

**BOTTOM SEDIMENT  
and  
SURFACE WATER  
EVALUATION**

Lacarbe Creek  
and  
Surrounding Waterbodies

**Camp Perry, Ohio**

**Ohio EPA  
Division of Water Quality Planning and Assessment  
Ecological Assessment Section  
March 13, 1992**

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Appendix 1 - Chemical parameters measured by Ohio EPA and Ecology and Environment from Lacarbe Creek and surrounding waterbodies sediment and surface water samples. (2 pages)

Appendix 2 - Raw chemical data (114 pages)

## SEDIMENT SUMMARY

Sediment samples were collected from Lacarbe Creek and waterbodies surrounding Camp Perry landfill by Ohio EPA during 1991 and Ecology and Environment during 1990 (Fig. 1). Sediments were analyzed for pesticides, PCBs, semivolatile organic compounds, volatile organic compounds, metals and cyanide (Appendix 1). Results are summarized in Tables 1-6.

- o Two pesticide compounds (heptachlor and methoxychlor) were identified in sediment samples from 17 locations in Lacarbe Creek and surrounding waterbodies (Table 1 and 3). Concentrations ranged from 26 ppb to 110 ppb.
- o Seven PCB mixtures were analyzed in sediment samples (Table 3). All results were reported as not detected above the quantitation limit (the quantitation limit varied from 80 ppb to 160 ppb).
- o Twelve semivolatile organic compounds were quantified in sediment samples collected from Lacarbe Creek and surrounding waterbodies (Tables 1 and 4). Of the 12 semivolatile compounds identified in sediment, nine were polycyclic aromatic hydrocarbons (PAHs). PAH parameters ranged in concentration from 110 ppb to 310 ppb. PAHs were most prevalent in the County Road 171 drainage ditch at the southwest corner of the landfill, the western carp pond and in the Ottawa National Wildlife Refuge adjacent to Lacarbe Creek. Bis(2-ethylhexyl) phthalate and di-n-octyl phthalate were measured in numerous samples during 1991; however, these parameters were also found in the method blank. One 1990 bis(2-ethylhexyl) phthalate sample from a wetland east of the landfill was reported as 3,000 ppb.
- o Six volatile organic compounds were detected in sediment collected in Lacarbe Creek and waterbodies surrounding Camp Perry landfill (Tables 1 and 5). Methylene chloride was detected at 9 of 16 sediment sampling locations, with concentrations ranging between 20 ppb and 2,500 ppb. The highest levels were recorded adjacent to the Camp Perry landfill (western carp pond - 2,500 ppb; County Road 171 drainage ditch - 1,900 ppb). Acetone was measured in three sediment samples; however, it was also found in the method blank. Chloroform, ethylbenzene, toluene and total xylenes were measured at relatively low concentrations, ranging from 1 ppb to 16 ppb.
- o Eleven metal parameters were measured and detected in the sediment of Lacarbe Creek and waterbodies surrounding Camp Perry landfill (Tables 1 and 6). Excluding mercury, all metal parameters were within acceptable levels. Using sediment evaluation criteria developed by Kelly and Hite (1984), mercury was considered highly elevated above background conditions at the following locations:

Lacarbe Creek - RM 0.62 and 0.01  
Northwest corner of South Lagoon  
East Wetland

- o Cyanide was analyzed at 19 sediment locations in Lacarbe Creek and surrounding waterbodies. All analytical results were reported below detection limits.

## SURFACE WATER SUMMARY

- o Surface water samples from seven locations in Lacarbe Creek and surrounding waterbodies did not reveal any detectable amounts of pesticides or PCBs (Tables 2 and 3).
- o Seven water samples from Lacarbe Creek and adjacent waterbodies were collected in 1990 and 1991 to assess semivolatile organics contaminant levels (Tables 2 and 4). Two parameters, bis (2-ethylhexyl) phthalate and di-n-octyl phthalate, were recorded from three samples. Bis (2-ethylhexyl) phthalate concentrations were below Ohio Water Quality Standards. The di-n-octyl phthalate value of 85 ppb is substantially below the LC50 toxicity data for *Daphnia magna* (>10 ppm) and fathead minnow (>32 ppm).
- o Three volatile organic compounds (tetrachloroethene, toluene, and total xylenes) were detected in surface water samples (Tables 2 and 5). Concentrations for these three parameters were low, ranging between 1 ppb and 4 ppb. For tetrachloroethene and toluene, parameters which have established water quality criteria, analytical results were well below Ohio Water Quality Standards.
- o Ten stations in Lacarbe Creek and surrounding waterbodies were sampled for metals during 1990 and 1991 (Tables 2 and 6). Of these ten locations, two exceedances of Ohio WQS occurred: one copper exceedance and one lead exceedance at the Ottawa National Wildlife Refuge site.

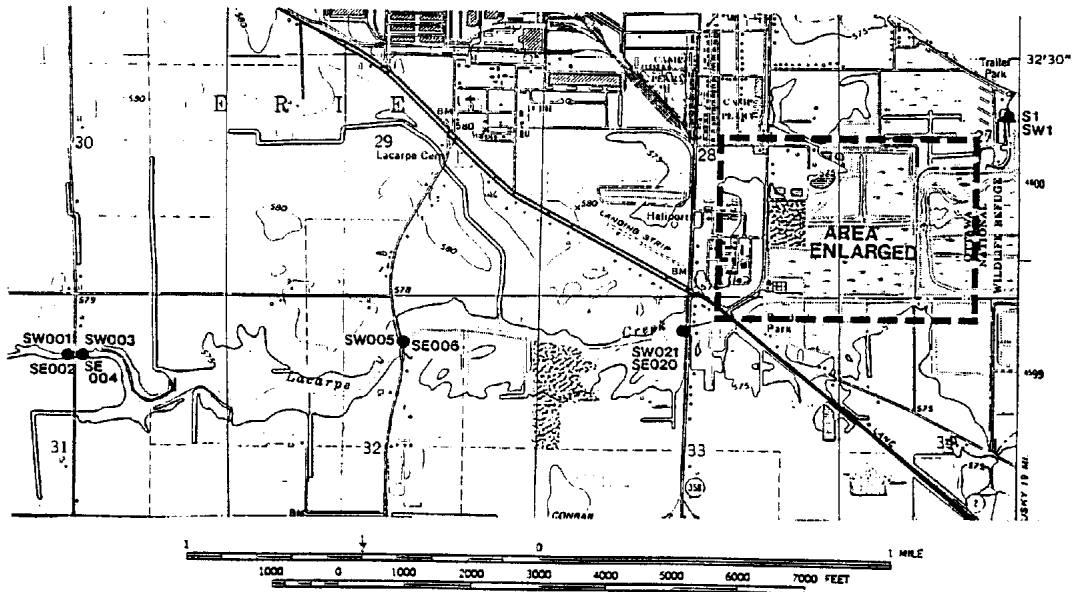
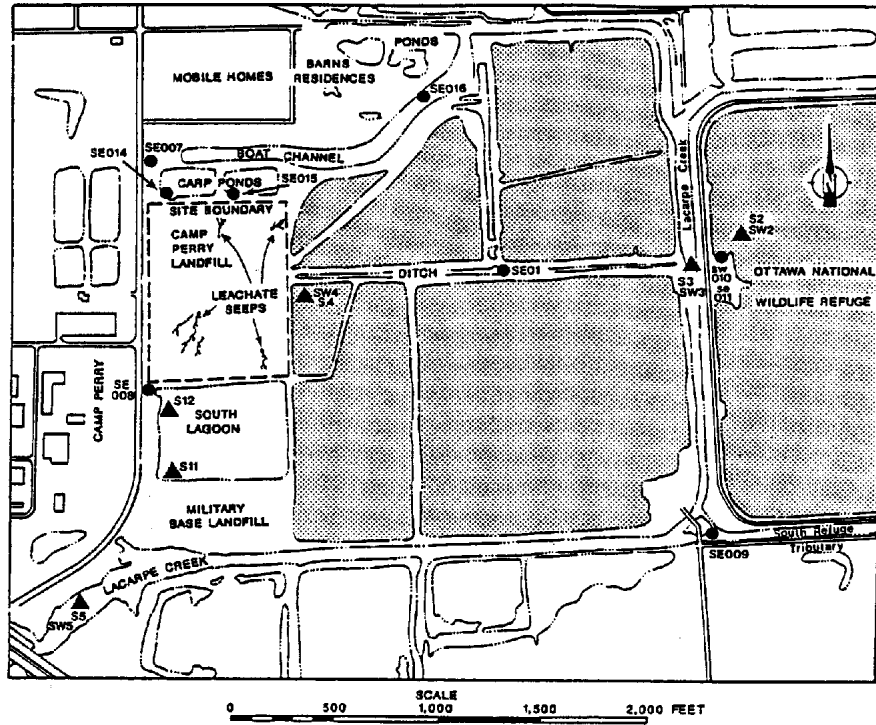


Figure 1. Map of the Lacarbe Creek study area showing Ohio EPA (dot) and Ecology and Environment (triangle) sediment and surface water locations from 1990 and 1991. Ohio EPA sediment and surface water samples are identified by letters SE and SW, respectively. E & E sediment and surface water samples are identified by letters S and SW, respectively. The shaded areas are wetlands.

Table 1. Lacarbe Creek and adjacent waterbodies **sediment** PCBs, pesticides, semivolatile and volatile organic compounds and metals concentrations, 1990 and 1991.

Parameter	Range
<b>PCBs</b>	
All PCBs	Not Detected
<b>PESTICIDES (ppb)</b>	
Heptachlor	26
Methoxychlor	110
<b>SEMIVOLATILE COMPOUNDS (ppb)</b>	
Fluoranthene	110 - 310
Pyrene	150 - 310
Chrysene	160 - 165
Benzo(b)fluoranthene	110 - 130
Benzo(k) fluoranthene	110 - 130
Benzo(a) pyrene	120 - 130
Phenanthrene	140
Anthracene	110
Benzo(a) anthracene	160 - 165
Bis(2-ethylhexyl) phthalate	260 - 3,000
Di-n-octyl phthalate	530
<b>METALS (ppm)</b>	
Antimony, Total	4.7 - 10.7
Arsenic, Total	3 - 7
Barium, Total	8.4 - 153
Chromium, Total	0.8 - 25.9
Copper, Total	10.4 - 45
Lead, Total	3.7 - 40.3
Mercury, Total	0.11 - 0.28
Nickel, Total	8.5 - 39
Silver, Total	1.5 - 2.3
Vanadium, Total	8.2 - 49.4
Zinc, Total	20.7 - 89.1
<b>VOLATILE COMPOUNDS (ppb)</b>	
Methylene chloride	20 - 2,500
Toluene	1 - 2
Ethylbenzene	12
Total Xylenes	16
Chloroform	3
Acetone	120

Table 2. Lacarbe Creek and adjacent waterbodies **surface water** PCBs, pesticides, semivolatile and volatile organic compounds and metals concentrations, 1990 and 1991.

Parameter	Range
<b>PCBs</b>	
All PCBs	Not Detected
<b>PESTICIDES (ppb)</b>	
All Pesticides	Not Detected
<b>SEMIVOLATILE COMPOUNDS (ppb)</b>	
Bis(2-ethylhexyl) phthalate	4 - 5
Di-n-octyl phthalate	85
<b>METALS (ppb)</b>	
Antimony, Total	20
Arsenic, Total	2 - 11
Barium, Total	23 - 249
Cadmium, Total	2
Chromium, Total	3 - 20
Copper, Total	6 - 36
Lead, Total	3 - 33
Nickel, Total	3 - 42
Silver, Total	1
Vanadium, Total	4 - 48
Zinc, Total	18 - 141
<b>VOLATILE COMPOUNDS (ppb)</b>	
Tetrachloroethene	2
Toluene	1 - 2
Total Xylenes	4

Table 3. Pesticide and PCB contaminant levels in sediment and surface water collected from Lacarbe Creek and surrounding waterbodies, Camp Perry, Ohio.

<b>PESTICIDES/ PCB's</b>						
<u>Stream</u>						
River Mile (Location)	Year	Lab Sample Number	Sample (Matrix)	Sample Type	Parameter	Concentration (ppb)
Sample ID Number						
<b><i>Lacarbe Creek</i></b>						
<b>2.60</b> (Tettau Rd.) CPSE006	1991	1115-537 (Betz)	Sediment	Grab	All	ND
<b>1.64</b> (S.R. 358) CPSE020	1991	1115-546 (Betz)	Sediment	Grab	All	ND
<b>1.64</b> (S.R. 358) CPSW021	1991	1115-569 (Betz)	Surface Water	Grab	All	ND
<b>1.40</b> (Dst. S.R. 2) SW5	1990	EKN91 (E&E)	Surface Water	Grab	All	ND
<b>1.40</b> (Dst. S.R. 2) S5	1990	EKN78 (E&E)	Sediment	Grab	<b>Heptachlor</b>	<b>26</b>
<b>0.62</b> (Adj. Ottawa NWR) SW3	1990	EKN89 (E&E)	Surface Water	Grab	All	ND
<b>0.62</b> (Adj. Ottawa NWR) S3	1990	EKN76 (E&E)	Sediment	Grab	All	ND
<b>0.01</b> (at mouth) SW1	1990	EKN86 (E&E)	Surface Water	Grab	All	ND
<b>0.01</b> (at mouth) S1	1990	EKG60 (E&E)	Sediment	Grab	All	ND
<b><i>South Refuge Tributary (Confluence with Lacarbe Creek at RM 0.85)</i></b>						
<b>0.03</b> (near mouth) CPSE009	1991	1115-540 (Betz)	Sediment	Grab	All	ND
<b><i>Boat Channel (Confluence with Lacarbe Creek at RM 0.49)</i></b>						
<b>0.35</b> (SE of mobile homes) CPSE016	1991	1115-544 (Betz)	Sediment	Grab	All	ND



Table 3. Continued.

<b>PESTICIDES/ PCB's</b>						
<u>Stream</u>						
River Mile (Location)	Year	Lab Sample Number	Sample (Matrix)	Sample Type	Parameter	Concentration (ppb)
<b><i>South Lagoon (South of Camp Perry Landfill)</i></b>						
- (SW corner of lagoon) S11	1990	EKN84 (E&E)	Sediment	Grab	<b>Methoxychlor (Mariate)</b>	<b>110J</b>
- (NW corner of lagoon) S12	1990	EKN85 (E&E)	Sediment	Grab	All	ND
<b><i>Road Drainage Ditch (County Road 171)</i></b>						
- (SW corner of landfill) CPSE008	1991	1115-539 (Betz)	Sediment	Grab	All	ND
- (NW corner of landfill) CPSE007	1991	1115-538 (Betz)	Sediment	Grab	All	ND
<b><i>Western Carp Pond</i></b>						
- (SW corner of pond) CPSE014	1991	1115-542 (Betz)	Sediment	Grab	All	ND
- (SW corner of pond) CPSE022	1991	1115-547 (Betz)	Sediment	Grab	All	ND
<i>Replicate of Lab No. 1115-542</i>						
<b><i>Eastern Carp Pond</i></b>						
- (SW corner of pond) CPSE015	1991	1115-543 (Betz)	Sediment	Grab	All	ND
<b><i>East Wetland</i></b>						
- (Adjacent to east side of landfill) SW4	1990	EKN90 (E&E)	Surface Water	Grab	All	ND
- (Adjacent to east side of landfill) S4	1990	EKN77 (E&E)	Sediment	Grab	All	ND
<b><i>East Drainage Ditch</i></b>						
- (0.3 mi. E. of landfill) CPSE019	1991	1115-545 (Betz)	Sediment	Grab	All	ND

Table 3. Continued.

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<b>PESTICIDES/ PCB's</b>						
<u>Stream</u>						
River Mile (Location)	Year	Lab Sample Number	Sample (Matrix)	Sample Type	Parameter	Concentration (ppb)
Sample ID Number						
<b><i>Ottawa National Wildlife Refuge</i></b>						
- (Near west dike) CPSW010	1991	1115-568 (Betz)	Surface Water	Grab	All	ND
- (Near west dike) CPSW023 <i>Replicate of Lab No. 1115-568</i>	1991	1115-570 (Betz)	Surface Water	Grab	All	ND
- (Near west dike) CPSE011	1991	1115-541 (Betz)	Sediment	Grab	All	ND
- (Near west dike) SW2	1990	EKN87 (E&E)	Surface Water	Grab	All	ND
- (Near west dike) Duplicate <i>Duplicate of Lab No. EKN87</i>	1990	EKN88 (E&E)	Surface Water	Grab	All	ND
- (Near west dike) S2	1990	EKG79 (E&E)	Sediment	Grab	All	ND

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ND - not detected above quantitation limit.

J - estimated value (below quantitation limit).

Table 4. Semivolatile organic compound contaminant levels in sediment and surface water collected from Lacarbe Creek and surrounding waterbodies, Camp Perry, Ohio.

<b>SEMIVOLATILE ORGANIC COMPOUNDS</b>						
<u>Stream</u>						
River Mile (Location)	Year	Lab Sample Number	Sample (Matrix)	Sample Type	Parameter	Concentration (ppb)
Sample ID Number						
<b><i>Lacarbe Creek</i></b>						
<b>1.64</b> (S.R. 358) CPSE020	1991	B1115546 (Betz)	Sediment	Grab	Bis(2-ethylhexyl)phthalate Di-n-octyl phthalate	120JB 490B
<b>1.64</b> (S.R. 358) CPSW021	1991	B1115569 (Betz)	Surface Water	Grab	All	ND
<b>1.40</b> (Dst. S.R. 2) SW5	1990	EKN91 (E&E)	Surface Water	Grab	Bis(2-ethylhexyl)phthalate	5J
<b>1.40</b> (Dst. S.R. 2) S5	1990	EKN78 (E&E)	Sediment	Grab	All	ND
<b>0.62</b> (Adj. Ottawa NWR) SW3	1990	EKN89 (E&E)	Surface Water	Grab	Di-n-octyl phthalate	85
<b>0.62</b> (Adj. Ottawa NWR) S3	1990	EKN76 (E&E)	Sediment	Grab	All	ND
<b>0.01</b> (at mouth) SW1	1990	EKN86 (E&E)	Surface Water	Grab	All	ND
<b>0.01</b> (at mouth) S1	1990	EKG60 (E&E)	Sediment	Grab	All	ND
<b><i>South Refuge Tributary (Confluence with Lacarbe Creek at RM 0.85)</i></b>						
<b>0.03</b> (near mouth) CPSE009	1991	B1115540 (Betz)	Sediment	Grab	Bis(2-ethylhexyl)phthalate Di-n-octyl phthalate Fluoranthene	260JB 1160B 110J
<b><i>Boat Channel (Confluence with Lacarbe Creek at RM 0.49)</i></b>						
<b>0.35</b> (SE of mobile homes) CPSE016	1991	B1115544 (Betz)	Sediment	Grab	Bis(2-ethylhexyl)phthalate Di-n-octyl phthalate	200JB 1200B

Table 4. Continued.

<b>SEMIVOLATILE ORGANIC COMPOUNDS</b>						
<u>Stream</u>						
River Mile (Location)	Year	Lab Sample Number	Sample (Matrix)	Sample Type	Parameter	Concentration (ppb)
<b><i>South Lagoon (South of Camp Perry Landfill)</i></b>						
- (SW corner of lagoon) S11	1990	EKN84 (E&E)	Sediment	Grab	All	ND
- (NW corner of lagoon) S12	1990	EKN85 (E&E)	Sediment	Grab	All	ND
<b><i>Road Drainage Ditch (County Road 171)</i></b>						
- (SW corner of landfill) CPSE008	1991	B1115539 (Betz)	Sediment	Grab	Anthracene	110J
					Benzo(a)anthracene	165J
					Benzo(b)fluoranthene	130J
					Benzo(k)fluoranthene	130J
					Benzo(a)pyrene	130J
					Bis(2-ethylhexyl)phthalate	200JB
					Chrysene	165J
					Di-n-octyl phthalate	530
					Fluoranthene	300J
					Pyrene	270J
- (NW corner of landfill) CPSE007	1991	B1115538 (Betz)	Sediment	Grab	Bis(2-ethylhexyl)phthalate	260J
					Di-n-octyl phthalate	1300B
<b><i>Western Carp Pond</i></b>						
- (SW corner of pond) CPSE014	1991	B1115542 (Betz)	Sediment	Grab	Bis(2-ethylhexyl)phthalate	420B
					Di-n-octyl phthalate	500B
- (SW corner of pond) CPSE022	1991	B1115547 (Betz)	Sediment	Grab	Bis(2-ethylhexyl)phthalate	160JB
					Di-n-octyl phthalate	690B
<i>Replicate of Lab No. B1115542</i>					Fluoranthene	130J
					Phenanthrene	140J
					Pyrene	150J
<b><i>Eastern Carp Pond</i></b>						
- (SW corner of pond) CPSE015	1991	B1115543 (Betz)	Sediment	Grab	Bis(2-ethylhexyl)phthalate	430B
					Di-n-butyl phthalate	610B

Table 4. Continued.

<b>SEMIVOLATILE ORGANIC COMPOUNDS</b>						
<u>Stream</u>						
River Mile (Location)	Year	Lab Sample	Sample	Sample	Parameter	Concentration
Sample ID Number		Number	(Matrix)	Type		(ppb)
<b><i>East Wetland</i></b>						
- (Adjacent to east side of landfill) SW4	1990	EKN90 (E&E)	Surface Water	Grab	Bis(2-ethylhexyl)phthalate	4J
- (Adjacent to east side of landfill) S4	1990	EKN77 (E&E)	Sediment	Grab	Bis(2-ethylhexyl)phthalate	3,000
<b><i>East Drainage Ditch</i></b>						
- (0.3 mi. E. of landfill) CPSE019	1991	B1115545 (Betz)	Sediment	Grab	Bis(2-ethylhexyl)phthalate Di-n-octyl phthalate	130JB 390B
<b><i>Ottawa National Wildlife Refuge</i></b>						
- (Near west dike) CPSW010	1991	B1115568 (Betz)	Surface Water	Grab	All	ND
- (Near west dike) CPSW023 <i>Replicate of Lab No. B1115568</i>	1991	B1115570 (Betz)	Surface Water	Grab	All	ND
- (Near west dike) CPSE011	1991	B1115541 (Betz)	Sediment	Grab	Benzo(a)anthracene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Bis(2-ethylhexyl)phthalate Chrysene Di-n-octyl phthalate Fluoranthene Pyrene	160J 110J 110J 120J 270JB 160J 680B 310J 310J
- (Near west dike) SW2	1990	EKN87 (E&E)	Surface Water	Grab	All	ND
- (Near west dike) Duplicate <i>Duplicate of Lab No. EKN87</i>	1990	EKN88 (E&E)	Surface Water	Grab	All	ND
- (Near west dike) S2	1990	EKG79 (E&E)	Sediment	Grab	All	ND

ND - not detected above quantitation limit.

J - estimated value (below quantitation limit).

B - analyte found in method blank.

Table 5. Volatile organic compound contaminant levels in sediment and surface water collected from Lacarbe Creek and surrounding waterbodies, Camp Perry, Ohio.

<b>VOLATILE ORGANIC COMPOUNDS</b>						
<u>Stream</u>						
River Mile (Location)	Year	Lab Sample Number	Sample (Matrix)	Sample Type	Parameter	Concentration (ppb)
Sample ID Number						
<b><i>Lacarbe Creek</i></b>						
<b>1.64</b> (S.R. 358) CPSE020	1991	B1115546 (Betz)	Sediment	Grab	Methylene chloride	20J
<b>1.64</b> (S.R. 358) CPSW021	1991	B1115575 (Betz)	Surface Water	Grab	All	ND
<b>1.40</b> (Dst. S.R. 2) SW5	1990	EKN91 (E&E)	Surface Water	Grab	Tetrachloroethene Toluene	2J 1J
<b>1.40</b> (Dst. S.R. 2) S5	1990	EKN78 (E&E)	Sediment	Grab	All	ND
<b>0.62</b> (Adj. Ottawa NWR) SW3	1990	EKN89 (E&E)	Surface Water	Grab	Toluene Total Xylenes	2J 4J
<b>0.62</b> (Adj. Ottawa NWR) S3	1990	EKN76 (E&E)	Sediment	Grab	All	ND
<b>0.01</b> (at mouth) SW1	1990	EKN86 (E&E)	Surface Water	Grab	All	ND
<b>0.01</b> (at mouth) S1	1990	EKG60 (E&E)	Sediment	Grab	Toluene	2J
<b><i>South Refuge Tributary (Confluence with Lacarbe Creek at RM 0.85)</i></b>						
<b>0.03</b> (near mouth) CPSE009	1991	B1115540 (Betz)	Sediment	Grab	Acetone Methylene chloride	160JB 850
<b><i>Boat Channel (Confluence with Lacarbe Creek at RM 0.49)</i></b>						
<b>0.35</b> (SE of mobile homes) CPSE016	1991	B1115544 (Betz)	Sediment	Grab	Methylene chloride	210

Table 5. Continued.

<b>VOLATILE ORGANIC COMPOUNDS</b>						
<u>Stream</u>						
River Mile (Location)	Year	Lab Sample Number	Sample (Matrix)	Sample Type	Parameter	Concentration (ppb)
Sample ID Number						
<b><u>South Lagoon (South of Camp Perry Landfill)</u></b>						
- (SW corner of lagoon) S11	1990	EKN84 (E&E)	Sediment	Grab	Toluene	1J
					Ethylbenzene	12
					Total xylenes	16
- (NW corner of lagoon) S12	1990	EKN85 (E&E)	Sediment	Grab	Toluene	1J
<b><u>Road Drainage Ditch (County Road 171)</u></b>						
- (SW corner of landfill) CPSE008	1991	B1115539 (Betz)	Sediment	Grab	Acetone	225JB
					Methylene chloride	120
- (NW corner of landfill) CPSE007	1991	B1115538 (Betz)	Sediment	Grab	Methylene chloride	1,900
<b><u>Western Carp Pond</u></b>						
- (SW corner of pond) CPSE014	1991	B1115542 (Betz)	Sediment	Grab	Methylene chloride	2,500
- (SW corner of pond) CPSE022	1991	B1115547 (Betz)	Sediment	Grab	Methylene chloride	75
<i>Replicate of Lab No. B1115542</i>						
<b><u>Eastern Carp Pond</u></b>						
- (SW corner of pond) CPSE015	1991	B1115543 (Betz)	Sediment	Grab	Methylene chloride	25
<b><u>East Wetland</u></b>						
- (Adjacent to east side of landfill) SW4	1990	EKN90 (E&E)	Surface Water	Grab	All	ND
- (Adjacent to east side of landfill) S4	1990	EKN77 (E&E)	Sediment	Grab	Chloroform	3J
<b><u>East Drainage Ditch</u></b>						
- (0.3 mi. E. of landfill) CPSE019	1991	B1115545 (Betz)	Sediment	Grab	Acetone	120J
					Methylene chloride	65

Table 5. Continued.

<b>VOLATILE ORGANIC COMPOUNDS</b>						
<u>Stream</u>						
River Mile (Location)	Year	Lab Sample Number	Sample (Matrix)	Sample Type	Parameter	Concentration (ppb)
Sample ID Number						
<b><i>Ottawa National Wildlife Refuge</i></b>						
- (Near west dike) CPSW010	1991	B1115574 (Betz)	Surface Water	Grab	All	ND
- (Near west dike) CPSW023 <i>Replicate of Lab No. B1115574</i>	1991	B1115576 (Betz)	Surface Water	Grab	All	ND
- (Near west dike) CPSE011	1991	B1115541 (Betz)	Sediment	Grab	Methylene chloride	100
- (Near west dike) SW2	1990	EKN87 (E&E)	Surface Water	Grab	Toluene	1J
- (Near west dike) Duplicate <i>Duplicate of Lab No. EKN87</i>	1990	EKN88 (E&E)	Surface Water	Grab	All	ND
- (Near west dike) S2	1990	EKG79 (E&E)	Sediment	Grab	All	ND

ND - not detected above quantitation limit.

J - estimated value (below quantitation limit).

B - analyte found in method blank.



Table 6. Metals and cyanide contaminant levels in sediment and surface water collected from Lacarbe Creek and surrounding waterbodies, Camp Perry, Ohio.

<b>METALS/ CYANIDE</b>						
<u>Stream</u>						
River Mile (Location)	Year	Lab Sample	Sample	Sample	Parameter	Concentration
Sample ID Number		Number	(Matrix)	Type		(ppb)
<b><i>Lacarbe Creek</i></b>						
<b>3.92</b> (Upst. Rymer Rd.)	1991	B1115535	Sediment	Grab	Barium, T	72.3
CPSE002		(Betz)			Chromium, T	19.4
<b>3.92</b> (Upst. Rymer Rd.)	1991	B1115571	Surface Water	Grab	Barium, T	0.064
CPSW001		(Betz)				
<b>3.90</b> (Dst. Rymer Rd.)	1991	B1115536	Sediment	Grab	Barium, T	50.7
CPSE004		(Betz)			Chromium, T	13.9
<b>3.90</b> (Dst. Rymer Rd.)	1991	B1115572	Surface Water	Grab	Barium, T.	0.086
CPSW003		(Betz)			Chromium, T	0.012
<b>2.60</b> (Tettau Rd.)	1991	B1115537	Sediment	Grab	Barium, T	53.2
CPSE006		(Betz)			Chromium, T	14.5
<b>2.60</b> (Tettau Rd.)	1991	B1115573	Surface Water	Grab	Barium, T	0.060
CPSW005		(Betz)				
<b>1.64</b> (S.R. 358)	1991	B1115546	Sediment	Grab	Barium, T	47.0
CPSE020		(Betz)			Chromium, T	13.2
<b>1.64</b> (S.R. 358)	1991	B1115575	Surface Water	Grab	Barium, T	0.055
CPSW021		(Betz)				
<b>1.40</b> (Dst. S.R. 2)	1990	MEKN76	Surface Water	Grab	Arsenic	0.002B
SW5		(E&E)			Barium	0.049B
					Chromium	0.003JB
					Copper	0.006JB
					Lead	0.004
					Nickel	0.008JB
					Vanadium	0.011B
					Zinc	0.029J

Table 6. Continued.

<b>METALS/ CYANIDE</b>						
<u>Stream</u> River Mile (Location) Sample ID Number	Year	Lab Sample Number	Sample (Matrix)	Sample Type	Parameter	Concentration (ppb)
<b>1.40</b> (Dst. S.R. 2) S5	1990	MEKN64 (E&E)	Sediment	Grab	Antimony	5.3BNJ
					Arsenic	4.9NJ
					Barium	153
					Chromium	25.1
					Copper	28.6
					Lead	21.6NJ
					Mercury	0.15
					Nickel	37.9
					Silver	1.8BJ
					Vanadium	49.4EJ
					Zinc	89.1EJ
<b>0.62</b> (Adj. Ottawa NWR) SW3	1990	MEKN74 (E&E)	Surface Water	Grab	Arsenic	0.002B
					Barium	0.036B
					Lead	0.003JWB
					Nickel	0.003B
					Vanadium	0.004JB
					Zinc	0.018JB
<b>0.62</b> (Adj. Ottawa NWR) S3	1990	MEKN62 (E&E)	Sediment	Grab	Antimony	10.7BNJ
					Arsenic	3.5BNJ
					Barium	84B
					Chromium	19.7
					Copper	45
					Lead	40.3+NJ
					Mercury	0.28
					Nickel	39
					Silver	2.2BJ
					Vanadium	30.6EJ
					Zinc	86EJ
<b>0.01</b> (at mouth) SW1	1990	MEKN71 (E&E)	Surface Water	Grab	Arsenic	0.002B
					Barium	0.033B
					Chromium	0.003JB
					Copper	0.007B
					Nickel	0.008B
					Silver	0.001JB
					Vanadium	0.006JB
					Zinc	0.030J

Table 6. Continued.

<b>METALS/ CYANIDE</b>						
<u>Stream</u>						
River Mile (Location)	Year	Lab Sample Number	Sample (Matrix)	Sample Type	Parameter	Concentration (ppb)
Sample ID Number						
<b>0.01</b> (at mouth) S1	1990	MEJY59 (E&E)	Sediment	Grab	Antimony	6.7BNJ
					Arsenic	3.4BNJ
					Barium	104
					Chromium	16.4
					Copper	41.8
					Lead	18.4NJ
					Mercury	0.22
					Nickel	30.5
					Silver	1.6BJ
					Vanadium	30.9EJ
					Zinc	77.2EJ
<b><u>South Refuge Tributary (Confluence with Lacarbe Creek at RM 0.85)</u></b>						
<b>0.03</b> (near mouth) CPSE009	1991	B1115540 (Betz)	Sediment	Grab	Barium, T	73.8
					Chromium, T	19.2
					Lead, T	13.4
<b><u>Boat Channel (Confluence with Lacarbe Creek at RM 0.49)</u></b>						
<b>0.35</b> (SE of mobile homes) CPSE016	1991	B1115544 (Betz)	Sediment	Grab	Barium, T	113
					Chromium, T	25.9
<b><u>South Lagoon (South of Camp Perry Landfill)</u></b>						
- (SW corner of lagoon) S11	1990	MEKN69 (E&E)	Sediment	Grab	Antimony	8.1BNJ
					Arsenic	6.2NJ
					Barium	101
					Chromium	16.1
					Copper	28
					Lead	23.1NJ
					Nickel	35.3
					Silver	2.2BJ
					Vanadium	32.2EJ

Table 6. Continued.

<b>METALS/ CYANIDE</b>						
<u>Stream</u>						
River Mile (Location) Sample ID Number	Year	Lab Sample Number	Sample (Matrix)	Sample Type	Parameter	Concentration (ppb)
<b><u>South Lagoon (South of Camp Perry Landfill)</u></b>						
- (NW corner of lagoon) S12	1990	MEKP83 (E&E)	Sediment	Grab	Antimony	6.9BNJ
					Arsenic	3.6NJB
					Barium	103
					Chromium	15.5
					Copper	28.7
					Lead	20.8NJ
					Mercury	0.19
					Nickel	31.4J
					Silver	1.5BJ
					Vanadium	31.9EJ
					Zinc	78.9EJ
<b><u>Road Drainage Ditch (County Road 171)</u></b>						
- (SW corner of landfill) CPSE008	1991	B1115539 (Betz)	Sediment	Grab	Barium, T	52.2
					Chromium, T	13.2
					Lead, T	29.0
- (NW corner of landfill) CPSE007	1991	B1115538 (Betz)	Sediment	Grab	Barium, T	79.3
					Chromium, T	17.9
					Lead, T	11.7
<b><u>Western Carp Pond</u></b>						
- (SW corner of pond) CPSE014	1991	B1115542 (Betz)	Sediment	Grab	Barium, T	42.1
					Chromium, T	11.5
- (SW corner of pond) CPSE022	1991	B1115547 (Betz)	Sediment	Grab	Barium, T	75.2
					Chromium, T	19.8
<i>Replicate of Lab No. B1115542</i>						
<b><u>Eastern Carp Pond</u></b>						
- (SW corner of pond) CPSE015	1991	B1115543 (Betz)	Sediment	Grab	Barium, T	84.3
					Chromium, T	22.5

Table 6. Continued.

<b>METALS/ CYANIDE</b>						
<u>Stream</u>						
River Mile (Location)	Year	Lab Sample Number	Sample (Matrix)	Sample Type	Parameter	Concentration (ppb)
Sample ID Number						
<b><u>East Wetland</u></b>						
- (Adjacent to east side of landfill) SW4	1990	MEKN75 (E&E)	Surface Water	Grab	Arsenic	0.003B
					Barium	0.039B
					Cadmium	0.002B
					Nickel	0.004B
					Vanadium	0.007JB
					Zinc	0.024J
- (Adjacent to east side of landfill) S4	1990	MEKN63 (E&E)	Sediment	Grab	Antimony	4.7BNJ
					Arsenic	7NJ
					Barium	101
					Chromium	17.5
					Copper	25.8
					Lead	15.5NJ
					Mercury	0.17
					Nickel	33.4
					Silver	2.3BJ
					Vanadium	32.9EJ
					Zinc	65.3EJ
<b><u>East Drainage Ditch</u></b>						
- (0.3 mi. E. of landfill) CPSE019	1991	B1115545 (Betz)	Sediment	Grab	Barium, T	70.9
					Chromium, T	16.1
<b><u>Ottawa National Wildlife Refuge</u></b>						
- (Near west dike) CPSW010	1991	B1115574 (Betz)	Surface Water	Grab	Barium, T	0.025
- (Near west dike) CPSW023	1991	B1115576 (Betz)	Surface Water	Grab	Barium, T	0.023
<i>Replicate of Lab No. B1115574</i>						
- (Near west dike) CPSE011	1991	B1115541 (Betz)	Sediment	Grab	Barium, T	25.5
					Chromium, T	7.84

Table 6. Continued.

<b>METALS/ CYANIDE</b>						
<u>Stream</u>						
River Mile (Location)	Year	Lab Sample Number	Sample (Matrix)	Sample Type	Parameter	Concentration (ppb)
Sample ID Number						
<b><i>Ottawa National Wildlife Refuge</i></b>						
- (Near west dike)	1990	MEKN72	Surface Water	Grab	Antimony	0.020B
SW2		(E&E)			Arsenic	0.011B
					Barium	0.234
					Chromium	0.020J
					Copper	0.036
					Lead	0.033
					Nickel	0.042
					Vanadium	0.042B
					Zinc	0.141
- (Near west dike)	1990	MEKN73	Surface Water	Grab	Antimony	0.020B
Duplicate		(E&E)			Arsenic	0.010
<i>Duplicate of Lab No. MEKN72</i>					Barium	0.249
					Chromium	0.020J
					Copper	0.032
					Lead	0.031
					Nickel	0.041
					Vanadium	0.048B
					Zinc	0.140
- (Near west dike)	1990	MEKN61	Sediment	Grab	Antimony	7.3BNJ
S2		(E&E)			Arsenic	3NJ
					Barium	8.4B
					Chromium	0.8B
					Copper	10.4J
					Lead	3.7NJ
					Mercury	0.11
					Nickel	8.5BJ
					Silver	1.5BJ
					Vanadium	8.2BEJ
					Zinc	20.7EJ

E - Estimated or not reported due to interference.

N - Spike recoveries outside QC protocols, which indicates a possible matrix problem. Data may be biased high or low.

+ - Correlation coefficient for standard additions is less than 0.995.

B - Value is real, but is above instrument DL and below CRDL.

J - Value is above CRDL and is an estimated value because of a QC protocol.

W - Post-digestion spike for furnace AA analysis is out of control limits(35-115%), while sample absorbance is <50% of spike absorbance

## REFERENCES

Kelly, M.H. and R.L. Hite. 1984. Evaluation of Illinois stream sediment data: 1974-1980. Illinois Environmental Protection Agency, Div. of Water Pollution Control.

Ecology and Environment. 1991. Screening site inspection report for Camp Perry Landfill, Port Clinton, Ohio. USEPA ID: OHD980610893.

## Appendix 1

### Semivolatile, Volatile, Pesticides/PCB's and Heavy Metal/Cyanide Compounds Analyzed for Ohio EPA 1991 and Ecology and Environment 1990 Lacarbe Creek and Surrounding Waterbodies Sediment and Surface Water Samples

#### 1991 & 1990 - Bold type

1991 only - *Italized type*

1990 only - Thin type

#### METALS / CYANIDE

Aluminum  
Antimony  
**Arsenic, Total**  
**Barium, Total**  
Beryllium  
**Cadmium, Total**  
Calcium  
**Chromium, Total**

Cobalt  
Copper  
Iron  
**Lead, Total**  
Magnesium  
Manganese  
**Mercury, Total**  
Nickel

Potassium  
**Selenium, Total**  
**Silver, Total**  
Sodium  
Thallium  
Tin  
Vanadium  
Zinc  
Cyanide

#### SEMIVOLATILE COMPOUNDS

**Acenaphthene**  
**Acenaphthylene**  
**Anthracene**  
**Benzo (A) anthracene**  
**Benzo(A) pyrene**  
**Benzo(B) fluoranthene**  
**Benzo(G,H,I) perylene**  
**Benzo(K) fluoranthene**  
**Benzoic acid**  
**Benzyl alcohol**  
**Benzylbutyl phthalate**  
**Bis(2-chloroethoxy) methane**  
**Bis(2-chloroethyl) ether**  
**Bis(2-chloroisopropyl)ether**  
**Bis(2-ethylhexyl) phthalate**  
**4-Bromophenyl phenyl ether**  
**4-Chloroaniline**  
**4-Chloro-3-methyl phenol**  
**2-Chloronaphthalene**  
**2-Chlorophenol**  
**4-Chlorophenyl phenyl ether**  
**Chrysene**

*o-Cresol*  
*p-Cresol*  
**Dibenzo(A,H) anthracene**  
**Dibenzofuran**  
**1,2-Dichlorobenzene**  
**1,3-Dichlorobenzene**  
**1,4-Dichlorobenzene**  
**3,3'-Dichlorobenzidine**  
**2,4-Dichlorophenol**  
**Diethyl phthalate**  
**2,4-Dimethylphenol**  
**Dimethyl phthalate**  
**Di-N-butyl phthalate**  
**2,4-Dinitrophenol**  
**2,4-Dinitrotoluene**  
**2,6-Dinitrotoluene**  
**Di-N-octyl phthalate**  
**Fluoranthene**  
**Fluorene**  
**Hexachlorobenzene**  
**Hexachlorobutadiene**  
**Hexachloroethane**

**Hexachloropentadiene**  
**Indeno (1,2,3-CD) pyrene**  
**Isophorone**  
**2-Methyl-4,6-Dinitrophenol**  
**2-Methylnaphthalene**  
**Naphthalene**  
**2-Nitroaniline**  
**3-Nitroaniline**  
**4-Nitroaniline**  
**Nitrobenzene**  
**2-nitrophenol**  
**4-Nitrophenol**  
**N-nitrosodiphenyl amine**  
**N-Nitroso-N-propylamine**  
**Pentachlorophenol**  
**Phenanthrene**  
**Phenol**  
**Pyrene**  
**1,2,4-Trichlorobenzene**  
**2,4,5-Trichlorophenol**  
**2,4,6-Trichlorophenol**  
**2-Methylphenol**  
**4-Methylphenol**



**Appendix 1 (Continued)****VOLATILE COMPOUNDS**

<b>Acetone</b>	<b>Chloroethane</b>	<b>1,2-Dichloropropane</b>	<b>Tetrachloroethene</b>
<b>Benzene</b>	<i>2-Chloroethylvinylether</i>	<b>cis-1,3-Dichloropropene</b>	<b>Toluene</b>
<b>Bromodichloromethane</b>	<b>Chloroform</b>	<b>Trans-1,3-dichloropropene</b>	<b>1,1,1-Trichloroethane</b>
<b>Bromoform</b>	<b>Chloromethane</b>	<b>Ethylbenzene</b>	<b>1,1,2-Trichloroethane</b>
<b>Bromomethane</b>	<b>Dibromochloromethane</b>	<b>2-Hexanone</b>	<b>Trichloroethene</b>
<b>2-Butanone</b>	<b>1,1-Dichloroethane</b>	<b>Methylene chloride</b>	<b>Vinyl acetate</b>
<b>Carbon disulfide</b>	<b>1,2-Dichloroethane</b>	<b>4-Methyl-2-pentanone</b>	<b>Vinyl chloride</b>
<b>Carbon tetrachloride</b>	<b>1,1-Dichloroethene</b>	<b>Styrene</b>	<b>Total Xylenes</b>
<b>Chlorobenzene</b>	<i>Trans-1,2-dichloroethene</i>	<b>1,1,2,2-Tetrachloroethane</b>	<b>1,2-Dichloroethene</b>

**PESTICIDES**

<b>a-BHC</b>	<b>Aldrin</b>	<b>Heptachlor</b>
<b>b-BHC</b>	<b>Dieldrin</b>	<b>Heptachlor epoxide</b>
<b>g-BHC (Lindane)</b>	<b>Endrin</b>	<b>Methoxychlor</b>
<b>d-BHC</b>	<i>Endrin Aldehyde</i>	<b>a-Chlordane</b>
<b>Endosulfan I</b>	<b>Endrin ketone</b>	Toxaphene
<b>Endosulfan II</b>	<b>4,4'-DDT</b>	<b>g-Chlordane</b>
<b>Endosulfan sulfate</b>	<b>4,4'-DDD</b>	
	<b>4,4'-DDE</b>	

**PCBs**

<b>PCB-1016</b>	<b>PCB-1232</b>	<b>PCB-1248</b>
<b>PCB-1221</b>	<b>PCB-1242</b>	<b>PCB-1254</b>
		<b>PCB-1260</b>

**APPENDIX 2**

Raw Data