.3	0.50	0.24
Nickel	294	1.0	294	0.11	1	28	1.126	0.67	19	30	107	0.64	0.18
Selenium	9.9	1.0	9.9	0.11	1	0.96	1.126	0.67	0.64	0.50	1.0	1.3	0.64
Silver	2.6	1.0	2.6	0.11	1	0.25	1.126	0.67	0.17	178	0.37	0.00094	0.45
Thallium	11	1.0	11	0.11	1	1.0	1.126	0.67	0.69	0.8	0.011	0.87	63
VOCs													
Trichloroethene	0.011	1.0	0.011	0.11	1	0.0010	1.126	0.67	0.00070	0.14	1.4	0.0050	0.00050
SVOCs													
Acenaphthylene	0.91	1.0	0.91	0.11	1	0.088	1.126	0.67	0.059	1.9	14	0.031	0.0042
Anthracene	6.4	1.0	6.4	0.11	1	0.62	1.126	0.67	0.42	1.9	10	0.22	0.042
Benzo (a) anthracene	15	1.0	15	0.11	1	1.4	1.126	0.67	0.97	1.5	0.41	0.65	2.37
Benzo (a) pyrene	14	1.0	14	0.11	1	1.3	1.126	0.67	0.88	1.9	2.1	0.46	0.42
bis (2-Ethylhexyl) phthalate	0.034	1.0	0.034	0.11	1	0.0033	1.126	0.67	0.0022	1.1	1.3	0.0020	0.0017
Chrysene	15	1.0	15	0.11	1	1.5	1.126	0.67	0.97	1.9	10	0.51	0.10
Fluoranthene	29	1.0	29	0.11	1	2.8	1.126	0.67	1.9	1.9	10	1.0	0.19
Fluorene	2.4	1.0	2.4	0.11	1	0.23	1.126	0.67	0.15	1.9	5.2	0.081	0.029
Naphthalene	1.7	1.0	1.7	0.11	1	0.16	1.126	0.67	0.11	1.9	1.8	0.058	0.06
Phenanthrene	23	1.0	23	0.11	1	2.3	1.126	0.67	1.5	1.9	2.5	0.80	0.61
Pyrene	21	1.0	21	0.11	1	2.1	1.126	0.67	1.4	1.9	2.6	0.72	0.53

Hazard Index - Detected Compounds	42	20
Hazard Index - Detected Compounds w/Detection Limits	43	84

NOTES:
(a) - See Attachment Q Table Q-20b.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table T-20b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Average Concentrations
Zone 4 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Chromium	6.3	1.0	6.3	0.11	1	0.61	1.126	0.67	0.41	1.0	1.7	0.41	0.25
Lead	14	1.0	14	0.11	1	1.3	1.126	0.67	0.88	1.5	16	0.59	0.055
Mercury	0.61	1.0	0.61	0.11	1	0.059	1.126	0.67	0.040	0.64	1.3	0.062	0.031
Nickel	25	1.0	25	0.11	1	2.4	1.126	0.67	1.6	30	107	0.054	0.015
Selenium	2.8	1.0	2.8	0.11	1	0.27	1.126	0.67	0.18	0.50	1.0	0.36	0.18
Silver	0.11	1.0	0.11	0.11	1	0.010	1.126	0.67	0.0069	178	0.37	0.000039	0.019
Thallium	0.12	1.0	0.12	0.11	1	0.012	1.126	0.67	0.0080	0.80	0.011	0.010	0.74
VOCs													
Trichloroethene	0.00016	1.0	0.00016	0.11	1	0.000016	1.126	0.67	0.000011	0.14	1.4	0.000073	0.0000073
SVOCs													
Acenaphthylene	0.024	1.0	0.024	0.11	1	0.0023	1.126	0.67	0.0016	1.9	14	0.00084	0.00011
Anthracene	0.12	1.0	0.12	0.11	1	0.012	1.126	0.67	0.0078	1.9	10	0.0042	0.00076
Benzo (a) anthracene	0.18	1.0	0.18	0.11	1	0.018	1.126	0.67	0.012	1.5	0.41	0.0081	0.029
Benzo (a) pyrene	0.15	1.0	0.15	0.11	1	0.015	1.126	0.67	0.0097	1.9	2.1	0.0052	0.0047
bis (2-Ethylhexyl) phthalate	0.047	1.0	0.047	0.11	1	0.0046	1.126	0.67	0.0031	1.1	1.3	0.0028	0.0024
Chrysene	0.21	1.0	0.21	0.11	1	0.020	1.126	0.67	0.013	1.9	10	0.0073	0.0013
Fluoranthene	0.45	1.0	0.45	0.11	1	0.043	1.126	0.67	0.029	1.9	10	0.016	0.0028
Fluorene	0.057	1.0	0.057	0.11	1	0.0055	1.126	0.67	0.0037	1.9	5.2	0.0020	0.00072
Naphthalene	0.019	1.0	0.019	0.11	1	0.0019	1.126	0.67	0.0013	1.9	1.8	0.00068	0.00070
Phenanthrene	0.44	1.0	0.44	0.11	1	0.043	1.126	0.67	0.029	1.9	2.5	0.015	0.011
Pyrene	0.33	1.0	0.33	0.11	1	0.032	1.126	0.67	0.021	1.9	2.6	0.011	0.0082

Hazard Index - Detected Compounds	1.6	0.61
Hazard Index - Detected Compounds w/Detection Limits	1.6	1.4

NOTES:
(a) - See Attachment Q Table Q-20a.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table T-21a
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Maximum Concentrations
Zone 5 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Chromium	510	1.0	510	0.11	1	49	1.126	0.67	33	1.0	1.7	33	19
Lead	195	1.0	195	0.11	1	19	1.126	0.67	13	1.5	16	8.4	0.79
Nickel	40	1.0	40	0.11	1	3.9	1.126	0.67	2.6	30	107	0.087	0.024
Selenium	15	1.0	15	0.11	1	1.5	1.126	0.67	1.0	0.50	1.0	2.0	1.0
Silver	2.0	1.0	2.0	0.11	1	0.20	1.126	0.67	0.13	178	0.37	0.00073	0.35
Thallium	19	1.0	19	0.11	1	1.9	1.126	0.67	1.2	0.8	0.011	1.6	113
VOCs													
Trichloroethene	0.0051	1.0	0.0051	0.11	1	0.00049	1.126	0.67	0.00033	0.14	1.4	0.0024	0.00024
SVOCs													
Acenaphthylene	0.65	1.0	0.65	0.11	1	0.063	1.126	0.67	0.042	1.9	14	0.022	0.0030
Anthracene	1.1	1.0	1.1	0.11	1	0.11	1.126	0.67	0.072	1.9	10	0.038	0.0072
Benzo (a) anthracene	2.2	1.0	2.2	0.11	1	0.21	1.126	0.67	0.14	1.5	0.41	0.094	0.34
Benzo (a) pyrene	1.8	1.0	1.8	0.11	1	0.18	1.126	0.67	0.12	1.9	2.1	0.063	0.057
bis (2-Ethylhexyl) phthalate	0.042	1.0	0.042	0.11	1	0.0041	1.126	0.67	0.0027	1.1	1.3	0.0025	0.0021
Chrysene	2.3	1.0	2.3	0.11	1	0.22	1.126	0.67	0.15	1.9	10	0.077	0.015
Fluoranthene	1.4	1.0	1.4	0.11	1	0.14	1.126	0.67	0.093	1.9	10	0.049	0.0093
Fluorene	1.3	1.0	1.3	0.11	1	0.12	1.126	0.67	0.081	1.9	5.2	0.043	0.016
Naphthalene	0.45	1.0	0.45	0.11	1	0.044	1.126	0.67	0.029	1.9	1.8	0.015	0.016
Phenanthrene	0.83	1.0	0.83	0.11	1	0.080	1.126	0.67	0.054	1.9	2.5	0.028	0.021
Pyrene	3.9	1.0	3.9	0.11	1	0.38	1.126	0.67	0.25	1.9	2.6	0.13	0.10

Hazard Index - Detected Compounds	46	135
Hazard Index - Detected Compounds w/Detection Limits	46	135

NOTES:
(a) - See Attachment Q Table Q-21b.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table T-21b
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Herbivorous Mice - Red-tailed Hawk
Average Concentrations
Zone 5 Background
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Deer Mouse (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Deer Mouse (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Deer Mouse (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Chromium	9.4	1.0	9.4	0.11	1	0.91	1.126	0.67	0.61	1.0	1.7	0.61	0.37
Lead	8.9	1.0	8.9	0.11	1	0.86	1.126	0.67	0.57	1.5	16	0.38	0.036
Nickel	5.0	1.0	5.0	0.11	1	0.48	1.126	0.67	0.32	30	107	0.011	0.0030
Selenium	2.4	1.0	2.4	0.11	1	0.23	1.126	0.67	0.16	0.50	1.0	0.31	0.16
Silver	0.13	1.0	0.13	0.11	1	0.013	1.126	0.67	0.0084	178	0.37	0.000047	0.022
Thallium	0.21	1.0	0.21	0.11	1	0.020	1.126	0.67	0.014	0.80	0.011	0.017	1.3
VOCs													
Trichloroethene	0.000068	1.0	0.000068	0.11	1	0.0000066	1.126	0.67	0.0000044	0.14	1.4	0.000030	0.0000030
SVOCs													
Acenaphthylene	0.014	1.0	0.014	0.11	1	0.0013	1.126	0.67	0.00088	1.9	14	0.00048	0.000061
Anthracene	0.018	1.0	0.018	0.11	1	0.0017	1.126	0.67	0.0011	1.9	10	0.00061	0.00011
Benzo (a) anthracene	0.023	1.0	0.023	0.11	1	0.0023	1.126	0.67	0.0015	1.5	0.41	0.0010	0.0037
Benzo (a) pyrene	0.019	1.0	0.019	0.11	1	0.0018	1.126	0.67	0.0012	1.9	2.1	0.00066	0.00059
bis (2-Ethylhexyl) phthalate	0.0036	1.0	0.0036	0.11	1	0.00035	1.126	0.67	0.00023	1.1	1.3	0.00021	0.00018
Chrysene	0.028	1.0	0.028	0.11	1	0.0027	1.126	0.67	0.0018	1.9	10	0.00098	0.00018
Fluoranthene	0.023	1.0	0.023	0.11	1	0.0022	1.126	0.67	0.0015	1.9	10	0.00081	0.00015
Fluorene	0.022	1.0	0.022	0.11	1	0.0021	1.126	0.67	0.0014	1.9	5.2	0.00075	0.00027
Naphthalene	0.0037	1.0	0.0037	0.11	1	0.00036	1.126	0.67	0.00024	1.9	1.8	0.00013	0.00013
Phenanthrene	0.017	1.0	0.017	0.11	1	0.0016	1.126	0.67	0.0011	1.9	2.5	0.00059	0.00043
Pyrene	0.050	1.0	0.050	0.11	1	0.0049	1.126	0.67	0.0033	1.9	2.6	0.0018	0.0013

Hazard Index - Detected Compounds	1.3	1.9
Hazard Index - Detected Compounds w/Detection Limits	1.3	1.9

NOTES:
(a) - See Attachment Q Table Q-21a.
(b) - No data available - Assuming the concentration in the deer mouse will be equal to its daily intake.
(c) - Concentration in deer mouse = BAF x daily dose in deer mouse.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-1.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected . HQs based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table T-22
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Carnivorous Mammals - Red-tailed Hawk
Blasdell Creek Sediment
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Raccoon (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Raccoon (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Raccoon (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kg/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Antimony	0.00023	1.0	0.00023	0.11	1	0.00002	1.126	0.67	0.000015	0.026	0.26	0.00058	0.000058
Arsenic	0.0080	1.0	0.0080	0.11	1	0.00077	1.126	0.67	0.00052	5.1	13	0.00010	0.000041
Barium	0.0032	1.0	0.0032	0.11	1	0.00031	1.126	0.67	0.00021	39	77	0.0000053	0.0000027
Cadmium	0.00088	1.0	0.00088	0.11	1	0.000085	1.126	0.67	0.000057	1.4	20	0.000039	0.0000029
Chromium	0.0029	1.0	0.0029	0.11	1	0.00029	1.126	0.67	0.00019	1.0	1.7	0.00019	0.00012
Lead	0.0019	1.0	0.0019	0.11	1	0.00018	1.126	0.67	0.00012	1.5	16	0.000082	0.0000077
Mercury	0.0000074	1.0	0.0000074	0.11	1	0.00000072	1.126	0.67	0.00000048	0.64	1.3	0.00000075	0.00000038
Nickel	0.0012	1.0	0.0012	0.11	1	0.00012	1.126	0.67	0.000078	30	107	0.0000026	0.00000073
Selenium	0.00090	1.0	0.00090	0.11	1	0.000087	1.126	0.67	0.000058	0.50	1.0	0.00012	0.000058
Silver	0.00057	1.0	0.00057	0.11	1	0.000055	1.126	0.67	0.000037	178	0.37	0.00000021	0.000099
Cyanide	0.000088	1.0	0.000088	0.11	1	0.0000085	1.126	0.67	0.0000057	0.039	0.3	0.00015	0.000019
VOCs													
Acenaphthene	0.0000022	1.0	0.0000022	0.11	1	0.00000021	1.126	0.67	0.00000014	1.9	14	0.000000076	0.0000000098
Acenaphthylene	0.0000043	1.0	0.0000043	0.11	1	0.00000041	1.126	0.67	0.00000028	1.9	14	0.00000015	0.000000019
Anthracene	0.0000046	1.0	0.0000046	0.11	1	0.00000045	1.126	0.67	0.00000030	1.9	10	0.00000016	0.000000029
Benzo (a) anthracene	0.000021	1.0	0.000021	0.11	1	0.0000020	1.126	0.67	0.0000014	1.5	0.41	0.00000091	0.0000033
Benzo (a) pyrene	0.000023	1.0	0.000023	0.11	1	0.0000022	1.126	0.67	0.0000015	1.9	2.1	0.00000077	0.00000070
bis (2-Ethylhexyl) phthalate	0.0000065	1.0	0.0000065	0.11	1	0.00000063	1.126	0.67	0.00000042	1.1	1.3	0.00000038	0.00000032
Chrysene	0.000026	1.0	0.000026	0.11	1	0.0000025	1.126	0.67	0.0000017	1.9	10	0.00000088	0.00000017
Fluoranthene	0.000072	1.0	0.000072	0.11	1	0.0000070	1.126	0.67	0.0000047	1.9	10	0.0000025	0.00000045
Fluorene	0.0000025	1.0	0.0000025	0.11	1	0.00000024	1.126	0.67	0.00000016	1.9	5.2	0.000000087	0.000000031
Hexachlorobenzene	0.000063	1.0	0.000063	0.11	1	0.0000061	1.126	0.67	0.0000041	0.13	0.25	0.000031	0.000016
Naphthalene	0.000048	1.0	0.000048	0.11	1	0.0000046	1.126	0.67	0.0000031	1.9	1.8	0.0000016	0.0000017
Phenanthrene	0.000019	1.0	0.000019	0.11	1	0.0000018	1.126	0.67	0.0000012	1.9	2.5	0.00000067	0.00000049
Pyrene	0.000035	1.0	0.000035	0.11	1	0.0000034	1.126	0.67	0.0000023	1.9	2.6	0.0000012	0.00000088

Hazard Index - Detected Compounds	0.0013	0.00041
Hazard Index - Detected Compounds w/Detection Limits	0.0013	0.00043

NOTES:
(a) - See Attachment W, Table W-1. Based on average of upstream and downstream raccoon ADDs
(b) - No data available - Assuming the concentration in the raccoon will be equal to its daily intake.
(c) - Concentration in raccoon = BAF x daily dose in raccoon.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-2.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected. HQ based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table T-23
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Carnivorous Mammals - Red-tailed Hawk
Smokes Creek Sediment
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Raccoon (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Raccoon (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Raccoon (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals													
Antimony	0.0034	1.0	0.0034	0.11	1	0.00033	1.126	0.67	0.00022	0.026	0.26	0.0085	0.00085
Arsenic	0.0058	1.0	0.0058	0.11	1	0.00056	1.126	0.67	0.00037	5.1	13	0.000074	0.000029
Barium	0.017	1.0	0.017	0.11	1	0.0016	1.126	0.67	0.0011	39	77	0.000028	0.000014
Cadmium	0.0020	1.0	0.0020	0.11	1	0.00019	1.126	0.67	0.00013	1.4	20	0.000089	0.0000065
Chromium	0.024	1.0	0.024	0.11	1	0.0023	1.126	0.67	0.0016	1.0	1.7	0.0016	0.00094
Lead	0.057	1.0	0.057	0.11	1	0.0055	1.126	0.67	0.0037	1.5	16	0.0024	0.00023
Mercury	0.00010	1.0	0.00010	0.11	1	0.0000099	1.126	0.67	0.0000066	0.64	1.3	0.000010	0.0000052
Nickel	0.0077	1.0	0.0077	0.11	1	0.00075	1.126	0.67	0.00050	30	107	0.000017	0.0000047
Selenium	0.0032	1.0	0.0032	0.11	1	0.00031	1.126	0.67	0.00020	0.50	1.0	0.00041	0.00021
Silver	0.0068	1.0	0.0068	0.11	1	0.00066	1.126	0.67	0.00044	178	0.37	0.0000025	0.0012
Zinc	1.2	1.0	1.2	0.11	1	0.11	1.126	0.67	0.075	24	217	0.0031	0.00035
Cyanide	0.0053	1.0	0.0053	0.11	1	0.00051	1.126	0.67	0.00034	0.039	0.30	0.0088	0.0011
VOCs													
Benzene	0.0000031	1.0	0.0000031	0.11	1	0.00000030	1.126	0.67	0.00000020	5.4	54	0.000000037	0.0000000037
Carbon disulfide	0.0000045	1.0	0.0000045	0.11	1	0.00000044	1.126	0.67	0.00000029	2.5	5.1	0.00000012	0.000000057
Chlorobenzene	0.00000028	1.0	0.00000028	0.11	1	0.000000027	1.126	0.67	0.000000018	7.6	15	0.0000000024	0.0000000012
Methyl ethyl ketone	0.000014	1.0	0.000014	0.11	1	0.0000014	1.126	0.67	0.00000093	224	577	0.0000000041	0.0000000016
Methylene chloride	0.0000035	1.0	0.0000035	0.11	1	0.00000034	1.126	0.67	0.00000023	0.74	6.3	0.00000030	0.000000036
Toluene	0.000033	1.0	0.000033	0.11	1	0.0000032	1.126	0.67	0.0000021	5.4	54	0.00000039	0.000000039
Trichlorofluoromethane	0.000016	1.0	0.000016	0.11	1	0.0000016	1.126	0.67	0.0000010	0.44	44	0.0000024	0.000000024
Xylenes, total	0.0000020	1.0	0.0000020	0.11	1	0.00000019	1.126	0.67	0.00000013	0.43	0.54	0.00000030	0.00000024
SVOCs													
Acenapthene	0.0000088	1.0	0.0000088	0.11	1	0.00000085	1.126	0.67	0.00000057	1.9	14	0.00000031	0.000000040
Acenaphthylene	0.000045	1.0	0.000045	0.11	1	0.0000044	1.126	0.67	0.0000029	1.9	14	0.0000016	0.00000020
Anthracene	0.000031	1.0	0.000031	0.11	1	0.0000030	1.126	0.67	0.0000020	1.9	10	0.0000011	0.00000019
Benzo (a) anthracene	0.000038	1.0	0.000038	0.11	1	0.0000037	1.126	0.67	0.0000025	1.5	0.41	0.0000017	0.0000060
Benzo (a) pyrene	0.000030	1.0	0.000030	0.11	1	0.0000029	1.126	0.67	0.0000020	1.9	2.1	0.0000011	0.00000095
Benzo (b) fluoranthene	0.000078	1.0	0.000078	0.11	1	0.0000075	1.126	0.67	0.0000051	1.9	2.1	0.0000027	0.0000024
Benzo (ghi) perylene	0.000031	1.0	0.000031	0.11	1	0.0000030	1.126	0.67	0.0000020	1.9	2.1	0.0000011	0.00000098
Benzo (k) fluoranthene	0.000013	1.0	0.000013	0.11	1	0.0000012	1.126	0.67	0.00000083	0.26	2.1	0.0000032	0.00000040
bis (2-Ethylhexyl) phthalate	0.000076	1.0	0.000076	0.11	1	0.0000074	1.126	0.67	0.0000049	1.1	1.3	0.0000045	0.0000039
Butyl benzyl phthalate	0.000040	1.0	0.000040	0.11	1	0.0000039	1.126	0.67	0.0000026	2.0	1.3	0.0000013	0.0000020
Chrysene	0.000039	1.0	0.000039	0.11	1	0.0000037	1.126	0.67	0.0000025	1.9	10	0.0000013	0.00000025
Di-n-butyl phthalate	0.0000017	1.0	0.0000017	0.11	1	0.00000017	1.126	0.67	0.00000011	0.16	1.3	0.00000071	0.000000087
Di-n-octyl phthalate	0.0000017	1.0	0.0000017	0.11	1	0.00000017	1.126	0.67	0.00000011	0.16	1.3	0.00000070	0.000000086
Dibenz (a,h) anthracene	0.0000051	1.0	0.0000051	0.11	1	0.00000049	1.126	0.67	0.00000033	0.72	2.1	0.00000046	0.00000016
Fluoranthene	0.00012	1.0	0.00012	0.11	1	0.000012	1.126	0.67	0.0000078	1.9	10	0.0000041	0.00000078
Fluorene	0.000015	1.0	0.000015	0.11	1	0.0000015	1.126	0.67	0.00000098	1.9	5.2	0.00000052	0.00000019
Hexachlorobenzene	0.00060	1.0	0.00060	0.11	1	0.000058	1.126	0.67	0.000039	0.13	0.25	0.00030	0.00015
Indeno (1,2,3-cd) pyrene	0.000043	1.0	0.000043	0.11	1	0.0000041	1.126	0.67	0.0000028	1.9	2.1	0.0000015	0.0000013
Isophorone	0.000028	1.0	0.000028	0.11	1	0.0000027	1.126	0.67	0.0000018	21	41	0.000000086	0.000000044
Naphthalene	0.000019	1.0	0.000019	0.11	1	0.0000019	1.126	0.67	0.0000012	1.9	1.8	0.00000066	0.00000069
Phenanthrene	0.000074	1.0	0.000074	0.11	1	0.0000072	1.126	0.67	0.0000048	1.9	2.5	0.0000025	0.0000019
Pyrene	0.000074	1.0	0.000074	0.11	1	0.0000072	1.126	0.67	0.0000048	1.9	2.6	0.0000025	0.0000018

Hazard Index - Detected Compounds	0.025	0.0050
Hazard Index - Detected Compounds w/Detection Limits	0.025	0.0051

NOTES:
(a) - See Attachment W, Table W-2; based on average of upstream and downstream ADDs
(b) - No data available - Assuming the concentration in the raccoon will be equal to its daily intake.
(c) - Concentration in raccoon = BAF x daily dose in raccoon.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-2.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected. HQ based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table T-24
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Carnivorous Mammals - Red-tailed Hawk
South Return Water Trench Sediment
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Average Daily Dose in Raccoon (a) (mg/kg/day)	Bioaccumulation Factor (units/day) (b) (BCF)	Concentration of Contaminant in Raccoon (mg/kg) (c)	Dietary Ingestion Rate (d) (kg/day)	Area Use Factor (e)	Dose in Raccoon (mg/kd/day)	Average Body Weight (d) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
Metals										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Antimony	0.0015	1.0	0.0015	0.11	1	0.00015	1.126	0.67	0.000097	0.026	0.26	0.0038	0.00038
Arsenic	0.005	1.0	0.005	0.11	1	0.00045	1.126	0.67	0.00030	5.1	13	0.000060	0.000024
Barium	0.003	1.0	0.0034	0.11	1	0.00033	1.126	0.67	0.00022	39	77	0.0000057	0.0000028
Chromium	0.0013	1.0	0.0013	0.11	1	0.00013	1.126	0.67	0.000087	1.0	1.7	0.000087	0.000053
Lead	0.010	1.0	0.010	0.11	1	0.0010	1.126	0.67	0.00067	1.5	16	0.00045	0.000042
Mercury	0.000025	1.0	0.000025	0.11	1	0.0000024	1.126	0.67	0.0000016	0.64	1.3	0.0000026	0.0000013
Selenium	0.00047	1.0	0.00047	0.11	1	0.000046	1.126	0.67	0.000031	0.50	1.0	0.000061	0.000031
Silver	0.0013	1.0	0.0013	0.11	1	0.00012	1.126	0.67	0.000081	178	0.37	0.00000046	0.00022
Thallium	0.00005	1.0	0.000051	0.11	1	0.0000050	1.126	0.67	0.0000033	0.80	0.011	0.0000042	0.00030
Cyanide, free	0.00012	1.0	0.00012	0.11	1	0.000012	1.126	0.67	0.0000080	0.039	0.30	0.00021	0.000027
VOCs													
Tetrachloroethene	0.000000069	1.0	0.000000069	0.11	1	0.0000000067	1.126	0.67	0.0000000045	0.41	2.10	0.000000011	0.0000000021
SVOCs													
Acenapthene	0.000017	1.0	0.000017	0.11	1	0.0000017	1.126	0.67	0.0000011	1.9	14	0.00000060	0.000000077
Acenaphthylene	0.000025	1.0	0.000025	0.11	1	0.0000024	1.126	0.67	0.0000016	1.9	14	0.00000088	0.00000011
Anthracene	0.0000075	1.0	0.0000075	0.11	1	0.00000072	1.126	0.67	0.00000048	1.9	10	0.00000026	0.000000047
Benzo (a) anthracene	0.000017	1.0	0.000017	0.11	1	0.0000016	1.126	0.67	0.0000011	1.5	0.41	0.00000073	0.0000026
Benzo (a) pyrene	0.000020	1.0	0.000020	0.11	1	0.0000019	1.126	0.67	0.0000013	1.9	2.1	0.00000069	0.00000062
Benzo (b) fluoranthene	0.000043	1.0	0.000043	0.11	1	0.0000041	1.126	0.67	0.0000028	1.9	2.1	0.0000015	0.0000013
Benzo (ghi) perylene	0.000016	1.0	0.000016	0.11	1	0.0000015	1.126	0.67	0.0000010	1.9	2.1	0.00000055	0.00000050
Benzo (k) fluoranthene	0.000011	1.0	0.000011	0.11	1	0.0000010	1.126	0.67	0.00000070	0.26	2.1	0.0000027	0.00000034
bis (2-Ethylhexyl) phthalate	0.0000061	1.0	0.0000061	0.11	1	0.00000059	1.126	0.67	0.00000040	1.1	1.3	0.00000036	0.00000030
Chrysene	0.000031	1.0	0.000031	0.11	1	0.0000030	1.126	0.67	0.0000020	1.9	10	0.0000011	0.00000020
Dibenz (a,h) anthracene	0.0000057	1.0	0.0000057	0.11	1	0.00000055	1.126	0.67	0.00000037	0.72	2.1	0.00000051	0.00000017
Fluoranthene	0.000048	1.0	0.000048	0.11	1	0.0000047	1.126	0.67	0.0000031	1.9	10	0.0000017	0.00000030
Fluorene	0.000028	1.0	0.000028	0.11	1	0.0000027	1.126	0.67	0.0000018	1.9	5.2	0.00000097	0.00000035
Hexachlorobenzene	0.000064	1.0	0.000064	0.11	1	0.0000062	1.126	0.67	0.0000041	0.13	0.25	0.000032	0.000017
Indeno (1,2,3-cd) pyrene	0.000019	1.0	0.000019	0.11	1	0.0000019	1.126	0.67	0.0000013	1.9	2.1	0.00000066	0.00000060
Naphthalene	0.000047	1.0	0.000047	0.11	1	0.0000045	1.126	0.67	0.0000030	1.9	1.8	0.0000016	0.0000017
Phenanthrene	0.000025	1.0	0.000025	0.11	1	0.0000024	1.126	0.67	0.0000016	1.9	2.5	0.00000085	0.00000065
Pyrene	0.000035	1.0	0.000035	0.11	1	0.0000034	1.126	0.67	0.0000023	1.9	2.6	0.0000012	0.00000088

Hazard Index - Detected Compounds	0.0045	0.0011
Hazard Index - Detected Compounds w/Detection Limits	0.0045	0.0011

NOTES:
(a) - See Attachment W, Table W-3.
(b) - No data available - Assuming the concentration in the raccoon will be equal to its daily intake.
(c) - Concentration in raccoon = BAF x daily dose in raccoon.
(d) - Sample and Suter, 1994.
(e) - See Attachment O, Table O-2.
(f) - Based on site use from March through November.
(g) - See Table 4-23.
Compound not detected. HQ based on detection limits

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

ATTACHMENT U

HQ/HI CALCULATIONS FOR MALLARD

BETHLEHEM STEEL CORPORATION

LACKAWANNA, NEW YORK

Table U-1
Hazard Quotients and Hazard Indices for Direct Exposure
Ingestion of Surface Water - Mallard
Lake Erie
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Highest Detected Concentration in Surface Water (mg/L)	Not Detected: 1/2 Detection Limit (a) (mg/L)	Surface Water Ingestion Rate (b) (L/day)	Average Body Weight (c) (kg)	Area Use Factor (d)	Seasonal Use Factor (e)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (f) (TRV)		Hazard Quotient	
								(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals											
Cadmium		0.0025	0.064	1.134	0.0104	0.67	0.0000010	1.5	20	0.00000068	0.000000049
Lead	0.0057		0.064	1.134	0.0104	0.67	0.0000022	1.5	16	0.0000015	0.00000014
Mercury		0.0001	0.064	1.134	0.0104	0.67	0.000000039	0.0064	0.064	0.0000062	0.00000062
Silver		0.005	0.064	1.134	0.0104	0.67	0.0000020	178	0.37	0.000000011	0.0000053
Cyanide	0.02		0.064	1.134	0.0104	0.67	0.0000079	0.039	0.30	0.00020	0.000026
SVOC's											
Butyl benzyl phthalate		0.005	0.064	1.134	0.0104	0.67	0.0000020	2.0	1.3	0.00000098	0.0000016
Di-n-butyl phthalate		0.005	0.064	1.134	0.0104	0.67	0.0000020	0.16	1.3	0.000012	0.0000016
Diethyl phthalate		0.005	0.064	1.134	0.0104	0.67	0.0000020	0.16	1.3	0.000012	0.0000016
Dimethyl phthalate		0.005	0.064	1.134	0.0104	0.67	0.0000020	0.16	1.3	0.000012	0.0000016
Di-n-octyl phthalate		0.005	0.064	1.134	0.0104	0.67	0.0000020	0.16	1.3	0.000012	0.0000016
Hexachlorobenzene		0.005	0.064	1.134	0.0104	0.67	0.0000020	0.13	0.25	0.000016	0.0000078
Pentachlorophenol		0.025	0.064	1.134	0.0104	0.67	0.0000099	0.030	0.30	0.00032	0.000032

Hazard Index - Detected Compounds	0.00020	0.000026
Hazard Index - Detected Compounds w/Detection Limits	0.00060	0.000080

NOTES:

(a) - One-half the detection limit was used for risk calculations only if all samples were non-detected.

(b) - Values calculated from body weight using the allometric equations of Calder and Braun (1983) (Ingestion $rate_{water}$ = 0.059 x $body\ weight^{0.67}$).

(c) - USEPA, 1993e

(d) - See Attachment O, Table O-2

(e) - Based on site use from March - November

(f) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient

Table U-2
Hazard Quotients and Hazard Indices for Direct Exposure
Ingestion of Surface Water - Mallard
Blasdell Creek
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Highest Detected Upstream Concentration in Surface Water (mg/L)	Not Detected: 1/2 Detection Limit (a) (mg/L)	Highest Detected Downstream Concentration in Surface Water (mg/L)	Surface Water Ingestion Rate (b) (L/day)	Average Body Weight (c) (kg)	Area Use Factor (d)	Seasonal Use Factor (e)	Average Daily Upstream Dose (mg/kd/day)	Average Daily Downstream Dose (mg/kd/day)	Toxicity Reference Value (f) (TRV)		Upstream Hazard Quotient		Downstream Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ
Metals															
Barium	0.092		0.039	0.064	1.134	0.00062	0.67	0.0000022	0.00000092	39	78	0.000000056	0.000000028	0.000000024	0.000000012
Lead	0.020		0.018	0.064	1.134	0.00062	0.67	0.00000046	0.00000041	1.5	16	0.00000031	0.000000029	0.00000027	0.000000026
Mercury		0.000027	0.000079	0.064	1.134	0.00062	0.67	0.00000000063	0.0000000019	0.0064	0.064	0.000000099	0.0000000099	0.00000029	0.000000029
Silver		0.00038		0.064	1.134	0.00062	0.67	0.0000000088	0.0000000088	178	0.37	0.000000000050	0.000000024	0.000000000050	0.000000024
SVOCs															
Butyl benzyl phthalate		0.0050		0.064	1.134	0.00062	0.67	0.00000012	0.00000012	2.0	1.3	0.000000058	0.000000092	0.000000058	0.000000092
Di-n-butyl phthalate		0.0050		0.064	1.134	0.00062	0.67	0.00000012	0.00000012	0.16	1.3	0.00000072	0.000000092	0.00000072	0.000000092
Diethyl phthalate		0.0050		0.064	1.134	0.00062	0.67	0.00000012	0.00000012	0.16	1.3	0.00000072	0.000000092	0.00000072	0.000000092
Dimethyl phthalate		0.0050		0.064	1.134	0.00062	0.67	0.00000012	0.00000012	0.16	1.3	0.00000072	0.000000092	0.00000072	0.000000092
Di-n-octyl phthalate		0.0050		0.064	1.134	0.00062	0.67	0.00000012	0.00000012	0.16	1.3	0.00000072	0.000000092	0.00000072	0.000000092
Hexachlorobenzene		0.0050		0.064	1.134	0.00062	0.67	0.00000012	0.00000012	0.13	0.25	0.00000093	0.00000046	0.00000093	0.00000046
Hexachlorocyclopentadiene		0.025		0.064	1.134	0.00062	0.67	0.00000059	0.00000059	0.076	0.14	0.0000077	0.0000042	0.0000077	0.0000042
Pentachlorophenol		0.025		0.064	1.134	0.00062	0.67	0.00000059	0.00000059	0.030	0.30	0.000019	0.0000019	0.000019	0.0000019
Hazard Index - Detected Compounds												0.00000036	0.000000057	0.00000059	0.000000067
Hazard Index - Detected Compounds w/Detection Limits												0.000031	0.0000072	0.000032	0.0000072

NOTES:
(a) - One-half the detection limit was used for risk calculations only if samples were non-detected.
(b) - Values calculated from body weight using the allometric equations of Calder and Braun (1983) (Ingestion $rate_{water}$ = 0.059 x body $weight^{0.67}$).
(c) - USEPA, 1993e
(d) - See Attachment O, Table O-2
(e) - Based on site use from March - November
(f) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient

Table U-3
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Macroinvertebrates - Mallard
Blasdell Creek Sediment
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Highest Detected Upstream Sediment Concentration (mg/kg)	Not Detected: 1/2 Detection Limit (a) (mg/kg)	Highest Detected Downstream Sediment Concentration (mg/kg)	Sediment Ingestion Rate (b) (kg/day)	Area Use Factor (c)	Dose in Upstream Sediment (mg/kd/day)	Dose in Downstream Sediment (mg/kd/day)	Macroinvertebrate Ingestion Rate (b) (kg food wet weight/day)	Estimated COPEC Concentration in Upstream Macroinvertebrates (d) (mg/kg)	Estimated COPEC Concentration in Downstream Macroinvertebrates (d) (mg/kg)	Area Use Factor (c)
Metals											
Antimony	3.2		16	0.0095	0.00062	0.00002	0.0001	0.32	0.63	3.1	0.00062
Arsenic	46		328	0.0095	0.00062	0.0002	0.002	0.32	18	126	0.00062
Barium	396		245	0.0095	0.00062	0.002	0.001	0.32	63	39	0.00062
Cadmium	9.1		17	0.0095	0.00062	0.0000	0.0001	0.32	8.5	16	0.00062
Chromium	94		526	0.0095	0.00062	0.000	0.003	0.32	1.5	8.4	0.00062
Lead	340		349	0.0095	0.00062	0.002	0.002	0.32	4.4	4.5	0.00062
Mercury	0.24		0.78	0.0095	0.00062	0.000001	0.00000	0.32	0.022	0.072	0.00062
Nickel	71		220	0.0095	0.00062	0.000	0.001	0.32	0.91	2.8	0.00062
Selenium	8.5		16	0.0095	0.00062	0.0000	0.0001	0.32	8.7	16	0.00062
Silver	0.74		1.8	0.0095	0.00062	0.00000	0.00001	0.32	4.5	11	0.00062
Cyanide	0.83		1.9	0.0095	0.00062	0.00000	0.00001	0.32	0.67	1.5	0.00062
SVOC's											
Acenaphthene		0.45		0.0095	0.00062	0.000002	0.000002	0.32	0.00059	0.00059	0.00062
Acenaphthylene	0.92		0.66	0.0095	0.00062	0.000005	0.000003	0.32	0.030	0.022	0.00062
Anthracene	1.9		0.92	0.0095	0.00062	0.00001	0.00000	0.32	0.0047	0.0043	0.00062
Benzo (a) anthracene	4.0		3.8	0.0095	0.00062	0.00002	0.00002	0.32	0.058	0.055	0.00062
Benzo (a) pyrene	4.3		4.3	0.0095	0.00062	0.00002	0.00002	0.32	0.042	0.042	0.00062
bis (2-Ethylhexyl) phthalate	2.4		1.2	0.0095	0.00062	0.00001	0.00001	0.32	0.029	0.014	0.00062
Chrysene	5.3		4.5	0.0095	0.00062	0.00003	0.00002	0.32	0.10	0.09	0.00062
Fluoranthene	11		11	0.0095	0.00062	0.0001	0.0001	0.32	0.38	0.38	0.00062
Fluorene	0.36		0.36	0.0095	0.00062	0.000002	0.000002	0.32	0.015	0.015	0.00062
Hexachlorobenzene		4.5		0.0095	0.00062	0.00002	0.00002	0.32	0.81	0.81	0.00062
Naphthalene	0.53	4.5		0.0095	0.00062	0.000003	0.00002	0.32	0.061	0.515	0.00062
Phenanthrene	3.9		3.5	0.0095	0.00062	0.00002	0.00002	0.32	0.051	0.046	0.00062
Pyrene	6.2		5.9	0.0095	0.00062	0.00003	0.00003	0.32	0.14	0.13	0.00062

NOTES:
(a) - One-half the detection limit was used for risk calculations only if samples were non-detected.
(b) - Assumes sediment ingestion rate of 3.3% (Beyer et al., 1994).
(c) - See Attachment O, Table O-2
(d) - See Table 4-16.
(e) - USEPA, 1993e
(f) - Based on site use from March through November.
(g) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table U-3
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Macroinvertebrates - Mallard
Blasdell Creek Sediment
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Dose in Upstream Macroinvertebrates (mg/kd/day)	Dose in Downstream Macroinvertebrates (mg/kd/day)	Average Body Weight (e) (kg)	Seasonal Use Factor (f)	Average Daily Upstream Dose (mg/kg/day)	Average Daily Downstream Dose (mg/kg/day)	Toxicity Reference Value (TRV) (g)		Upstream Hazard Quotient		Downstream Hazard Quotient	
							(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ
Metals												
Antimony	0.00011	0.00053	1.134	0.67	0.00008	0.0004	0.026	0.26	0.0033	0.00033	0.016	0.0016
Arsenic	0.0030	0.022	1.134	0.67	0.0022	0.016	5.1	13	0.00043	0.00017	0.0031	0.0012
Barium	0.011	0.0068	1.134	0.67	0.009	0.005	39	78	0.00023	0.00011	0.00014	0.000069
Cadmium	0.0015	0.0027	1.134	0.67	0.0010	0.0019	1.5	20	0.00070	0.000051	0.0013	0.000094
Chromium	0.00026	0.0015	1.134	0.67	0.000	0.003	1.0	1.7	0.00050	0.00030	0.0028	0.0017
Lead	0.00075	0.00077	1.134	0.67	0.002	0.002	1.5	16	0.0011	0.00010	0.0011	0.00011
Mercury	0.0000038	0.000012	1.134	0.67	0.000003	0.000011	0.0064	0.064	0.00053	0.000053	0.0017	0.00017
Nickel	0.00016	0.00049	1.134	0.67	0.0004	0.001	30	107	0.000012	0.0000033	0.000036	0.000010
Selenium	0.0015	0.0028	1.134	0.67	0.0010	0.0019	0.50	1.0	0.0021	0.0010	0.0039	0.0019
Silver	0.00078	0.0019	1.134	0.67	0.00053	0.0013	178	0.37	0.0000030	0.0014	0.0000072	0.0034
Cyanide	0.00012	0.00027	1.134	0.67	0.00008	0.00019	0.039	0.30	0.0021	0.00027	0.0047	0.00062
SVOC's												
Acenaphthene	0.00000010	0.00000010	1.134	0.67	0.000002	0.000002	1.9	14	0.00000088	0.00000011	0.00000088	0.00000011
Acenaphthylene	0.0000053	0.0000038	1.134	0.67	0.00001	0.000005	1.9	14	0.0000036	0.00000046	0.0000026	0.00000033
Anthracene	0.00000081	0.00000074	1.134	0.67	0.00000	0.00000	1.9	10	0.0000022	0.00000039	0.0000020	0.00000036
Benzo (a) anthracene	0.000010	0.0000096	1.134	0.67	0.00002	0.00002	1.5	0.41	0.000014	0.000050	0.000013	0.000047
Benzo (a) pyrene	0.0000072	0.0000072	1.134	0.67	0.00002	0.00002	1.9	2.1	0.000011	0.0000095	0.000011	0.0000095
bis (2-Ethylhexyl) phthalate	0.0000050	0.0000025	1.134	0.67	0.00001	0.00001	1.1	1.3	0.000011	0.0000092	0.0000053	0.0000046
Chrysene	0.000017	0.000015	1.134	0.67	0.00003	0.00003	1.9	10	0.000016	0.0000029	0.000014	0.0000025
Fluoranthene	0.000066	0.000066	1.134	0.67	0.0001	0.0001	1.9	10	0.000044	0.0000079	0.000044	0.0000079
Fluorene	0.0000026	0.0000026	1.134	0.67	0.000003	0.000003	1.9	5.2	0.0000016	0.00000058	0.0000016	0.00000058
Hexachlorobenzene	0.00014	0.00014	1.134	0.67	0.00011	0.00011	0.13	0.25	0.00087	0.00043	0.00087	0.00043
Naphthalene	0.000010	0.000089	1.134	0.67	0.000009	0.00008	1.9	1.8	0.0000048	0.0000049	0.000040	0.000042
Phenanthrene	0.0000089	0.0000080	1.134	0.67	0.00002	0.00002	1.9	2.5	0.000010	0.0000077	0.0000094	0.0000069
Pyrene	0.000024	0.000023	1.134	0.67	0.00004	0.00004	1.9	2.6	0.000020	0.000015	0.000019	0.000014
Hazard Index - Detected Compounds									0.011	0.0039	0.035	0.011
Hazard Index - Detected Compounds w/Detection Limits									0.012	0.0044	0.036	0.011

Table U-4
Hazard Quotients and Hazard Indices for Direct Exposure
Ingestion of Surface Water - Mallard
Smokes Creek
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Highest Detected Concentration in Upstream Surface Water (mg/L)	Not Detected: 1/2 Detection Limit (a) (mg/L)	Highest Detected Concentration in Downstream Surface Water (mg/L)	Surface Water Ingestion Rate (b) (L/day)	Average Body Weight (c) (kg)	Area Use Factor (d)	Seasonal Use Factor (e)	Average Daily Upstream Dose (mg/kg/day)	Average Daily Downstream Dose (mg/kg/day)	Toxicity Reference Value (f) (TRV)		Upstream Hazard Quotient		Downstream Hazard Quotient	
										(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ
Metals															
Barium	0.050		0.030	0.064	1.134	0.0081	0.67	0.000015	0.0000092	39	78	0.00000040	0.00000020	0.00000024	0.00000012
Cadmium		0.0025	0.0041	0.064	1.134	0.0081	0.67	0.00000077	0.0000013	1.5	20	0.00000053	0.000000038	0.00000087	0.000000063
Chromium	0.0010		0.021	0.064	1.134	0.0081	0.67	0.00000031	0.0000065	1.0	1.7	0.00000031	0.00000018	0.0000065	0.0000039
Lead	0.0010		0.0052	0.064	1.134	0.0081	0.67	0.00000031	0.0000016	1.5	16	0.00000020	0.000000019	0.0000011	0.00000010
Mercury		0.00010		0.064	1.134	0.0081	0.67	0.000000031	0.000000031	0.0064	0.064	0.0000048	0.00000048	0.0000048	0.00000048
Selenium	0.0031		0.0073	0.064	1.134	0.0081	0.67	0.00000095	0.0000022	0.50	1.0	0.0000019	0.00000095	0.0000045	0.0000022
Silver		0.0050		0.064	1.134	0.0081	0.67	0.0000015	0.0000015	178	0.37	0.0000000086	0.000004	0.0000000086	0.0000041
Cyanide		0.0050	0.019	0.064	1.134	0.0081	0.67	0.0000015	0.0000058	0.039	0.30	0.000039	0.0000051	0.00015	0.000019
VOCs															
Bromoform	0.0018		0.0021	0.064	1.134	0.0081	0.67	0.00000055	0.00000065	0.23	0.45	0.0000024	0.0000012	0.0000028	0.0000014
Chloroform	0.0055		0.0088	0.064	1.134	0.0081	0.67	0.0000017	0.0000027	0.19	0.52	0.0000089	0.0000033	0.000014	0.0000052
Methylene chloride		0.0050	0.014	0.064	1.134	0.0081	0.67	0.0000015	0.0000043	0.74	6.3	0.0000021	0.00000024	0.0000058	0.00000068
Vinyl chloride		0.0050	0.0020	0.064	1.134	0.0081	0.67	0.0000015	0.00000061	0.022	0.22	0.000071	0.0000071	0.000029	0.0000029
Xylenes, total		0.0050	0.00020	0.064	1.134	0.0081	0.67	0.0000015	0.000000061	0.43	0.54	0.0000035	0.0000029	0.00000014	0.00000011
SVOCs															
Butyl benzyl phthalate	0.00020		0.00020	0.064	1.134	0.0081	0.67	0.000000061	0.000000061	2.0	1.3	0.000000031	0.000000048	0.000000031	0.000000048
Di-n-butyl phthalate	0.00060		0.0012	0.064	1.134	0.0081	0.67	0.00000018	0.00000037	0.16	1.3	0.0000011	0.00000014	0.0000023	0.00000029
1,2-Dichlorobenzene	0.0050		0.00010	0.064	1.134	0.0081	0.67	0.0000015	0.000000031	11	108	0.00000014	0.000000014	0.0000000028	0.00000000028
1,3-Dichlorobenzene	0.0050		0.00010	0.064	1.134	0.0081	0.67	0.0000015	0.000000031	124	62	0.000000012	0.000000025	0.00000000025	0.00000000050
1,4-Dichlorobenzene	0.00010		0.00010	0.064	1.134	0.0081	0.67	0.000000031	0.000000031	124	62	0.00000000025	0.00000000050	0.00000000025	0.00000000050
Diethyl phthalate	0.0057		0.00050	0.064	1.134	0.0081	0.67	0.0000018	0.00000015	0.16	1.3	0.000011	0.0000014	0.00000094	0.00000012
Dimethyl phthalate		0.0050		0.064	1.134	0.0081	0.67	0.0000015	0.0000015	0.16	1.3	0.0000094	0.0000012	0.0000094	0.0000012
Di-n-octyl phthalate	0.00030		0.00020	0.064	1.134	0.0081	0.67	0.000000092	0.000000061	0.16	1.3	0.00000056	0.000000072	0.00000038	0.000000048
2,6-Dinitrotoluene		0.0050	0.00010	0.064	1.134	0.0081	0.67	0.0000015	0.000000031	2.8	20	0.00000055	0.000000077	0.000000011	0.0000000015
Hexachlorobenzene		0.0050		0.064	1.134	0.0081	0.67	0.0000015	0.0000015	0.13	0.25	0.000012	0.0000061	0.000012	0.0000061
Pentachlorophenol		0.0255		0.064	1.134	0.0081	0.67	0.0000078	0.0000078	0.030	0.30	0.00026	0.000026	0.00026	0.000026
Hazard Index - Detected Compounds												0.000027	0.0000075	0.00022	0.000037
Hazard Index - Detected Compounds w/Detection Limits												0.00043	0.000061	0.00050	0.000074

NOTES:

(a) - One-half the detection limit was used for risk calculations only if samples were non-detected.

(b) - Values calculated from body weight using the allometric equations of Calder and Braun (1983) (Ingestion $rate_{water} = 0.059 \times body\ weight^{0.67}$).

(c) - USEPA, 1993e

(d) - See Attachment O, Table O-2

(e) - Based on site use from March - November

(f) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient

Table U-5
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Macroinvertebrates - Mallard
Smokes Creek Sediment
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Highest Detected Concentration in Upstream Sediment (mg/kg)	Not Detected: 1/2 Detection Limit (a) (mg/kg)	Highest Detected Concentration in Downstream Sediment (mg/kg)	Sediment Ingestion Rate (b) (kg/day)	Area Use Factor (c)	Dose in Upstream Sediment (mg/kd/day)	Dose in Downstream Sediment (mg/kd/day)	Macroinvertebrate Ingestion Rate (b) (kg food wet weight/day)	Estimated COPEC Concentration in Upstream Macroinvertebrates (d) (mg/kg)	Estimated COPEC Concentration in Downstream Macroinvertebrates (d) (mg/kg)	Area Use Factor (e)
Metals											
Antimony	15		23	0.010	0.0081	0.001	0.002	0.32	3.0	4.6	0.0081
Arsenic	60		35	0.010	0.0081	0.00	0.003	0.32	23	13	0.0081
Barium	86		121	0.010	0.0081	0.01	0.01	0.32	14	19	0.0081
Cadmium	2.5		8.6	0.010	0.0081	0.0002	0.001	0.32	2.3	8.0	0.0081
Chromium	31		197	0.010	0.0081	0.002	0.01	0.32	0.50	3.2	0.0081
Lead	634		465	0.010	0.0081	0.0	0.0	0.32	8.1	6.0	0.0081
Mercury		0.12	0.78	0.010	0.0081	0.00001	0.0001	0.32	0.011	0.072	0.0081
Nickel	43		64	0.010	0.0081	0.003	0.00	0.32	0.55	0.81	0.0081
Selenium	18		13	0.010	0.0081	0.001	0.001	0.32	19	13	0.0081
Silver	3.9		8.0	0.010	0.0081	0.0003	0.001	0.32	24	49	0.0081
Zinc	162		925	0.010	0.0081	0.01	0.1	0.32	1534	8762	0.0081
Cyanide		0.60	44	0.010	0.0081	0.0000	0.003	0.32	0.49	0.49	0.0081
VOC's											
Benzene		0.0060	0.025	0.010	0.0081	0.000000	0.000002	0.32	0.00050	0.00050	0.0081
Carbon disulfide		0.0060	0.037	0.010	0.0081	0.000000	0.000003	0.32	0.00055	0.00055	0.0081
Chlorobenzene		0.0060	0.0020	0.010	0.0081	0.000000	0.0000001	0.32	0.00030	0.00030	0.0081
Methyl ethyl ketone		0.060	0.10	0.010	0.0081	0.00000	0.00001	0.32	0.019	0.019	0.0081
Methylene chloride	0.018		0.025	0.010	0.0081	0.000001	0.000002	0.32	0.0028	0.0039	0.0081
Toluene		0.060	0.27	0.010	0.0081	0.00000	0.00002	0.32	0.0034	0.0034	0.0081
Trichlorofluoromethane		0.060	0.13	0.010	0.0081	0.00000	0.00001	0.32	0.0038	0.0038	0.0081
Xylenes, total		0.060	0.012	0.010	0.0081	0.00000	0.000001	0.32	0.0045	0.0045	0.0081
SVOC's											
Acenapthene		19	0.77	0.010	0.0081	0.001	0.0001	0.32	0.027	0.0011	0.0081
Acenaphthylene	7.0	2.9		0.010	0.0081	0.001	0.0002	0.32	0.25	0.10	0.0081
Anthracene	46		2.6	0.010	0.0081	0.00	0.0002	0.32	0.24	0.013	0.0081
Benzo (a) anthracene	85		2.9	0.010	0.0081	0.01	0.0002	0.32	1.4	0.046	0.0081
Benzo (a) pyrene	61		2.4	0.010	0.0081	0.00	0.0002	0.32	0.65	0.025	0.0081
Benzo (b) fluoranthene	62		5.7	0.010	0.0081	0.00	0.000	0.32	1.2	0.11	0.0081
Benzo (ghi) perylene	35		2.7	0.010	0.0081	0.003	0.0002	0.32	0.078	0.0060	0.0081
Benzo (k) fluoranthene	48		0.99	0.010	0.0081	0.00	0.0001	0.32	0.66	0.014	0.0081
bis (2-Ethylhexyl) phthalate	1.9		5.9	0.010	0.0081	0.0001	0.000	0.32	0.025	0.078	0.0081
Butyl benzyl phthalate	0.070	2.9		0.010	0.0081	0.00001	0.0002	0.32	0.0015	0.061	0.0081
Chrysene	83		2.8	0.010	0.0081	0.01	0.0002	0.32	1.7	0.058	0.0081
Di-n-butyl phthalate		17	0.14	0.010	0.0081	0.001	0.00001	0.32	0.16	0.0013	0.0081
Di-n-octyl phthalate	0.16		0.14	0.010	0.0081	0.00001	0.00001	0.32	0.0015	0.0013	0.0081
Dibenz (a,h) anthracene	19		0.38	0.010	0.0081	0.001	0.00003	0.32	0.34	0.0068	0.0081
Fluoranthene	180		7.6	0.010	0.0081	0.01	0.001	0.32	6.8	0.29	0.0081
Fluorene	33		0.90	0.010	0.0081	0.002	0.0001	0.32	1.5	0.041	0.0081
Hexachlorobenzene		17		0.010	0.0081	0.001	0.001	0.32	3.4	3.4	0.0081
Indeno (1,2,3-cd) pyrene	38		3.3	0.010	0.0081	0.003	0.0002	0.32	0.51	0.044	0.0081
Isophorone		17	1.1	0.011	0.0081	0.001	0.0001	0.32	2.0	0.13	0.0081
Naphthalene	0.072		0.73	0.010	0.0081	0.00001	0.0001	0.32	0.0090	0.091	0.0081
Phenanthrene	170		5.7	0.010	0.0081	0.01	0.000	0.32	2.5	0.082	0.0081
Pyrene	190		5.2	0.010	0.0081	0.01	0.000	0.32	4.6	0.13	0.0081

NOTES:
(a) - One-half the detection limit was used for risk calculations only if samples were non-detected.
(b) - Assumes 3.3% of mallard diet is sediment (Beyer et al., 1994).
(c) - See Attachment O, Table O-2
(d) - See Table 4-17.
(e) - USEPA, 1993e
(f) - Based on site use from March through November.
(g) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table U-5
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Macroinvertebrates - Mallard
Smokes Creek Sediment
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Dose in Upstream Macroinvertebrates (mg/kd/day)	Dose in Downstream Macroinvertebrates (mg/kd/day)	Average Body Weight (e) (kg)	Seasonal Use Factor (f)	Average Daily Upstream Dose (mg/kg/day)	Average Daily Downstream Dose (mg/kg/day)	Toxicity Reference Value (TRV) (g)		Upstream Hazard Quotient		Downstream Hazard Quotient	
							(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ
Metals												
Antimony	0.0067	0.010	1.134	0.67	0.005	0.008	0.026	0.26	0.20	0.020	0.32	0.032
Arsenic	0.052	0.030	1.134	0.67	0.04	0.022	5.1	13	0.0074	0.0029	0.0043	0.0017
Barium	0.031	0.044	1.134	0.67	0.03	0.04	39	78	0.00065	0.00032	0.00091	0.00046
Cadmium	0.0053	0.018	1.134	0.67	0.0036	0.013	1.5	20	0.0025	0.00018	0.0087	0.00063
Chromium	0.0011	0.0071	1.134	0.67	0.002	0.01	1.0	1.7	0.0023	0.0014	0.015	0.0088
Lead	0.018	0.013	1.134	0.67	0.04	0.03	1.5	16	0.029	0.0027	0.021	0.0020
Mercury	0.000024	0.00016	1.134	0.67	0.00002	0.0001	0.0064	0.064	0.0034	0.00034	0.023	0.0023
Nickel	0.0012	0.0018	1.134	0.67	0.003	0.004	30	107	0.000098	0.000028	0.00015	0.000041
Selenium	0.042	0.030	1.134	0.67	0.029	0.021	0.50	1.0	0.058	0.029	0.042	0.021
Silver	0.054	0.11	1.134	0.67	0.036	0.074	178	0.37	0.00020	0.097	0.00042	0.20
Zinc	3.5	20	1.134	0.67	2.3	13	24	215	0.098	0.011	0.56	0.062
Cyanide	0.0011	0.0011	1.134	0.67	0.0008	0.003	0.039	0.30	0.019	0.0025	0.074	0.010
VOC's												
Benzene	0.0000011	0.0000011	1.134	0.67	0.0000011	0.000002	5.5	55	0.00000019	0.000000019	0.00000037	0.000000037
Carbon disulfide	0.0000012	0.0000012	1.134	0.67	0.0000011	0.000003	2.5	5.1	0.00000045	0.00000022	0.0000011	0.00000053
Chlorobenzene	0.00000068	0.00000068	1.134	0.67	0.0000008	0.0000006	7.6	15	0.00000010	0.000000050	0.000000073	0.000000037
Methyl ethyl ketone	0.000043	0.000043	1.134	0.67	0.00003	0.00003	224	578	0.00000014	0.000000055	0.00000015	0.000000058
Methylene chloride	0.0000064	0.0000088	1.134	0.67	0.000005	0.000007	0.74	6.3	0.0000070	0.00000082	0.0000097	0.0000011
Toluene	0.0000077	0.0000077	1.134	0.67	0.000008	0.00002	5.4	54	0.0000015	0.00000015	0.0000035	0.00000035
Trichlorofluoromethane	0.0000085	0.0000085	1.134	0.67	0.000009	0.00001	0.44	44	0.000020	0.00000020	0.000028	0.00000028
Xylenes, total	0.000010	0.000010	1.134	0.67	0.000010	0.000007	0.43	0.54	0.000022	0.000018	0.000017	0.000014
SVOC's												
Acenapthene	0.000061	0.0000025	1.134	0.67	0.001	0.00004	1.9	14	0.00053	0.000068	0.000022	0.0000028
Acenaphthylene	0.00057	0.00024	1.134	0.67	0.001	0.0003	1.9	14	0.00039	0.000051	0.00016	0.000021
Anthracene	0.00053	0.000030	1.134	0.67	0.003	0.0001	1.9	10	0.0014	0.00026	0.000081	0.000014
Benzo (a) anthracene	0.0031	0.00010	1.134	0.67	0.01	0.0002	1.5	0.41	0.0043	0.015	0.00015	0.00052
Benzo (a) pyrene	0.0015	0.000057	1.134	0.67	0.004	0.0002	1.9	2.1	0.0022	0.0019	0.000085	0.000076
Benzo (b) fluoranthene	0.0028	0.00025	1.134	0.67	0.005	0.0005	1.9	2.1	0.0027	0.0024	0.00024	0.00022
Benzo (ghi) perylene	0.00018	0.000014	1.134	0.67	0.002	0.0001	1.9	2.1	0.0010	0.00090	0.000077	0.000070
Benzo (k) fluoranthene	0.0015	0.000031	1.134	0.67	0.003	0.0001	0.26	2.1	0.013	0.0016	0.00027	0.000034
bis (2-Ethylhexyl) phthalate	0.000057	0.00018	1.134	0.67	0.0001	0.0004	1.1	1.3	0.00012	0.00010	0.00037	0.00032
Butyl benzyl phthalate	0.0000033	0.00014	1.134	0.67	0.00001	0.0002	2.0	1.3	0.0000028	0.0000045	0.00012	0.00019
Chrysene	0.0039	0.00013	1.134	0.67	0.01	0.0002	1.9	10	0.0036	0.00065	0.00012	0.000022
Di-n-butyl phthalate	0.00036	0.0000030	1.134	0.67	0.001	0.00001	0.16	1.3	0.0067	0.00086	0.000055	0.0000071
Di-n-octyl phthalate	0.0000033	0.0000029	1.134	0.67	0.00001	0.00001	0.16	1.3	0.000062	0.0000080	0.000054	0.0000070
Dibenz (a,h) anthracene	0.00077	0.000015	1.134	0.67	0.001	0.00003	0.73	2.1	0.0020	0.00071	0.000040	0.000014
Fluoranthene	0.015	0.00065	1.134	0.67	0.02	0.001	1.9	10	0.010	0.0019	0.00044	0.000079
Fluorene	0.0034	0.000093	1.134	0.67	0.004	0.0001	1.9	5.2	0.0021	0.00076	0.000058	0.000021
Hexachlorobenzene	0.0076	0.0076	1.134	0.67	0.006	0.006	0.13	0.25	0.047	0.023	0.047	0.023
Indeno (1,2,3-cd) pyrene	0.0011	0.000099	1.134	0.67	0.003	0.0002	1.9	2.1	0.0014	0.0013	0.00012	0.00011
Isophorone	0.0045	0.00029	1.134	0.67	0.004	0.0003	21	41	0.00019	0.000094	0.000012	0.0000061
Naphthalene	0.000020	0.00021	1.134	0.67	0.00002	0.0002	1.9	1.8	0.0000093	0.0000096	0.000094	0.000097
Phenanthrene	0.0055	0.00019	1.134	0.67	0.01	0.0004	1.9	2.5	0.0066	0.0048	0.00022	0.00016
Pyrene	0.010	0.00029	1.134	0.67	0.02	0.0005	1.9	2.6	0.0089	0.0064	0.00024	0.00017
Hazard Index - Detected Compounds									0.46	0.20	1.1	0.34
Hazard Index - Compounds w/Detection Limits									0.54	0.23	1.1	0.36

Table U-6
Hazard Quotients and Hazard Indices for Direct Exposure
Ingestion of Surface Water - Mallard
North Return Water Trench
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Highest Detected Concentration in Surface Water (mg/L)	Not Detected: 1/2 Detection Limit (a) (mg/L)	Surface Water Ingestion Rate (b) (L/day)	Average Body Weight (c) (kg)	Area Use Factor (d)	Seasonal Use Factor (e)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (f) (TRV)		Hazard Quotient	
								(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals											
Cadmium		0.0025	0.064	1.134	0.00028	0.67	0.000000027	1.5	20	0.000000018	0.0000000013
Chromium	0.0124		0.064	1.134	0.00028	0.67	0.00000013	1.0	1.7	0.00000013	0.000000079
Lead	0.0062		0.064	1.134	0.00028	0.67	0.000000066	1.5	16	0.000000044	0.0000000041
Mercury		0.0001	0.064	1.134	0.00028	0.67	0.0000000011	0.0064	0.064	0.00000017	0.000000017
Silver		0.005	0.064	1.134	0.00028	0.67	0.000000053	178	0.37	0.00000000030	0.00000014
VOCs											
Methylene chloride	0.0009		0.064	1.134	0.00028	0.67	0.0000000096	0.74	6.3	0.000000013	0.0000000015
SVOCs											
Butyl benzyl phthalate		0.005	0.064	1.134	0.00028	0.67	0.000000053	2.0	1.3	0.000000026	0.000000042
Di-n-butyl phthalate		0.005	0.064	1.134	0.00028	0.67	0.000000053	0.16	1.3	0.00000032	0.000000042
Diethyl phthalate		0.005	0.064	1.134	0.00028	0.67	0.000000053	0.16	1.3	0.00000032	0.000000042
Dimethyl phthalate		0.005	0.064	1.134	0.00028	0.67	0.000000053	0.16	1.3	0.00000032	0.000000042
Di-n-octyl phthalate		0.005	0.064	1.134	0.00028	0.67	0.000000053	0.16	1.3	0.00000032	0.000000042
Hexachlorobenzene		0.005	0.064	1.134	0.00028	0.67	0.000000053	0.13	0.25	0.00000042	0.00000021
Pentachlorophenol		0.025	0.064	1.134	0.00028	0.67	0.00000027	0.030	0.30	0.0000087	0.00000087

Hazard Index - Detected Compounds	0.00000019	0.000000085
Hazard Index - Detected Compounds w/Detection Limits	0.000011	0.0000015

NOTES:
(a) - One-half the detection limit was used for risk calculations only if all samples were non-detected.
(b) - Values calculated from body weight using the allometric equations of Calder and Braun (1983) (Ingestion $rate_{water} = 0.059 \times body\ weight^{0.67}$).
(c) - USEPA, 1993e
(d) - See Attachment O, Table O-2
(e) - Based on site use from March - November
(f) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient

Table U-7
Hazard Quotients and Hazard Indices for Direct Exposure
Ingestion of Surface Water - Mallard
South Return Water Trench
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Highest Detected Concentration in Surface Water (mg/L)	Not Detected: 1/2 Detection Limit (a) (mg/L)	Surface Water Ingestion Rate (b) (L/day)	Average Body Weight (c) (kg)	Area Use Factor (d)	Seasonal Use Factor (e)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (f) (TRV)		Hazard Quotient	
								(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals											
Lead	0.0083		0.064	1.134	0.00041	0.67	0.00000013	1.5	16	0.000000086	0.0000000080
Mercury	0.00058		0.064	1.134	0.00041	0.67	0.0000000090	0.0064	0.064	0.0000014	0.00000014
Silver		0.005	0.064	1.134	0.00041	0.67	0.000000078	178	0.37	0.00000000044	0.00000021
SVOC's											
Butyl benzyl phthalate		0.005	0.064	1.134	0.00041	0.67	0.000000078	2.0	1.3	0.000000039	0.000000061
Di-n-butyl phthalate		0.005	0.064	1.134	0.00041	0.67	0.000000078	0.16	1.3	0.00000047	0.000000061
Diethyl phthalate		0.005	0.064	1.134	0.00041	0.67	0.000000078	0.16	1.3	0.00000047	0.000000061
Dimethyl phthalate		0.005	0.064	1.134	0.00041	0.67	0.000000078	0.16	1.3	0.00000047	0.000000061
Di-n-octyl phthalate		0.005	0.064	1.134	0.00041	0.67	0.000000078	0.16	1.3	0.00000047	0.000000061
Hexachlorobenzene		0.005	0.064	1.134	0.00041	0.67	0.000000078	0.13	0.25	0.00000061	0.00000031
Pentachlorophenol		0.025	0.064	1.134	0.00041	0.67	0.00000039	0.030	0.30	0.000013	0.0000013

Hazard Index - Detected Compounds	0.0000015	0.00000015
Hazard Index - Detected Compounds w/Detection Limits	0.000017	0.0000023

NOTES:
(a) - One-half the detection limit was used for risk calculations only if all samples were non-detected.
(b) - Values calculated from body weight using the allometric equations of Calder and Braun (1983) (Ingestion $rate_{water} = 0.059 \times body\ weight^{0.67}$).
(c) - USEPA, 1993e
(d) - See Attachment O, Table O-2
(e) - Based on site use from March - November
(f) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient

Table U-8
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Macroinvertebrates - Mallard
South Return Water Trench Sediment
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Highest Detected Concentration in Sediment (mg/kg)	Not Detected: 1/2 Detection Limit (a) (mg/kg)	Sediment Ingestion Rate (b) (kg/day)	Area Use Factor (c)	Dose in Sediment (mg/kd/dny)	Macroinvertebrate Ingestion Rate (b) (kg food wet weight/day)	Estimated Concentration of Contaminant in Macroinvertebrates (d) (mg/kg)	Area Use Factor (c)	Dose in Macroinvertebrates (mg/kd/day)	Average Body Weight (e) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
													(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																
Antimony	53		0.0095	0.00041	0.0002	0.32	11	0.00041	0.0012	1.134	0.67	0.0009	0.026	0.26	0.036	0.0036
Arsenic	102		0.0095	0.00041	0.000	0.32	39	0.00041	0.0045	1.134	0.67	0.003	5.1	13	0.00063	0.00025
Barium	139		0.0095	0.00041	0.000	0.32	22	0.00041	0.0025	1.134	0.67	0.002	39	78	0.000052	0.000026
Chromium	127		0.0095	0.00041	0.000	0.32	2.0	0.00041	0.00023	1.134	0.67	0.0004	1.0	1.7	0.00045	0.00027
Lead	1010		0.0095	0.00041	0.00	0.32	13	0.00041	0.0015	1.134	0.67	0.003	1.5	16	0.0022	0.00021
Mercury	1.4		0.0095	0.00041	0.00000	0.32	0.13	0.00041	0.000015	1.134	0.67	0.00001	0.0064	0.064	0.0021	0.00021
Selenium	4.4		0.0095	0.00041	0.00002	0.32	4.5	0.00041	0.00051	1.134	0.67	0.00035	0.50	1.0	0.00071	0.00035
Silver	2.1		0.0095	0.00041	0.00001	0.32	13	0.00041	0.0015	1.134	0.67	0.0010	178	0.37	0.0000056	0.0026
Thallium	2.1		0.0095	0.00041	0.00001	0.32	0.34	0.00041	0.000038	1.134	0.67	0.00003	0.81	0.011	0.000038	0.0028
Cyanide, free	1.4		0.0096	0.00041	0.00000	0.32	1.1	0.00041	0.00013	1.134	0.67	0.00009	0.039	0.30	0.0023	0.00030
VOCs																
Tetrachloroethene	0.0052		0.0095	0.00041	0.00000002	0.32	0.00023	0.00041	0.000000026	1.134	0.67	0.00000003	0.41	2.1	0.000000071	0.000000014
SVOCs																
Acenapthene		1.9	0.0095	0.00041	0.00001	0.32	0.0034	0.00041	0.00000039	1.134	0.67	0.00000	1.9	14	0.0000024	0.00000031
Acenaphthylene		1.9	0.0095	0.00041	0.00001	0.32	0.087	0.00041	0.0000099	1.134	0.67	0.00001	1.9	14	0.0000059	0.00000075
Anthracene	0.77		0.0095	0.00041	0.000003	0.32	0.0051	0.00041	0.00000059	1.134	0.67	0.000002	1.9	10	0.0000012	0.00000021
Benzo (a) anthracene	1.5		0.0095	0.00041	0.00001	0.32	0.031	0.00041	0.0000036	1.134	0.67	0.00001	1.5	0.41	0.0000040	0.000014
Benzo (a) pyrene	1.9		0.0095	0.00041	0.00001	0.32	0.026	0.00041	0.0000030	1.134	0.67	0.00001	1.9	2.1	0.0000034	0.0000031
Benzo (b) fluoranthene	3.7		0.0095	0.00041	0.00001	0.32	0.10	0.00041	0.000011	1.134	0.67	0.00002	1.9	2.1	0.0000085	0.0000076
Benzo (ghi) perylene	1.7		0.0095	0.00041	0.00001	0.32	0.0049	0.00041	0.00000056	1.134	0.67	0.00000	1.9	2.1	0.0000023	0.0000021
Benzo (k) fluoranthene	1.0		0.0095	0.00041	0.00000	0.32	0.018	0.00041	0.0000021	1.134	0.67	0.000004	0.26	2.1	0.000014	0.0000018
bis (2-Ethylhexyl) phthalate	0.57		0.0095	0.00041	0.000002	0.32	0.010	0.00041	0.0000011	1.134	0.67	0.000002	1.1	1.3	0.0000019	0.0000016
Chrysene	2.7		0.0095	0.00041	0.00001	0.32	0.073	0.00041	0.0000083	1.134	0.67	0.00001	1.9	10	0.0000063	0.0000011
Dibenz (a,h) anthracene	0.50		0.0095	0.00041	0.000002	0.32	0.012	0.00041	0.0000013	1.134	0.67	0.000002	0.73	2.1	0.0000028	0.00000099
Fluoranthene	3.5		0.0095	0.00041	0.00001	0.32	0.17	0.00041	0.000020	1.134	0.67	0.00002	1.9	10	0.000011	0.0000021
Fluorene		1.9	0.0095	0.00041	0.00001	0.32	0.11	0.00041	0.000013	1.134	0.67	0.00001	1.9	5.2	0.0000069	0.0000025
Hexachlorobenzene		1.9	0.0095	0.00041	0.00001	0.32	0.49	0.00041	0.000056	1.134	0.67	0.00004	0.13	0.25	0.00033	0.00016
Indeno (1,2,3-cd) pyrene	1.8		0.0095	0.00041	0.00001	0.32	0.031	0.00041	0.0000036	1.134	0.67	0.00001	1.9	2.1	0.0000035	0.0000032
Naphthalene		1.9	0.0095	0.00041	0.00001	0.32	0.31	0.00041	0.000035	1.134	0.67	0.00003	1.9	1.8	0.000015	0.000016
Phenanthrene	2.3		0.0095	0.00041	0.00001	0.32	0.043	0.00041	0.0000049	1.134	0.67	0.00001	1.9	2.5	0.0000046	0.0000034
Pyrene	2.9		0.0095	0.00041	0.00001	0.32	0.092	0.00041	0.000011	1.134	0.67	0.00001	1.9	2.6	0.0000074	0.0000053

Hazard Index - Detected Compounds	0.045	0.011
Hazard Index - Detected Compounds w/Detection Limits	0.045	0.011

NOTES:

(a) - One-half the detection limit was used for risk calculations only if all samples were non-detected.

(b) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0582 x body $weight^{0.651}$)/0.2) (Note: Sediment ingestion rate not available - based on dietary ingestion rate.)

(c) - See Attachment O, Table O-2

(d) - See Table 4-18.

(e) - USEPA, 1993e

(f) - Based on site use from March through November.

(g) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.

LOAEL - Lowest Observable Adverse Effects Level.

HQ - Hazard Quotient.

ATTACHMENT V

HQ/HI CALCULATIONS FOR GREAT BLUE HERON

BETHLEHEM STEEL CORPORATION

LACKAWANNA, NEW YORK

Table V-1
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Fish - Great Blue Heron
Blasdell Creek
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Highest Detected Upstream Concentration in Surface Water (mg/L)	Not Detected: 1/2 Detection Limit (a) (mg/L)	Highest Detected Downstream Concentration in Surface Water (mg/L)	Water Ingestion Rate (b) (L/day)	Area Use Factor (e)	Dose in Upstream Water (mg/kd/day)	Dose in Downstream Water (mg/kd/day)	Fish Ingestion Rate (b) (kg/day)	Bioaccumulation Factor (L/kg) - (BAF) Trophic Level 3	Reference for Bioaccumulation Factor (c)	Concentration in Upstream Fish (d) (mg/kg)	Concentration in Downstream Fish (d) (mg/kg)	Area Use Factor (e)
Metals													
Barium	0.092		0.039	0.11	0.20	0.00081	0.00035	0.42	1.0	2	0.092	0.039	0.20
Lead	0.020		0.018	0.11	0.20	0.00017	0.00015	0.42	45	1	0.88	0.79	0.20
Mercury		0.000027	0.000079	0.11	0.20	0.00000024	0.00000070	0.42	27900	1	0.75	2.2	0.20
Silver		0.00038		0.11	0.20	0.0000033	0.0000033	0.42	5.5	(h)	0.0021	0.0021	0.20
SVOC's													
Butyl benzyl phthalate		0.0050		0.11	0.20	0.000044	0.000044	0.42	927	(h)	4.6	4.6	0.20
Di-n-butyl phthalate		0.0050		0.11	0.20	0.000044	0.000044	0.42	3661	1	18	18	0.20
Diethyl phthalate		0.0050		0.11	0.20	0.000044	0.000044	0.42	47	1	0.24	0.24	0.20
Dimethyl phthalate		0.0050		0.11	0.20	0.000044	0.000044	0.42	10	(h)	0.050	0.050	0.20
Di-n-octyl phthalate		0.0050		0.11	0.20	0.000044	0.000044	0.42	22867	(h)	114	114	0.20
Hexachlorobenzene		0.0050		0.11	0.20	0.000044	0.000044	0.42	353420	(h)	1767	1767	0.20
Hexachlorocyclopentadiene		0.025		0.11	0.20	0.00022	0.00022	0.42	2833	(h)	71	71	0.20
Pentachlorophenol		0.025		0.11	0.20	0.00022	0.00022	0.42	3643	1	91	91	0.20

	Dose in Upstream Fish (mg/kd/day)	Dose in Downstream Fish (mg/kd/day)	Average Body Weight (b) (kg)	Seasonal Use Factor (f)	Average Daily Upstream Dose (mg/kg/day)	Average Daily Downstream Dose (mg/kg/day)	Toxicity Reference Value (g) (TRV)		Upstream Hazard Quotient		Downstream Hazard Quotient	
							(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ
Metals												
Barium	0.0032	0.0014	2.39	0.67	0.0027	0.0012	45	90	0.000060	0.000030	0.000026	0.000013
Lead	0.031	0.028	2.39	0.67	0.021	0.019	1.7	19	0.012	0.0011	0.011	0.0010
Mercury	0.026	0.077	2.39	0.67	0.018	0.052	0.74	1.5	0.024	0.012	0.070	0.035
Silver	0.000072	0.000072	2.39	0.67	0.000051	0.000051	207	0.43	0.00000025	0.00012	0.00000025	0.00012
SVOC's												
Butyl benzyl phthalate	0.16	0.16	2.39	0.67	0.11	0.11	2.3	1.5	0.047	0.074	0.047	0.074
Di-n-butyl phthalate	0.64	0.64	2.39	0.67	0.43	0.43	0.19	1.5	2.3	0.29	2.3	0.29
Diethyl phthalate	0.0083	0.0083	2.39	0.67	0.0056	0.0056	0.19	1.5	0.029	0.0038	0.029	0.0038
Dimethyl phthalate	0.0018	0.0018	2.39	0.67	0.0012	0.0012	0.19	1.5	0.0063	0.00082	0.0063	0.00082
Di-n-octyl phthalate	4.0	4.0	2.39	0.67	2.7	2.7	0.19	1.5	14	1.8	14	1.8
Hexachlorobenzene	62	62	2.39	0.67	42	42	0.15	0.29	283	142	283	142
Hexachlorocyclopentadiene	2.5	2.5	2.39	0.67	1.7	1.7	0.088	0.16	19	10	19	10
Pentachlorophenol	3.2	3.2	2.39	0.67	2.1	2.1	0.035	0.35	61	6.1	61	6.1
Hazard Index - Detected Compounds									0.012	0.0012	0.081	0.036
Hazard Index - Detected Compounds w/ Detection Limits									380	160	380	160

NOTES:
(a) - One-half the detection limit was used for risk calculations only if samples were non-detected.
(b) - Sample & Suter II, 1994.
(c) - 1 = Sample et al., 1996; 2 = No data available - BCF assumed to be equal to 1 to allow for bioaccumulation but not biomagnification.
(d) - Concentration in Fish = Concentration of COPEC in water x Bioaccumulation Factor.
(e) - See Attachment O, Table O-2
(f) - Based on site use from March - November.
(g) - See Table 4-23.
(h) - See Table 4-19.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient

Table V-2
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Fish - Great Blue Heron
Smokes Creek
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Highest Detected Upstream Concentration in Surface Water (mg/L)	Not Detected: 1/2 Detection Limit (a) (mg/L)	Highest Detected Downstream Concentration in Surface Water (mg/L)	Water Ingestion Rate (b) (L/day)	Area Use Factor (e)	Dose in Upstream Water (mg/kd/day)	Dose in Downstream Water (mg/kd/day)	Fish Ingestion Rate (b) (kg/day)	Bioaccumulation Factor (L/kg) - (BAF) Trophic Level 3	Reference for Bioaccumulation Factor (c)	Concentration in Upstream Fish (d) (mg/kg)	Concentration in Downstream Fish (d) (mg/kg)	Area Use Factor (e)
Metals													
Barium	0.050		0.030	0.11	1	0.0022	0.0013	0.42	1.0	2	0.050	0.030	1
Cadmium		0.0025	0.0041	0.11	1	0.00011	0.00018	0.42	12400	1	31	51	1
Chromium	0.0010		0.021	0.11	1	0.000044	0.00094	0.42	3	1	0.0030	0.064	1
Lead	0.0010		0.0052	0.11	1	0.000044	0.00023	0.42	45	1	0.045	0.23	1
Mercury		0.00010		0.11	1	0.0000044	0.0000044	0.42	27900	1	2.8	2.8	1
Selenium	0.0031		0.0073	0.11	1	0.00014	0.00032	0.42	2600	1	8.1	19	1
Silver		0.0050		0.11	1	0.00022	0.00022	0.42	5.5	(h)	0.028	0.028	1
Cyanide		0.0050	0.019	0.11	1	0.00022	0.00084	0.42	0.0	1	0.0	0.0	1
VOCs													
Bromoform	0.0018		0.0021	0.11	1	0.000080	0.000093	0.42	38	(h)	0.068	0.080	1
Chloroform	0.0055		0.0088	0.11	1	0.00024	0.00039	0.42	17	1	0.094	0.15	1
Methylene chloride		0.0050	0.014	0.11	1	0.00022	0.00062	0.42	5.3	1	0.026	0.074	1
Vinyl chloride		0.0050	0.0020	0.11	1	0.00022	0.000089	0.42	8.1	1	0.041	0.016	1
Xylenes, total		0.0050	0.00020	0.11	1	0.00022	0.0000089	0.42	166	1	0.83	0.033	1
SVOCs													
Butyl benzyl phthalate	0.00020		0.00020	0.11	1	0.0000089	0.0000089	0.42	927	(h)	0.19	0.19	1
Di-n-butyl phthalate	0.00060		0.0012	0.11	1	0.000027	0.000053	0.42	3661	1	2.2	4.4	1
1,2-Dichlorobenzene	0.0050		0.00010	0.11	1	0.00022	0.0000044	0.42	241	(h)	1.2	0.024	1
1,3-Dichlorobenzene	0.0050		0.00010	0.11	1	0.00022	0.0000044	0.42	233	(h)	1.2	0.023	1
1,4-Dichlorobenzene	0.00010		0.00010	0.11	1	0.0000044	0.0000044	0.42	302	(h)	0.030	0.030	1
Diethyl phthalate	0.0057		0.00050	0.11	1	0.00025	0.000022	0.42	47	1	0.27	0.024	1
Dimethyl phthalate		0.0050		0.11	1	0.00022	0.00022	0.42	10	(h)	0.050	0.050	1
Di-n-octyl phthalate	0.00030		0.00020	0.11	1	0.000013	0.0000089	0.42	22867	(h)	6.9	4.6	1
2,6-Dinitrotoluene		0.0050	0.00010	0.11	1	0.00022	0.0000044	0.42	33	(h)	0.17	0.0033	1
Hexachlorobenzene		0.0050		0.11	1	0.00022	0.00022	0.42	353420	(h)	1767	1767	1
Pentachlorophenol		0.026		0.11	1	0.0011	0.0011	0.42	3643	1	93	93	1

NOTES:
(a) - One-half the detection limit was used for risk calculations only if samples were non-detected.
(b) - Sample & Suter II, 1994.
(c) - 1 = Sample et al., 1996; 2 = No data available - BCF assumed to be equal to 1 to allow for bioaccumulation but not biomagnification.
(d) - Concentration in Fish = Concentration of COPEC in water x Bioaccumulation Factor.
(e) - See Attachment O, Table O-2.
(f) - Based on site use from March - November.
(g) - See Table 4-23.
(h) - See Table 4-19.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient

Table V-2
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Fish - Great Blue Heron
Smokes Creek
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Dose in Upstream Fish (mg/kg/day)	Dose in Downstream Fish (mg/kg/day)	Average Body Weight (b) (kg)	Seasonal Use Factor (f)	Average Daily Upstream Dose (mg/kd/day)	Average Daily Downstream Dose (mg/kd/day)	Toxicity Reference Value (g) (TRV)		Upstream Hazard Quotient		Downstream Hazard Quotient	
Metals							(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ
Barium	0.0088	0.0053	2.39	0.67	0.0074	0.0044	45	90	0.00016	0.000082	0.000098	0.000049
Cadmium	5.4	8.9	2.39	0.67	3.7	6.0	1.7	23	2.2	0.16	3.6	0.26
Chromium	0.00053	0.011	2.39	0.67	0.00038	0.0081	1.2	1.9	0.00033	0.00020	0.0070	0.0042
Lead	0.0079	0.041	2.39	0.67	0.0053	0.028	1.7	19	0.0031	0.00029	0.016	0.0015
Mercury	0.49	0.49	2.39	0.67	0.33	0.33	0.74	1.5	0.44	0.22	0.44	0.22
Selenium	1.4	3.3	2.39	0.67	0.95	2.2	0.58	1.2	1.6	0.82	3.9	1.9
Silver	0.0048	0.0048	2.39	0.67	0.0034	0.0034	207	0.43	0.000016	0.0078	0.000016	0.0078
Cyanide	0.0	0.0	2.39	0.67	0.00015	0.00056	0.040	0.30	0.0038	0.00049	0.014	0.0019
VOCs												
Bromoform	0.012	0.014	2.39	0.67	0.0081	0.0095	0.26	0.52	0.031	0.015	0.036	0.018
Chloroform	0.016	0.026	2.39	0.67	0.011	0.018	0.22	0.60	0.051	0.019	0.081	0.030
Methylene chloride	0.0046	0.013	2.39	0.67	0.0032	0.0091	0.86	7.3	0.0038	0.00044	0.011	0.0012
Vinyl chloride	0.0071	0.0029	2.39	0.67	0.0049	0.0020	0.025	0.25	0.20	0.020	0.079	0.0079
Xylenes, total	0.15	0.0058	2.39	0.67	0.098	0.0039	0.50	0.62	0.19	0.16	0.0078	0.0063
SVOCs												
Butyl benzyl phthalate	0.033	0.033	2.39	0.67	0.022	0.022	2.3	1.5	0.0094	0.015	0.0094	0.015
Di-n-butyl phthalate	0.39	0.77	2.39	0.67	0.26	0.52	0.19	1.5	1.4	0.18	2.7	0.35
1,2-Dichlorobenzene	0.21	0.0042	2.39	0.67	0.14	0.0028	13	126	0.011	0.0011	0.00023	0.000023
1,3-Dichlorobenzene	0.20	0.0041	2.39	0.67	0.14	0.0027	144	72	0.00095	0.0019	0.000019	0.000038
1,4-Dichlorobenzene	0.0053	0.0053	2.39	0.67	0.0036	0.0036	144	72	0.000025	0.000049	0.000025	0.000049
Diethyl phthalate	0.047	0.0042	2.39	0.67	0.032	0.0028	0.19	1.5	0.17	0.022	0.015	0.0019
Dimethyl phthalate	0.0088	0.0088	2.39	0.67	0.0060	0.0060	0.19	1.5	0.032	0.0041	0.032	0.0041
Di-n-octyl phthalate	1.2	0.80	2.39	0.67	0.81	0.54	0.19	1.5	4.2	0.55	2.8	0.36
2,6-Dinitrotoluene	0.029	0.00058	2.39	0.67	0.020	0.00039	3.2	23	0.0060	0.00084	0.00012	0.000017
Hexachlorobenzene	311	311	2.39	0.67	208	208	0.15	0.29	1417	708	1417	708
Pentachlorophenol	16	16	2.39	0.67	11	11	0.035	0.35	310	31	310	31
Hazard Index - Detected Compounds									7.5	1.6	13	3.0
Hazard Index - Detected Compounds w/ Detection Limits									1738	742	1741	743

ATTACHMENT W

HQ/HI CALCULATIONS FOR RACCOON

BETHLEHEM STEEL CORPORATION

LACKAWANNA, NEW YORK

Table W-1
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Macroinvertebrates - Raccoon
Blasdell Creek Sediment
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Highest Detected Concentration in Upstream Sediment (mg/kg)	Not Detected: 1/2 Detection Limit (a) (mg/kg)	Highest Detected Concentration in Downstream Sediment (mg/kg)	Sediment Ingestion Rate (b) (kg/day)	Area Use Factor (c)	Dose in Upstream Sediment (mg/kd/day)	Dose in Downstream Sediment (mg/kd/day)	Macroinvertebrate Ingestion Rate (b) (kg food wet weight/day)	Estimated COPEC Concentration in Upstream Macroinvertebrates (d) (mg/kg)	Estimated COPEC Concentration in Downstream Macroinvertebrates (d) (mg/kg)	Area Use Factor (c)
Metals											
Antimony	3.2		16	0.15	0.00031	0.00002	0.0001	1.6	0.63	3.1	0.00031
Arsenic	46		328	0.15	0.00031	0.0003	0.002	1.6	18	126	0.00031
Barium	396		245	0.15	0.00031	0.003	0.002	1.6	63	39	0.00031
Cadmium	9.1		17	0.15	0.00031	0.00006	0.0001	1.6	8.5	16	0.00031
Chromium	94		526	0.15	0.00031	0.0007	0.004	1.6	1.5	8.4	0.00031
Lead	340		349	0.15	0.00031	0.002	0.002	1.6	4.4	4.5	0.00031
Mercury	0.24		0.78	0.15	0.00031	0.000002	0.000006	1.6	0.022	0.072	0.00031
Nickel	71		220	0.15	0.00031	0.0005	0.002	1.6	0.91	2.8	0.00031
Selenium	8.5		16	0.15	0.00031	0.00006	0.0001	1.6	8.7	16	0.00031
Silver	0.74		1.8	0.15	0.00031	0.000005	0.00001	1.6	4.5	11	0.00031
Cyanide	0.83		1.9	0.15	0.00031	0.000006	0.00001	1.6	0.67	1.5	0.00031
SVOCs											
Acenaphthene		0.45		0.15	0.00031	0.000003	0.000003	1.6	0.00059	0.00059	0.00031
Acenaphthylene	0.92		0.66	0.15	0.00031	0.000007	0.000005	1.6	0.030	0.022	0.00031
Anthracene	1.0		0.92	0.15	0.00031	0.000007	0.000007	1.6	0.0047	0.0043	0.00031
Benzo (a) anthracene	4.0		3.8	0.15	0.00031	0.00003	0.00003	1.6	0.058	0.055	0.00031
Benzo (a) pyrene	4.3		4.3	0.15	0.00031	0.00003	0.00003	1.6	0.042	0.042	0.00031
bis (2-Ethylhexyl) phthalate	2.4		1.2	0.15	0.00031	0.00002	0.000009	1.6	0.029	0.014	0.00031
Chrysene	5.3		4.5	0.15	0.00031	0.00004	0.00003	1.6	0.10	0.086	0.00031
Fluoranthene	11		11	0.15	0.00031	0.00008	0.00008	1.6	0.38	0.38	0.00031
Fluorene	0.36		0.36	0.15	0.00031	0.000003	0.000003	1.6	0.015	0.015	0.00031
Hexachlorobenzene		4.5		0.15	0.00031	0.00003	0.00003	1.6	0.81	0.81	0.00031
Naphthalene	0.53	4.5		0.15	0.00031	0.000004	0.00003	1.6	0.061	0.51	0.00031
Phenanthrene	3.9		3.5	0.15	0.00031	0.00003	0.00002	1.6	0.051	0.046	0.00031
Pyrene	6.2		5.9	0.15	0.00031	0.00004	0.00004	1.6	0.14	0.13	0.00031

NOTES:
(a) - One-half the detection limit was used for risk calculations only if samples were non-detected.
(b) - Approximately 9.4% of raccoon diet is sediment (Beyer et al., 1994).
(c) - See Attachment O, Table O-2
(d) - See Table 4-16.
(e) - USEPA, 1993e
(f) - Based on site use from March through November.
(g) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table W-1
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Macroinvertebrates - Raccoon
Blasdell Creek Sediment
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Dose in Upstream Macroinvertebrates (mg/kg/day)	Dose in Downstream Macroinvertebrates (mg/kg/day)	Average Body Weight (e) (kg)	Seasonal Use Factor (f)	Average Daily Upstream Dose (mg/kg/day)	Average Daily Downstream Dose (mg/kg/day)	Toxicity Reference Value (TRV) (g)		Upstream Hazard Quotient		Downstream Hazard Quotient	
							(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ
Metals												
Antimony	0.000048	0.00023	6.67	0.67	0.00005	0.00023	0.090	0.90	0.00053	0.000053	0.0026	0.00026
Arsenic	0.0013	0.0096	6.67	0.67	0.0011	0.008	0.064	0.64	0.018	0.0018	0.13	0.013
Barium	0.0048	0.0030	6.67	0.67	0.005	0.003	2.4	9.4	0.0021	0.00055	0.0013	0.00034
Cadmium	0.00064	0.0012	6.67	0.67	0.00048	0.0009	0.48	1.9	0.00099	0.00024	0.0018	0.00045
Chromium	0.00011	0.00064	6.67	0.67	0.0005	0.003	2.7	11	0.00019	0.000048	0.0011	0.00027
Lead	0.00033	0.00034	6.67	0.67	0.002	0.002	6.7	67	0.00028	0.000028	0.00028	0.000028
Mercury	0.0000017	0.0000055	6.67	0.67	0.000002	0.000007	12	0.024	0.00000019	0.000094	0.00000062	0.00031
Nickel	0.000069	0.00021	6.67	0.67	0.0004	0.001	34	67	0.000012	0.0000058	0.000036	0.000018
Selenium	0.00066	0.0012	6.67	0.67	0.00048	0.0009	0.21	0.34	0.0023	0.0014	0.0043	0.0026
Silver	0.00034	0.00084	6.67	0.67	0.00023	0.00057	15	1.3	0.000015	0.00018	0.000038	0.00044
Cyanide	0.000051	0.00012	6.67	0.67	0.000038	0.00009	5.9	1.6	0.0000065	0.000023	0.000015	0.000053
SVOCs												
Acenaphthene	0.000000045	0.000000045	6.67	0.67	0.000002	0.000002	253	51	0.0000000086	0.000000043	0.0000000086	0.000000043
Acenaphthylene	0.0000023	0.0000017	6.67	0.67	0.000006	0.000004	253	51	0.000000024	0.00000012	0.000000017	0.000000084
Anthracene	0.00000036	0.00000033	6.67	0.67	0.000005	0.000005	723	36	0.0000000069	0.00000014	0.0000000064	0.00000013
Benzo (a) anthracene	0.0000044	0.0000042	6.67	0.67	0.00002	0.00002	1.7	1.4	0.000013	0.000015	0.000013	0.000015
Benzo (a) pyrene	0.0000032	0.0000032	6.67	0.67	0.00002	0.00002	0.72	7.2	0.000031	0.0000031	0.000031	0.0000031
bis (2-Ethylhexyl) phthalate	0.0000022	0.0000011	6.67	0.67	0.00001	0.000006	323	521	0.000000040	0.000000025	0.000000020	0.000000012
Chrysene	0.0000077	0.0000065	6.67	0.67	0.00003	0.00003	362	36	0.000000084	0.00000084	0.000000072	0.00000072
Fluoranthene	0.000029	0.000029	6.67	0.67	0.00007	0.00007	18	36	0.0000040	0.0000020	0.0000040	0.0000020
Fluorene	0.0000011	0.0000011	6.67	0.67	0.000002	0.000002	9.0	18	0.00000028	0.00000014	0.00000028	0.00000014
Hexachlorobenzene	0.000062	0.000062	6.67	0.67	0.00006	0.00006	0.84	1.7	0.000075	0.000038	0.000075	0.000038
Naphthalene	0.0000046	0.000039	6.67	0.67	0.000006	0.00005	5.9	12	0.00000095	0.00000047	0.0000080	0.0000040
Phenanthrene	0.0000039	0.0000035	6.67	0.67	0.00002	0.00002	362	42	0.000000059	0.00000051	0.000000053	0.00000046
Pyrene	0.000011	0.000010	6.67	0.67	0.00004	0.00003	5.4	9.0	0.0000068	0.0000041	0.0000064	0.0000039
Hazard Index - Detected Compounds									0.024	0.0044	0.14	0.017
Hazard Index - Detected Compounds w/Detection Limits									0.024	0.0044	0.14	0.017

Table W-2
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Macroinvertebrates - Raccoon
Smokes Creek Sediment
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Highest Detected Concentration in Upstream Sediment (mg/kg)	Not Detected: 1/2 Detection Limit (a) (mg/kg)	Highest Detected Concentration in Downstream Sediment (mg/kg)	Sediment Ingestion Rate (b) (kg/day)	Area Use Factor (c)	Dose in Upstream Sediment (mg/kg/day)	Dose in Downstream Sediment (mg/kg/day)	Macroinvertebrate Ingestion Rate (b) (kg food wet weight/day)	Estimated COPEC Concentration in Upstream Macroinvertebrates (d) (mg/kg)	Estimated COPEC Concentration in Downstream Macroinvertebrates (d) (mg/kg)	Area Use Factor (c)
Metals											
Antimony	15		23	0.15	0.00075	0.00025	0.00039	1.6	3.0	4.6	0.00075
Arsenic	60		35	0.15	0.00075	0.0010	0.00058	1.6	23	13	0.00075
Barium	86		121	0.15	0.00075	0.0014	0.0020	1.6	14	19	0.00075
Cadmium	2.5		8.6	0.15	0.00075	0.000042	0.00014	1.6	2.3	8.0	0.00075
Chromium	31		197	0.15	0.00075	0.00053	0.0033	1.6	0.50	3.2	0.00075
Lead	634		465	0.15	0.00075	0.011	0.0078	1.6	8.1	6.0	0.00075
Mercury		0.12	0.78	0.15	0.00075	0.0000019	0.000013	1.6	0.011	0.072	0.00075
Nickel	43		64	0.15	0.00075	0.00072	0.0011	1.6	0.55	0.81	0.00075
Selenium	18		13	0.15	0.00075	0.00030	0.00022	1.6	19	13	0.00075
Silver	3.9		8.0	0.15	0.00075	0.000066	0.00013	1.6	24	49	0.00075
Zinc	162		925	0.15	0.00075	0.0027	0.016	1.6	1534	8762	0.00075
Cyanide		0.60	44	0.15	0.00075	0.000010	0.00073	1.6	0.49	0.49	0.00075
VOCs											
Benzene		0.0060	0.025	0.15	0.00075	0.00000010	0.00000042	1.6	0.00050	0.00050	0.00075
Carbon disulfide		0.0060	0.037	0.15	0.00075	0.00000010	0.00000062	1.6	0.00055	0.00055	0.00075
Chlorobenzene		0.0060	0.0020	0.15	0.00075	0.00000010	0.000000034	1.6	0.00030	0.00030	0.00075
Methyl ethyl ketone		0.060	0.10	0.15	0.00075	0.0000010	0.0000017	1.6	0.019	0.019	0.00075
Methylene chloride	0.018		0.025	0.15	0.00075	0.00000030	0.00000042	1.6	0.0028	0.0039	0.00075
Toluene		0.060	0.27	0.15	0.00075	0.0000010	0.0000046	1.6	0.0034	0.0034	0.00075
Trichlorofluoromethane		0.060	0.13	0.15	0.00075	0.0000010	0.0000022	1.6	0.0038	0.0038	0.00075
Xylenes, total		0.060	0.012	0.15	0.00075	0.0000010	0.00000020	1.6	0.0045	0.0045	0.00075
SVOCs											
Acenapthene		19	0.77	0.15	0.00075	0.00032	0.000013	1.6	0.027	0.0011	0.00075
Acenaphthylene	7.0	2.9		0.15	0.00075	0.00012	0.000049	1.6	0.25	0.10	0.00075
Anthracene	46		2.6	0.15	0.00075	0.00078	0.000044	1.6	0.24	0.013	0.00075
Benzo (a) anthracene	85		2.9	0.15	0.00075	0.0014	0.000049	1.6	1.4	0.046	0.00075
Benzo (a) pyrene	61		2.4	0.15	0.00075	0.0010	0.000040	1.6	0.65	0.025	0.00075
Benzo (b) fluoranthene	62		5.7	0.15	0.00075	0.0010	0.000096	1.6	1.2	0.11	0.00075
Benzo (ghi) perylene	35		2.7	0.15	0.00075	0.00059	0.000045	1.6	0.078	0.0060	0.00075
Benzo (k) fluoranthene	48		0.99	0.15	0.00075	0.00081	0.000017	1.6	0.66	0.014	0.00075
bis (2-Ethylhexyl) phthalate	1.9		5.9	0.15	0.00075	0.000032	0.000099	1.6	0.025	0.078	0.00075
Butyl benzyl phthalate	0.070	2.9		0.15	0.00075	0.0000012	0.000049	1.6	0.0015	0.061	0.00075
Chrysene	83		2.8	0.15	0.00075	0.0014	0.000047	1.6	1.7	0.058	0.00075
Di-n-butyl phthalate		17	0.14	0.15	0.00075	0.00029	0.0000024	1.6	0.16	0.0013	0.00075
Di-n-octyl phthalate	0.16		0.14	0.15	0.00075	0.0000027	0.0000024	1.6	0.0015	0.0013	0.00075
Dibenz (a,h) anthracene	19		0.38	0.15	0.00075	0.00032	0.0000064	1.6	0.34	0.0068	0.00075
Fluoranthene	180		7.6	0.15	0.00075	0.0030	0.00013	1.6	6.8	0.29	0.00075
Fluorene	33		0.90	0.15	0.00075	0.00056	0.000015	1.6	1.5	0.041	0.00075
Hexachlorobenzene		17		0.15	0.00075	0.00029	0.00029	1.6	3.4	3.4	0.00075
Indeno (1,2,3-cd) pyrene	38		3.3	0.15	0.00075	0.00064	0.000056	1.6	0.51	0.044	0.00075
Isophorone		17	1.1	0.15	0.00075	0.00029	0.000019	1.6	2.0	0.13	0.00075
Naphthalene	0.072		0.73	0.15	0.00075	0.0000012	0.000012	1.6	0.0090	0.091	0.00075
Phenanthrene	170		5.7	0.15	0.00075	0.0029	0.000096	1.6	2.5	0.082	0.00075
Pyrene	190		5.2	0.15	0.00075	0.0032	0.000088	1.6	4.6	0.13	0.00075

NOTES:
(a) - One-half the detection limit was used for risk calculations only if samples were non-detected.
(b) - Assumes raccoon sediment ingestion is 9.4% of total diet (Beyer et al., 1994)
(c) - See Attachment O, Table O-2
(d) - See Table 4-17.
(e) - USEPA, 1993e
(f) - Based on site use from March through November.
(g) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

Table W-2
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Macroinvertebrates - Raccoon
Smokes Creek Sediment
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Dose in Upstream Macroinvertebrates (mg/kg/day)	Dose in Downstream Macroinvertebrates (mg/kg/day)	Average Body Weight (c) (kg)	Seasonal Use Factor (f)	Average Daily Upstream Dose (mg/kg/day)	Average Daily Downstream Dose (mg/kg/day)	Toxicity Reference Value (TRV) (g)		Upstream Hazard Quotient		Downstream Hazard Quotient	
Metals							(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ
Antimony	0.00053	0.00083	6.67	0.67	0.00052	0.00082	0.090	0.90	0.0058	0.00058	0.0091	0.00091
Arsenic	0.0041	0.0024	6.67	0.67	0.0034	0.0020	0.064	0.64	0.054	0.0054	0.031	0.0031
Barium	0.0025	0.0035	6.67	0.67	0.0026	0.0037	2.4	9.4	0.0011	0.00028	0.0015	0.00039
Cadmium	0.00042	0.0014	6.67	0.67	0.00031	0.0011	0.48	1.9	0.00064	0.00016	0.0022	0.00055
Chromium	0.000090	0.00056	6.67	0.67	0.00041	0.0026	2.7	11	0.00015	0.000038	0.00095	0.00024
Lead	0.0015	0.0011	6.67	0.67	0.0081	0.0060	6.7	67	0.0012	0.00012	0.00089	0.000089
Mercury	0.0000019	0.000013	6.67	0.67	0.0000026	0.000017	12	0.024	0.00000021	0.00011	0.0000015	0.00072
Nickel	0.000099	0.00015	6.67	0.67	0.00055	0.00081	34	67	0.000016	0.0000082	0.000024	0.000012
Selenium	0.0033	0.0024	6.67	0.67	0.0024	0.0017	0.21	0.34	0.012	0.0071	0.0084	0.0051
Silver	0.0043	0.0088	6.67	0.67	0.0029	0.0060	15	1.3	0.00019	0.0022	0.00039	0.0046
Zinc	0.28	1.6	6.67	0.67	0.19	1.1	146	293	0.0013	0.00064	0.0073	0.0036
Cyanide	0.000087	0.000087	6.67	0.67	0.000065	0.00055	5.9	1.6	0.000011	0.000040	0.000093	0.00033
VOCs												
Benzene	0.000000089	0.000000089	6.67	0.67	0.00000013	0.00000034	9.9	99	0.000000013	0.0000000013	0.000000035	0.0000000035
Carbon disulfide	0.000000099	0.000000099	6.67	0.67	0.00000013	0.00000048	17	29	0.0000000080	0.0000000046	0.000000029	0.000000017
Chlorobenzene	0.000000054	0.000000054	6.67	0.67	0.00000010	0.000000059	50	101	0.0000000021	0.0000000010	0.0000000012	0.00000000059
Methyl ethyl ketone	0.0000034	0.0000034	6.67	0.67	0.0000030	0.0000034	1484	3830	0.0000000020	0.00000000077	0.0000000023	0.00000000089
Methylene chloride	0.00000051	0.00000070	6.67	0.67	0.00000054	0.00000075	3.4	29	0.00000016	0.0000000019	0.00000022	0.0000000026
Toluene	0.00000061	0.00000061	6.67	0.67	0.0000011	0.0000035	18.8	188	0.0000000058	0.0000000058	0.00000018	0.0000000018
Trichlorofluoromethane	0.00000068	0.00000068	6.67	0.67	0.0000011	0.0000019	2.9	292	0.00000039	0.0000000039	0.00000066	0.0000000066
Xylenes, total	0.00000080	0.00000080	6.67	0.67	0.0000012	0.00000067	1.5	1.9	0.00000080	0.00000065	0.00000044	0.00000036
SVOCs												
Acenapthene	0.0000049	0.00000020	6.67	0.67	0.00022	0.0000088	253	51	0.00000086	0.0000043	0.0000000035	0.00000017
Acenaphthylene	0.000045	0.000019	6.67	0.67	0.00011	0.000045	253	51	0.00000043	0.0000022	0.00000018	0.00000090
Anthracene	0.000042	0.0000024	6.67	0.67	0.00055	0.000031	723	36	0.00000076	0.000015	0.0000000043	0.00000086
Benzo (a) anthracene	0.00024	0.0000083	6.67	0.67	0.0011	0.000038	1.7	1.4	0.00067	0.00078	0.000023	0.000026
Benzo (a) pyrene	0.00012	0.0000046	6.67	0.67	0.00077	0.000030	0.72	7.2	0.0011	0.00011	0.000042	0.0000042
Benzo (b) fluoranthene	0.00022	0.000020	6.67	0.67	0.00085	0.000078	0.72	7.2	0.0012	0.00012	0.00011	0.000011
Benzo (ghi) perylene	0.000014	0.0000011	6.67	0.67	0.00040	0.000031	0.72	7.2	0.00056	0.000056	0.000043	0.0000043
Benzo (k) fluoranthene	0.00012	0.0000025	6.67	0.67	0.00062	0.000013	0.72	7.2	0.00086	0.000086	0.000018	0.0000018
bis (2-Ethylhexyl) phthalate	0.0000045	0.000014	6.67	0.67	0.000024	0.000076	323	521	0.000000076	0.000000047	0.00000024	0.00000015
Butyl benzyl phthalate	0.00000026	0.000011	6.67	0.67	0.00000097	0.000040	13	39	0.000000073	0.000000025	0.0000030	0.0000010
Chrysene	0.00031	0.000010	6.67	0.67	0.0011	0.000039	362	36	0.0000032	0.000032	0.00000011	0.0000011
Di-n-butyl phthalate	0.000029	0.00000024	6.67	0.67	0.00021	0.0000017	3549	11827	0.000000060	0.000000018	0.00000000049	0.00000000015
Di-n-octyl phthalate	0.00000026	0.00000023	6.67	0.67	0.0000020	0.0000017	3549	11827	0.00000000056	0.00000000017	0.00000000049	0.00000000015
Dibenz (a,h) anthracene	0.000061	0.0000012	6.67	0.67	0.00026	0.0000051	0.17	7.2	0.0015	0.000035	0.000030	0.00000071
Fluoranthene	0.0012	0.000052	6.67	0.67	0.0029	0.00012	18	36	0.00016	0.000079	0.0000067	0.0000033
Fluorene	0.00027	0.0000074	6.67	0.67	0.00055	0.000015	9.0	18	0.000061	0.000031	0.0000017	0.00000084
Hexachlorobenzene	0.00060	0.00060	6.67	0.67	0.00060	0.00060	0.84	1.7	0.00071	0.00036	0.00071	0.00036
Indeno (1,2,3-cd) pyrene	0.000091	0.0000079	6.67	0.67	0.00049	0.000043	0.72	7.2	0.00068	0.000068	0.000059	0.0000059
Isophorone	0.000357	0.0000231	6.67	0.67	0.00043	0.000028	723	145	0.00000060	0.0000030	0.0000000039	0.00000019
Naphthalene	0.0000016	0.0000016	6.67	0.67	0.0000019	0.000019	5.9	12	0.00000032	0.00000016	0.0000032	0.0000016
Phenanthrene	0.00044	0.000015	6.67	0.67	0.0022	0.000074	362	42	0.0000061	0.000053	0.00000021	0.0000018
Pyrene	0.00083	0.000023	6.67	0.67	0.0027	0.000074	5.4	9.0	0.00050	0.00030	0.000014	0.0000082
Hazard Index - Detected Compounds									0.083	0.018	0.062	0.020
Hazard Index - Detected Compounds w/Detection Limits									0.084	0.019	0.063	0.020

Table W-3
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Macroinvertebrates - Raccoon
South Return Water Trench Sediment
ISG-Former Bethlehem Steel Corporation -Lackawanna, NY

	Highest Detected Concentration in Sediment (mg/kg)	Not Detected: 1/2 Detection Limit (a) (mg/kg)	Sediment Ingestion Rate (b) (kg/day)	Area Use Factor (c)	Dose in Sediment (mg/kd/day)	Macroinvertebrate Ingestion Rate (b) (kg food wet weight/day)	Estimated Concentration of Contaminant in Macroinvertebrates (d) (mg/kg)	Area Use Factor (c)	Dose in Macroinvertebrates (mg/kd/day)	Average Body Weight (e) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
													(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Metals																
Antimony	53		0.15	0.00060	0.0007	1.6	11	0.00060	0.0015	6.67	0.67	0.0015	0.090	0.90	0.017	0.0017
Arsenic	102		0.15	0.00060	0.001	1.6	39	0.00060	0.0056	6.67	0.67	0.005	0.064	0.64	0.074	0.0074
Barium	139		0.15	0.00060	0.002	1.6	22	0.00060	0.0032	6.67	0.67	0.003	2.4	9.4	0.0014	0.00036
Chromium	127		0.15	0.00060	0.002	1.6	2.0	0.00060	0.00029	6.67	0.67	0.001	2.7	11	0.00049	0.00012
Lead	1010		0.15	0.00060	0.01	1.6	13	0.00060	0.0019	6.67	0.67	0.01	6.7	67	0.0016	0.00016
Mercury	1.4		0.15	0.00060	0.00002	1.6	0.13	0.00060	0.000019	6.67	0.67	0.00003	12	0.024	0.0000021	0.0010
Selenium	4.4		0.15	0.00060	0.00006	1.6	4.5	0.00060	0.00065	6.67	0.67	0.00047	0.21	0.34	0.0023	0.0014
Silver	2.1		0.15	0.00060	0.00003	1.6	13	0.00060	0.0018	6.67	0.67	0.0013	15	1.3	0.000083	0.00096
Thallium	2.1		0.15	0.00060	0.00003	1.6	0.34	0.00060	0.000048	6.67	0.67	0.00005	0.004202	0.042	0.012	0.0012
Cyanide, free	1.4		0.15	0.00060	0.00002	1.6	1.1	0.00060	0.00016	6.67	0.67	0.00012	5.9	1.6	0.000021	0.000075
VOCs																
Tetrachloroethene	0.0052		0.15	0.00060	0.00000007	1.6	0.00023	0.00060	0.000000033	6.67	0.67	0.00000007	1.4	7.2	0.000000048	0.0000000095
SVOCs																
Acenaphthene		1.9	0.15	0.00060	0.00003	1.6	0.0034	0.00060	0.00000049	6.67	0.67	0.00002	253	51	0.000000068	0.00000034
Acenaphthylene		1.9	0.15	0.00060	0.00003	1.6	0.087	0.00060	0.000012	6.67	0.67	0.00003	253	51	0.000000099	0.00000050
Anthracene	0.77		0.15	0.00060	0.00001	1.6	0.0051	0.00060	0.00000074	6.67	0.67	0.000007	723	36	0.000000010	0.00000021
Benzo (a) anthracene	1.5		0.15	0.00060	0.00002	1.6	0.031	0.00060	0.0000045	6.67	0.67	0.00002	1.7	1.4	0.0000099	0.000011
Benzo (a) pyrene	1.9		0.15	0.00060	0.00003	1.6	0.026	0.00060	0.0000038	6.67	0.67	0.00002	0.72	7.2	0.000027	0.0000027
Benzo (b) fluoranthene	3.7		0.15	0.00060	0.00005	1.6	0.10	0.00060	0.000014	6.67	0.67	0.00004	0.72	7.2	0.000059	0.0000059
Benzo (ghi) perylene	1.7		0.15	0.00060	0.00002	1.6	0.0049	0.00060	0.00000071	6.67	0.67	0.00002	0.72	7.2	0.000022	0.0000022
Benzo (k) fluoranthene	1.0		0.15	0.00060	0.00001	1.6	0.018	0.00060	0.0000026	6.67	0.67	0.00001	0.72	7.2	0.000015	0.0000015
bis (2-Ethylhexyl) phthalate	0.57		0.15	0.00060	0.000008	1.6	0.010	0.00060	0.0000014	6.67	0.67	0.000006	323	521	0.000000019	0.000000012
Chrysene	2.7		0.15	0.00060	0.00004	1.6	0.073	0.00060	0.000010	6.67	0.67	0.00003	362	36	0.000000087	0.00000087
Dibenz (a,h) anthracene	0.50		0.15	0.00060	0.000007	1.6	0.012	0.00060	0.0000017	6.67	0.67	0.000006	0.17	7.2	0.000034	0.00000078
Fluoranthene	3.5		0.15	0.00060	0.00005	1.6	0.17	0.00060	0.000025	6.67	0.67	0.00005	18	36	0.0000027	0.0000013
Fluorene		1.9	0.15	0.00060	0.00003	1.6	0.11	0.00060	0.000016	6.67	0.67	0.00003	9.0	18	0.0000031	0.0000015
Hexachlorobenzene		1.9	0.15	0.00060	0.00003	1.6	0.49	0.00060	0.000070	6.67	0.67	0.00006	0.84	1.7	0.000076	0.000038
Indeno (1,2,3-cd) pyrene	1.8		0.15	0.00060	0.00002	1.6	0.031	0.00060	0.0000045	6.67	0.67	0.00002	0.72	7.2	0.000027	0.0000027
Naphthalene		1.9	0.15	0.00060	0.00003	1.6	0.31	0.00060	0.000044	6.67	0.67	0.00005	5.9	12	0.0000078	0.0000039
Phenanthrene	2.3		0.15	0.00060	0.00003	1.6	0.043	0.00060	0.0000062	6.67	0.67	0.00002	362	42	0.000000069	0.00000060
Pyrene	2.9		0.15	0.00060	0.00004	1.6	0.092	0.00060	0.000013	6.67	0.67	0.00004	5.4	9.0	0.0000065	0.0000039

Hazard Index - Detected Compounds	0.11	0.014
Hazard Index - Detected Compounds w/Detection Limits	0.11	0.014

NOTES:
(a) - One-half the detection limit was used for risk calculations only if all samples were non-detected.
(b) - Assumes 9.4% of raccoon diet is sediment (Beyer et al., 1994).
(c) - See Attachment O, Table O-2
(d) - See Table 4-18.
(e) - USEPA, 1993e
(f) - Based on site use from March through November.
(g) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient.

ATTACHMENT X

HQ/HI CALCULATIONS FOR SPOTTED SANDPIPER

BETHLEHEM STEEL CORPORATION

LACKAWANNA, NEW YORK

Table X-1
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Benthic Macroinvertebrates - Spotted Sandpiper
Blasdell Creek Sediments
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Highest Detected Concentration in Upstream Sediment (mg/kg)	Not Detected: 1/2 Detection Limit (a) (mg/kg)	Highest Detected Concentration in Downstream Sediment (mg/kg)	Sediment Ingestion Rate (b) (kg/day)	Area Use Factor (c)	Dose in Upstream Sediment (mg/kd/day)	Dose in Downstream Sediment (mg/kd/day)	Macroinvertebrate Ingestion Rate (b) (kg food wet weight/day)	Estimated COPEC Concentration in Upstream Macroinvertebrates (d) (mg/kg)	Estimated COPEC Concentration in Downstream Macroinvertebrates (d) (mg/kg)	Area Use Factor (c)
Metals											
Antimony	3.2		16	0.0066	0.19	0.10	0.47	0.036	0.63	3.1	0.19
Arsenic	46		328	0.0066	0.19	1.4	10	0.036	18	126	0.19
Barium	396		245	0.0066	0.19	12	7.4	0.036	63	39	0.19
Cadmium	9.1		17	0.0066	0.19	0.28	0.51	0.036	8.5	16	0.19
Chromium	94		526	0.0066	0.19	2.8	16	0.036	1.5	8.4	0.19
Lead	340		349	0.0066	0.19	10	11	0.036	4.4	4.5	0.19
Mercury	0.24		0.78	0.0066	0.19	0.0073	0.024	0.036	0.022	0.072	0.19
Nickel	71		220	0.0066	0.19	2.2	6.7	0.036	0.91	2.8	0.19
Selenium	8.5		16	0.0066	0.19	0.26	0.48	0.036	8.7	16	0.19
Silver	0.74		1.8	0.0066	0.19	0.022	0.055	0.036	4.5	11	0.19
Cyanide	0.83		1.9	0.0066	0.19	0.025	0.058	0.036	0.67	1.5	0.19
SVOC's											
Acenaphthene		0.45		0.0066	0.19	0.014	0.014	0.036	0.00059	0.00059	0.19
Acenaphthylene	0.92		0.66	0.0066	0.19	0.028	0.020	0.036	0.030	0.022	0.19
Anthracene	1.0		0.92	0.0066	0.19	0.030	0.028	0.036	0.0047	0.0043	0.19
Benzo (a) anthracene	4.0		3.8	0.0066	0.19	0.12	0.12	0.036	0.058	0.055	0.19
Benzo (a) pyrene	4.3		4.3	0.0066	0.19	0.13	0.13	0.036	0.042	0.042	0.19
bis (2-Ethylhexyl) phthalate	2.4		1.2	0.0066	0.19	0.073	0.036	0.036	0.029	0.014	0.19
Chrysene	5.3		4.5	0.0066	0.19	0.16	0.14	0.036	0.10	0.086	0.19
Fluoranthene	11		11	0.0066	0.19	0.33	0.33	0.036	0.38	0.38	0.19
Fluorene	0.36		0.36	0.0066	0.19	0.011	0.011	0.036	0.015	0.015	0.19
Hexachlorobenzene		4.5		0.0066	0.19	0.14	0.14	0.036	0.81	0.81	0.19
Naphthalene	0.53	4.5		0.0066	0.19	0.016	0.14	0.036	0.061	0.51	0.19
Phenanthrene	3.9		3.5	0.0066	0.19	0.12	0.11	0.036	0.051	0.046	0.19
Pyrene	6.2		5.9	0.0066	0.19	0.19	0.18	0.036	0.14	0.13	0.19

NOTES:
(a) - One-half the detection limit was used for risk calculations only if samples were non-detected.
(b) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0582 x body $weight^{0.651}$)/0.2). Sediment ingestion rate calculated as 18% of the dry matter intake of the western sandpiper (Beyer *et al*., 1994)
(c) - See Attachment O, Table O-2.
(d) - See Table 4-16.
(e) - Values derived from Terres, 1991.
(f) - Based on site use from March through November.
(g) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient

Table X-1
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Benthic Macroinvertebrates - Spotted Sandpiper
Blasdell Creek Sediments
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Dose in Upstream Macroinvertebrates (mg/kd/day)	Dose in Downstream Macroinvertebrates (mg/kd/day)	Average Body Weight (e) (kg)	Seasonal Use Factor (f)	Average Daily Upstream Dose (mg/kd/day)	Average Daily Downstream Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Upstream Hazard Quotient		Downstream Hazard Quotient	
							(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ
Metals												
Antimony	0.11	0.52	0.041	0.67	0.14	0.66	0.013	0.13	10	1.0	50	5.0
Arsenic	3.0	21	0.041	0.67	2.9	21	0.14	0.36	21	8.2	148	59
Barium	11	6.6	0.041	0.67	15	9.4	20	40	0.76	0.38	0.47	0.24
Cadmium	1.4	2.6	0.041	0.67	1.1	2.1	0.75	10	1.5	0.11	2.8	0.21
Chromium	0.25	1.4	0.041	0.67	2.1	12	0.51	0.86	4.0	2.4	23	14
Lead	0.73	0.75	0.041	0.67	7.4	7.6	0.77	8.3	9.6	0.90	9.8	0.92
Mercury	0.0038	0.012	0.041	0.67	0.0074	0.024	0.33	0.66	0.022	0.011	0.073	0.037
Nickel	0.15	0.48	0.041	0.67	1.6	4.8	16	55	0.10	0.028	0.31	0.087
Selenium	1.5	2.7	0.041	0.67	1.2	2.1	0.26	0.51	4.5	2.2	8.4	4.2
Silver	0.76	1.9	0.041	0.67	0.53	1.3	92	0.19	0.0058	2.7	0.014	6.7
Cyanide	0.11	0.26	0.041	0.67	0.093	0.21	0.039	0.30	2.4	0.31	5.5	0.71
SVOC's												
Acenaphthene	0.000099	0.000099	0.041	0.67	0.0092	0.0092	0.96	7.5	0.0096	0.0012	0.0096	0.0012
Acenaphthylene	0.0051	0.0037	0.041	0.67	0.022	0.016	0.96	7.5	0.023	0.0030	0.017	0.0021
Anthracene	0.00079	0.00073	0.041	0.67	0.021	0.019	0.96	5.3	0.022	0.0039	0.020	0.0036
Benzo (a) anthracene	0.0098	0.0093	0.041	0.67	0.088	0.084	0.76	0.21	0.12	0.41	0.11	0.39
Benzo (a) pyrene	0.0070	0.0070	0.041	0.67	0.092	0.092	0.96	1.1	0.096	0.087	0.096	0.087
bis (2-Ethylhexyl) phthalate	0.0049	0.0024	0.041	0.67	0.052	0.026	0.57	0.65	0.092	0.080	0.046	0.040
Chrysene	0.017	0.014	0.041	0.67	0.12	0.10	0.96	5.3	0.12	0.022	0.11	0.019
Fluoranthene	0.064	0.064	0.041	0.67	0.27	0.27	0.96	5.3	0.28	0.050	0.28	0.050
Fluorene	0.0025	0.0025	0.041	0.67	0.0090	0.0090	0.96	2.7	0.0094	0.0034	0.0094	0.0034
Hexachlorobenzene	0.14	0.14	0.041	0.67	0.18	0.18	0.065	0.13	2.8	1.4	2.8	1.4
Naphthalene	0.010	0.087	0.041	0.67	0.018	0.15	0.96	0.92	0.018	0.019	0.16	0.16
Phenanthrene	0.0087	0.0078	0.041	0.67	0.085	0.076	0.96	1.3	0.089	0.065	0.080	0.059
Pyrene	0.023	0.022	0.041	0.67	0.14	0.13	0.96	1.3	0.15	0.11	0.14	0.10
Hazard Index - Detected Compounds									55	19	249	91
Hazard Index - Detected Compounds w/Detection Limits									58	21	252	93

Table X-2
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Macroinvertebrates - Spotted Sandpiper
Smokes Creek Sediment
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Highest Detected Concentration in Upstream Sediment (mg/kg)	Not Detected: 1/2 Detection Limit (a) (mg/kg)	Highest Detected Concentration in Downstream Sediment (mg/kg)	Sediment Ingestion Rate (b) (kg/day)	Area Use Factor (c)	Dose in Upstream Sediment (mg/kd/day)	Dose in Downstream Sediment (mg/kd/day)	Macroinvertebrate Ingestion Rate (b) (kg food wet weight/day)	Estimated COPEC Concentration in Upstream Macroinvertebrates (d) (mg/kg)	Estimated COPEC Concentration in Downstream Macroinvertebrates (d) (mg/kg)	Area Use Factor (c)
Metals											
Antimony	15		23	0.0066	0.47	1.1	1.8	0.036	3.0	4.6	0.47
Arsenic	60		35	0.0066	0.47	4.5	2.6	0.036	23	13	0.47
Barium	86		121	0.0066	0.47	6.4	9.1	0.036	14	19	0.47
Cadmium	2.5		8.6	0.0066	0.47	0.19	0.65	0.036	2.3	8.0	0.47
Chromium	31		197	0.0066	0.47	2.4	15	0.036	0.50	3.2	0.47
Lead	634		465	0.0066	0.47	48	35	0.036	8.1	6.0	0.47
Mercury		0.12	0.78	0.0066	0.47	0.0086	0.059	0.036	0.011	0.072	0.47
Nickel	43		64	0.0066	0.47	3.2	4.8	0.036	0.55	0.81	0.47
Selenium	18		13	0.0066	0.47	1.4	0.98	0.036	19	13	0.47
Silver	3.9		8.0	0.0066	0.47	0.29	0.60	0.036	24	49	0.47
Zinc	162		925	0.0066	0.47	12	69	0.036	1534	8762	0.47
Cyanide		0.60	44	0.0066	0.47	0.045	3.3	0.036	0.49	0.49	0.47
VOCs											
Benzene		0.0060	0.025	0.0066	0.47	0.00045	0.0019	0.036	0.00050	0.00050	0.47
Carbon disulfide		0.0060	0.037	0.0066	0.47	0.00045	0.0028	0.036	0.00055	0.00055	0.47
Chlorobenzene		0.0060	0.0020	0.0066	0.47	0.00045	0.00015	0.036	0.00030	0.00030	0.47
Methyl ethyl ketone		0.060	0.10	0.0066	0.47	0.0045	0.0075	0.036	0.019	0.019	0.47
Methylene chloride	0.018		0.025	0.0066	0.47	0.0014	0.0019	0.036	0.0028	0.0039	0.47
Toluene		0.060	0.27	0.0066	0.47	0.0045	0.020	0.036	0.0034	0.0034	0.47
Trichlorofluoromethane		0.060	0.13	0.0066	0.47	0.0045	0.0098	0.036	0.0038	0.0038	0.47
Xylenes, total		0.060	0.012	0.0066	0.47	0.0045	0.00090	0.036	0.0045	0.0045	0.47
SVOCs											
Acenaphthene		17	0.77	0.0066	0.47	1.3	0.058	0.036	0.027	0.0011	0.47
Acenaphthylene	7.0	2.9		0.0066	0.47	0.53	0.22	0.036	0.25	0.10	0.47
Anthracene	46		2.6	0.0066	0.47	3.5	0.20	0.036	0.24	0.013	0.47
Benzo (a) anthracene	85		2.9	0.0066	0.47	6.4	0.22	0.036	1.4	0.046	0.47
Benzo (a) pyrene	61		2.4	0.0066	0.47	4.6	0.18	0.036	0.65	0.025	0.47
Benzo (b) fluoranthene	62		5.7	0.0066	0.47	4.7	0.43	0.036	1.2	0.11	0.47
Benzo (ghi) perylene	35		2.7	0.0066	0.47	2.6	0.20	0.036	0.078	0.0060	0.47
Benzo (k) fluoranthene	48		0.99	0.0066	0.47	3.6	0.074	0.036	0.66	0.014	0.47
bis (2-Ethylhexyl) phthalate	1.9		5.9	0.0066	0.47	0.14	0.44	0.036	0.025	0.078	0.47
Butyl benzyl phthalate	0.070	2.9		0.0066	0.47	0.0053	0.22	0.036	0.0015	0.061	0.47
Chrysene	83		2.8	0.0066	0.47	6.2	0.21	0.036	1.7	0.058	0.47
Di-n-butyl phthalate		17	0.14	0.0066	0.47	1.3	0.011	0.036	0.16	0.0013	0.47
Di-n-octyl phthalate	0.16		0.14	0.0066	0.47	0.012	0.011	0.036	0.0015	0.0013	0.47
Dibenz (a,h) anthracene	19		0.38	0.0066	0.47	1.4	0.029	0.036	0.34	0.0068	0.47
Fluoranthene	180		7.6	0.0066	0.47	14	0.57	0.036	6.8	0.29	0.47
Fluorene	33		0.90	0.0066	0.47	2.5	0.068	0.036	1.5	0.041	0.47
Hexachlorobenzene		17		0.0066	0.47	1.3	1.3	0.036	3.4	3.4	0.47
Indeno (1,2,3-cd) pyrene	38		3.3	0.0066	0.47	2.9	0.25	0.036	0.51	0.044	0.47
Isophorone		17	1.1	0.0066	0.47	1.3	0.083	0.036	2.0	0.13	0.47
Naphthalene	0.072		0.73	0.0066	0.47	0.0054	0.055	0.036	0.0090	0.091	0.47
Phenanthrene	170		5.7	0.0066	0.47	13	0.43	0.036	2.5	0.082	0.47
Pyrene	190		5.2	0.0066	0.47	14	0.39	0.036	4.6	0.13	0.47

NOTES:
(a) - One-half the detection limit was used for risk calculations only if samples were non-detected.
(b) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion $rate_{food}$ = (0.0582 x body $weight^{0.651}$)/0.2). Sediment ingestion rate calculated as 18% of the dry matter intake of the western sandpiper (Beyer *et al*., 1994)
(c) - See Attachment O, Table O-2.
(d) - See Table 4-17.
(e) - Values derived from Terres, 1991.
(f) - Based on site use from March through November.
(g) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient

Table X-2
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Macroinvertebrates - Spotted Sandpiper
Smokes Creek Sediment
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Dose in Upstream Macroinvertebrates (mg/kd/day)	Dose in Downstream Macroinvertebrates (mg/kd/day)	Average Body Weight (e) (kg)	Seasonal Use Factor (f)	Average Daily Upstream Dose (mg/kd/day)	Average Daily Downstream Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Upstream Hazard Quotient		Downstream Hazard Quotient	
Metals							(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ
Antimony	1.2	1.9	0.041	0.67	1.6	2.5	0.013	0.13	118	12	186	19
Arsenic	9.6	5.6	0.041	0.67	9.4	5.5	0.14	0.36	67	26	39	15
Barium	5.7	8.1	0.041	0.67	8.2	12	20	40	0.41	0.20	0.58	0.29
Cadmium	0.97	3.3	0.041	0.67	0.78	2.7	0.75	10	1.0	0.076	3.6	0.26
Chromium	0.21	1.3	0.041	0.67	1.7	11	0.51	0.86	3.3	2.0	21	13
Lead	3.4	2.5	0.041	0.67	34	25	0.77	8.3	44	4.1	32	3.0
Mercury	0.0045	0.030	0.041	0.67	0.0088	0.059	0.33	0.66	0.027	0.013	0.18	0.090
Nickel	0.23	0.34	0.041	0.67	2.3	3.4	16	55	0.15	0.042	0.22	0.062
Selenium	7.7	5.6	0.041	0.67	6.1	4.4	0.26	0.51	24	12	17	8.5
Silver	10	20	0.041	0.67	6.9	14	92	0.19	0.075	36	0.15	73
Zinc	640	3656	0.041	0.67	437	2496	2827	25539	0.15	0.017	0.88	0.098
Cyanide	0.20	0.20	0.041	0.67	0.17	2.3	0.039	0.30	4.3	0.56	60	7.8
VOCs												
Benzene	0.00021	0.00021	0.041	0.67	0.00044	0.0014	2.8	28	0.00016	0.000016	0.00050	0.000050
Carbon disulfide	0.00023	0.00023	0.041	0.67	0.00046	0.0020	1.3	2.6	0.00035	0.00018	0.0015	0.00077
Chlorobenzene	0.00013	0.00013	0.041	0.67	0.00039	0.00019	3.9	7.8	0.000099	0.000049	0.000047	0.000024
Methyl ethyl ketone	0.0079	0.0079	0.041	0.67	0.0083	0.010	115	298	0.000072	0.000028	0.000090	0.000035
Methylene chloride	0.0012	0.0016	0.041	0.67	0.0017	0.0024	0.38	3.3	0.0044	0.00052	0.0062	0.00072
Toluene	0.0014	0.0014	0.041	0.67	0.0040	0.015	2.8	28	0.0014	0.00014	0.0053	0.00053
Trichlorofluoromethane	0.0016	0.0016	0.041	0.67	0.0041	0.0076	0.23	23	0.018	0.00018	0.033	0.00033
Xylenes, total	0.0019	0.0019	0.041	0.67	0.0043	0.0019	0.22	0.28	0.019	0.015	0.0083	0.0067
SVOCs												
Acenaphthene	0.011	0.00046	0.041	0.67	0.86	0.039	0.96	7.5	0.90	0.12	0.041	0.0052
Acenaphthylene	0.11	0.044	0.041	0.67	0.42	0.18	0.96	7.5	0.44	0.057	0.18	0.024
Anthracene	0.098	0.0056	0.041	0.67	2.4	0.13	0.96	5.3	2.5	0.45	0.14	0.025
Benzo (a) anthracene	0.57	0.019	0.041	0.67	4.7	0.16	0.76	0.21	6.2	22	0.21	0.75
Benzo (a) pyrene	0.27	0.011	0.041	0.67	3.3	0.13	0.96	1.1	3.4	3.1	0.13	0.12
Benzo (b) fluoranthene	0.51	0.047	0.041	0.67	3.5	0.32	0.96	1.1	3.6	3.3	0.33	0.30
Benzo (ghi) perylene	0.033	0.0025	0.041	0.67	1.8	0.14	0.96	1.1	1.9	1.7	0.14	0.13
Benzo (k) fluoranthene	0.28	0.0057	0.041	0.67	2.6	0.054	0.13	1.1	19	2.4	0.40	0.050
bis (2-Ethylhexyl) phthalate	0.010	0.033	0.041	0.67	0.10	0.32	0.57	0.65	0.18	0.16	0.56	0.49
Butyl benzyl phthalate	0.00062	0.026	0.041	0.67	0.0039	0.16	1.0	0.65	0.0038	0.0060	0.16	0.25
Chrysene	0.72	0.024	0.041	0.67	4.7	0.16	0.96	5.3	4.9	0.88	0.16	0.030
Di-n-butyl phthalate	0.067	0.00055	0.041	0.67	0.90	0.0074	0.084	0.65	0.94	0.17	0.088	0.011
Di-n-octyl phthalate	0.00061	0.00053	0.041	0.67	0.0085	0.0074	0.084	0.65	0.0088	0.0032	0.088	0.011
Dibenz (a,h) anthracene	0.14	0.0028	0.041	0.67	1.1	0.021	0.37	1.1	16	8.1	0.056	0.020
Fluoranthene	2.8	0.12	0.041	0.67	11	0.46	0.96	5.3	11	10	0.48	0.087
Fluorene	0.63	0.017	0.041	0.67	2.1	0.057	0.96	2.7	2.2	0.78	0.059	0.021
Hexachlorobenzene	1.4	1.4	0.041	0.67	1.8	1.8	0.065	0.13	28	14	28	14
Indeno (1,2,3-cd) pyrene	0.21	0.018	0.041	0.67	2.1	0.18	0.96	1.1	2.1	1.9	0.19	0.17
Isophorone	0.82	0.053	0.041	0.67	1.4	0.091	11	21	0.13	0.066	0.0086	0.0043
Naphthalene	0.0038	0.038	0.041	0.67	0.0061	0.062	0.96	0.92	0.0064	0.0066	0.065	0.067
Phenanthrene	1.0	0.034	0.041	0.67	9.2	0.31	0.96	1.3	9.7	7.1	0.32	0.24
Pyrene	1.9	0.053	0.041	0.67	11	0.30	0.96	1.3	11	8.2	0.31	0.22
Hazard Index - Detected Compounds									353	163	364	143
Hazard Index - Detected Compounds w/Detection Limits									387	177	392	157

Table X-3
Hazard Quotients and Hazard Indices for Indirect Exposure
Ingestion of Macroinvertebrates - Spotted Sandpiper
South Return Water Trench Sediment
ISG-Former Bethlehem Steel Corporation - Lackawanna, NY

	Highest Detected Concentration in Sediment (mg/kg)	Not Detected: 1/2 Detection Limit (a) (mg/kg)	Sediment Ingestion Rate (b) (kg/day)	Area Use Factor (c)	Dose in Sediment (mg/kd/day)	Macroinvertebrate Ingestion Rate (b) (kg food wet weight/day)	Estimated Concentration of Contaminant in Macroinvertebrates (d) (mg/kg)	Area Use Factor (c)	Dose in Macroinvertebrates (mg/kd/day)	Average Body Weight (e) (kg)	Seasonal Use Factor (f)	Average Daily Dose (mg/kd/day)	Toxicity Reference Value (TRV) (g)		Hazard Quotient	
Metals													(NOAEL)	(LOAEL)	NOAEL HQ	LOAEL HQ
Antimony	53		0.0066	0.37	3.2	0.036	11	0.37	3.5	0.041	0.67	4.4	0.013	0.13	334	33
Arsenic	102		0.0066	0.37	6.0	0.036	39	0.37	13	0.041	0.67	13	0.14	0.36	90	36
Barium	139		0.0066	0.37	8.2	0.036	22	0.37	7.3	0.041	0.67	10	20	40	0.52	0.26
Chromium	127		0.0066	0.37	7.5	0.036	2.0	0.37	0.67	0.041	0.67	5.5	0.51	0.86	11	6.4
Lead	1010		0.0066	0.37	60	0.036	13	0.37	4.2	0.041	0.67	43	0.77	8.3	55	5.2
Mercury	1.4		0.0066	0.37	0.083	0.036	0.13	0.37	0.043	0.041	0.67	0.084	0.33	0.66	0.26	0.13
Selenium	4.4		0.0066	0.37	0.26	0.036	4.5	0.37	1.5	0.041	0.67	1.2	0.26	0.51	4.5	2.3
Silver	2.1		0.0066	0.37	0.12	0.036	13	0.37	4.2	0.041	0.67	2.9	92	0.19	0.032	15
Thallium	2.1		0.0066	0.37	0.12	0.036	0.34	0.37	0.11	0.041	0.67	0.16	0.27	0.0037	0.58	43
Cyanide, free	1.4		0.0066	0.37	0.083	0.036	1.1	0.37	0.37	0.041	0.67	0.30	0.039	0.30	7.8	1.0
VOCs																
Tetrachloroethene	0.0052		0.0066	0.37	0.00031	0.036	0.00023	0.37	0.000075	0.041	0.67	0.00026	0.21	1.1	0.0012	0.00024
SVOCs						0.036										
Acenapthene		1.9	0.0066	0.37	0.11	0.036	0.0034	0.37	0.0011	0.041	0.67	0.074	0.96	7.5	0.077	0.010
Acenaphthylene		1.9	0.0066	0.37	0.11	0.036	0.087	0.37	0.029	0.041	0.67	0.092	0.96	7.5	0.097	0.012
Anthracene	0.77		0.0066	0.37	0.046	0.036	0.0051	0.37	0.0017	0.041	0.67	0.032	0.96	5.3	0.033	0.0059
Benzo (a) anthracene	1.5		0.0066	0.37	0.089	0.036	0.031	0.37	0.010	0.041	0.67	0.066	0.76	0.21	0.088	0.31
Benzo (a) pyrene	1.9		0.0066	0.37	0.11	0.036	0.026	0.37	0.0086	0.041	0.67	0.081	0.96	1.1	0.085	0.076
Benzo (b) fluoranthene	3.7		0.0066	0.37	0.22	0.036	0.095	0.37	0.031	0.041	0.67	0.17	0.96	1.1	0.17	0.16
Benzo (ghi) perylene	1.7		0.0066	0.37	0.10	0.036	0.0049	0.37	0.0016	0.041	0.67	0.068	0.96	1.1	0.071	0.064
Benzo (k) fluoranthene	1.0		0.0066	0.37	0.059	0.036	0.018	0.37	0.0059	0.041	0.67	0.044	0.13	1.1	0.33	0.041
bis (2-Ethylhexyl) phthalate	0.57		0.0066	0.37	0.034	0.036	0.010	0.37	0.0032	0.041	0.67	0.025	0.57	0.65	0.044	0.038
Chrysene	2.7		0.0066	0.37	0.16	0.036	0.073	0.37	0.024	0.041	0.67	0.12	0.96	5.3	0.13	0.023
Dibenz (a,h) anthracene	0.50		0.0066	0.37	0.030	0.036	0.012	0.37	0.0038	0.041	0.67	0.022	0.37	1.1	0.060	0.021
Fluoranthene	3.5		0.0066	0.37	0.21	0.036	0.17	0.37	0.057	0.041	0.67	0.18	0.96	5.3	0.18	0.033
Fluorene		1.9	0.0066	0.37	0.11	0.036	0.11	0.37	0.037	0.041	0.67	0.10	0.96	2.7	0.10	0.037
Hexachlorobenzene		1.9	0.0066	0.37	0.11	0.036	0.49	0.37	0.16	0.041	0.67	0.18	0.065	0.13	2.8	1.4
Indeno (1,2,3-cd) pyrene	1.8		0.0066	0.37	0.11	0.036	0.031	0.37	0.010	0.041	0.67	0.078	0.96	1.1	0.082	0.073
Naphthalene		1.9	0.0066	0.37	0.11	0.036	0.31	0.37	0.10	0.041	0.67	0.14	0.96	0.92	0.15	0.15
Phenanthrene	2.3		0.0066	0.37	0.14	0.036	0.043	0.37	0.014	0.041	0.67	0.10	0.96	1.3	0.11	0.077
Pyrene	2.9		0.0066	0.37	0.17	0.036	0.092	0.37	0.030	0.041	0.67	0.14	0.96	1.3	0.14	0.10

Hazard Index - Detected Compounds	504	143
Hazard Index - Detected Compounds w/ Detection Limits	508	145

NOTES:
(a) - One-half the detection limit was used for risk calculations only if all samples were non-detected.
(b) - Values calculated from body weight using the allometric equations of Nagy (1987). (Ingestion rate$_{food}$ = (0.0582 x body weight$^{0.651}$)/0.2). Sediment ingestion rate calculated as 18% of the dry matter intake of western sandpiper (Beyer *et al*., 1994)
(c) - See Attachment O, Table O-2.
(d) - See Table 4-18.
(e) - Values derived from Terres, 1991.
(f) - Based on site use from March through November.
(g) - See Table 4-23.

NOAEL - No Observable Adverse Effects Level.
LOAEL - Lowest Observable Adverse Effects Level.
HQ - Hazard Quotient