



Pfohl Brothers Landfill

Cheektowaga, NY, Erie County

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FINAL REPORT

**Contaminant Concentrations in Fish from Waters
Associated with Pfohl Brothers Landfill**

**New York State Department of Environmental
Conservation
Division of Fish and Wildlife
Division of Hazardous Waste Remediation**

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1.0 Introduction

This document is a summary report of sampling and analysis of fish collected from the surface waters in the vicinity of the Pfohl Brothers Landfill Inactive Hazardous Waste Disposal site. These activities were undertaken by the New York State Department of Environmental Conservation (NYSDEC) Division of Fish and Wildlife (DFW) at the request and with the support of the Division of Hazardous Waste Remediation (DHWR).

From the results of the Remedial Investigation sampling conducted during 1988 and 1989 and reported in the "Interim Report: Leachate, Surface Water and Sediment Investigation, January 1990", it became clear that a possibility for contaminant migration to adjacent water bodies and fish habitat existed. After review of the data collected, the NYSDEC's Divisions of Fish and Wildlife and Hazardous Waste Remediation concluded that based on the interim report's results, PCB's, mercury, organochlorine pesticides, dioxin and dibenzofuran were potential contaminants of concern from the landfill which could impact fish in the area. The identified areas of concern were; Aero Lake, "Aero Creek" (an unnamed tributary to Ellicott Creek from the northern boundary of landfill) and Ellicott Creek. In response to this potential threat and the concerns expressed by citizens, dealing with the safety of fish taken and whether fishing should be restricted for the surface water in the vicinity of the landfill, a study was initiated in 1990 of fish collected from Aero Lake, Aero Creek and Ellicott Creek.

The DFW initiated these actions by preparing a scope of work for the study (included as Section 4.0) which detailed the work to be performed, analytical protocols and costs. Once funding was secured by DHWR, the field work was initiated and the fish were collected in May of 1990 by the DFW and prepared for analysis. Subsequent to the sampling, the results of the PCB, mercury and organochlorine pesticides analysis were released to the public in September of 1990 (Section 3.0). Complications, due to funding and contractual matters related to procurement of the external laboratory services necessary, delayed the dioxin and dibenzofuran analytical results. The DHWR recently received these results and is issuing this final report of all analytical results obtained and the conclusion resulting from this data. The document presents the Final Report on the levels of contaminants of concern identified in the fish collected adjacent to the Pfohl Brothers Landfill, prepared by the NYSDEC Division of Fish and Wildlife. Also included are the Interim Reports, which were released to the public in 1990, the initial project outline/scope of work and a copy of the New York State Department of Health (NYSDOH) publication "Health Advisory: Chemicals in Sportfish or Game" which outlines the statewide NYSDOH policy for evaluating and issuing a decision on the consumption of fish from NYS waters.

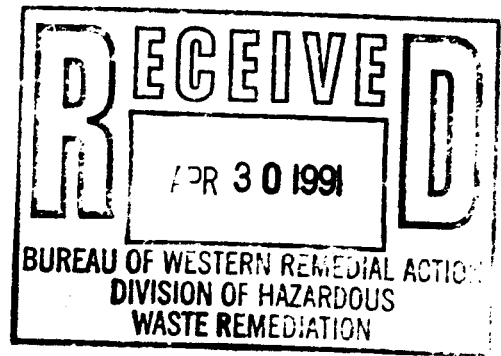
Based upon the information presented by these reports, the following conclusions have resulted:

1. Based on the samples collected in this study, fish in the vicinity of the Pfohl Brothers Landfill do not contain concentrations of PCB, mercury and organochlorine pesticides which exceed tolerance or action levels established by the U.S. Food and Drug Administration.

2. Dioxin and dibenzofuran concentrations in fish are well below guidelines established by the New York State Department of Health (NYSDOH) and do not present a significant human health threat. However, the NYSDOH's general advisory to eat no more than one meal (one-half pound) per week of fish taken from the State's freshwaters applies to these waters.
3. With respect to fish eating wildlife, at least one species of fish from all four locations sampled, including the control station, contained PCB levels which exceeded the recommendation (0.11 ppm PCB) contained in Newell et al. (1987) for the protection of those species. However, PCB concentrations did not exceed the lowest concentration documented (0.6 ppm) that caused an impact in a fish eating species (i.e. reproductive impairment in mink).
4. Mercury, organochlorine pesticides, dioxins and dibenzofurans were not present in quantities which would impair sensitive wildlife consumers of fish.
5. No significant differences could be determined in the spatial distribution of PCB and other compounds analyzed. The average PCB levels in fish from Aero Lake to Tributary II B of Ellicott Creek were slightly higher than the levels in fish from Ellicott Creek near Bowmansville. The differences, however, were not statistically significant. The power of the statistical tests to detail such differences was affected by the small number of samples.

Section 2.0

Final Report Fish Study



Contaminant concentrations in
fish from waters associated
with Pfohl Brothers Landfill,
Cheektowaga, New York

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Pfohl Brothers Fish Analyses

At the request of the Division of Hazardous Waste Remediation, the Division of Fish and Wildlife (DFW) has conducted limited sampling of fish from waters near the Pfohl Brothers Landfill in Cheektowaga, New York. Chemical analyses of these samples were conducted by DFW or coordinated with a contract laboratory (Triangle Laboratories, Inc.). These analyses were conducted to help ascertain whether certain chemical contaminants have migrated from the landfill into local fisheries.

METHODS.

Available fish were collected by Region 9 Bureau of Fisheries staff from four sites surrounding the landfill (Figure 1):

<u>Station</u>	<u>Location</u>
A	Ellicott Creek upstream of the landfill in the vicinity of Bowmansville (control location)
B	Aero Lake
C	Tributary 11B of Ellicott Creek which flows between the landfill and Aero Lake
D	Ellicott Creek below Tributary 11B in the vicinity of the Greater Buffalo International Airport

Collections were conducted on May 15, 16 and 31, 1990 by seining of Aero Lake and electrofishing at all other locations. All fish were measured for total length, composite samples of individual species were weighed, samples were wrapped in hexane rinsed aluminum foil, appropriately labelled and frozen. All samples were transported to Hale Creek Field Station, Gloversville, New York for preparation for chemical analysis. All samples were analyzed as whole fish.

Chemical analyses for PCB and organochlorine pesticides were conducted by methods in the U. S. Food and Drug Administration's Pesticide Analytical Manual, Volume 1, Sections 211 and 253.

Mercury was analyzed by the cold vapor technique of Hatch and Ott (1968) as modified for instrumentation of the laboratory. All these analyses were conducted by the Analytical Services Unit at the Hale Creek Field Station. All reported values are in ug/g (parts per million) on a wet weight basis.

Dioxin and dibenzofuran analyses were conducted by the contract laboratory following Method 8290, "National Dioxin Study Analytical Procedures and Quality Assurance Plan for the Analysis of 2, 3, 7, 8 - TCDD" (EPA/600/3-85/09) with a modification. The change is the use of chlorhydric acid in sample digestion to prevent decomposition of certain PCDD/PCDF congeners. All results are reported in pg/g (parts per trillion) on a wet weight basis.

RESULTS:

A total of sixteen samples were analyzed for PCB, organochlorine pesticides and mercury. This exceeds the requirements of the project protocol (i.e. 12 samples). For dioxin and dibenzofuran analyses, only nine samples were analyzed which is less than the number outlined in the protocol. The latter deficiency was due to insufficient sample mass to conduct chemical analyses on three samples. The remaining four samples were not submitted for analyses due to lack of sufficient mass or lack of comparable species at more than one location.

Table 1 presents the results of PCB and organochlorine pesticide analyses. Table 2 presents the results of mercury analyses. Table 3 summarizes dioxin and dibenzofuran analytical results. When examining Tables 1 and 2, the following notations will aid interpretation:

- a. species abbreviations represent the following species of fish:

CARP	=	carp
LMB	=	largemouth bass
BB	=	brown bullhead
CSUCK=WS	=	white sucker= common sucker
NOP	=	northern pike
RE	=	rock bass
COSH	=	common shiner

- b. date indicates collection date with two digits for year/month/day;

- c. length is average length of the individuals included in the composite sample or for an individual fish its total length;

- d. weight is the weight of the composite or individual fish analyzed.

For Table 1, the number of fish in each composite is indicated in parenthesis after the tag number except "IND" indicates and individual fish was analyzed. In Table 2, the number of fish analyzed in each sample is indicated in the sample remarks column.

The greatest PCB concentrations occurred in Aero Lake with a maximum concentration of 0.393 ppm in bluegill. Carp, a fatty species normally accumulating higher levels of lipophilic substances such as PCB, contained less than one-half the PCB levels found in bluegill.

Mercury concentrations (Table 2) were less than 0.2 ppm in all collections except one of northern pike (0.357 ppm) from the control location on Ellicott Creek at Bowmansville, New York. This latter fish is a large (24.6 inches) older fish which would be anticipated to contain greater mercury concentrations due to its piscivorous dietary habit and the longer period of exposure.

The highly toxic 2, 3, 7, 8 -tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) congener could not be detected in any fish sample analyzed (Table 3). With the exception of the relatively non-toxic octachlorodibenzo-p-dioxin (OCDD), most dioxins were generally not detectable. The OCDD congener was present in concentrations up to 34 ppt.

Dibenzofurans (Table 3) were generally below detection limits. The maximum concentration found of any congener was 1.8 ppt of 2,3,7,8-tetrachlorodibenzofuran in a sample from Aero Lake and a sample from Ellicott Creek near the airport.

The sum of toxicity equivalents for dioxins and dibenzofurans did not exceed 1.0 for any sample (Table 3).

DISCUSSION

Human Health:

For consideration of potential human health impacts, the U.S. Food and Drug Administration limits are provided on Tables 1 and 2 for each respective compound listed. None of the fish analyzed exceeded limits established by the U.S. Food and Drug Administration (FDA) for the protection of human consumers of fish. Indeed, for PCB and organochlorine pesticides, all samples contained concentrations that were less than one-fifth of their respective FDA limit. As a consequence, there is little expectation of any significant adverse human health impact via consumption of fish due to these compounds.

Dioxins and dibenzofurans as total toxicity equivalents do not exceed 10 ppt. which is the NYS Department of Health guideline for 2,3,7,8-TCDD. A human health impact due to these chemicals in the fish sampled would not be expected.

Wildlife impacts:

Newell et al. (1987) recommended limits for concentrations of several compounds in fish so that sensitive wildlife consumers of fish would be protected (Table 4). Only PCB were found in concentrations which exceed a recommended limit (0.11 ppm). This would suggest that an impact on a sensitive wildlife species may be expected. Platnow and Karstad (1973) reported some reproductive impairment in mink when exposed to fish containing Aroclor 1254. The dietary concentration producing the impact was 0.64 ppm. Since the observed concentration of Aroclor 1254 in fish (Table 1) is between the calculated no observed effect level of 0.11 ppm and the known, lowest observed impact level of 0.64 ppm, the possibility of an impact on mink is uncertain.

Spatial relationships:

As an indicator, PCB was selected to examine possible spatial differences in contaminant levels. The data were converted (Table 5) to a lipid basis to eliminate variability due to differing lipid concentrations for these lipid soluble compounds. The data conversion also reduces, but does not eliminate, variability caused by age, sex and differing species.

Statistical similarity occurs for fish from Aero Lake and tributary 11B and for tributary 11B and the two Ellicott Creek sampling points. However, largemouth bass contain substantially greater lipid-based PCB concentrations (43.2 and 19.2 ppm PCB for largemouth bass from Aero Lake and Tributary 11B, respectively). When these levels are combined with small sample size, there is a substantial influence on the mean and the associated 95% confidence limits for the mean. When largemouth bass data is removed for these stations, all stations have PCB concentrations which are statistically the same.

CONCLUSIONS

The following major findings are noted for chemical contaminants found in fish associated with the Pfohl Brothers Landfill.

1. Based on the samples collected in this study, fish in the vicinity of the Pfohl Brothers Landfill do not contain concentrations of PCB, mercury and organochlorine pesticides which exceed tolerance or action levels established by the U.S. Food and Drug Administration.
2. Dioxin and dibenzofuran concentrations in fish are well below guidelines established by the New York State Department of Health (NYSDOH) and do not present a significant human health threat. However, the NYSDOH's general advisory to eat no more than one meal (one-half pound) per week of fish taken from the State's freshwaters applies to these waters.
3. With respect to fish eating wildlife, at least one species of fish from all four locations sampled, including the control station, contained PCB levels which exceeded the recommendation (0.11 ppm PCB) contained in Newell et al. (1987) for the protection of those species. However, PCB concentrations did not exceed the lowest concentration documented (0.6 ppm) that caused an impact in a fish eating species (i.e. reproductive impairment in mink).
4. Mercury, organochlorine pesticides, dioxins and dibenzofurans were not present in quantities which would impair sensitive wildlife consumers of fish.
5. No significant differences could be determined in the spatial distribution of PCB and other compounds analyzed. The average PCB levels in fish from Aero Lake to Tributary II B of Ellicott Creek were slightly higher than the levels in fish from Ellicott Creek near Bowmansville. The differences, however, were not statistically significant. The power of the statistical tests to detail such differences was affected by the small number of samples.

REFERENCES CITED

Newell, A. J., D. W. Johnson, and L. K. Allen. 1987. Niagara River biota contamination project: Fish flesh criteria for piscivorous wildlife. Tech. Rept. 87-3, Division of Fish and Wildlife, NYS Department of Environmental Conservation, Albany. 182 p.

Platnow, N., and C. Karstad. 1973. Dietary effects of polychlorinated to biphenyls on mink. Can. J. Comp. Med. 37:391-400.

Table 1: PCB and organochlorine pesticide concentrations in fish from the vicinity of Pfohl Brothers landfill, Cheektowaga, NY; 1990 collections.

LAB #	TAG #	SPECIES	DATE	LOCATION	LENGTH	WEIGHT	SLIPID	0101A/1200	0125A/1200	P,P DDE	P,P DDD	P,P DDT	HEPT	HEX	PCB	TRANS CHLORANE	CIS CHLORANE	TRANS CHLORANE	HEXACHLOR	BTX	DIBENZO	
0-3	0513-90-H	CARP (3)	CAMP	000515	AEBO LAKE	525	6004	76.3	5.44	-0.020	0.159	0.070	0.012	-0.002	-0.005	-0.002	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
	0514-90-H	CARP (1)	CAMP	000515	AEBO LAKE	202	1210	63.7	0.47	-0.020	0.203	0.021	0.003	-0.002	-0.005	-0.002	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
	0515-90-H	CARP (3)	CAMP	000515	AEBO LAKE	202	1210	63.9	0.273	0.023	0.006	-0.002	-0.002	-0.002	-0.005	-0.002	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
	0516-90-H	CARP (5)	CAMP	000515	AEBO LAKE	100	367	70.0	1.77	-0.020	0.375	0.007	0.004	-0.002	-0.005	-0.002	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
0-4	0517-90-H	CARP (7)	CAMP	000516	TR10 TR10/ELLICOTT	254	625	89.4	1.83	-0.020	0.028	0.003	0.002	-0.002	-0.005	-0.002	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
	0518-90-H	CARP (3)	CAMP	000516	TR10 TR10/ELLICOTT	140	70	74.4	2.49	0.171	0.007	0.004	-0.002	-0.002	-0.005	-0.002	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
	0519-90-H	CARP (1)	CAMP	000516	TR10 TR10/ELLICOTT	142	28	71.9	0.84	-0.020	0.165	0.021	0.005	0.002	-0.002	-0.005	-0.002	-0.005	-0.005	-0.005	-0.005	-0.005
	0520-90-H	CARP (7)	CAMP	000516	TR10 TR10/ELLICOTT	122	253	64.0	1.70	-0.020	0.044	0.012	0.002	-0.002	-0.005	-0.002	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
0-5	0521-90-H	CARP (1)	CAMP	000531	ELLICOTT/AIRPORT	249	625	86.4	2.49	0.121	0.145	0.021	0.004	0.002	-0.002	-0.005	-0.002	-0.005	-0.005	-0.010	-0.010	-0.005
	0522-90-H	CARP (1)	CAMP	000531	ELLICOTT/AIRPORT	172	28	64.0	0.86	-0.020	0.028	0.003	0.002	-0.002	-0.005	-0.002	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
	0523-90-H	CARP (1)	CAMP	000531	ELLICOTT/AIRPORT	249	1013	70.0	2.30	-0.020	0.076	0.013	0.002	0.004	-0.002	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
	0524-90-H	CARP (1)	CAMP	000531	ELLICOTT/AIRPORT	226	190	63.0	2.46	-0.020	0.232	0.056	0.015	0.008	-0.002	-0.005	-0.002	-0.005	0.013	-0.005	-0.005	-0.005
0-6	0525-90-H	CARP (1)	CAMP	000531	ELLICOTT/AIRPORT	175	546	75.9	3.59	-0.020	0.140	0.040	0.011	0.007	-0.002	-0.005	-0.002	-0.005	0.011	-0.005	-0.005	-0.005
	0526-90-H	CARP (1)	CAMP	000531	ELLICOTT/AIRPORT	175	303	75.7	3.59	-0.020	0.130	0.037	0.019	0.007	-0.002	-0.005	-0.002	-0.005	0.011	-0.005	-0.005	-0.005
	0527-90-H	CARP (1)	CAMP	000531	ELLICOTT/AIRPORT	114	156	66.9	2.81	-0.020	0.070	0.010	-0.002	-0.002	-0.005	-0.002	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
	0528-90-H	CARP (7)	CAMP	000531	ELLICOTT/AIRPORT	133	254	65.3	7.14	-0.020	-0.020	0.043	-0.002	-0.002	-0.005	-0.002	-0.005	-0.005	0.008	-0.005	-0.005	-0.005
0-3	0529-90-H	CARP (1)	CAMP	000531	ELLICOTT/NOV/VIL	249	1013	70.0	7.14	-0.020	0.232	0.056	0.015	0.008	-0.002	-0.005	-0.002	-0.005	0.013	-0.010	-0.010	-0.005
	0530-90-H	CARP (1)	CAMP	000531	ELLICOTT/NOV/VIL	116	156	65.3	2.34	-0.020	-0.020	0.010	-0.002	-0.002	-0.005	-0.002	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
	0531-90-H	CARP (1)	CAMP	000531	ELLICOTT/NOV/VIL	246	1070	76.3	1.76	-0.020	-0.020	0.007	-0.002	0.004	-0.002	-0.005	-0.002	-0.005	-0.005	-0.005	-0.005	-0.005
	0532-90-H	CARP (1)	CAMP	000531	ELLICOTT/NOV/VIL	675	1531	76.0	0.44	-0.020	0.041	0.002	-0.002	0.002	-0.002	-0.005	-0.002	-0.005	-0.005	-0.005	-0.005	-0.005
0-3	0533-90-H	CARP (1)	CAMP	000531	ELLICOTT/NOV/VIL	155	452	75.4	3.20	-0.020	0.124	0.038	-0.002	-0.002	-0.005	-0.002	-0.005	-0.005	0.009	-0.005	-0.005	-0.005
	0534-90-H	CARP (1)	CAMP	000531	ELLICOTT/NOV/VIL	675	1070	76.0	3.20	-0.020	0.124	0.038	-0.002	-0.002	-0.005	-0.002	-0.005	-0.005	0.009	-0.005	-0.005	-0.005
	0535-90-H	CARP (1)	CAMP	000531	ELLICOTT/NOV/VIL	452	452	75.4	0.44	-0.020	-0.020	0.007	-0.002	-0.002	-0.005	-0.002	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
	0536-90-H	CARP (1)	CAMP	000531	ELLICOTT/NOV/VIL	155	452	75.4	0.44	-0.020	-0.020	0.007	-0.002	-0.002	-0.005	-0.002	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
FDA limit																						
										2.0	5.0	0.1	0.3									

Table 2: Total mercury concentrations in fish from the vicinity of Pfohl Brothers landfill, Cheektowaga, NY; 1990 collections.

LAB ID NUMBER	TAG NUMBER	SPECIES	COLLECT. DATE	LOCATION	AGE SEX	LENGTH MM	WEIGHT GRAMS	Hg PPM	RUN	SAMPLE REMARKS
0513-90-H	COMP.A	CARP	900515	AERO LAKE		525	6804	-0.050		3/AVE.L/TOT.WT
0514-90-H	COMP.B	LMB	900515	AERO LAKE		282	1218	0.176		4/AVE.L/TOT.WT
0515-90-H1	COMP.C	BB	900515	AERO LAKE		227	368	-0.050	1	3/AVE.L/TOT.WT
0515-90-H2	COMP.C	BB	900515	AERO LAKE		227	368	-0.050	2	3/AVE.L/TOT.WT
0516-90-H	COMP.D	BLG	900515	AERO LAKE		180	567	-0.050		5/AVE.L/TOT.WT
0517-90-H	COMP.E	BB	900516	TRIB 118/ELL		254	425	-0.050		2/AVE.L/TOT.WT
0518-90-H	COMP.F	CSUCK	900516	TRIB 118/ELL		140	70	-0.050		4/AVE.L/TOT.WT
0519-90-H	COMP.G	LMB	900516	TRIB 118/ELL		146	28	0.055		1/INDIVIDUAL
0520-90-H	COMP.H	BLG	900516	TRIB 118/ELL		122	253	-0.050		9/AVE.L/TOT.WT
0521-90-H	COMP.I	WS	900531	ELLCOTT/AIR		248	1813	0.177		10/AVE.L/TOT.WT
0522-90-H	COMP.J	NOP	900531	ELLCOTT/AIR		226	198	0.157		1/INDIVIDUAL
0523-90-H	COMP.K	RB	900531	ELLCOTT/AIR		175	566	0.133		4/AVE.L/TOT.WT
0524-90-H	COMP.L	BLG	900531	ELLCOTT/AIR		116	156	-0.050		4/AVE.L/TOT.WT
0525-90-H1	COMP.M	COSH	900531	ELLCOTT/AIR		133	254	-0.050	1	7/AVE.L/TOT.WT
0525-90-H2	COMP.M	COSH	900531	ELLCOTT/AIR		133	254	-0.050	2	7/AVE.L/TOT.WT
0526-90-H	COMP.N	WS	900531	ELLCOTT/BOW		246	1898	0.088		10/AVE.L/TOT.WT
0527-90-H	COMP.O	NOP	900531	ELLCOTT/BOW		625	1531	0.357		1/INDIVIDUAL
0528-90-H	COMP.P	RB	900531	ELLCOTT/BOW		155	452	0.127		4/AVE.L/TOT.WT

FDA limit for mercury is 1.0 ppm as methylmercury.

NOTES:

1. ANALYZED BY METHOD Hg1.102.
2. LAB NUMBERS ENDING IN -H2 ARE DUPLICATE ANALYSES.
3. ~~NEGATIVE NUMBERS INDICATE QUANTITATION LIMITS.~~
4. STORED IN FILE D:PF0HLHG2.DBF

Table 3: Dioxins and dibenzofurans in fish from the vicinity of the Pfohl Brothers Landfill, Cheektowaga, NY, 1990 collections

Location	Species	ID No.	No. of Fish	Dioxins (ppt.)					Dibenzofurans (ppt.)					2,3,7,8-TCDD toxicity equivalents*		
				2,3,7,8	4Cl	5Cl	6Cl	7Cl	8Cl	2,3,7,8	4Cl	5Cl	6Cl	7Cl	8Cl	NYS (1985)
Acro Lake	Carp	0513	3	ND	ND	ND	ND	ND	1.8	2.3	1.5	ND	ND	ND	0.85	0.26
		0514	4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	0
		0515	3	ND	ND	ND	ND	1.5	11.9	0.48*	0.48*	0.48*	0.33*	ND	0.16	0.05
		0516	5	ND	ND	ND	ND	0.62	8.0	0.26*	0.26*	ND	0.26*	ND	0.20	0.06
		0517	2	ND	1.3	0.82*	0.69*	1.5	8.0*	0.30	0.30	0.64*	0.35*	ND	0.10	0.04
Trib. 11B of Elliott Creek	White sucker	0518	3	Insufficient sample quantity for analysis												
		0519	1	No analyses requested												
		0520	9	ND	0.65	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	0.07
		0521	10	Insufficient sample quantity for analysis												
Elliott Creek at Airport	Northern pike	0522	1	No analyses requested												
		0523	4	ND	ND	ND	ND	1.9	34.2	1.8	1.8	ND	ND	ND	0.60	0.18
		0524	4	Insufficient sample quantity for analysis												
		0525	7	No analyses requested												
		0526	10	ND	ND	0.45*	ND	ND	5.1	0.43	0.43	ND	0.24*	ND	0.14	0.04
Elliott Creek at Bownsville	Northern pike	0527	1	No analyses requested												
		0528	4	0.27*	0.27*	ND	ND	ND	0.95*	0.27*	0.27*	ND	ND	ND	0	0

* Estimated maximum possible concentration. Tentative identification which did not meet all requirements for positive identification. These values were not included in calculation of 2,3,7,8-TCDD toxicity equivalents.

Table 4: Fish flesh criteria for the protection of piscivorous wildlife.

<u>Contaminant</u>	<u>Non-carcinogenic Flesh criteria (mg/kg)</u>	<u>1 in 100 Cancer Risk criteria (mg/kg)</u>
PCB's	0.11	0.11
Aldrin/dieldrin	0.12	0.022
DDT, DDD, DDE	0.2	0.27
Chlordane	0.5	0.37
Mirex	0.33	0.37
Hexachlorobenzene	0.33	0.2
Dioxin	0.000003	0.0000023

Adapted from: Newell et al. (1987).

Table 5: Lipid based PCB concentrations in fish associated with the Pfohl Brothers Landfill; 1990 collections

<u>Location</u>	<u>Mean</u>	<u>95% confidence limit</u>	
		<u>Lower</u>	<u>Upper</u>
Aero Lake	18.8 (10.7)*	10.44 (-15.71)	48.2 (37.2)
Trib 11B of Ellicott Creek	7.55 (3.67)*	4.99 (0.62)	20.1 (7.96)
Ellicott Creek at Airport	3.08	1.66	7.83
Ellicott Creek at Bowmansville (control)	3.81	2.74	10.36

* Excludes largemouth bass data.

Section 3.0
Interim Reports

Issue Date	Subject
9/25/90	Mercury analysis for fish samples
9/20/90	PCB and organochlorine pesticides in fish samples
6/4/90	Notes on sampling at Pfohl Landfill

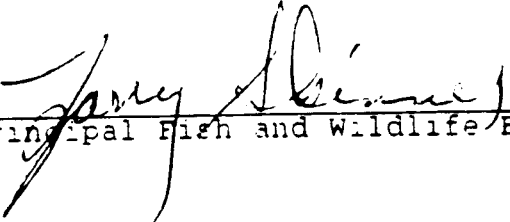
MEMORANDUM

September 25, 1990

TO: Joe White
FROM: Lawrence C. Skinner
RE: Pfohl Brothers - Fish analyses - Site = 09-15-043

Attached is the complete report of mercury analyses for fish samples collected in the vicinity of Pfohl Brothers Landfill pursuant to our agreement. For our purposes, the edited data (labelled PFOHL HG 2.DBF in the upper left corner) should be used since some analytical results were below quantitation limits.

All analytical results for mercury are well below the U.S. Food and Drug Administration action level of 1.0 ppm (as methylmercury) in these samples (maximum of 0.357 ppm). Mercury concentrations in fish from Aero Lake and Trib. 11B of Ellicott Creek below Pfohl Brothers Landfill are generally less than corresponding samples from control sites. Mercury is not a chemical of concern for fish at these stations.


Principal Fish and Wildlife Ecologist

LS:rd
cc: L. Nelson
S. Mooradian
B. Shupp
J. Colquhoun
R. Sloan
W. Stone
S. Jackling
N. Kim
T. Forti

LS20.Mem/rd003

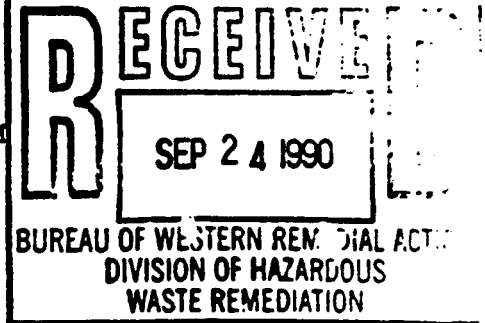
 * HALE CREEK FIELD STATION *
 * MERCURY ANALYSIS REPORT *

LAB ID NUMBER	TAG NUMBER	SPECIES	COLLECT. DATE	LOCATION	AGE SEX	LENGTH MM	WEIGHT GRAMS	Hg PPM	RUN	SAMPLE REMARKS
0513-90-H	COMP.A	CARP	900515	AERO LAKE		525	6804	-0.050		3/AVE.L/TOT.WT
0514-90-H	COMP.B	LMB	900515	AERO LAKE		282	1218	0.176		4/AVE.L/TOT.WT
0515-90-H1	COMP.C	BB	900515	AERO LAKE		227	368	-0.050	1	3/AVE.L/TOT.WT
0515-90-H2	COMP.C	BB	900515	AERO LAKE		227	368	-0.050	2	3/AVE.L/TOT.WT
0516-90-H	COMP.D	BLG	900515	AERO LAKE		180	567	-0.050		5/AVE.L/TOT.WT
0517-90-H	COMP.E	BB	900516	TRIB 11B/ELL		254	425	-0.050		2/AVE.L/TOT.WT
0518-90-H	COMP.F	CSUCK	900516	TRIB 11B/ELL		140	70	-0.050		4/AVE.L/TOT.WT-
0519-90-H	COMP.G	LMB	900516	TRIB 11B/ELL		146	28	0.055		1/INDIVIDUAL
0520-90-H	COMP.H	BLG	900516	TRIB 11B/ELL		122	253	-0.050		9/AVE.L/TOT.WT
0521-90-H	COMP.I	WS	900531	ELLCOTT/AIR		248	1813	0.177		10/AVE.L/TOT.WT
0522-90-H	COMP.J	NOP	900531	ELLCOTT/AIR		226	178	0.157		1/INDIVIDUAL
0523-90-H	COMP.K	RB	900531	ELLCOTT/AIR		175	566	0.133		4/AVE.L/TOT.WT
0524-90-H	COMP.L	BLG	900531	ELLCOTT/AIR		116	156	-0.050		4/AVE.L/TOT.WT
0525-90-H1	COMP.M	COSH	900531	ELLCOTT/AIR		133	254	-0.050	1	7/AVE.L/TOT.WT
0525-90-H2	COMP.M	COSH	900531	ELLCOTT/AIR		133	254	-0.050	2	7/AVE.L/TOT.WT
0526-90-H	COMP.N	WS	900531	ELLCOTT/BOW		246	1898	0.088		10/AVE.L/TOT.WT
0527-90-H	COMP.O	NOP	900531	ELLCOTT/BOW		625	1531	0.357		1/INDIVIDUAL
0528-90-H	COMP.P	RB	900531	ELLCOTT/BOW		155	452	0.127		4/AVE.L/TOT.WT

NOTES:

1. ANALYZED BY METHOD Hg1.102.
2. LAB NUMBERS ENDING IN -H2 ARE DUPLICATE ANALYSES.
3. NEGATIVE NUMBERS INDICATE QUANTITATION LIMITS.
4. STORED IN FILE D:PF0HLM62.DBF

MEMORANDUM



TO: Joseph White
FROM: Lawrence C. Skinner
SUBJECT: Pfohl Brothers - Fish Analyses Site Number 09-15-043
DATE: September 20, 1990

As per our agreement, we have completed chemical analyses of PCB and organochlorine pesticides in fish samples from waters surrounding the Pfohl Brothers Landfill (raw data is attached). All fish were analyzed as whole fish in composite samples except three samples were of individual fish (Lab numbers 0519-90-H, 0522-90-H and 0527-90-H). Please note we conducted analyses on 16 samples which exceeds the protocols request for analysis of 12 samples. The data for two duplicate samples is also included (i.e. lab numbers 0514-90-H2 and 0523-90-H2). Some notes helpful in making better sense of the data follow:

- a. the number of fish in each composite is indicated in parenthesis after the tag number except "IND" indicates an individual fish was analyzed;
- b. the date indicates sampling date
- c. length is average length of individuals in the composite or for individual fish its total length;
- d. weight is the weight of the composite;
- e. all analyses are expressed on a wet weight basis in ug/g (parts per million); and
- f. species abbreviations represent the following species of fish:

CARP	=	carp
LMB	=	largemouth bass
BB	=	brown bullhead
BLG	=	bluegill
CSUCK=WS	=	white sucker = common sucker
NOP	=	northern pike
RB	=	rock bass
COSH	=	common shiner

A copy of the original collection records are also attached for your records. The data expressed on a wet weight basis shows that concentrations of all compounds analyzed are less than one-fifth of existing U.S. regulatory levels for the protection of human health, and frequently are undetected. The data are comparable to findings in 1987.

For the protection of fish consuming wildlife, some PCB values exceed the recommendation of Newell et al (1987) of 0.11 ppm to all stations sampled. However, the concentrations do not exceed 0.5 ppm which has been shown to impair mink reproduction.

To examine special differences the data were converted to a lipid basis with the following results. Lipid-based values eliminate variability due to differing lipid concentrations for lipid soluble compounds such as PCB and the organochlorine pesticides reported here and it reduces, but does not eliminate, interspecific variability and age or sex variability of compounds.

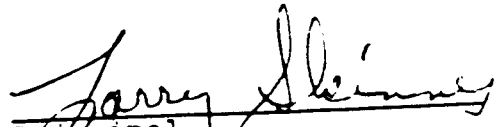
Location	Concentration (ppm lipid-based)		
	Mean PCB	95% Confidence limits	
		Lower	Upper
Aero Lake	18.8	10.5	48.2
Trib. 11B of Ellicott Creek	8.77	3.65	21.2
Ellicott Cr. at Airport	3.08	1.66	7.83
Ellicott Cr. at Bowmansville	3.81	2.74	10.4

The data showed that statistical similarity occurs for PCB in Aero Lake and Trib 11.B and for Trib 11B and the two Ellicott Creek sampling points. Aero Lake is different from the other sampling locations only because of one sample of largemouth bass (Comp B) which produced the greatest lipid-based PCB value (43.2 ppm).

These data will be provided to the Department of Health for evaluation for health advisory purposes. I do not anticipate any restrictive advisory being issued due to this information.

A portion of these samples are to be analyzed by our contract laboratory, Triangle Laboratories Inc., for dioxins and dibenzofurans. The samples await shipment to the laboratory. Shipment is dependent upon approval of the contract amendment by the State Comptroller. We are still waiting for that approval.

Total mercury analyses of these samples by our Hale Creek Field Station will be forthcoming soon.


Principal
Fish & Wildlife Ecologist

Attachment

LCS/lfc

cc: L. Nelson
S. Mooradian
B. Shupp
J. Colquhoun

R. Sloan
W. Stone
S. Jackling
N. Kim
T. Forti

LCS9.MEM/LC0051

HALL CREEK FIELD STATION
PEOM BROTHER'S SITE
COLLECTED 1990
PPM - WET WEIGHT

LAB #	TAG #	SPECIES	DATE	LOCATION	LENGTH	WEIGHT	MOISTURE	LIP18	M1016/		M1254/		P.P. DOC	P.P. DDD	P.P. DDI	MIREI	PHOTO	MIREI	HCB	TRANS	C15	NONACHLOR	DIT	DIELDRIN	
									1248	1249	1249	1249													
60-5	0513-90-M	COMP 131	COMP	900515	NECO LAKE	535	4804	74.3	5.44	-0.20	0.159	0.020	0.020	0.012	-0.002	-0.002	-0.005	-0.002	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
	0514-90-M	COMP 107	COMP	900515	NECO LAKE	282	1218	63.9	0.47	-0.020	0.203	0.021	0.005	-0.002	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
	0514-90-M	COMP 141	COMP	900515	NECO LAKE	282	1218	63.9	0.47	-0.020	0.223	0.023	0.006	-0.002	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
	0515-90-M	COMP 131	COMP	900515	NECO LAKE	227	348	74.4	1.52	-0.020	0.097	0.007	0.004	0.004	-0.002	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.005	-0.005	-0.005	-0.005
	0515-90-M	COMP 151	COMP	900515	NECO LAKE	185	537	78.0	1.72	-0.020	0.393	0.046	0.014	0.002	-0.002	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.005	-0.005	-0.005	-0.005
60-6	0517-90-M	COMP 127	COMP	900516	TR19 119/ELLIOT	254	425	80.4	2.49	0.121	0.145	0.021	0.006	0.002	-0.002	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.005	-0.005	-0.005	-0.005
	0518-90-M	COMP 131	COMP	900516	TR19 119/ELLIOT	140	70	74.6	2.49	-0.020	0.134	0.007	-0.002	-0.002	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.005	-0.005	-0.005
	0518-90-M	COMP 180	COMP	900516	TR19 119/ELLIOT	146	28	71.9	0.86	-0.020	0.135	0.021	0.005	-0.002	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.005	-0.005	-0.005
	0518-90-M	COMP 191	COMP	900516	TR19 119/ELLIOT	122	233	66.0	1.78	-0.020	0.046	0.012	0.002	-0.002	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.005	-0.005	-0.005
	0518-90-M	COMP 171	COMP	900516	TR19 119/ELLIOT	122	28	66.0	0.736	-0.020	0.028	0.005	-0.002	-0.002	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.005	-0.005	-0.005
60-7	0521-90-M	COMP 110	COMP	900531	ELLIOT/ALPORN	249	1813	76.6	2.38	-0.020	0.076	0.013	0.002	0.004	-0.002	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.005	-0.005
	0522-90-M	COMP 180	COMP	900531	ELLIOT/ALPORN	226	198	65.8	2.46	-0.020	0.232	0.056	0.015	0.008	-0.002	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.005	
	0523-90-M	COMP 141	COMP	900531	ELLIOT/ALPORN	175	565	75.9	3.59	-0.020	0.140	0.040	0.011	0.007	-0.002	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.005	
	0523-90-M	COMP 191	COMP	900531	ELLIOT/ALPORN	175	366	75.9	3.59	-0.020	0.130	0.039	0.016	-0.002	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	
	0524-90-M	COMP 141	COMP	900531	ELLIOT/ALPORN	116	156	66.9	2.81	-0.020	0.030	0.010	-0.002	-0.002	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	
0525-90-M	COMP 171	COMP	900531	ELLIOT/ALPORN	133	254	65.3	7.14	-0.020	0.043	0.043	-0.002	-0.002	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.005	
60-8	0526-90-M	COMP 110	COMP	900531	ELLIOT/ALPORN	249	1813	76.6	7.14	-0.020	0.232	0.056	0.015	0.008	-0.002	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.005	
	0527-90-M	COMP 180	COMP	900531	ELLIOT/ALPORN	226	156	65.3	2.36	-0.020	0.020	0.010	-0.002	-0.002	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	
	0528-90-M	COMP 141	COMP	900531	ELLIOT/ALPORN	155	452	75.4	3.20	-0.020	0.124	0.036	-0.002	-0.002	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	-0.002	-0.005	

60-3

New York State Department of Environmental Conservation

MEMORANDUM

TO: Mr. Lawrence Skinner, 12233-4756
 FROM: Mr. James Pomeroy
 SUBJECT: NOTES ON SAMPLING OF FISH FOR CONTAMINANTS ANALYSIS ASSOCIATED WITH THE PFOHL LANDFILL HAZARDOUS WASTE SITE
 DATE: June 4, 1990

There are a few items of information associated with our sampling of Aero Lake and trib 11b to Ellicott Creek which I wish to pass along at this time.

During the sampling of tributary 11b on May 16, 1990, we discovered a direct connection between Aero Lake and trib 11b to Ellicott Creek (see map labeled "Figure 2, Pfohl Brothers Landfill Site"). The water in this connection was at least 12 feet wide and three feet deep at the center. The significance of this observation is that fish can migrate freely between the lake and the ditch (trib 11b) between the lake and the landfill. However, most of the water in trib 11b appeared to be coming from sources other than Aero Lake.

The sediments in trib 11b for the first few hundred feet below the landfill and in the section immediately adjacent to the landfill were, when stirred up, very dark with an odor of petroleum or similar organics. An oily sheen often appeared at the surface as a result of the disturbance.

The area had experienced quite a bit of precipitation in the previous four days. In fact it was raining at the time of our sampling. The flow in trib 11b was undoubtedly above normal. I estimate that it was roughly 2 cfs. I doubt if this stream normally goes totally dry since such rooted aquatics as Potamogeton crispus were growing in the channel downstream of the landfill. The two tribs of 11b are normally dry or nearly so much of the year in my estimation. The flow from the first trib (11b-1) was perhaps 100 gpm while the second (11b-2) was no more than 50 gpm. The route of both these small streams has been (and is being) altered by a construction and demolition debris dump located somewhat west of the Pfohl Site.

The fish which are being forwarded are as follows:

Species	Aero Lake	Trib 11b	Ellicott Cr. Airport	Ellicott Cr. Bowmansville
Carp	3			
Largemouth Bass	4	1		
Brown Bullhead	3	2		
Bluegill Sunfish	5	9	4	
Rock Bass			4	4
Common Sucker		4	10	10
Common Shiner			7	
Northern Pike			1	1

All sites except Aero Lake have at least one more species than was requested. Perhaps you will not want to have all of them analyzed.

James K. Pomeroy
 James K. Pomeroy
 Senior Aquatic Biologist
 Section 9 - Clean

CHAIN OF CUSTODY



I, James K. Pomeroy, of 128 South Street, Cheektowaga, N.Y. have
(Print Name) (Print Address)

collected the on May 15, 1990 from Aero Lake in the
 vicinity of Pfohl Brothers Site Town of Cheektowaga,
Erie County.

Items: Bag 1: 3 carp (9T1601-9T1603); Bag 2: 4 Largemouth Bass (9T1604-9T1607),
3 Brown Bullhead (9T1608-9T1610), 5 Bluegill Sunfish (9T1611-9T1615).

said sample(s) were in my possession and handled according to standard procedures provided to me prior
 to collection. The sample(s) were placed in the custody of a representative of the New York State Depart-
 ment of Environmental Conservation on May 15, 1990

James K. Pomeroy 5-15-90
Signature Date

I, James K. Pomeroy, have received the above mentioned samples on the date specified
 and have assigned identification number(s) 9T1601 through 9T1615 to the sample(s).
 I have recorded pertinent data for the sample(s) on the attached collection records. The sample(s) remained in
 my custody until subsequently transferred, prepared or shipped at times and dates as attested to below.

James K. Pomeroy 6-4-90
Signature Date

SECOND RECIPIENT (Print Name)	TIME AND DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
THIRD RECIPIENT (Print Name)	TIME AND DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
FOURTH RECIPIENT (Print Name)	TIME AND DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
RECEIVED IN LABORATORY BY (Print Name)	TIME AND DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
LOGGED IN BY (Print Name)	TIME AND DATE	ACCESSION NUMBERS
SIGNATURE	UNIT	

SEE REVERSE SIDE

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
CHAIN OF CUSTODY



I, James K. Fomeroy, of 128 South Street, Chean, N.Y. have
(Print Name) (Print Address)
 collected the on May 16, 1990 from Trib 11b to Ellicott Creek in the
 vicinity of Pfohl Brothers Landfill Town of Cheektowaga,
Erie County.

Items: Bag 1 of 1: 2 Brown Bullhead (9T1616-9T1617), 1 Common Suckers (9T1618-9T1621), 1 largemouth bass (9T1622), 9 Bluegill Sunfish (9T1623-9T1631)

said sample(s) were in my possession and handled according to standard procedures provided to me prior to collection. The sample(s) were placed in the custody of a representative of the New York State Department of Environmental Conservation on May 16, 1990
James K. Fomeroy Signature 5-16-90 Date

I, James K. Fomeroy, have received the above mentioned samples on the date specified and have assigned identification number(s) 9T1616 through 9T1631 to the sample(s). I have recorded pertinent data for the sample(s) on the attached collection records. The sample(s) remained in my custody until subsequently transferred, prepared or shipped at times and dates as attested to below.
James K. Fomeroy Signature 6-4-90 Date

SECOND RECIPIENT (Print Name)	TIME AND DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
THIRD RECIPIENT (Print Name)	TIME AND DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
FOURTH RECIPIENT (Print Name)	TIME AND DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
RECEIVED IN LABORATORY BY (Print Name)	TIME AND DATE	
SIGNATURE	UNIT	
LOGGED IN BY (Print Name)	TIME AND DATE	ACCESSION NUMBERS
SIGNATURE	UNIT	

SEE REVERSE SIDE

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
CHAIN OF CUSTODY



I, James K. Pomeroy, of 128 South Street, Olean, N.Y. have
(Print Name) (Print Address)

collected the on May 31, 1990, ~~1989~~ from Ellicott Creek in the
(Buffalo International Airport)
 vicinity of Aero Drive and Young Road Town of Cheektowaga,
Erie County.

Items: 10 White Suckers (9T1632-9T1641), 1 Northern Pike (9T1642), 1 Rock Bass (9T1643-9T1646), 1 Bluegill Sunfish (9T1647-9T1650), 7 Common Shiners (9T1651-9T1657)

said sample(s) were in my possession and handled according to standard procedures provided to me prior to collection. The sample(s) were placed in the custody of a representative of the New York State Department of Environmental Conservation on May 31, 1990 ~~7-1989~~

James K. Pomeroy 5-31-90
 Signature Date

I, James K. Pomeroy, have received the above mentioned samples on the date specified and have assigned identification number(s) 9T1632 through 9T1657 to the sample(s). I have recorded pertinent data for the sample(s) on the attached collection records. The sample(s) remained in my custody until subsequently transferred, prepared or shipped at times and dates as attested to below.

James K. Pomeroy 6-4-90
 Signature Date

SECOND RECIPIENT (Print Name)	TIME AND DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
THIRD RECIPIENT (Print Name)	TIME AND DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
FOURTH RECIPIENT (Print Name)	TIME AND DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
RECEIVED IN LABORATORY BY (Print Name)	TIME AND DATE	
SIGNATURE	UNIT	
LOGGED IN BY (Print Name)	TIME AND DATE	ACCESSION NUMBERS.
SIGNATURE	UNIT	

SEE REVERSE SIDE

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
CHAIN OF CUSTODY



I, James K. Pomeroy, of 128 South Street, Olean, N.Y. have
(Print Name) (Print Address)
 collected the on May 31, 1990, ~~xxx~~ from Ellicott Creek in the
 vicinity of Bozonsville - NYS Route 33 Town of Cheektowaga,
Erie County.

Items: 10 White Suckers (9T1658-9T1667), 1 Northern Pike (9T1668), 1 Rock Bass (9T1669-9T1672)

said sample(s) were in my possession and handled according to standard procedures provided to me prior to collection. The sample(s) were placed in the custody of a representative of the New York State Department of Environmental Conservation on May 31, 1990, ~~xxxx~~

James K. Pomeroy 5-31-90
 Signature Date

I, James K. Pomeroy, have received the above mentioned samples on the date specified and have assigned identification number(s) 9T1658 through 9T1672 to the sample(s). I have recorded pertinent data for the sample(s) on the attached collection records. The sample(s) remained in my custody until subsequently transferred, prepared or shipped at times and dates as attested to below.

James K. Pomeroy 6-4-90
 Signature Date

SECOND RECIPIENT (Print Name)	TIME AND DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
THIRD RECIPIENT (Print Name)	TIME AND DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
FOURTH RECIPIENT (Print Name)	TIME AND DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
RECEIVED IN LABORATORY BY (Print Name)	TIME AND DATE	
SIGNATURE	UNIT	
LOGGED IN BY (Print Name)	TIME AND DATE	ACCESSION NUMBERS.
SIGNATURE	UNIT	

SEE REVERSE SIDE

82-14-61(2/84)

FISH/WILDLIFE COLLECTION RECORD
 NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
 DIVISION OF FISH AND WILDLIFE

Pfohl Brothers Site

TOXIC SUBSTANCE MONITORING PROGRAM

ON REGION 9 FOR

Pomeroy, Rende, Hohmann, Tuck

USING

seine

COLLECTION METHOD.

COLLECTOR(S)

freezing

METHOD.

SPECIMENS PRESERVED BY

ALL IN APPROPRIATE BLANKS AS COMPLETELY AS POSSIBLE.

LAB E ONLY B ENTRY	COLLECTION OR TAG NO.	SPECIES	DATE TAKEN	** Area B in Figures 1 & 2 LOCATION**	AGE	SEX 6/OR REPROD. CONDIT.	LENGTH (mm)	WEIGHT (g)	REMARKS
	9T1601	Carp	5/15/90	Aero Lake		--	592	3175	
	9T1602	Carp	5/15/90	Aero Lake		Male	521	2041	
	9T1603	Carp	5/15/90	Aero Lake		--	462	1588	
	9T1604	Largemouth Bass	5/15/90	Aero Lake		--	284	283	
	9T1605	Largemouth Bass	5/15/90	Aero Lake		--	349	567	
	9T1606	Largemouth Bass	5/15/90	Aero Lake		--	224	113	
	9T1607	Largemouth Bass	5/15/90	Aero Lake		--	272	255	
	9T1608	Brown Bullhead	5/15/90	Aero Lake		--	222	113	
	9T1609	Brown Bullhead	5/15/90	Aero Lake		--	239	142	
	9T1610	Brown Bullhead	5/15/90	Aero Lake		--	219	113	
	9T1611	Brown Sunfish	5/15/90	Aero Lake		--	232	283	
	9T1612	Brown Sunfish	5/15/90	Aero Lake		--	181	113	
	9T1613	Brown Sunfish	5/15/90	Aero Lake		--	165	57	
	9T1614	Brown Sunfish	5/15/90	Aero Lake		--	160	57	
	9T1615	Brown Sunfish	5/15/90	Aero Lake		--	163	57	

82-14-61(2/84)

FISH/WILDLIFE COLLECTION RECORD
 NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
 DIVISION OF FISH AND WILDLIFE

TOXIC SUBSTANCE MONITORING PROGRAM
 Battery Backpack

WM REGION 9 FOR Pfohl Brothers Site
 COLLECTOR(S) Pomeroy, Rende, Hohmann, Tuck
 USING Electrosucker COLLECTION METHOD.

ECHMENS PRESERVED BY freezing METHOD.

ALL IN APPROPRIATE BLANKS AS COMPLETELY AS POSSIBLE.

R LAB E ONLY N ENTRY	COLLECTION OR TAG NO.	SPECIES	DATE TAKEN	** Area C in Figures 1 & 2 LOCATION**	AGE	SEX &/OR REPROD. CONDIT.	LENGTH (mm)	WEIGHT (g)	REMARKS
	9T1616	Brown Bullhead	5/16/90	T-11B to Ellicott Ck.			254	227	
	9T1617	Brown Bullhead	5/16/90	T-11B to Ellicott Ck.			253	198	
	9T1618	Common Sucker	5/16/90	T-11B to Ellicott Ck.			150	28	
	9T1619	Common Sucker	5/16/90	T-11B to Ellicott Ck.			126	14	
	9T1620	Common Sucker	5/16/90	T-11B to Ellicott Ck.			147	14	
	9T1621	Common Sucker	5/16/90	T-11B to Ellicott Ck.			138	14	
	9T1622	Largemouth Bass	5/16/90	T-11B to Ellicott Ck.			146	28	
	9T1623	Bluegill Sunfish	5/16/90	T-11B to Ellicott Ck.			136	57	
	9T1624	Bluegill Sunfish	5/16/90	T-11B to Ellicott Ck.			124	28	
	9T1625	Bluegill Sunfish	5/16/90	T-11B to Ellicott Ck.			129	28	
	9T1626	Bluegill Sunfish	5/16/90	T-11B to Ellicott Ck.			121	28	
	9T1627	Bluegill Sunfish	5/16/90	T-11B to Ellicott Ck.			123	28	
	9T1628	Bluegill Sunfish	5/16/90	T-11B to Ellicott Ck.			116	28	
	9T1629	Bluegill Sunfish	5/16/90	T-11B to Ellicott Ck.			123	28	
	9T1630	Bluegill Sunfish	5/16/90	T-11B to Ellicott Ck.			113	14	

82-14-61(2/84)

FISH/WILDLIFE COLLECTION RECORD
 NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
 DIVISION OF FISH AND WILDLIFE

FROM REGION 9 FOR Pfohl Brothers Site

TOXIC SUBSTANCE MONITORING PROGRAM

Y COLLECTOR(S) Pomeroy, Wilkinson, Rende, Hohmann, Cornett

Georator electrofishing USING COLLECTION METHOD.

RECIDENS PRESERVED BY Freezing METHOD.

FILL IN APPROPRIATE BLANKS AS COMPLETELY AS POSSIBLE.

OR LAB SE ONLY AN ENTRY 0.	COLLECTION OR TAG. NO.	SPECIES	DATE TAKEN	** Area D in Figure 1 (near intersection of Aero Drive and Young Rd) LOCATION **	AGE	SEX 6/OR REPROD. CONDIT.	LENGTH (mm)	WEIGHT (g)	REMARKS
	9T1632	White Sucker	5/31/90	ELLICOTT Cr-Airport			286	255	
	9T1633	White Sucker	5/31/90	ELLICOTT Cr-Airport			271	227	
	9T1634	White Sucker	5/31/90	ELLICOTT Cr-Airport			267	227	
	9T1635	White Sucker	5/31/90	ELLICOTT Cr-Airport			246	198	
	9T1636	White Sucker	5/31/90	ELLICOTT Cr-Airport			254	198	
	9T1637	White Sucker	5/31/90	ELLICOTT Cr-Airport			205	113	
	9T1638	White Sucker	5/31/90	ELLICOTT Cr-Airport			253	170	
	9T1639	White Sucker	5/31/90	ELLICOTT Cr-Airport			235	170	
	9T1640	White Sucker	5/31/90	ELLICOTT Cr-Airport			240	142	
	9T1641	White Sucker	5/31/90	ELLICOTT Cr-Airport			208	113	
	9T1642	Northern Pike	5/31/90	ELLICOTT Cr-Airport			226	198	
	9T1643	Rock Bass	5/31/90	ELLICOTT Cr-Airport			193	198	
	9T1644	Rock Bass	5/31/90	ELLICOTT Cr-Airport			162	113	
	9T1645	Rock Bass	5/31/90	ELLICOTT Cr-Airport			177	142	
	9T1646	Rock Bass	5/31/90	ELLICOTT Cr-Airport			169	113	

82-14-61(2/84)

FISH/WILDLIFE COLLECTION RECORD
 NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
 DIVISION OF FISH AND WILDLIFE

TOXIC SUBSTANCE MONITORING PROGRAM
 Georator electrofishing
 COLLECTION METHOD.

BOW REGION 9 FOR Pfohl Brothers Site

RY COLLECTOR(S) Pomeroy, Wilkinson, Rende, Hohmann, Cornett

PECIMENS PRESERVED BY Freezing METHOD.

ILL IN APPROPRIATE BLANKS AS COMPLETELY AS POSSIBLE.

OR LAB USE ONLY AB ENTRY	COLLECTION OR TAG NO.	SPECIES	DATE TAKEN	** Area D in Figure 1 (near intersection of Aero Drive and LOCATION)**	AGE	SEX &/OR REPROD. CONDIT.	LENGTH (mm)	WEIGHT (g)	REMARKS
	9T1647	BUEGILL Sunfish	9/31/90	ELLICOTT Cr-Airport			135	57	
	9T1648	BUEGILL Sunfish	9/31/90	ELLICOTT Cr-Airport			125	57	
	9T1649	BUEGILL Sunfish	9/31/90	ELLICOTT Cr-Airport			108	28	
	9T1650	BUEGILL Sunfish	9/31/90	ELLICOTT Cr-Airport			97	14	
	9T1651	Common Shiner	9/31/90	ELLICOTT Cr-Airport			149	57	
	9T1652	Common Shiner	9/31/90	ELLICOTT Cr-Airport			151	57	
	9T1653	Common Shiner	9/31/90	ELLICOTT Cr-Airport			139	28	
	9T1654	Common Shiner	9/31/90	ELLICOTT Cr-Airport			118	28	
	9T1655	Common Shiner	9/31/90	ELLICOTT Cr-Airport			143	28	
	9T1656	Common Shiner	9/31/90	ELLICOTT Cr-Airport			121	28	
	9T1657	Common Shiner	9/31/90	ELLICOTT Cr-Airport			107	28	

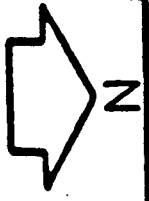
82-14-61(2/84)

FISH/WILDLIFE COLLECTION RECORD
 NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
 DIVISION OF FISH AND WILDLIFE

FROM REGION 9 FOR Pfohl Brothers Site TOXIC SUBSTANCE MONITORING PROGRAM
 BY COLLECTOR(S) Pomeroy, Wilkinson, Rende, Hohmann, Cornett Georator electrofishing
 SPECIMENS PRESERVED BY Freezing METHOD. COLLECTION METHOD.

FILL IN APPROPRIATE BLANKS AS COMPLETELY AS POSSIBLE.

FOR LAB USE ONLY LAB ENTRY NO.	COLLECTION OR TAG NO.	SPECIES	DATE TAKEN	** Area A in Figure 1 (downstream of NYS H.G. 33 in Bowmansville) **	AGE	SEX A/OR REPROD. CONDIT.	LENGTH (mm)	WEIGHT (g)	REMARKS
	9T1658	White Sucker	5/31/90	Ellicott Creek Bowmansville			326	482	
	9T1659	White Sucker	5/31/90	Ellicott Creek Bowmansville			280	255	
	9T1660	White Sucker	5/31/90	Ellicott Creek Bowmansville			250	170	
	9T1661	White Sucker	5/31/90	Ellicott Creek Bowmansville			248	170	
	9T1662	White Sucker	5/31/90	Ellicott Creek Bowmansville			255	170	
	9T1663	White Sucker	5/31/90	Ellicott Creek Bowmansville			242	170	
	9T1664	White Sucker	5/31/90	Ellicott Creek Bowmansville			224	142	
	9T1665	White Sucker	5/31/90	Ellicott Creek Bowmansville			212	113	
	9T1666	White Sucker	5/31/90	Ellicott Creek Bowmansville			202	113	
	9T1667	White Sucker	5/31/90	Ellicott Creek Bowmansville			223	113	
	9T1668	Northern Pike	5/31/90	Ellicott Creek Bowmansville			625	1531	
	9T1669	Rock Bass	5/31/90	Ellicott Creek Bowmansville			156	113	
	9T1670	Rock Bass	5/31/90	Ellicott Creek Bowmansville			161	113	
	9T1671	Rock Bass	5/31/90	Ellicott Creek Bowmansville			158	113	
	9T1672	Rock Bass	5/31/90	Ellicott Creek Bowmansville			146	113	



NEW YORK STATE THRUWAY

Aero Lake
(connection between lake and trib)

Trib 11b

Site Boundary

Ellicott Creek

Pion Brothers Landfill

Site Boundary

ROAD

AERO DRIVE

Pion Brothers Landfill

PFOHL ROAD

TRANSIT

LEGEND:



NYSDEC Trailor



Proposed Fence Location



Fenced Drum Storage Area



Marshy Area

Sampling Sites

B — Aero Lake

C — trib 11b

FIGURE 2
Pion Brothers Landfill Site

Pion Brothers Landfill, Cheektowaga, New York

Section 4.0

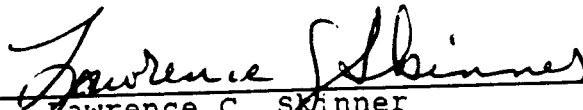
PROJECT OUTLINE

PROJECT OUTLINE


DIOXINS AND DIBENZOFURANS IN
FISH ASSOCIATED WITH THE
PFOHL BROTHERS SITE

New York Department of Environmental Conservation
Division of Fish and Wildlife
and
Division of Hazardous Waste Remediation

Project Leader:


Lawrence C. Spinner
Bureau of Environmental Protection

Project Quality Assurance Officer:

 5/2/90
Robert W. Bauer
Division of Fish and Wildlife

Date: February 23, 1990

1. Project Name: Dioxins and Dibenzofurans in Fish Associated with the Pfohl Brothers site
2. Project Requested By: NYSDEC, Division of Hazardous Waste Remediation
3. Date of Request: February 1990
4. Date of Project Initiation: February 1990
5. Project Officer: Lawrence C. Skinner
6. Quality Assurance Officer: Robert W. Bauer
7. Project Description:

A. Background:

The presence of 2, 3, 7, 8 - tetrachlorodibenzo-p-dioxin (2, 3, 7, 8-TCDD) has been documented in a hazardous waste site known as the Pfohl Brothers Landfill in Cheektowaga, New York. The site is near the Greater Buffalo International Airport and has leachates which drain to a tributary of Ellicott Creek and to Aero Lake (Camp, Dresser and McKee, 1990).

The New York State Department of Environmental Conservation is directing remedial investigations of the extent of chemical contamination caused by the landfill and its impacts on local biota. This protocol will provide limited data on dioxin contamination of the local fishery resource.

B. Objective and Scope:

The one objective of this study is to determine the presence or absence of dioxin and dibenzofuran contamination of fisheries in Ellicott Creek and Aero Lake. This is a one-time investigation only.

C. Data Usage:

The data provided by this study will provide an initial assessment of the local extent of contamination of fish by dioxins and dibenzofurans that originate from the Pfohl Brothers Landfill.

D. Monitoring Network Design and Rationale:

This is a very limited study to determine the presence or absence of dioxins and dibenzofurans in fish associated

with the Pfohl Brothers Landfill. As a consequence, a total of twelve composite fish samples are requested as follows (Figure 1):

<u>Station</u>	<u>Location</u>	<u>Collected</u>
A.	Ellicott Creek upstream of landfill in the vicinity of Bowmansville	2 samples
B.	Aero Lake	4 samples
C.	Tributary between Landfill and Aero Lake	3 samples
D.	Ellicott Creek below tributary in the vicinity of the Greater Buffalo International Airport	3 samples

Each composite sample is to be of a single species and should contain 100 grams of flesh as a minimum. A sample should contain a minimum of three fish. If the fish are edible species of a size that may be consumed, the sample weight should be of edible flesh. If the fish are non-edible species or edible species of a size that can not be consumed, then whole fish will be used in determining when an adequate sample weight is obtained. In the event 100 grams of fish can not be obtained for each sample, keep the available fish and contact Lawrence Skinner for instructions.

Where possible, the same species should be collected from each station. However, it is obvious that this is not possible at all locations due to differing habitats. From Aero Lake, if available, preferred species include carp, bullhead and then other edible species. In stream habitats, white sucker and minnow species are most likely to be encountered.

It is possible that the water quality in the tributary is too degraded to sustain fish life or the flow may be insufficient to support fish. In this event, sampling should be shifted to Ellicott Creek downstream of the landfill.

Two additional drainages emanate from the vicinity of the landfill. These drainages are normally intermittent, however, an estimate of flow, if any, should be determined at the nearest road crossing at the time of sampling of other waters noted above.

This collection may be the subject of litigation. Proper completion of chain of custody documentation and sample collection forms is essential. Adherence to chain of custody procedures outlined in section 12 is required. The chain of custody form is in Appendix I.

Sample collection by the use of electrofishing equipment or nets is preferred. Following capture, the fish should be kept alive until processing for record keeping purposes. Processing will be by procedures in Appendix I. Data on collection location, method of collection, collection personnel, date of collection, sample preservation method, fish species, tag or identification numbers, fish length (to the nearest millimeter), fish weight (to the nearest 5 grams of edible individuals or composite samples) will be recorded on the "Fish/Wildlife Collection Record" (Appendix I).

E. Analytical Parameters

A contract laboratory (i.e. Triangle Laboratories, Inc. at Research Triangle Park, North Carolina) will analyze ground fish samples for 2, 3, 7, 8-TCDD, tetra - penta - , hexa - , hepta - and octachlorodibenzo-p-dioxins plus 2, 3, 7, 8-TCDF, tetra - , penta - , hexa - , hepta - , and octachlorodibenzofurans, and lipid content. Concentrations of dioxins and dibenzofurans will be reported in pg/g (parts per trillion) on a wet weight basis and lipid values are to be reported to the nearest one hundredth of one percent. Quantitation limits for dioxin and dibenzofurans are to be 5.0 ppt or better. Laboratory and Department sample numbers are to be reported. The analytical methodology is specified in Method 8290 "National Dioxin Study Analytical Procedures and Quality Assurance Plan for the Analysis of 2, 3, 7, 8-TCDD" (EPA/600/3-85/19) with a modification. The modification is the use of chlorhydric acid in sample digestion to prevent decomposition of certain PCDD/PCDF congeners.

The Analytical Services Unit of the Department's Hale Creek Field Station (Gloversville, N.Y.) will conduct chemical analyses for PCB, organochlorine pesticides and total mercury. PCB, organochlorine pesticide methodology is published in the U.S. Food and Drug Administration's Pesticide Analytical Manual, Volume 1, Sections 211 and 253. Determinations will be made using gas chromatography with electron capture detectors and capillary columns. Mercury will be analyzed by the cold vapor technique of Hatch and Ott (1968) as modified for instrumentation at the laboratory.

F. Quality assurance:

For these 12 fish samples, quality assurance needs for dioxin and dibenzofuran analyses are limited to:

1. 1 blank sample,
2. 1 duplicate analysis,
3. 1 spiked sample, and
4. 1 internal standard sample.

The quality control limits are indicated in "National Dioxin Study Analytical Procedures and Quality Assurance Plan for the Analysis of 2, 3, 7, 8 - TCDD" (EPA/600/3-85/09).

For the PCB, organochlorine pesticide and mercury analyses, one blank sample, one duplicate analyses and one spiked sample will be run and reported. Quality control limits are those indicated in standard operating procedures for the Analytical Services Unit at the Hale Creek Field Station, Gloversville, N.Y.

All samples collected will be placed in hexane-rinsed aluminum foil following recording of pertinent data noted in 7.D. above. Each sample package will be labelled with date of collection, site name (Pfohl Brothers), sample location, and sample identification number on a tag to be affixed to the sample package with an adhesive tape.

8 Project fiscal information:

The estimated staff time and fiscal expenditures for this project are found below:

<u>Purpose</u>	<u>Staff days</u>	<u>Cost (\$)</u>
Personnel		
- collection + transport	6	960
- sample processing and shipping	1.5	150
- project coordination, data management	4	800
Supplies + Materials	-	940
Travel	-	150
Contractual services		19,000
Sample analyses at Hale Creek Field Station	6	2,500
Total	16.5	24,500

9. Schedule of tasks and products:

<u>Activity</u>	<u>Month/Year</u>
Sampling & shipment to DEC lab.	April - May 1990
Contract amendment completion	June, 1990
Sample processing & shipment to contract laboratory	June, 1990
Receive analytical results & report to Division of Hazardous Waste Remediation	August, 1990

10. Project organization and responsibility:

<u>Duty</u>	<u>Responsibility</u>
Project coordination, administration, data analysis, reporting	Lawrence Skinner, Division of Fish and Wildlife
Overall quality assurance	Robert Bauer
Sample collection and transport to Hale Creek Field Station	Stephen Mooradian
Sample preparation and shipping to contract laboratory; chemical analysis of PCB, organochlorine pesticides and mercury	Samuel Jackling

10. Project organization and responsibility (cont'd.)

<u>Duty</u>	<u>Responsibility</u>
Dioxin and dibenzofuran analysis and reporting to Department	Triangle Laboratories Inc.
Funding and overall project management	Joseph White Division of Hazardous Waste Remediation

11. Data quality requirements and assessments:

Data completeness: Data will be considered complete when reporting of all analytical results for all samples submitted is received by the Department and results of quality assurance samples are accepted by the project leader.

Data comparability: Data will be compared with guidance values for the protection of public health (10 ppt by the Department of Health) and for the protection of piscivorous wildlife (2.3 ppt as suggested by Newell et al., 1987).

12. Sample custody procedures:

All samples shall remain in the custody of the original collector until passed successively to the Hale Creek Field Station, Triangle Laboratories, Inc. and transmitted to the project leader. Custody and each change in custody shall be recorded on the Department of Environmental Conservation Chain of Custody form (Form 82-14-64) (final copy to be provided to project leader). Analysis request form (Appendix II) shall show change of custody when samples are sent to the contract laboratory (copy to be retained by project leader). The analysis request forms must be double checked to ensure accuracy and that shipment contents are properly accounted.

Shipping containers, e.g. ice chests or other containers, must be taped shut during any transport of samples. Broken seals, if not done intentionally for project purposes, shall indicate potential sample tampering and must be indicated on custody records. During storage, samples are to be retained in locked freezers.

13. Calibration procedures and preventative maintenance:

These procedures are detailed in the methodology for analysis of dioxins and dibenzofurans noted in 7.E. above.

14. Documentation, data reduction, and reporting.

A. Documentation: A data will be produced on a hard copy paper report sheet and will be stored in computer filed. All data will be checked for possible errors.

B. Data reduction and reporting: All raw data will be placed on a summary table and reported with limited comparisons to existing regulatory or environmental guidelines. Reporting will occur within one month of receipt of the complete data set.

15. Data validation:

All data, including quality assurance information, will be reviewed by the project leader and accepted, qualified or rejected.

16. Performance and system audits:

The contract laboratory will be visited by the Quality Assurance Officer in calendar year 1990 for an on-site audit. Data audits will be accomplished through inspection and use of quality assurance procedures.

17. Corrective Actions:

Where insufficient samples are available, the collection personnel must consult with the project leader to evaluate alternatives and implement mutually agreed decisions.

For chemical analyses, corrective actions are outlined in the analytical methodology cited in section 7.E. above.

When quality assurance samples indicate results exceeding control limits, the sample will be rerun if an error in calculation or reporting is not found. If the samples remain control limits, the data is voided.

18. Personnel safety:

There is no authorization for entry on to the Pfohl Brothers Landfill provided or inherent in this sample collection request. All sampling is designed to avoid the necessity of entry onto the landfill site. However, there is a concern for personnel safety due to the potential presence of dioxins in sediments of Aero Lake and streams originating or flowing past the Pfohl Brothers landfill. Care should be taken to minimize body contact with sediments. All gear coming in contact with sediments should be thoroughly washed following exposure.

Due to federal regulations regarding entry of personnel onto hazardous waste sites, personnel collecting these fish samples should be accompanied by a Department member that is certified as having received hazardous waste site safety training. Please contact Jaspal Walia, Senior Sanitary Engineer for Region 9 (716-847-4585), to arrange the required assistance.

19. References Cited:

- Camp, Dresser and McKee. 1990. Draft interim report: Leachate, surface water and sediment investigation Pfohl Brothers Landfill, Cheektowaga, New York, Site Number 9-15-043. Prepared for NYS Dept. of Environmental Conservation, Albany.
- Hatch, W.R., and W.L. Ott. 1968. Determination of sub-microgram quantities of mercury by atomic absorption spectrophotometry. *Analyt. Chem.* 40:2085-2087.
- Newell, A.J., D.W. Johnson, and L.K. Allen. 1987. Niagara River biota contamination project: Fish flesh criteria for piscivorous wildlife. Tech. Rep. 87-3, Division of Fish and Wildlife, NYS Department of Environmental Conservation, Albany, NY. 182 p.

APPENDIX I

APPENDIX I

GENERAL NEW YORK STATE

FISH COLLECTION PROCEDURES

A. Following data are to be taken on each fish collected:

1. Date collected
2. Species identification (please be explicit enough to enable assigning genus and species)
3. Total length (nearest mm or smallest sub-unit on measuring instrument) and weight (nearest g or smallest sub-unit of weight on weighing instrument). Take all measures as soon as possible with calibrated, protected instruments (e.g. from wind and upsets) and prior to freezing.
4. Method of collection (gill net, hook and line, etc.)
5. Sample location (Waterway and nearest prominent identifiable landmark).
6. Sex - fish may be cut enough to allow sexing, but do not eviscerate.
7. Tag number (each specimen to be individually tagged with jaw tag).

Record length and weight as soon as possible after collection and before freezing. Other data are recorded in the field upon collection. An age determination of each fish is optional, but if done, it is recorded in the appropriate "Age" column.

The original of all collection record and continuity of evidence forms shall accompany delivery of fish to the lab. A copy shall be directed to Larry Skinner or Ron Sloan. All necessary forms will be supplied by the Bureau of Environmental Protection.

Please submit photocopies of topographic maps or good quality navigation charts indicating sampling locations. These records are of immense help to us (and hopefully you) in providing documented location records which are not dependent on memory and/or the same collection crew. In addition, they may be helpful for contaminant source trackdown and control efforts of the Department.

B. Each fish to be wrapped in hexane rinsed aluminum foil. The Bureau of Environmental Protection will supply the aluminum foil.

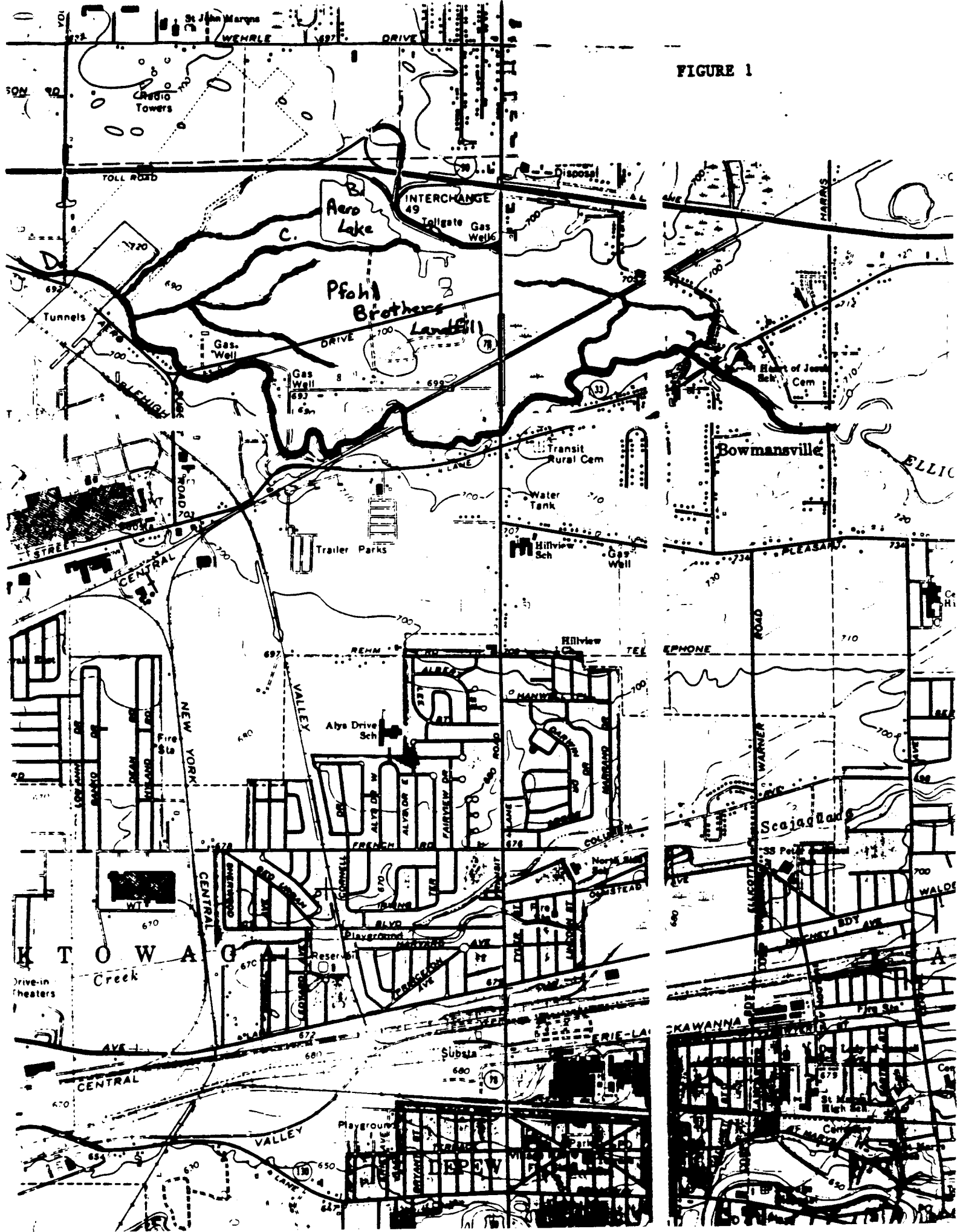
- C. Groups of fish, by species, to be placed in one large plastic bag per sampling location. The Bureau of Environmental Protection will supply the larger bags.
- D. Do not eviscerate.
- E. All fish must be kept at a temperature below 45° F immediately following data processing. As soon as possible, freeze at 0° F + 10° F. Due to occasional freezer failures, daily freezer temperature logs are required.
- F. Prior to any delivery of fish, coordinate delivery with, and send copies of the collection records, continuity of evidence forms, and freezer temperature logs, to:

Larry Skinner or Ron Sloan
Bureau of Environmental Protection
Room 530
50 Wolf Road
Albany, New York 12233-4756
Telephone: (518) 457-1769

Samples will then be directed to:

The analytical facility and personnel
noted on specific project descriptions.

FIGURE 1



CHAIN OF CUSTODY



I, _____, of _____ have
(Print Name) (Print Address)

collected the on _____, 198__ from _____ in the
 vicinity of _____ Town of _____,
 _____ County.

Items: _____

said sample(s) were in my possession and handled according to standard procedures provided to me prior to collection. The sample(s) were placed in the custody of a representative of the New York State Department of Environmental Conservation on _____, 198__

_____ Signature _____ Date

I, _____, have received the above mentioned samples on the date specified
 () have assigned identification number(s) _____ to the sample(s).
 I have recorded pertinent data for the sample(s) on the attached collection records. The sample(s) remained in my custody until subsequently transferred, prepared or shipped at times and dates as attested to below.

_____ Signature _____ Date

SECOND RECIPIENT (Print Name)	TIME AND DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
THIRD RECIPIENT (Print Name)	TIME AND DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
FOURTH RECIPIENT (Print Name)	TIME AND DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
RECEIVED IN LABORATORY BY (Print Name)	TIME AND DATE	
SIGNATURE	UNIT	
LOGGED IN BY (Print Name)	TIME AND DATE	ACCESSION NUMBERS:
SIGNATURE	UNIT	

**NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
BUREAU OF ENVIRONMENTAL PROTECTION**

FISH PREPARATION PROCEDURES FOR CONTAMINANT ANALYSIS

Background

New York State Department of Environmental Conservation (DEC) conducts studies requiring chemical analysis on fish tissues. Routine monitoring and surveillance studies develop data on contaminants in fish for several reasons:

1. To identify sources of environmental contamination;
2. To identify the geographic extent of environmental contamination;
3. To identify temporal trends of contaminants in fish and wildlife; and
4. To provide information regarding human consumption advisories.

Chemical analyses of edible fish flesh have been determined to be the most appropriate analyses for satisfying all of these objectives. The following methodology has been developed in order to standardize the tissues under analysis and to adequately represent the contaminant levels of fish flesh. The methodology is slightly modified from the U.S. Food and Drug Administration procedures. The portion of edible flesh analyzed will be referred to as the standard fillet unless otherwise noted. For some species, the procedure is modified as indicated below.

Procedures for Standard Filleting

1. Remove scales from fish. Do not remove the skin.
2. Make a cut along the ventral midline of the fish from the vent to the base of the jaw.
3. Make diagonal cut from base of cranium following just behind gill to the ventral side just behind pectoral fin.
4. Remove the flesh and ribcage from one-half of the fish by cutting from the cranium along the spine and dorsal rays to the caudal fin. The ribs should remain on the fillet.
5. Score the skin and homogenize the entire fillet.

Modifications to Standard Fillet

Four modifications of the standard fillet procedure are designed to account for variations in fish size or known preferred preparation methods of the fish for human consumption.

1. Some fish are too small to fillet by the above procedure. Fish less than approximately 6 inches long and rainbow smelt are prepared by cutting the head off from behind the pectoral fin and eviscerating the fish. Ensure that the belly flap is retained on the carcass to be analyzed. When this modification is used, it should be noted when reporting analytical results.

2. Some species are generally eaten by skinning the fish. The skin from these species is also relatively difficult to homogenize in the sample. Hence, for the following list of species, the fish is first skinned prior to filleting:

Brown bullhead	White catfish
Yellow bullhead	Channel catfish
Atlantic sturgeon	Lake sturgeon
Black bullhead	

3. American eel are analyzed by removing the head, skin, and viscera; filleting is not attempted.

4. Forage fish and young-of-year fish are analyzed whole. This category is considered to be less than 150mm (6 inches).

APPENDIX II

APPENDIX II
 TRIANGLE LABORATORIES, INC
 801-10 CAPITOLA DRIVE
 DURHAM, NC 27713
 PHONE: (919) 544-5729
 FAX: (919) 544-5491

PLEASE FILL IN THE FOLLOWING INFORMATION AND THE TYPE OF ANALYSIS(S) YOU ARE REQUESTING AND RETURN WITH THE SAMPLES.

CUSTOMER INFORMATION

TECH CONTACT _____ TYPE AND NO. OF SAMPLES
 PHONE NUMBER _____
 COMPANY _____ SOIL WATER SLUDGE PULP
 PROJECT NAME _____ MILK FISH ADIPOSE PUF
 PURCHASE ORDER NO. _____ ASH MM5 VOST CARDBOARD
 QUOTATION REFERENCE NO. _____ * OTHER _____

* If a manufactured chemical, please give us the proper name of chemical (i.e. IUPAC or common name) or Material Safety Data Sheet.

ANTICIPATED TURNAROUND TIME..... 30 DAYS FOR ORGANICS
 30-45 DAYS FOR DIOXINS
 FAST TURNAROUND 21 DAYS
 14 DAYS
 7 DAYS

(All Fast-turnaround samples should be negotiated with TLI Laboratories before shipment due to scheduling concerns)

SHIPPING (STREET) ADDRESS: _____ BILLING ADDRESS: _____

 ATTN: _____ ATTN: _____

PARAMETERS TO BE ANALYZED:

<u>DIOXINS</u>	<u>ORGANICS</u>	METHOD (if known)
DD and DF _____	VOLATILES _____	_____
2378 TCDF ONLY _____	SEMIVOLATILES _____	_____
2378 TCDD ONLY _____	PESTICIDES/PCB _____	_____
TCDD/TCDF _____	PCB (GC/MS) _____	_____
TETRA-OCTA _____	CBCP (GC/MS) _____	_____
CONFIRMATION _____	PAH (GC/MS) _____	_____

OTHERS: _____ OTHERS: _____

ADDITIONAL COMMENTS/REQUIREMENTS:

Section 5.0

HEALTH ADVISORIES

HEALTH ADVISORIES: CHEMICALS IN SPORTFISH OR GAME**SUMMARY**

The New York State Department of Health (DOH) issues an advisory on eating sportfish and wildlife taken in New York State because some of these foods contain potentially harmful levels of chemical contaminants. The health advisory is divided into three sections: (1) general advice on sportfish taken from waters in New York State; (2) advice on sportfish from specific water bodies; and (3) advice on wildlife. The advisory is developed and updated yearly and is directed to persons who may be likely to eat large quantities of sportfish or wildlife which might be contaminated.

BACKGROUND

Fishing and hunting provide many benefits including food and recreation. Many people enjoy cooking and eating their own catch. However, some fish and wildlife contain elevated levels of potentially harmful chemicals. These chemicals or contaminants enter the environment through such means as past industrial discharges, leaking landfills and the widespread use of pesticides. Fish and wildlife take in contaminants directly from the environment and from the food they eat. Some chemicals remain in them and then are ingested by people. DDT, PCBs, mirex, chlordane and mercury have been found in some species of fish taken in New York State at levels that exceed federal food standards. Long-term exposure to high levels of these chemicals has been linked to health effects such as cancer (in laboratory animals) or nervous system disorders (in humans).

The federal government establishes standards (tolerance levels or action levels) for chemical residues in or on raw agricultural products, including fish, in the United States. A tolerance level is the maximum amount of a residue expected when a pesticide is used according to the label directions, provided that the level is not an unacceptable health risk. The health risks are estimated assuming that people eat about one one-half pound fish meal each month. Action levels are established for chemicals that do not have approved agriculture uses but may unavoidably contaminate food due to their environmental persistence. Fish and wildlife cannot be legally sold if they contain a contaminant at a level greater than its tolerance or action level.

In New York State, the Department of Environmental Conservation (DEC) routinely monitors contaminant levels in fish and wildlife. The contaminant levels are measured in a skin-on fillet which has not been trimmed; the federal government uses this sample in determining whether or not the fish exceeds the tolerance level. When fish from a specific water body are found to contain high contaminant levels, DOH issues a sportfish consumption advisory for that species of fish. Under some circumstances, the state prohibits the sale or offering for sale of fish containing high contaminant levels. Advisories are also developed for contaminated wildlife. These actions are taken to minimize public exposure to contaminated food products.

GENERAL ADVISORY

The general health advisory for sportfish is that an individual eat no more than one meal (one-half pound) per week of fish from the state's freshwaters, the Hudson River estuary, or the New York City harbor area (the New York waters of the Hudson River to the Verrazano Narrows Bridge, the East River to the Throgs Neck Bridge, the Arthur Kill, Kill Van Kull, and Harlem River). This general advisory is designed to protect against consumption of large amounts of fish which may come from contaminated waterways that are as yet untested or which may contain unidentified contaminants. The general advisory does not apply to fish taken from marine waters. Ocean fish, although less tested, are generally less contaminated than freshwater fish, and fish that live further out from shore are likely to be even less contaminated than those that live or migrate close to the shore.

SPECIFIC FRESHWATER ADVISORIES

The second part of the health advisory contains information and recommendations for specific bodies of water. Fish monitoring has identified over thirty water bodies that have fish with a contaminant level that exceeds an action level or a tolerance level. Department of Health recommendations are based on the contaminant levels and suggest either limiting or avoiding eating a specific kind of fish from a particular body of water. In some cases, enough information is available to issue advisories based on the length of the fish. Older (larger) fish are often more contaminated than younger (smaller) fish.

The health advisory contains specific advice for infants, children under the age of fifteen and women of childbearing age. The Health Department recommends that they not eat fish from the specific water bodies listed in the advisory. The reason for this specific advice is that chemicals can have a potentially greater impact on developing organs in young children or in the fetus. Waters which have specific advisories have at least one species of fish with an elevated contaminant level, which means that a contamination source is in or near the water.

MARINE WATERS

The Department of Health has issued specific advisories for marine waters. These apply to striped bass, bluefish, and American eels and are the only marine fish advisories currently in effect. Striped bass, bluefish, and eels have specific habits or characteristics which make them more likely to have contaminants than other marine species.

An advisory has been issued for striped bass because of PCB contamination. Although saltwater fish are generally less contaminated than freshwater fish, fish like striped bass which spend time in Hudson River waters, can be contaminated at levels above food standards. The advisory for striped bass is divided into two geographical areas. For striped bass taken from the Hudson River, New York Harbor and western Long Island waters, the Health Department recommends against any consumption. For bass taken from eastern Long Island waters, the advisory is to eat no more than one meal per month. Women of childbearing age, infants and children under fifteen should not eat striped bass.

The Department has extended the general advisory to bluefish and American eels. They are contaminated with PCBs, although to a lesser extent than striped bass. The recommendation for bluefish and American eels caught in New York State's waters is to eat no more than one meal (one-half pound) per week, with an additional recommendation to not eat American eels from the Hudson, Harlem, and East Rivers and New York City harbor area.

OTHER ADVISORIES

The Department has also issued special advisories for crabs in the Hudson River, snapping turtles, and waterfowl which have been found to be contaminated with PCBs. Cooking methods that minimize the amount of contaminants which would be eaten are recommended. The complete advisory is provided at the end of this brochure.

The health implications of eating deformed or cancerous fish are unknown. Any obviously diseased fish (marked by tumors, lesions or other abnormal condition of the fish skin, meat or internal organs) should be discarded.

SHELLFISH

All foods of animal origin, such as meat, poultry, seafoods and dairy products should be thoroughly cooked before consumption. The Health Department specifically recommends that the public not eat raw or partially cooked clams or oysters. This advice is not because of chemical contamination. Raw or partially cooked shellfish illegally harvested from waters contaminated with sewage have been linked to gastrointestinal illness and hepatitis A, caused by bacteria or viruses.

SHOULD I BE CONCERNED ABOUT MEDICAL-TYPE WASTE AND GARBAGE AFFECTING FISH?

The recent wash-up of medical-type waste and garbage on New York and Long Island beaches has not affected the sanitary condition of marine fish, lobster and crabs. Furthermore, fish do not carry or transmit the AIDS virus. Consumers need not limit consumption of these foods because of these problems. Good sanitary practices should be followed when preparing fish from any waters. Fish should be kept iced or refrigerated until cleaned and filleted and then refrigerated until cooked. Hands, utensils, and work surfaces should be washed before and after handling any raw food, including fish. Seafood should be cooked to an internal temperature of 140° F.

WHAT CAN I DO TO REDUCE MY EXPOSURE TO CHEMICAL CONTAMINANTS FROM FISH?

Fish is an important source of protein and is low in saturated fat. Naturally occurring fish oils have been reported to lower plasma cholesterol and triglycerides, thereby decreasing the risk of coronary heart disease. Increasing fish consumption is useful in reducing dietary fat and controlling weight. By eating a diet which includes food from a variety of protein sources, an individual is more likely to have a diet which is adequate in all nutrients.

Although eating fish has some health benefits, fish with high contaminant levels should be avoided. When deciding whether or not to eat fish which may be contaminated, the benefits of eating those fish can be weighed against the risks. For young women, eating contaminated fish is a health concern not only for herself but also to any unborn or nursing child, since the chemicals may reach the fetus and can be passed on in breastmilk. For an older person with heart disease the risks, especially of long term health effects, may not be as great a concern when compared to the benefits of reducing the risks of heart disease.

Everyone can benefit from eating the fish they catch and can minimize their contaminant intake by following these general recommendations:

1. Choose uncontaminated species from water bodies which are not listed in the Health Department's advisory.
2. Use a method of filleting the fish which will reduce the skin, fatty material and dark meat. Those parts of the fish contain many of the contaminants. A pamphlet on this method is available from the DEC.
3. Choose smaller fish, consistent with DEC regulations, within a species since they may have lower contaminant levels. Older (larger) fish within a species may be more contaminated because they have had more time to accumulate contaminants in their bodies.
4. For shellfish, such as crab and lobster, do not eat the soft green substance found in the body section (tomalley, liver). This part of the shellfish has been found to contain high levels of chemical contaminants, including PCBs and heavy metals.
5. Based on limited studies, cooking methods such as broiling, poaching, boiling, and baking, which allow contaminants from the fatty portions of fish to drain out, are preferable. Pan frying is not recommended. The cooking liquids of fish from contaminated waters should be avoided since these liquids may retain contaminants.

ADDITIONAL INFORMATION

NEW YORK STATE DEPARTMENT OF HEALTH

For more information on health effects from exposure to chemical contaminants, contact:

Environmental Health Information
1-800-458-1158 (toll-free number)

Leave your name, number and brief message. Your call will be returned as soon as possible.

Bureau of Toxic Substance Assessment
2 University Place
Albany, NY 12203-3313
(518) 458-6376

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

For more information on fishing, contact:

Regional Offices

Region 1

SUNY Campus, Bldg. 40
Stony Brook, NY 11794
(516) 751-7900

Region 2

47-40 21st St.
Long Island City, NY 11101
(718) 482-4900

Region 3

21 South Putt Corners Rd.
New Paltz, NY 12561
(914) 255-54538

Region 4

2176 Guilderland Ave.
Schenectady, NY 12306
(518) 382-0680

Region 5

Route 86
Ray Brook, NY 12977
(518) 891-1370

Region 6

State Office Bldg.
Watertown, NY 13601
(315) 785-2236

Region 7

7481 Henry Clay Blvd.
Liverpool, NY 13088
(315) 428-4497

Region 8

Routes 5 and 20
Avon, NY 14414
(716) 226-2466

Region 9

600 Delaware Ave.
Buffalo, NY 14202
(716) 847-4600

For information on contaminant levels, contact:

Bureau of Environmental Protection
50 Wolf Road
Albany, NY 12233
(518) 457-6178

Prepared by:
New York State Department of Health
Division of Environmental Health Assessment
April 1989

1989-90 HEALTH ADVISORY

The following recommendations are based on evaluating contaminant levels in fish and wildlife. To minimize potential adverse health impacts, the New York State Department of Health recommends:

- o Eat no more than one meal (one half pound) per week of fish from the state's freshwaters, the Hudson River estuary, or the New York City harbor area (the New York waters of the Hudson River to the Verrazano Narrows Bridge, the East River to the Throgs Neck Bridge, the Arthur Kill, Kill Van Kull, and Harlem River), except as recommended below.
- o Women of childbearing age, infants and children under the age of 15 should not eat fish with elevated contaminant levels. The fish species listed from the waters below have contaminant levels that exceed federal food standards and most fish taken from these waters contain elevated contaminant levels.
- o Observe the following restrictions on eating fish from these waters and their tributaries to the first barrier impassable by fish:

<u>Water</u>	<u>Species</u>	<u>Recommendation</u>
Belmont Lake (Suffolk Co.)	Carp	Eat None.
Buffalo River and Harbor (Erie Co.)	Carp	Eat none.
Canadice Lake (Ontario Co.)	Lake or brown trout over 21"	Eat none.
Canandaigua Lake (Ontario-Yates Co.)	Lake trout over 24"	Eat no more than one meal per month.
Cayuga Creek (Niagara Co.)	All species	Eat none.
East River (NYC)	American eel	Eat none.
Fourth Lake (Herkimer- Hamilton Co.)	Lake trout	Eat none.
Freeport Reservoir (Nassau Co.)	All species	Eat no more than one meal per month.
Gill Creek (Niagara Co.; mouth to Hyde Park Lake Dam)	All species	Eat none.
Hall's Pond (Nassau Co.)	Carp, Goldfish	Eat none.
Harlem River (NYC)	American eel	Eat none.
Hoosic River (Rensselaer Co.)	Brown and rainbow trout	Eat no more than one meal per month.

Hudson River

- Hudson Falls to Troy Dam	All species	No fishing.
- Troy Dam south to and including the Lower N.Y. Harbor	American eel, white perch, Carp, Goldfish, Brown bullhead, Largemouth bass, Pumpkinseed, White catfish, Walleye, Striped bass	Eat none.
	Black crappie, Rainbow smelt, Atlantic needlefish, Bluefish, Tiger muskellunge, Northern pike	Eat no more than one meal per month.
	Blue crab	Eat no more than 6 crabs per week.
	- hepatopancreas (mustard, liver or tomalley)	Eat none.
	- cooking liquid	Discard.
Indian Lake (Lewis Co.)	All species	Eat no more than one meal per month.
Irondequoit Bay	Carp	Eat none.
Keuka Lake (Yates-Steuben Co.)	Lake trout over 25"	Eat no more than one meal per month.
*Kinderhook Lake (Columbia Co.)	American eel	Eat no more than one meal per month.
*Lake Champlain		
-whole lake	Lake trout greater than 25"	Eat no more than one meal per month.
-Bay within Cumberland Head to Valcour Island	American eel, Brown bullhead	Eat no more than one meal per month.
Lake Ontario, St. Lawrence and Niagara River below the falls	Eel, Channel catfish, Lake trout, Chinook salmon, Coho salmon over 21", Rainbow trout over 25", Brown trout over 20".	Eat none.
	Carp, White perch, smaller Coho salmon, Rainbow and Brown trout.	Eat no more than one meal per month.

Loft's Pond (Nassau Co.)	Carp, Goldfish	Eat no more than one meal per month.
Long Pond (Lewis Co.)	Splake over 12"	Eat none.
Upper Massapequa Reservoir (Nassau Co.)	White perch	Eat no more than one meal per month.
*Mohawk River (Below Lock 7)	White perch	Eat none.
	Smallmouth bass	Eat no more than one meal per month.
Nassau Lake (Rensselaer Co.)	All species	Eat none.
Niagara River (entire)	Carp	Eat no more than one meal per month.
Niagara River (below the falls; also see Lake Ontario)	Smallmouth bass	Eat no more than one meal per month.
Onondaga Lake (Onondaga Co.)	All species	Eat none.
Oswego River (Oswego Co.; power dam in Oswego to upper dam at Fulton)	Channel catfish	Eat no more than one meal per month.
St. James Pond (Suffolk Co.)	All species	Eat no more than one meal per month.
St. Lawrence River (see Lake Ontario)		
Salmon River (Oswego Co.; mouth to Salmon Reservoir; also see Lake Ontario)	Smallmouth bass	Eat none.
Saw Mill River (Westchester Co.)	American eel	Eat no more than one meal per month.
Schroon Lake (Warren Co.)	Lake trout	Eat no more than one meal per month.
Sheldrake River (Westchester Co.)	American eel	Eat none.
Smith Pond Rockville Center (Nassau Co.)	All species	Eat no more than one meal per month.

Smith Pond Roosevelt Park (Nassau Co.)	Carp, Goldfish	Eat no more than one meal per month.
Spring Pond (Suffolk Co.)	All species	Eat none.
Stillwater Reservoir (Herkimer Co.)	Splake	Eat no more than one meal per month.
Valatie Kill - between Co. Rt. 18 and Nassau Lake	All species	Eat none.

Additional Advice

A brochure which provides further information on the health advisory is available from NYS DEC and NYS DOH Regional Offices or can be obtained by calling 1-800-458-1158.

The health implications of eating deformed or cancerous fish are unknown. Any grossly diseased fish should probably be discarded. Levels of PCB, mirex and possibly other contaminants of concern (except mercury) can be reduced by removing the skin and fatty portions along the back, sides and belly of smallmouth bass, brown trout, lake trout, coho salmon, striped bass, and bluefish. (This technique does not reduce mercury levels, however.) A guide to this method can be obtained from any DEC office.

*Marine Waters - The general advisory (eat no more than one meal per week) applies to bluefish and American eels but not to other fish species taken from marine waters. American eels from the Hudson, Harlem, and East Rivers and New York Harbor should not be eaten.

Marine Striped Bass - Eat no striped bass taken from the marine waters of Western Long Island, which includes that portion of the Island west of a line between Wading River and the terminus of Route 46 near Mastic Beach. Eat no more than one meal (1/2 pound) per month of striped bass taken from Eastern Long Island marine waters. Women of childbearing age, infants and children under 15 should not eat striped bass taken from Long Island marine waters. (Legal minimum length of marine striped bass is 36".)

*Marine Crabs and Lobsters - It is recommended that the hepatopancreas (liver, mustard, or tomalley) of crabs and lobsters not be eaten because this organ has high contaminant levels.

Snapping turtles - Snapping turtles retain contaminants in their fat, liver, eggs and to a lesser extent in the muscle. If you choose to consume snapping turtles, carefully trimming away all fat and discarding the fat, liver, and eggs prior to cooking the meat or preparing soup or other dishes will reduce exposure. Women of childbearing age, and children under the age of 15 should avoid ingesting snapping turtles or any soup or stew made with snapping turtle meat.

Waterfowl - It is recommended that you eat no mergansers and common goldeneyes since they are the most heavily contaminated waterfowl species. Other waterfowl should be skinned and all fat removed before cooking; stuffing should be discarded after cooking; limit eating to two meals per month. Monitoring data indicate that wood ducks and Canada geese are less contaminated than other waterfowl species with dabbling ducks and then diving ducks having increasingly higher contaminant levels.

*Changes from the 1988-89 Health Advisory