Tables

TABLE 2.1

CONSTITUENTS OF POTENTIAL ECOLOGICAL CONCERN IDENTIFIED IN THE SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT
FORMER PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

COPECs	*Residential Area 1*	*Residential Area 2*	*Residential Area 3*	*Residential Area 4*	*Waterfront Plaza*	*Mixed Residential/ Commercial Area 1*	*Mixed Residential/ Commercial Area 2*	*Commercial Area 1*	*Commercial Area 2*	*Commercial Area 3*	*Commercial Area 4*
Volatile Organic Compounds (VOCs)											
1,2-Dibromo-3-chloropropane (DBCP)	LOD > ESV	LOD > ESV	LOD > ESV	LOD > ESV		LOD > ESV	LOD > ESV	LOD > ESV	LOD > ESV	LOD > ESV	LOD > ESV
1,2,4-Trimethylbenzene							No ESV				
1,3,5-Trimethylbenzene							No ESV				
2-Phenylbutane (sec-Butylbenzene)							No ESV				
Acetone				SQ = 3.4			SQ = 2.2				
Cymene							No ESV				
Isopropyl benzene	No ESV			No ESV			No ESV			No ESV	No ESV
N-Propylbenzene							No ESV				
N-Butylbenzene							No ESV				
Tetrahydrofuran							No ESV				
BTEX											
Benzene				SQ = 13			SQ = 2.8				SQ = 1.4
Toluene				SQ = 4.6			SQ = 2.4				
o-Xylene				SQ = 1.2			SQ =1.1				
m&p-Xylenes				SQ = 1.7			SQ = 1.6				
Semi-Volatile Organic Compounds (SVOCs)											
2,4-Dimethylphenol				LOD > ESV		LOD > ESV	LOD > ESV	LOD > ESV	LOD > ESV		LOD > ESV
2,4-Dinitrophenol				LOD > ESV							
2-Chlorophenol	LOD > ESV	LOD > ESV	LOD > ESV	LOD > ESV		LOD > ESV	LOD > ESV	LOD > ESV	LOD > ESV	LOD > ESV	LOD > ESV
4,6-Dinitro-2-methylphenol (4,6-Dinitro-o-cresol)	LOD > ESV	LOD > ESV	LOD > ESV	LOD > ESV		LOD > ESV	LOD > ESV	LOD > ESV	LOD > ESV	LOD > ESV	LOD > ESV
bis(2-Ethylhexyl)phthalate (DEHP)	SQ = 3.8										
Carbazole	No ESV		No ESV	No ESV		No ESV	No ESV	No ESV			No ESV
Dibenzofuran	No ESV		No ESV	No ESV		---	No ESV	No ESV		No ESV	No ESV
Hexachlorobenzene	LOD > ESV	LOD > ESV	LOD > ESV	LOD > ESV		LOD > ESV	LOD > ESV	LOD > ESV	LOD > ESV	LOD > ESV	LOD > ESV
Hexachlorobutadiene	LOD > ESV	LOD > ESV	LOD > ESV	LOD > ESV		LOD > ESV	LOD > ESV	LOD > ESV	LOD > ESV	LOD > ESV	LOD > ESV
Polcyclic Aromatic Hydrocarbons (PAHs)											
Sum of LMW PAHs							SQ = 3.0				
Sum of HMW PAHs	SQ = 7.4	SQ = 1.4	SQ = 1.6	SQ = 54		SQ = 3.5	SQ = 57	SQ = 7.5	SQ = 4.1	SQ = 1.2	SQ = 18

TABLE 2.1

CONSTITUENTS OF POTENTIAL ECOLOGICAL CONCERN IDENTIFIED IN THE SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT
FORMER PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

COPECs	*Residential Area 1*	*Residential Area 2*	*Residential Area 3*	*Residential Area 4*	*Waterfront Plaza*	*Mixed Residential/ Commercial Area 1*	*Mixed Residential/ Commercial Area 2*	*Commercial Area 1*	*Commercial Area 2*	*Commercial Area 3*	*Commercial Area 4*
Polychlorinated Biphenyls (PCBs)											
Aroclor-1016 (PCB-1016)											
Aroclor-1221 (PCB-1221)											
Aroclor-1242 (PCB-1242)											
Aroclor-1248 (PCB-1248)											
Aroclor-1254 (PCB-1254)											
Aroclor-1260 (PCB-1260)											
Total PCBs	SQ = 3,584	SQ = 684	SQ = 1,205	SQ = 1,205			SQ = 3,313	SQ = 3,072	SQ = 361		SQ = 33,133
Inorganic Constituents											
Antimony			SQ = 1.5	SQ = 5.6			SQ = 202			SQ = 1.1	SQ = 32
Arsenic			SQ = 1.1	SQ = 1.2		SQ = 1.1	SQ = 5.7		SQ = 1.9		SQ = 4.2
Barium							SQ = 2.6				SQ = 1.5
Cadmium	SQ = 3.1			SQ = 11		SQ = 2.6	SQ = 6.4		SQ = 3.6	SQ = 3.1	SQ = 4.7
Chromium			SQ = 1.4	SQ = 1.1			SQ = 3.3				SQ = 1.5
Cobalt						SQ 2.3	SQ = 2.9				
Copper	SQ = 1.8	SQ = 1.6	SQ = 1.3	SQ = 7.9	BCOC		SQ = 91	SQ = 1.1			SQ = 11
Iron	SQ = 116	SQ = 76	SQ = 129	SQ = 94	SQ = 23	SQ = 51	SQ = 313	SQ = 71	SQ = 70	SQ = 74	SQ = 426
Lead	SQ = 6.1	SQ = 4.1	SQ = 5.8	SQ = 90		SQ = 15	SQ = 212	SQ = 7.7	SQ = 8.2	SQ = 7.9	SQ = 50
Manganese	SQ = 4.5	SQ = 3.2	SQ = 3.2	SQ = 3.2		SQ = 8.5	SQ = 5.0	SQ = 6.9	SQ = 4.1	SQ = 3.4	SQ = 18
Mercury	SQ = 3.3	BCOC	SQ = 22	SQ = 56		SQ = 1.6	SQ = 40	SQ = 2.4	SQ = 1.9	SQ > 47	SQ = 8.0
Nickel	BCOC	BCOC	BCOC	BCOC	BCOC	BCOC	SQ = 1.6	BCOC	BCOC	BCOC	BCOC
Selenium	SQ = 3.1	SQ = 1.5	SQ = 2.1	SQ = 8.7		SQ = 1.2	SQ = 5.8	SQ = 1.9	SQ = 2.3	SQ = 5.0	SQ = 2.9
Vanadium	SQ = 3.6	SQ = 2.4	SQ = 6.9	SQ = 2.4		SQ = 1.8	SQ = 5.0	SQ = 2.6	SQ = 2.7	SQ = 2.3	SQ = 6.3
Zinc	SQ = 2.8	SQ = 1.3	SQ = 2.4	SQ = 9.8		SQ = 2.3	SQ = 100	SQ = 1.6	SQ = 1.9	SQ = 1.5	SQ = 17
Cyanide (Total)				SQ = 1.4			SQ = 1.9		SQ = 1.8	SQ = 1.7	SQ = 1.8

Notes :
BCOC - Bioaccumulative Chemical of Concern
COPEC - Constituent of Potential Ecological Concern
ESV - Ecological Screening Value
LOD - Limit of Detection
SQ - Screening Quotient
BTEX - Benzene, toluene, ethylbenzene, and xylenes
LMW - Low Molecular Weight
HMW - High Molecular Weight

TABLE 4.1

RE-SCREENING SUMMARY FOR REFINEMENT DATASET
FORMER PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

Constituent	*Units*	*ESV*	*Source*	*No. Samples*	*No. Detects*	*FOD*	*Max Conc.*	*Area of Max. Conc.*	*Sample with Max. Conc.*	*SQ*	*BCOC*	*Retain as COPEC*	*Rationale for Retaining or Eliminating*
Volatile Organic Compounds (VOCs)													
Acetone	**µg/kg**	**2,500**	**a**	**3**	**3**	**100%**	**5,500**	**Residential Area 4**	**SB-302**	**2.2**	**No**	**Yes**	**SQ > 1**
Isopropylbenzene	**µg/kg**	**n/a**	**---**	**24**	**3**	13%	**660**	**Residential Area 4**	**SB-302**	**-**	**No**	**Yes**	**No ESV**
BTEX													
Benzene	**µg/kg**	**255**	**a**	**24**	**7**	**29%**	**1,300**	**Residential Area 4**	**SB-302**	**5.1**	**No**	**Yes**	**SQ > 1**
Toluene	**µg/kg**	**5,450**	**a**	**24**	**10**	**42%**	**22,000**	**Residential Area 4**	**SB-302**	**4.0**	**No**	**Yes**	**SQ > 1**
o-Xylene	**µg/kg**	10,000	a	24	10	42%	7,400	Residential Area 4	SB-302	0.74	No	No	SQ < 1
m&p-Xylenes	**µg/kg**	**10,000**	**a**	**24**	**9**	**38%**	**11,000**	**Residential Area 4**	**SB-302**	**1.1**	**No**	**Yes**	**SQ > 1**
Semi-Volatile Organic Compounds (SVOCs)													
bis(2-Ethylhexyl)phthalate	**µg/kg**	925	a	24	13	54%	350	Commercial Area 4	SB-201	0.38	No	No	SQ < 1
Carbazole	**µg/kg**	**n/a**	**---**	**23**	**3**	13%	**83**	**Residential Area 4**	**SB-302**	**-**	**No**	**Yes**	**No ESV**
Polcyclic Aromatic Hydrocarbons (PAHs)													
High Molecular Weight (HMW) PAHs													
Benzo(a)anthracene	**µg/kg**			29	16	55%	3,800	Residential Area 4	DG3				
Benzo(a)pyrene	**µg/kg**			29	17	59%	4,900	Residential Area 4	DG3				
Chrysene	**µg/kg**			30	19	63%	8,100	Residential Area 4	DG3				
Dibenz(a,h)anthracene	**µg/kg**			30	11	37%	6,400	Residential Area 4	DG4				
Fluoranthene	**µg/kg**			30	17	57%	7,700	Commercial Area 4	TP-341				
Pyrene	**µg/kg**			26	15	58%	6,000	Residential Area 4	DG3				
Sum of HMW PAHs		**1,100**	**b**	**30**	**22**	**73%**	**26,500**	**Residential Area 4**	**DG3**	**24**	**No**	**Yes**	**SQ > 1**
Polychlorinated Biphenyls (PCBs)													
Aroclor-1248	**µg/kg**			17	1	5.9%	52	Residential Area 1	SB-101		**Yes**		
Aroclor-1254	**µg/kg**			17	14	82%	230	Residential Area 1	SB-104		**Yes**		
Aroclor-1260	**µg/kg**			17	12	71%	200	Residential Area 4	SB-302		**Yes**		
Total PCBs	**µg/kg**	**0.332**	**a**	**23**	**20**	**87%**	**400**	Residential Area 4	SB-302	**1,205**	**Yes**	**Yes**	**SQ > 1**
Inorganic Constituents													
Antimony	**mg/kg**	**0.27**	**c**	**24**	**8**	**33%**	**3.1**	**Commercial Area 4**	**TP-341**	**11**	**No**	**Yes**	**SQ > 1**
Arsenic	**mg/kg**	**18**	**d**	**30**	**29**	**97%**	**21.6**	**Residential Area 4**	**SB-301**	**1.2**	**No**	**Yes**	**SQ > 1**
Barium	**mg/kg**	**330**	**e**	**24**	**24**	**100%**	**500**	**Commercial Area 4**	**TP-341**	**1.5**	**No**	**Yes**	**SQ > 1**
Cadmium	**mg/kg**	**0.36**	**f**	**30**	**15**	**50%**	**3.9**	**Residential Area 4**	**DG4**	**11**	**Yes**	**Yes**	**SQ > 1**
Chromium	**mg/kg**	**26**	**g**	**30**	**30**	**100%**	**40**	**Commercial Area 4**	**TP-341**	**1.5**	**Yes**	**Yes**	**SQ > 1**
Cobalt	mg/kg	13	h	24	24	100%	7.7	Commercial Area 4	TP-341	0.59	No	No	SQ < 1
Copper	**mg/kg**	**28**	**i**	**30**	**29**	**97%**	**308**	**Commercial Area 4**	**TP-341**	**11**	**Yes**	**Yes**	**SQ > 1**
Iron	mg/kg	200	j	24	24	100%	22,200	Commercial Area 4	TP-341	**111**	No	No	see text
Lead	**mg/kg**	**11**	**k**	**30**	**30**	**100%**	**990**	**Residential Area 4**	**DG4**	**90**	**Yes**	**Yes**	**SQ > 1**
Manganese	**mg/kg**	**220**	**l**	**24**	**24**	**100%**	**698**	**Residential Area 3**	**SB-138**	**3.2**	**No**	**Yes**	**SQ > 1**
Mercury	**mg/kg**	**0.1**	**m**	**30**	**24**	**80%**	**5.6**	**Residential Area 4**	**DG3**	**56**	**Yes**	**Yes**	**SQ > 1**
Nickel	mg/kg	38	n	24	24	100%	29.3	Residential Area 3	SB-138	0.77	Yes	No	SQ < 1
Selenium	**mg/kg**	**0.52**	**o**	**30**	**19**	**63%**	**1.8**	**Residential Area 4**	**SB-302**	**3.5**	**Yes**	**Yes**	**SQ > 1**
Vanadium	**mg/kg**	**7.8**	**p**	**24**	**24**	**100%**	**28**	**Residential Area 1**	**SB-102**	**3.6**	**No**	**Yes**	**SQ > 1**
Zinc	**mg/kg**	**46**	**q**	**30**	**27**	**90%**	**764**	**Commercial Area 4**	**TP-341**	**17**	**Yes**	**Yes**	**SQ > 1**
Cyanide (Total)	**mg/kg**	**1.33**	**a**	**6**	**6**	**81%**	**1.8**	**Residential Area 4**	**SB-321**	**1.4**	**No**	**Yes**	**SQ > 1**

TABLE 4.1

RE-SCREENING SUMMARY FOR REFINEMENT DATASET
FORMER PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

Notes:

Bold Font identifies constituent identified as Constituent of Potential Ecological Concern (COPEC)
n/a - Ecological Screening Value (ESV) not available
BCOC - Bioaccumulative Chemical of Concern
COPEC - Constituent of Potential Ecological Concern
ESV - Ecological Screening Value
FOD - Frequency of Detection
SQ - Screening Quotient
BTEX - Benzene, toluene, ethylbenzene, and xylenes
µg/kg- micrograms per kilogram
mg/kg- milligrams per kilogram
LMW - Low Molecular Weight
HMW - High Molecular Weight

For LMW PAHs, constituents were summed for each sample, and the max was compared to the screening value for total LMW PAHs. The same was done for HWM PAHs. Non-detects were treated as 1/2 the detection limit.

Rationale for Retaining or Eliminating

No ESV - Constituent was detected; ESV not available
SQ < 1 - Maximum concentration is less than the ESV
SQ > 1 - Maximum concentration is greater than the ESV

ESV Source:

a - U.S. EPA Region 5 Ecological Soil Screening Level (U.S. EPA, 2003)
b - Ecological Soil Screening Level - Mammalian Wildlife (U.S. EPA, 2007e)
c - Ecological Soil Screening Level - Mammalian Wildlife (U.S. EPA, 2005a)
d - Ecological Soil Screening Level - Plants (U.S. EPA, 2005b)
e - Ecological Soil Screening Level - Invertebrates (U.S. EPA, 2005c)
f - Ecological Soil Screening Level - Mammalian Wildlife (U.S. EPA, 2005d)
g - Ecological Soil Screening Level - Avian Wildlife (U.S. EPA, 2008)
h - Ecological Soil Screening Level - Plants (U.S. EPA, 2005e)
i - Ecological Soil Screening Level - Avian Wildlife (U.S. EPA, 2007b)
j - Oak Ridge National Laboratory - Microbes (Efroymson et al., 1997b)
k - Ecological Soil Screening Level - Avian Wildlife (U.S. EPA, 2005f)
l - Ecological Soil Screening Level - Plants (U.S. EPA, 2007c)
m - Oak Ridge National Laboratory - Invertebrates (Efroymson et al., 1997b)
n - Ecological Soil Screening Level - Plants (U.S. EPA, 2007d)
o - Ecological Soil Screening Level - Plants (U.S. EPA, 2007f)
p - Ecological Soil Screening Level - Avian Wildlife (U.S. EPA, 2005g)
q - Ecological Soil Screening Level - Avian Wildlife (U.S. EPA, 2007g)

TABLE 5.1

REFINEMENT BENCHMARKS FOR AVIAN WILDLIFE
FORMER PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

Constituent	*Background*		*ECO-SSL*	*Effroymson et al. (1997a)*	*CCME*	*Refinement Benchmark*
	MDEQ (2005)	*U.S. EPA (2007a)*				
Volatile Organic Compounds (VOCs) (µg/kg)						
Acetone	---	---	---	---	---	n/a
Isopropylbenzene	---	---	---	---	---	n/a
BTEX (µg/kg)						
Benzene	---	---	---	---	---	n/a
Toluene	---	---	---	---	---	n/a
Xylene (Total)	---	---	---	---	---	n/a
Semi-Volatile Organic Compounds (SVOCs) (µg/kg)						
Carbazole	---	---	---			n/a
Polcyclic Aromatic Hydrocarbons (PAHs) (µg/kg)						
High Molecular Weight (HMW) PAHs	---	---	---	---	600	600
Polychlorinated Biphenyls (PCBs) (µg/kg)						
Total PCBs	---	---	---	655	1,300	655
Inorganic Constituents (mg/kg)						
Antimony	---	1.3	---	---	---	1.3
Arsenic	1.09	4.2	43	102	380	43
Barium	14.2	127	---	283	---	283
Cadmium	< 2.0	0.90	0.77	4.2	3.8	0.90
Chromium	2.8	13.8	26	16.1	---	26
Copper	2.7	12	28	515	300	28
Lead	7.4	9.2	11	40.5	70	11
Manganese	117	230	4,300	---	---	4,300
Mercury	< 0.1	---	---	0.00051	---	0.00051
Selenium	< 0.5	0.30	1.2	---	4.5	1.2
Vanadium	---	44	7.8	---	---	44
Zinc	13	33	46	8.5	640	46
Cyanide (Total)	---	---	---	---	11	11

TABLE 5.1

REFINEMENT BENCHMARKS FOR AVIAN WILDLIFE
FORMER PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

Notes:

--- Ecological benchmark concentration is not available
CCME - Canadian Council of Ministers of the Environment
ECO-SSL - Ecological Soil Screening Level
MDEQ - Michigan Department of Environmental Quality
U.S. EPA - United States Environmental Protection Agency
BTEX - Benzene, toluene, ethylbenzene, and xylenes
µg/kg - micrograms per kilogram
mg/kg - milligrams per kilogram

TABLE 5.2

REFINEMENT OF CONSTITUENTS OF POTENTIAL ECOLOGICAL CONCERN - AVIAN WILDLIFE
FORMER PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

Constituent	*Units*	*Refinement Benchmark*	*No. Samples*	*No. Detects*	*Minimum Detected*	*Maximum Detected*	*95% UCL*	*RQ_{UCL}*	*Retain as COPEC*	*Rationale*
Volatile Organic Compounds (VOCs)										
Acetone	**µg/kg**	**n/a**	**3**	**3**	**310**	**5,500**	**n/c**	**---**	**Yes**	**No RB**
Isopropylbenzene	**µg/kg**	**n/a**	**24**	**3**	**50**	**660**	**150**	**---**	**Yes**	**No RB**
BTEX										
Benzene	**µg/kg**	**n/a**	**24**	**7**	**5.6**	**1,300**	**167**		**Yes**	**No RB**
Toluene	**µg/kg**	**n/a**	**24**	**10**	**16**	**22,000**	**2,661**		**Yes**	**No RB**
Xylenes (Total)	**µg/kg**	**na**	**24**	**10**	**27**	**18,400**	**2,343**		**Yes**	**No RB**
Semi-Volatile Organic Compounds (SVOCs)										
Carbazole	**µg/kg**	**n/a**	**23**	**3**	**40**	**83**	**83**	**---**	**Yes**	**No RB**
Polycyclic Aromatic Hydrocarbons (PAHs)										
High Molecular Weight PAHs	**µg/kg**	**600**	**30**	**22**	**82.1**	**26,500**	**13,920**	**23**	**Yes**	**$RQ_{UCL} > 1$**
Polychlorinated Biphenyls (PCBs)										
Total PCBs	µg/kg	655	23	20	10	400	187	0.29	No	$RQ_{UCL} < 1$
Inorganic Constituents										
Antimony	mg/kg	1.3	24	8	0.30	3.1	0.944	0.73	No	$RQ_{UCL} < 1$
Arsenic	mg/kg	43	30	29	3.3	21.6	11.0	0.25	No	$RQ_{UCL} < 1$
Barium	mg/kg	283	24	24	17.2	500	171	0.60	No	$RQ_{UCL} < 1$
Cadmium	**mg/kg**	**0.90**	**30**	**15**	**0.27**	**3.9**	**0.948**	**1.1**	**No**	**$RQ_{UCL} < 1$**
Chromium	mg/kg	26	30	30	5.5	40	16.7	0.64	No	$RQ_{UCL} < 1$
Copper	**mg/kg**	**28**	**30**	**29**	**3.8**	**308**	**143**	**5.1**	**Yes**	**$RQ_{UCL} > 1$**
Lead	**mg/kg**	**11**	**30**	**30**	**4.0**	**990**	**181**	**16**	**Yes**	**$RQ_{UCL} > 1$**
Manganese	mg/kg	4,300	24	24	127	698	468	0.11	No	$RQ_{UCL} < 1$
Mercury	**mg/kg**	**0.00051**	**30**	**24**	**0.049**	**5.6**	**1.53**	**2,990**	**Yes**	**$RQ_{UCL} > 1$**
Selenium	mg/kg	1.2	30	19	0.30	1.8	0.744	0.62	No	$RQ_{UCL} < 1$
Vanadium	mg/kg	44	24	24	8.0	28	18.2	0.41	No	$RQ_{UCL} < 1$
Zinc	**mg/kg**	**46**	**30**	**27**	**18**	**764**	**333**	**7.2**	**Yes**	**$RQ_{UCL} > 1$**
Cyanide (Total)	mg/kg	11	6	6	0.50	1.8	1.47	0.13	Yes	$RQ_{UCL} < 1$

TABLE 5.2

REFINEMENT OF CONSITITUENTS OF POTENTIAL ECOLOGICAL CONCERN - AVIAN WILDLIFE
FORMER PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

Notes **:**

COPEC - Constituent of Potential Eecological Concern

RB - Refinement Benchmark

RQ_{UCL} - Refinement quotient based on the 95% upper confidence limit

UCL - Upper Confidence Limit

µg/kg- micrograms per kilogram

mg/kg- milligrams per kilogram

TABLE 5.3

REFINEMENT BENCHMARKS FOR MAMMALIAN WILDLIFE
FORMER PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

Constituent	*Background*		*ECO-SSL*	*U.S. EPA 5 ESL*	*Effroymson et al. (1997a)*	*CCME*	*Refinement Benchmark*
	MDEQ (2005)	*U.S. EPA (2007a)*					
Volatile Organic Compounds (VOCs) (µg/kg)							
Acetone	---	---	---	2,500	---	---	2,500
Isopropylbenzene	---	---	---	---	---	---	n/a
BTEX (µg/kg)							
Benzene	---	---	---	255	---	---	255
Toluene	---	---	---	5,450	---	---	5,450
Xylenes (Total)	---	---	---	---	---	---	n/a
Semi-Volatile Organic Compounds (SVOCs) (µg/kg)							
Carbazole	---	---	---	---	---		n/a
Polcyclic Aromatic Hydrocarbons (PAHs) (µg/kg)							
High Molecular Weight (HMW) PAHs	---	---	1,100	0.332	391	1,300	1,100
Polychlorinated Biphenyls (PCBs) (µg/kg)							
Total PCBs	---	---	---	---	---	1,300	1,300
Inorganic Constituents (mg/kg)							
Antimony	---	1.3	0.27	0.142	---	---	1.3
Arsenic	1.09	4.2	46	5.7	9.9	380	46
Barium	14.2	127	2,000	1.04	329	---	2,000
Cadmium	< 2.0	0.90	0.36	0.0022	6.0	3.8	0.90
Chromium	2.8	13.8	34	0.40	110	---	34
Copper	2.7	12	49	5.4	370	300	49
Lead	7.4	9.2	56	0.0537	740	70	56
Manganese	117	230	4,000	---	---	---	4,000
Mercury	< 0.1	---	---	---	0.146	---	0.146
Selenium	< 0.5	0.30	0.63	0.0276	---	4.5	0.63
Vanadium	---	44	280	1.59	55	---	280
Zinc	13	33	79	---	1,600	640	79
Cyanide (Total)	---	---	---	1.33	---	11	1.33

TABLE 5.3

REFINEMENT BENCHMARKS FOR MAMMALIAN WILDLIFE
FORMER PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

Notes:

--- Ecological benchmark concentration is not available
CCME - Canadian Council of Ministers of the Environment
ECO-SSL - Ecological Soil Screening Level
ESL - Ecological Screening Level
MDEQ - Michigan Department of Environmental Quality
U.S. EPA - United States Environmental Protection Agency
BTEX - Benzene, toluene, ethylbenzene, and xylenes
µg/kg- micrograms per kilogram
mg/kg- milligrams per kilogram

TABLE 5.4

REFINEMENT OF CONSTITUENTS OF POTENTIAL ECOLOGICAL CONCERN - MAMMALIAN WILDLIFE
FORMER PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

Constituent	*Units*	*Refinement Benchmark*	*No. Samples*	*No. Detects*	*Minimum Detected*	*Maximum Detected*	*95% UCL*	*RQ_{UCL}*	*Retain as COPEC*	*Rationale*
Volatile Organic Compounds (VOCs)										
Acetone	**µg/kg**	**2,500**	**3**	**3**	**310**	**5,500**	**n/c**	**2.2**	**Yes**	**RQ_{UCL} > 1**
Isopropylbenzene	**µg/kg**	**n/a**	**24**	**3**	**50**	**660**	**150**	**---**	**Yes**	**No RB**
BTEX										
Benzene	µg/kg	255	**24**	**7**	5.6	1,300	167	0.65	No	RQ_{UCL} < 1
Toluene	µg/kg	5,450	**24**	**10**	16	22,000	2,661	0.49	No	RQ_{UCL} < 1
Xylene (Total)	**µg/kg**	**na**	**24**	**10**	**27**	**18,400**	**2,343**	**---**	**Yes**	**No RB**
Semi-Volatile Organic Compounds (SVOCs)										
Carbazole	**µg/kg**	**n/a**	**23**	**3**	**40**	**83**	**83**	**---**	**Yes**	**No RB**
Polycyclic Aromatic Hydrocarbons (PAHs)										
High Molecular Weight PAHs	**µg/kg**	**1,100**	**30**	**22**	**82.1**	**26,500**	**13,920**	**13**	**Yes**	**RQ_{UCL} > 1**
Polychlorinated Biphenyls (PCBs)										
Total PCBs	µg/kg	1,300	23	20	10	400	187	0.14	No	RQ_{UCL} < 1
Inorganic Constituents										
Antimony	mg/kg	1.3	24	8	0.30	3.1	0.944	0.73	No	RQ_{UCL} < 1
Arsenic	mg/kg	46	30	29	3.3	21.6	11.0	0.24	No	RQ_{UCL} < 1
Barium	mg/kg	2,000	24	24	17.2	500	171	0.085	No	RQ_{UCL} < 1
Cadmium	**mg/kg**	**0.90**	**30**	**15**	**0.27**	**3.9**	**0.948**	**1.1**	**No**	**RQ_{UCL} < 1**
Chromium	mg/kg	34	30	30	5.5	40	16.7	0.49	No	RQ_{UCL} < 1
Copper	**mg/kg**	**49**	**30**	**29**	**3.8**	**308**	**143**	**2.9**	**Yes**	**RQ_{UCL} > 1**
Lead	**mg/kg**	**56**	**30**	**30**	**4.0**	**990**	**181**	**3.2**	**Yes**	**RQ_{UCL} > 1**
Manganese	mg/kg	4,000	24	24	127	698	468	0.12	No	RQ_{UCL} < 1
Mercury	**mg/kg**	**0.146**	**30**	**24**	**0.049**	**5.6**	**1.53**	**10**	**Yes**	**RQ_{UCL} > 1**
Selenium	**mg/kg**	**0.63**	**30**	**19**	**0.30**	**1.8**	**0.744**	**1.2**	**Yes**	**RQ_{UCL} > 1**
Vanadium	mg/kg	280	24	24	8.0	28	18.2	0.065	No	RQ_{UCL} < 1
Zinc	**mg/kg**	**79**	**30**	**27**	**18**	**764**	**333**	**4.2**	**Yes**	**RQ_{UCL} > 1**
Cyanide (Total)	**mg/kg**	**1.33**	6	6	0.50	1.8	1.47	**1.1**	**Yes**	**RQ_{UCL} > 1**

TABLE 5.4

REFINEMENT OF CONSTITUENTS OF POTENTIAL ECOLOGICAL CONCERN - MAMMALIAN WILDLIFE
FORMER PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

Notes *:*

COPEC - Constituent of potential ecological concern

RB - Refinement Benchmark

RQ_{UCL} - Refinement quotient based on the 95% upper confidence limit

UCL - Upper Confidence Limit

µg/kg- micrograms per kilogram

mg/kg- milligrams per kilogram

TABLE 5.5

EXPOSURE PARAMETERS FOR AVIAN INDICATOR SPECIES
FORMER PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

Parameter	***Units***	***American Woodcock***	***Mourning Dove***	***Red-Tailed Hawk***
Body Weight	kg	0.18	0.02	1.13
Ingestion				
IR_{Food}	kg DW/kg BW/day	0.214	0.190	0.0353
IR_{Water}	L/kg/day	Negligible	Negligible	Negligible
P_s	Unitless	0.164	0.139	0.057
Diet				
Terrestrial Invertebrates	Percent	100	0	0
Terrestrial Plants	Percent	0	100	0
Small Terrestrial Mammals	Percent	0	0	100
Area Use				
Diet from Assessment Area	Unitless	1	1	1
Bioavailability	Percent	100	100	100

Notes :

BW - Body Weight
Body Weight from Table 12A-1 of U.S. EPA (1999a)
DW - Dry Weight
IR_{Food} - Ingestion Rate of Food
IR_{Water} - Ingestion Rate of Water
P_s - Proportion of Soil Ingested
IR_{Food} from Table 4.1 of Attachment 4-1 of U.S. EPA (2007a)
P_s from Table 4-1 of U.S. EPA (2007a)
kg - kilogram
mg - milligram
L - liter

TABLE 5.6

EXPOSURE PARAMETERS FOR MAMMALIAN INDICATOR SPECIES
FORMER PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

Parameter	*Units*	*Short-Tailed Shrew*	*Meadow Vole*	*Long-Tailed Weasel*
Body Weight	kg	0.02	0.02	0.19
Ingestion				
IR_{Food}	kg DW/kg BW/day	0.209	0.0875	0.13
IR_{Water}	L/kg/day	Negligible	Negligible	Negligible
P_s	Unitless	0.03	0.032	0.043
Diet				
Terrestrial Invertebrates	Percent	100	0	0
Terrestrial Plants	Percent	0	100	0
Small Terrestrial Mammals	Percent	0	0	100
Area Use				
Diet from Assessment Area	Unitless	1	1	1
Bioavailability	Percent	100	100	100

Notes **:**

BW - Body Weight

Body Weight from Table 12A-1 of U.S. EPA (1999a)

IR_{Food} - Ingestion Rate of Food

IR_{Water} - Ingestion Rate of Water

P_s - Proportion of Soil Ingested

IR_{Food} from Table 4.1 of Attachment 4-1 of U.S. EPA (2007a)

P_s from Table 4-1 of U.S. EPA (2007a)

kg - kilogram

mg - milligram

L - liter

TABLE 5.7

EQUATIONS FOR CALCULATING EXPOSURE CONCENTRATIONS IN DIETARY ITEMS
FORMER PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

COPEC	Soil Invertebrates		Terrestrial Plants		Small Mammals	
	Equation	Source	Equation	Source	Equation	Source
Volatile Organic Compounds (VOCs)						
Acetone	$C_I = 0 * C_S$	a	$C_P = 0 * C_S$	a	C_M = Greater of C_I and C_P	e
Isopropylbenzene	$C_I = 71.05 * C_S * 5.99$	c	$C_P = 0.30 * C_S$	c	C_M = Greater of C_I and C_P	e
BTEX						
Benzene	$C_I = 0 * C_S$	a	$C_P = 0 * C_S$	a	C_M = Greater of C_I and C_P	e
Toluene	$C_I = 0 * C_S$	a	$C_P = 0 * C_S$	a	C_M = Greater of C_I and C_P	e
Xylenes (Total)	$C_I = 0 * C_S$	a	$C_P = 0 * C_S$	a	C_M = Greater of C_I and C_P	e
Semi-Volatile Organic Compounds (SVOCs)						
Carbazole	$C_I = 79.6 * C_S * 5.99$	c	$C_P = 0.274 * C_S$	c	C_M = Greater of C_I and C_P	e
Polycyclic Aromatic Hydrocarbons (PAHs)						
HMW PAHs	$C_I = 2.6 * C_S$	c	$\ln(C_P) = 0.9469 * \ln(C_S) - 1.7026$	c	$C_M = 0 * C_S$	c
Inorganic Constituents						
Cadmium	$\ln(C_I) = 0.795 * \ln(C_S) + 2.114$	b	$\ln(C_P) = 0.546 * \ln(C_S) - 0.475$	b	$\ln(C_M) = 0.4723 * \ln(C_S) - 1.2571$	b
Copper	$C_I = 0.515 * C_S$	b	$\ln(C_P) = 0.394 * \ln(C_S) + 0.668$	b	$\ln(C_M) = 0.1444 * \ln(C_S) + 2.042$	b
Lead	$\ln(C_I) = 0.807 * \ln(C_S) - 0.218$	b	$\ln(C_P) = 0.561 * \ln(C_S) - 1.328$	b	$\ln(C_M) = 0.4422 * \ln(C_S) + 0.0761$	b
Mercury	$C_I = 0.04 * C_S * 5.99$	c	$C_P = 0.0375 * C_S$	c	$C_M = 0.0543 * C_S$	d
Selenium	$\ln(C_I) = 0.733 * \ln(C_S) - 0.075$	b	$\ln(C_P) = 1.104 * \ln(C_S) - 0.677$	b	$\ln(C_M) = 0.3764 * \ln(C_S) - 0.4158$	b
Zinc	$\ln(C_I) = 0.328 * \ln(C_S) -+ 4.449$	b	$\ln(C_P) = 0.554 * \ln(C_S) + 1.575$	b	$\ln(C_M) = 0.0706 * \ln(C_S) + 4.3632$	b
Cyanide (Total)	$C_I = 1.12 * C_S * 5.99$	c	$C_P = 1.0 * C_S$	e	C_M = Greater of C_I and C_P	e

Notes :

C_I - Concentration in soil invertebrates
C_P - Concentration terrestrial plants
C_S - Concentration in soil
C_M - Concentration in small mammals
BTEX - Benzene, toluene, ethylbenzene, and xylenes
HMW - High Molecular Weight
PAH - Polycyclic Aromatic Hydrocarbon

Source:

a - U.S. EPA (2000)
b - U.S. EPA (2007a)
c - U.S. EPA (1999b)
d - Sample et al. (1998)
e - Data not available

TABLE 5.8

EXPOSURE CONCENTRATIONS FOR FOOD CHAIN MODELS
FORMER PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

Constituent	*Water (mg/L)*	*Soil (mg/kg DW)*	*Soil Invertebrates (mg/kg DW)*	*Terrestrial Plants (mg/kg DW)*	*Small Mammals (mg/kg DW)*
Volatile Organic Compounds (VOCs)					
Acetone	0	5.50	0	0	0
Isopropylbenzene	0	0.150	63.8	0.045	63.8
BTEX					
Benzene	0	0.167	0	0	0
Toluene	0	2.66	0	0	0
Xylenes (Total)	0	2.34	0	0	0
Semi-Volatile Organic Compounds (SVOCs)					
Carbazole	0	0.083	39.6	0.023	39.6
Polycyclic Aromatic Hydrocarbons (PAHs)					
High Molecular Weight PAHs	0	19.9	51.80	3.10	0
Inorganic Compounds					
Cadmium	0	0.948	7.94	0.604	0.277
Copper	0	143	73.6	13.8	15.8
Lead	0	181	53.4	4.90	10.7
Mercury	0	1.53	0.367	0.057	0.083
Selenium	0	0.744	0.747	0.367	0.590
Zinc	0	333	575	121	118
Cyanide (Total)	0	1.47	9.83	1.47	9.83

Notes **:**

DW - Dry weight
BTEX - Benzene, toluene, ethylbenzene and xylenes
mg - milligram
kg - kilogram
L - liter

TABLE 5.9

TOXICITY REFERENCE VALUES FOR AVIAN AND MAMMALIAN WILDLIFE
FORMER PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

Constituent	*Avian Wildlife*				*Mammalian Wildlife*			
	NOAEL	*Source*	*LOAEL*	*Source*	*NOAEL*	*Source*	*LOAEL*	*Source*
Volatile Organic Compounds (VOCs)								
Acetone	5.2	a	52	a	10	d	50	d
Isopropylbenzene	n/a	---	n/a	---	154	e	462	f
BTEX								
Benzene	n/a	---	n/a	---	26.36	d	263.6	d
Toluene	n/a	---	n/a	---	26	d	260	d
Xylenes (Total)	n/a	---	n/a	---	2.1	d	2.6	d
Semi-Volatile Organic Compounds (SVOCs)								
Carbazole	n/a	---	n/a	---	5.2	e	57.3	f
Polycyclic Aromatic Hydrocarbons (PAHs)								
High Molecular Weight PAHs	2.0	b	20	b	0.615	b	28.6	b
Inorganic Constituents								
Cadmium	0.70	c	10.4	c	0.06	c	2.64	e
Copper	2.3	c	52.3	c	2.67	c	632	e
Lead	0.014	c	8.75	c	1.0	c	241	e
Mercury	0.039	c	0.18	c	0.027	c	4.0	e
Selenium	0.23	c	0.93	c	0.05	c	1.21	e
Zinc	17.2	c	172	c	9.6	c	411	e
Cyanide (Total)	n/a	---	n/a	---	68.7	d	n/a	---

Notes :

LOAEL - Lowest Observed Adverse Effect Level
NOAEL - No Observed Adverse Effect Level
n/a -Value not available

Source:

a - U.S. EPA (1999b)
b - U.S. EPA (2007a)
c - U.S. EPA, Region 9 (2009)
d - Sample et al. (1996)
e - U.S. EPA, Region 9 (2002)
f - See text for derivation

TABLE 5.10

SUMMARY OF FOOD CHAIN MODEL FOR AMERICAN WOODCOCK
FORMER PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

CONSTITUENT	*Ingestion (mg/kg/day)*				*NOAEL (mg/kg/day)*	*HQ_{NOAEL} (Unitless)*	*LOAEL (mg/kg/day)*	*HQ_{LOAEL} (Unitless)*	*Develop Ecological PRG*
	Food	*Soil*	*Water*	*Total*					
Volatile Organic Compounds (VOCs)									
Acetone	0	0.193	0	0.193	5.2	0.037	---	---	No
Isopropylbenzene	13.7	0.005	0	13.7	n/a	---	n/a	---	---
BTEX									
Benzene	0	0.006	0	0.006	n/a	---	n/a	---	---
Toluene	0	0.093	0	0.093	n/a	---	n/a	---	---
Xylenes (Total)	0	0.082	0	0.082	n/a	---	n/a	---	---
Semi-Volatile Organic Compounds (SVOCs)									
Carbazole	8.47	0.003	0	8.50	n/a	---	n/a	---	---
Polycyclic Aromatic Hydrocarbons (PAHs)									
High Molecular Weight PAHs	11.1	0.699	0	11.8	2.0	**5.9**	20	0.59	Yes
Inorganic Constituents									
Cadmium	1.70	0.033	0	1.73	0.70	**2.5**	10.4	0.17	Yes
Copper	15.8	5.02	0	20.8	2.3	**9.0**	52.3	0.40	Yes
Lead	11.4	6.35	0	17.8	0.014	**1,269**	8.75	**2.0**	Yes
Mercury	0.078	0.054	0	0.132	0.039	**3.4**	0.18	0.73	Yes
Zinc	123	11.7	0	135	17.2	**7.8**	172	0.78	Yes

Notes :

Bold Font identifies hazard quotient greater than 1.0

n/a - Value not available

BTEX - Benzene, Toluene, Ethylbenzene, and Xylenes

mg - milligram

kg - kilogram

LOAEL - Lowest Observed Adverse Effect Level

NOAEL - No Observed Adverse Effect Level

HQ_{LOAEL} - Hazard quotient based on LOAEL

HQ_{NOAEL} - Hazard quotient based on NOAEL

PRG - Preliminary Remediation Goal

TABLE 5.11

SUMMARY OF FOOD CHAIN MODEL FOR MOURNING DOVE
FORMER PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

CONSTITUENT	*Ingestion (mg/kg/day)*				*NOAEL (mg/kg/day)*	*HQ $_{NOAEL}$ (Unitless)*	*LOAEL (mg/kg/day)*	*HQ $_{LOAEL}$ (Unitless)*	*Develop Ecological PRG*
	Food	*Soil*	*Water*	*Total*					
Volatile Organic Compounds (VOCs)									
Acetone	0	0.145	0	0.145	5.2	0.028	---	---	No
Isopropylbenzene	0.009	0.004	0	0.013	n/a	---	n/a	---	---
BTEX									
Benzene	0	0.004	0	0.004	n/a	---	n/a	---	---
Toluene	0	0.070	0	0.070	n/a	---	n/a	---	---
Xylenes (Total)	0	0.062	0	0.062	n/a	---	n/a	---	---
Semi-Volatile Organic Compounds (SVOCs)									
Carbazole	0.004	0.002	0	0.007	n/a	---	n/a	---	---
Polycyclic Aromatic Hydrocarbons (PAHs)									
High Molecular Weight PAHs	0.588	0.526	0	1.11	2.0	0.56	---	---	No
Inorganic Constituents									
Cadmium	0.115	0.025	0	0.140	0.70	0.20	---	---	No
Copper	2.62	3.78	0	6.40	2.3	**2.8**	52.3	0.12	Yes
Lead	0.930	4.78	0	5.71	0.014	**408**	8.75	0.65	Yes
Mercury	0.011	0.040	0	0.051	0.039	**1.3**	0.180	0.29	Yes
Zinc	22.9	8.79	0	31.7	17.2	**1.8**	172	0.18	Yes

Notes :

Bold Font identifies hazard quotient greater than 1.0

n/a - Value not available

BTEX - Benzene, Toluene, Ethylbenzene, and Xylenes

mg - milligram

kg - kilogram

LOAEL - Lowest Observed Adverse Effect Level

NOAEL - No Observed Adverse Effect Level

HQ_{LOAEL} - Hazard quotient based on LOAEL

HQ_{NOAEL} - Hazard quotient based on NOAEL

PRG - Preliminary Remediation Goal

TABLE 5.12

SUMMARY OF FOOD CHAIN MODEL FOR RED-TAILED HAWK
FORMER PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

CONSTITUENT	*Ingestion (mg/kg/day)*				*NOAEL (mg/kg/day)*	*HQ_{NOAEL} (Unitless)*	*LOAEL (mg/kg/day)*	*HQ_{LOAEL} (Unitless)*	*Develop Ecological PRG*
	Food	*Soil*	*Water*	*Total*					
Volatile Organic Compounds (VOCs)									
Acetone	0	0.011	0	0.011	5.2	0.002	---	---	No
Isopropylbenzene	2.25	0.0003	0	2.25	n/a	---	n/a	---	---
BTEX									
Benzene	0	0.0003	0	0.0003	n/a	---	n/a	---	---
Toluene	0	0.005	0	0.005	n/a	---	n/a	---	---
Xylenes (Total)	0	0.005	0	0.005	n/a	---	n/a	---	---
Semi-Volatile Organic Compounds (SVOCs)									
Carbazole	1.40	0.0002	0	1.40	n/a	---	n/a	---	---
Polycyclic Aromatic Hydrocarbons (PAHs)									
High Molecular Weight PAHs	0	0.040	0	0.040	2.0	0.020	---	---	No
Inorganic Constituents									
Cadmium	0.010	0.002	0	0.012	0.70	0.017	---	---	No
Copper	0.557	0.288	0	0.845	2.3	0.37	---	---	No
Lead	0.379	0.364	0	0.744	0.014	**53**	8.75	0.085	Yes
Mercury	0.003	0.003	0	0.006	0.039	0.15	---	---	No
Zinc	4.18	0.670	0	4.80	17.2	0.28	---	---	No

Notes :

Bold Font identifies hazard quotient greater than 1.0

n/a - Value not available

BTEX - Benzene, Toluene, Ethylbenzene, and Xylenes

mg - milligram

kg - kilogram

LOAEL - Lowest Observed Adverse Effect Level

NOAEL - No Observed Adverse Effect Level

HQ_{LOAEL} - Hazard quotient based on LOAEL

HQ_{NOAEL} - Hazard quotient based on NOAEL

PRG - Preliminary Remediation Goal

TABLE 5.13

SUMMARY OF FOOD CHAIN MODEL FOR SHORT-TAILED SHREW
FORMER PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

CONSTITUENT	*Ingestion (mg/kg/day)*				*NOAEL (mg/kg/day)*	*HQ $_{NOAEL}$ (Unitless)*	*LOAEL (mg/kg/day)*	*HQ $_{LOAEL}$ (Unitless)*	*Develop Ecological PRG*
	Food	*Soil*	*Water*	*Total*					
Volatile Organic Compounds (VOCs)									
Acetone	0	0.034	0	0.034	10	0.003	---	---	No
Isopropylbenzene	13.3	0.0009	0	13.3	154	0.086	---	---	No
BTEX									
Xylenes (Total)	0	0.015	0	0.015	2.1	0.007	---	---	No
Semi-Volatile Organic Compounds (SVOCs)									
Carbazole	8.27	0.0005	0	8.27	5.2	**1.6**	57.3	0.14	Yes
Polycyclic Aromatic Hydrocarbons (PAHs)									
High Molecular Weight PAHs	10.8	0.125	0	10.9	0.615	**18**	28.6	0.38	Yes
Inorganic Constituents									
Cadmium	1.66	0.006	0	1.66	0.06	**28**	2.64	0.63	Yes
Copper	15.4	0.897	0	16.3	2.67	**6.1**	632	0.026	Yes
Lead	11.2	1.13	0	12.3	1.0	**12**	241	0.051	Yes
Mercury	0.077	0.010	0	0.086	0.027	**3.2**	4.0	0.022	Yes
Selenium	0.156	0.005	0	0.161	0.05	**3.2**	1.21	0.13	Yes
Zinc	120	2.09	0	122	9.6	**13**	411	0.30	Yes
Cyanide (Total)	2.05	0.009	0	2.06	68.7	0.030	---	---	No

Notes **:**

Bold Font identifies hazard quotient greater than 1.0
BTEX - Benzene, Toluene, Ethylbenzene, and Xylenes
mg - milligram
kg - kilogram
LOAEL - Lowest Observed Adverse Effect Level
NOAEL - No Observed Adverse Effect Level
HQ_{LOAEL} - Hazard quotient based on LOAEL
HQ_{NOAEL} - Hazard quotient based on NOAEL
PRG - Preliminary Remediation Goal

TABLE 5.14

SUMMARY OF FOOD CHAIN MODEL FOR MEADOW VOLE
FORMER PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

CONSTITUENT	*Ingestion (mg/kg/day)*				*NOAEL (mg/kg/day)*	*HQ $_{NOAEL}$ (Unitless)*	*LOAEL (mg/kg/day)*	*HQ $_{LOAEL}$ (Unitless)*	*Develop Ecological PRG*
	Food	*Soil*	*Water*	*Total*					
Volatile Organic Compounds (VOCs)									
Acetone	0	0.015	0	0.015	10	0.002	---	---	No
Isopropylbenzene	0.004	0.0004	0	0.004	154	0.00003	---	---	No
BTEX									
Xylenes (Total)	0	0.007	0	0.007	2.1	0.003	---	---	No
Semi-Volatile Organic Compounds (SVOCs)									
Carbazole	0.002	0.0002	0	0.002	5.2	0.0004	---	---	No
Polycyclic Aromatic Hydrocarbons (PAHs)									
High Molecular Weight PAHs	0.271	0.056	0	0.327	0.615	0.53	---	---	No
Inorganic Constituents									
Cadmium	0.053	0.003	0	0.06	0.06	0.93	---	---	No
Copper	1.21	0.400	0	1.61	2.67	0.60	---	---	No
Lead	0.428	0.507	0	0.940	1.0	0.94	---	---	No
Mercury	0.005	0.004	0	0.009	0.027	0.34	---	---	No
Selenium	0.032	0.002	0	0.034	0.05	0.68	---	---	No
Zinc	10.6	0.932	0	11.5	9.6	**1.2**	411	0.028	Yes
Cyanide (Total)	0.128	0.004	0	0.13	68.7	0.002	---	---	No

Notes :

Bold Font identifies hazard quotient greater than 1.0
BTEX - Benzene, Toluene, Ethylbenzene, and Xylenes
mg - milligram
kg - kilogram
LOAEL - Lowest Observed Adverse Effect Level
NOAEL - No Observed Adverse Effect Level
HQ_{LOAEL} - Hazard quotient based on LOAEL
HQ_{NOAEL} - Hazard quotient based on NOAEL
PRG - Preliminary Remediation Goal

TABLE 5.15

SUMMARY OF FOOD CHAIN MODEL FOR LONG-TAILED WEASEL
FORMER PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

CONSTITUENT	*Ingestion (mg/kg/day)*				*NOAEL (mg/kg/day)*	*HQ_{NOAEL} (Unitless)*	*LOAEL (mg/kg/day)*	*HQ_{LOAEL} (Unitless)*	*Develop Ecological PRG*
	Food	*Soil*	*Water*	*Total*					
Volatile Organic Compounds (VOCs)									
Acetone	0	0.031	0	0.031	10	0.003	---	---	No
Isopropylbenzene	8.30	0.0008	0	8.30	154	0.054	---	---	No
BTEX									
Xylenes (total)	0	0.013	0	0.013	2.1	0.006	---	---	No
Semi-Volatile Organic Compounds (SVOCs)									
Carbazole	5.14	0.0005	0	5.15	5.2	0.99	---	---	No
Polycyclic Aromatic Hydrocarbons (PAHs)									
High Molecular Weight PAHs	0	0.111	0	0.111	0.615	0.18	---	---	No
Inorganic Constituents									
Cadmium	0.036	0.005	0	0.041	0.06	0.69	---	--	No
Copper	2.05	0.799	0	2.85	2.67	**1.1**	632	0.005	Yes
Lead	1.40	1.01	0	2.41	1.0	**2.4**	241	0.010	Yes
Mercury	0.011	0.009	0	0.019	0.027	0.72	---	---	No
Selenium	0.077	0.004	0	0.081	0.050	**1.6**	1.21	0.067	Yes
Zinc	15.4	1.86	0	17.2	9.6	**1.8**	411	0.042	Yes
Cyanide (Total)	1.28	0.008	0	1.29	68.7	0.019	---	---	No

Notes **:**

Bold Font identifies hazard quotient greater than 1.0
BTEX - Benzene, Toluene, Ethylbenzene, and Xylenes
mg - milligram
kg - kilogram
LOAEL - Lowest Observed Adverse Effect Level
NOAEL - No Observed Adverse Effect Level
HQ_{LOAEL} - Hazard quotient based on LOAEL
HQ_{NOAEL} - Hazard quotient based on NOAEL
PRG - Preliminary Remediation Goal

TABLE 7.1

EXPOSURE PARAMETERS FOR AMERICAN WOODCOCK AND SHORT-TAILED SHREW FOR DEVELOPMENT OF PRELIMINARY REMEDIATION GOALS
FORMER PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

Parameter	*Units*	*American Woodcock*	*Short-Tailed Shrew*
Body Weight	kg	0.213	0.015
Free Metabolic Rate	kcal/day	96.65	8.4
Assimilation Efficiency	Unitless		
Soil Invertebrates		0.83	0.90
Plant Material		0.76	0.91
Weighted Average Metabolizable Energy	kcal/g	2.93	2.27
Normalized Daily Intake	kg DW/kg/day	0.187	0.259
Soil Ingestion			
P_s	Unitless	0.164	0.03
Rate	kg DW/kg/day	0.031	0.007
Diet	Unitless		
Soil Invertebrates		0.678	0.820
Plant Material		0.322	0.180

Notes **:**

DW - Dry Weight
kcal - kilocalories
kg - kilogram
g - gram
mg - milligram
P_s - Proportion of Soil Ingested (from U.S. EPA, 2007a)
All other exposure parameters from Wildlife Scenario Builder (U.S. EPA, 2013b)

TABLE 7.2

ECOLOGICAL PRELIMINARY REMEDIATION GOALS
FORMER PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

COPEC	***American Woodcock*** mg/kg	***Short-Tailed Shrew*** mg/kg	***Ecological PRG*** mg/kg
Semi-Volatile Organic Compounds (SVOCs)			
Carbazole	nc	0.672	0.672
Polycyclic Aromatic Hydrocarbons (PAHs)			
High Molecular Weight PAHs	69.6	59.6	59.6
Inorganic Compounds			
Cadmium	23.0	2.01	2.01
Copper	634	6,334	634
Lead	140[a]/812[b]	7,212	140[a]/812[b]
Mercury	3.19	76.8	3.19
Selenium	nc	9.09	9.09
Zinc	1,705	9,142	1,705

Notes :

[a] - Lower end PRG based on LOAEL of 8.75 mg/kg-day (LOAEL identified by U.S. EPA for use in food chain model)
[b] - Upper end PRG based on LOAEL of 42.7 mg/kg-day (geometric mean of bounded LOAELs identified in U.S. EPA (2005f))
nc - Preliminary Remediation Goal not calculated
PRG - Preliminary Remediation Goal
mg/kg - milligrams per kilogram
COPEC - Constituent of Potential Ecological Concern

TABLE 7.3

COMPARISION OF ECOLOGICAL PRELIMINARY REMEDIATION GOALS TO EXPOSURE CONCENTRATIONS
FORMER PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

COPEC	*Ecological PRG mg/kg*	*95% UCL mg/kg*	*95% UCL < PRG*	*UCL Percent of PRG [b]*	*Risk Management Required to Meet RAO*
Semi-Volatile Organic Compounds (SVOCs)					
Carbazole	0.672	0.083 [a]	Yes	12%	No
Polycyclic Aromatic Hydrocarbons (PAHs)					
High Molecular Weight PAHs	59.6	19.9	Yes	33%	No
Inorganic Compounds					
Cadmium	2.01	0.948	Yes	47%	No
Copper	634	143	Yes	23%	No
Lead	140[c]/812[d]	181	No[c]/Yes[d]	129%[c]/22%[d]	**YES**
Mercury	3.19	1.53	Yes	48%	No
Selenium	9.09	0.744	Yes	8.2%	No
Zinc	1,705	333	Yes	20%	No

Notes :

[a] - Maximum concentration. Insufficient number of detects to calculate an Upper Confidence Limit (UCL)
[b] - Calculated as ((UCL/PRG)*100)
[c] - Lower end PRG based on LOAEL of 8.75 mg/kg-day (LOAEL identified by U.S. EPA for use in food chain model)
[d] - Upper end PRG based on LOAEL of 42.7 mg/kg-day (geometric mean of bounded LOAELs identified in U.S. EPA (2005f))
PRG - Preliminary Remediation Goal
RAO - Remedial Action Objective
mg/kg - milligrams per kilogram