WATER QUALITY STUDY

OF

BRUSHY LAKE

MONROE COUNTY, ARKANSAS

NOVEMBER 1998

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BRUSHY LAKE,
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INTRODUCTION

In October, 1997 the United States Fish and Wildlife Service (Service) requested that the Arkansas Department of Pollution Control and Ecology (Department) conduct a study to determine the extent of possible contamination in the Brushy Lake Complex of the White River National Wildlife Refuge.

The Service was concerned that the effluent discharge from Baird Manufacturing in Clarendon may contain high concentrations of heavy metals and that these metals may be accumulating to unacceptable levels in the sediment and aquatic biota of the Brushy Lake Complex. Brushy Lake is in Monroe County, Arkansas approximately two miles south of the City of Clarendon.

CURRENT STUDY

Data Acquisition

The Brushy Lake Study was initiated on the morning of July 21, 1998 when fish were collected from Brushy Lake and from First Old River Lake for the purpose of tissue analysis. In-situ measurements, water quality grabs, dissolved metals and sediment samples were collected from these lakes in conjunction with the fish collection. On July 27, in-situ measurements, water quality grabs, dissolved metals and sediment samples were collected at three stations downstream of Baird Manufacturing and at one upstream station that is not impacted by the discharge from Baird.

Parameters

The water samples collected were analyzed for dissolved oxygen, temperature, pH, 5-day biochemical oxygen demand (BOD_5), total organic carbon (TOC), ammonia-nitrogen (NH_3-N), ortho-phosphorus (O-PHOS), total phosphorus (T-PHOS), Br, F, sulfate (SO_4), Cl, total dissolved solids (TDS), and total suspended solids (TSS). The water dissolved metals samples were analyzed for aluminum, arsenic, barium, beryllium, boron, cadmium, calcium, total chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, selenium, sodium, vanadium, zinc, and hardness. The sediment and fish tissue samples collected were analyzed for metals, pesticides, and semivolatiles. Complete parameter lists for fish tissue and sediment can be found in the appendix.

Collection, Preservation and Measurements

Water quality grab samples were collected, preserved, and analyzed according to the 18th edition of Standard Methods for Examination of Water and Wastewater. Analysis was conducted under ADPC&E's existing Quality Assurance Program. Dissolved oxygen and stream temperature were measured using an Orion Model 840 portable dissolved oxygen meter, which was calibrated according to the manufacturers instruction prior to use. Stream pH was measured using an Orion Model 230A portable pH meter, which was calibrated using buffer solutions of pH 4 and 7. Water grab samples, dissolved metals and sediment samples were taken at three stations below Baird Manufacturing: (1)approximately 300 yds below the discharge of Baird Manufacturing in a drainage ditch; (2)in an unnamed channelized tributary to Brushy Lake, and (3)at the levee southeast of Clarendon downstream of the sluice gate. A fourth stream sample was collected in the channelized tributary upstream of the confluence with the drainage ditch that carries the Baird effluent (Figure 1). Lake samples collected during this study were collected in depositional areas of Brushy and First Old River Lakes. Fish tissue was collected using the Departments electroshocking boat. Fish species targeted during the study were largemouth bass, *Micropterus salmoides*. Collections from each lake consisted of five adult bass not less than 12 inches in length and another sample from each lake of bass greater than 16 inches in length. The edible filets of each fish were removed, composited with the other fish of comparable size and analyzed at the ADPC&E laboratory. Sediment collections were made using a petite ponar dredge (6 in x 6 in x 6 in). Several sediment grabs were collected from the depositional areas of the two lakes. These grabs were composited forming one sediment sample per lake. Composited samples were returned to shore where they were passed through a 2 mm sieve. This homogenized sample was then sealed in a glass container and transported to the ADPC&E laboratory at $<4\ ^{0}C$.

Station Description

Four stations were established in the unnamed drainage ditches and channelized canals in the study area, with one station being located in each of the two area lakes. The station descriptions are as follows:

Location of Sample Stations

Brushy 1 In the drainage ditch in the City of Clarendon that receives the Baird discharge. Approximately 1000 ft downstream of the discharge of Baird Manufacturing between Baird Manufacturing and Walker Street. Water quality, dissolved metals and sediment.

Brushy 2 Channelized unnamed tributary to Brushy Lake. Approximately 0.5 miles north of Walker Street upstream of the confluence with the drainage ditch containing the Baird discharge. Brushy 2 is located upstream in the unnamed tributary for the purpose of assessing the background conditions of that tributary. Water quality, dissolved metals, and sediment.

Brushy 3 Channelized unnamed tributary to Brushy Lake. Brushy 3 is located south of Walker Street downstream of the confluence with the drainage ditch containing the Baird discharge. This station is approximately 1.0 mile downstream of the Baird outfall. Water quality, dissolved metals, and sediment.

Brushy 4 Unnamed tributary to Brushy Lake. Brushy 4 is located approximately 2.0 miles downstream of the Baird outfall at the levee access southeast of Clarendon. The sample was collected approximately 5 meters downstream of the levee sluice gate. Water quality, dissolved metals, and sediment.

Brushy Lake At the mouth of the unnamed tributary where the tributary enters Brushy Lake. This station is approximately 2.5 miles downstream of the Baird outfall. Water quality, dissolved metals, sediment, and fish tissue.

First Old River Lake Reference station located at the north end of the western fork of First Old River Lake. First Old River Lake is located 0.25 miles west of the City of Clarendon, west of the White River. Water quality, dissolved metals, sediment, and fish tissue.

Figures 1 and 2 provide the locations sampling stations.

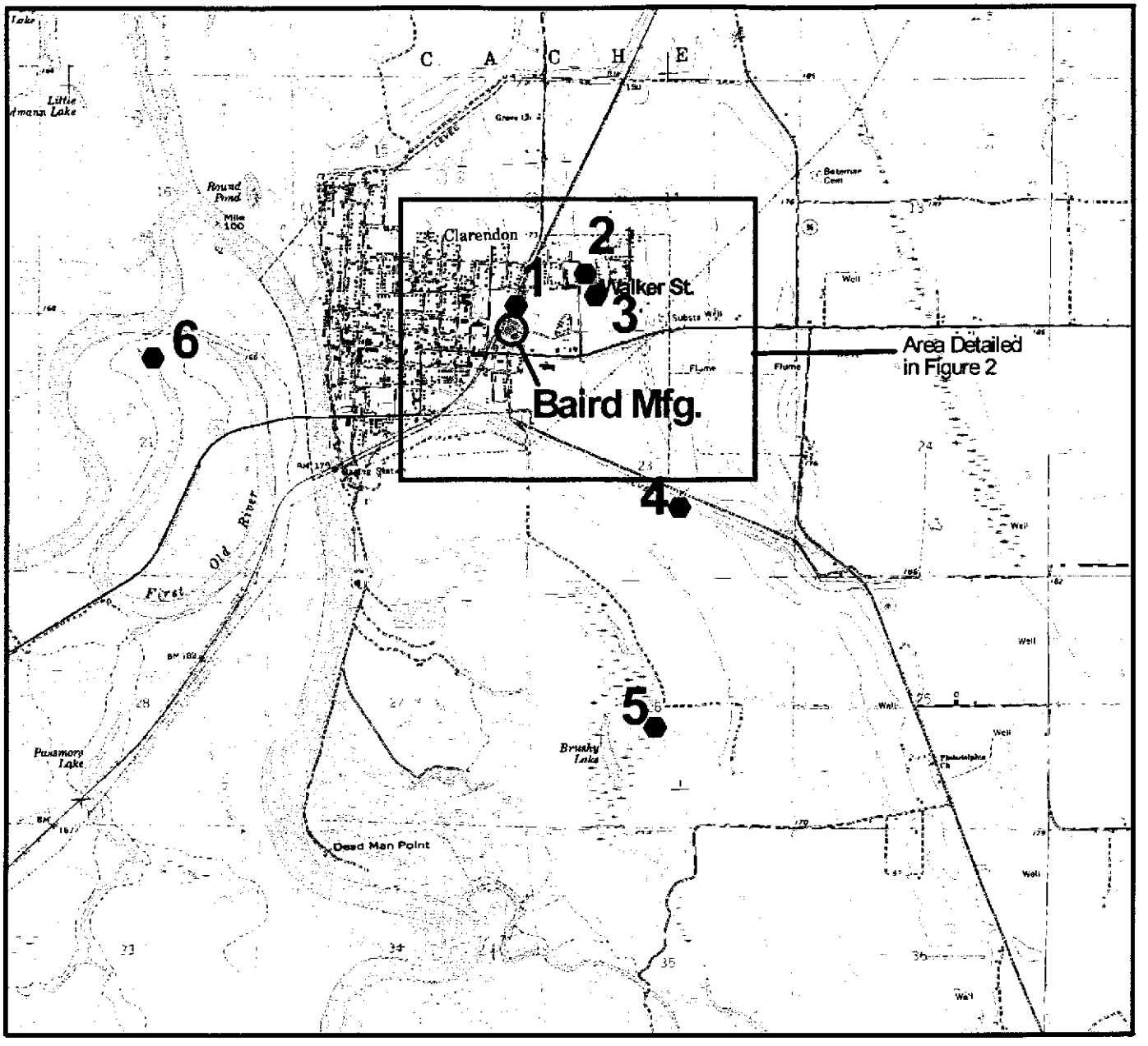
DATA RESULTS

WATER QUALITY

Chlorides, Sulfates, and Total Dissolved Solids

Water quality samples taken at Brushy 1 had chloride concentrations of 1150 mg/L. The highest chloride concentrations collected during this survey. The concentration further downstream at Brushy 4 was 13.3 mg/L. The 1983 ecoregion data indicates a "background" level of 5 mg/L for chlorides for small watershed streams. The chloride concentration in Brushy Lake does not reflect the elevated values at Brushy 1. Samples taken in Brushy Lake indicated chloride concentrations of only 3.24 mg/L. This compares favorably with chloride concentrations collected at First Old River Lake (4.14 mg/L).

Sulfates were also found to be elevated downstream of Baird Manufacturing. At Brushy 1 just downstream of Baird, the sulfate concentration was 767 mg/L. This is reduced to 3.41 mg/L downstream at Brushy 3 and 14.6 mg/L at Brushy 4. Ecoregion data indicates a sulfate value of 3 mg/L for small streams in the Delta Ecoregion. Sulfate values for Brushy Lake (0.15 mg/L) and First Old River Lake (2.06 mg/L) did not reflect the elevated concentrations below Baird Manufacturing.



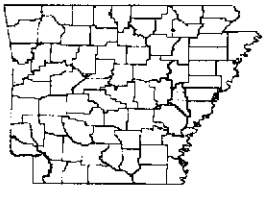
● Sample Site

N

Scale 1:40,000

0.3 0 0.3 0.6 Miles

Study Area

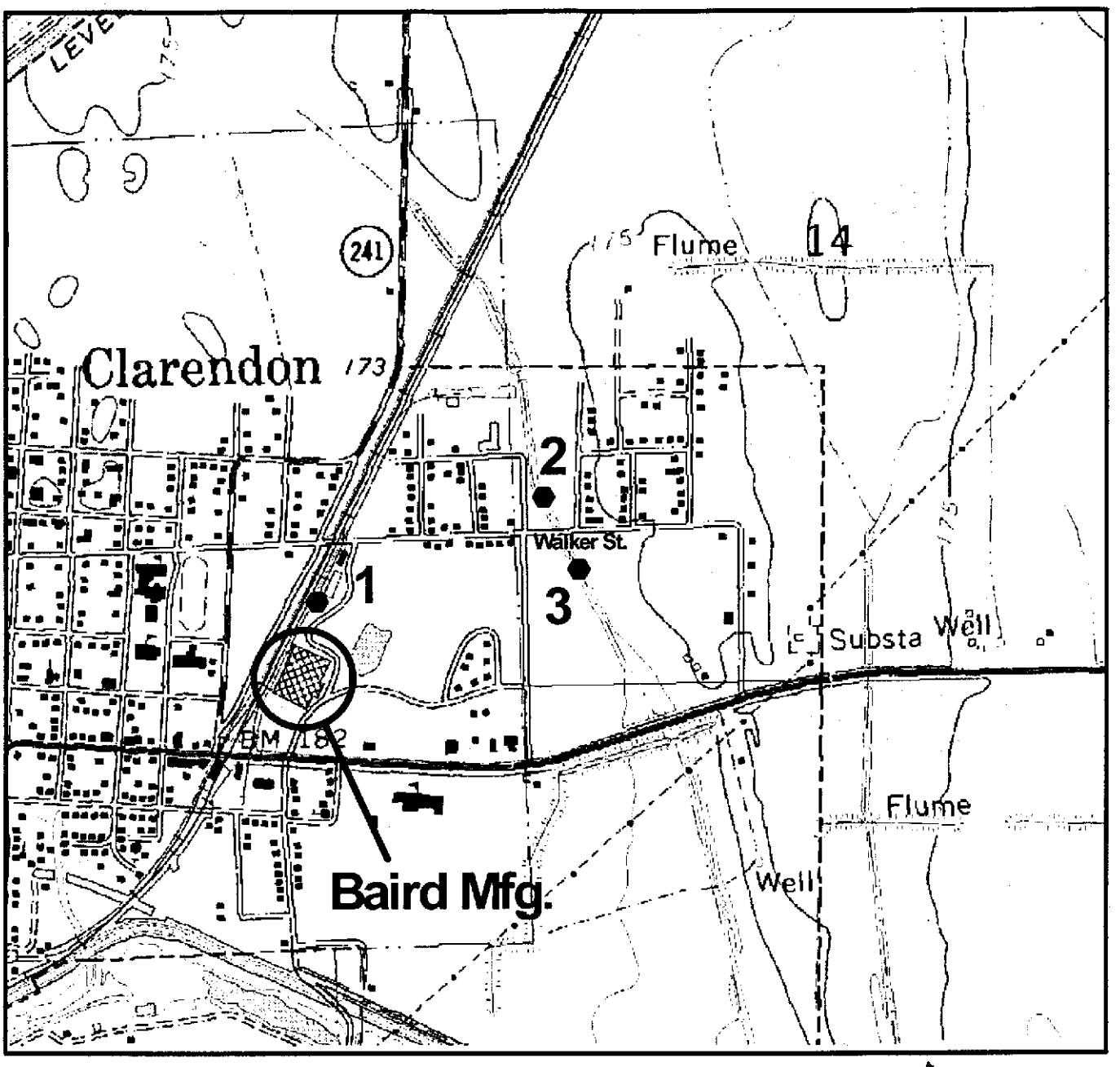


Base map from USGS 1:24,000 Clarendon, AR quadrangle

Figure 1

Brushy Lake Survey
Sampling Locations

11/19/97 adpce/water/planning/hill/gis/kdd.apr



● Sample Site

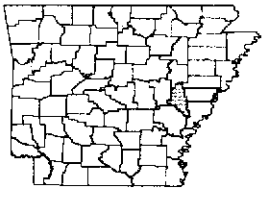
N

Scale 1:12,000

0.1 0 0.1 0.2 Miles

Base map from USGS 1:24,000 Clarendon, AR quadrangle

Study Area



11/19/97 adpce/water/planning/hill/gis/kdd.apr

Figure 2

Brushy Lake Survey

Sampling Locations

Total dissolved solids concentrations were elevated similarly to the chloride and sulfate values. Ecoregion data indicates TDS concentrations of 93 for Delta Ecoregion small streams. This contrasts sharply with the values seen below Baird. At Brushy 1, the TDS concentration was 3005 mg/L. Below at Brushy 3 and Brushy 4, the concentrations were 330 mg/L and 256 mg/L, respectively. TDS concentrations were also somewhat elevated in Brushy Lake (153 mg/L). Although, this value compares quite well with the reference lake (173 mg/L).

Nutrients

The concentrations of nutrients collected below Baird Manufacturing were all very low. Ammonia levels at all stations were well below the 0.30 mg/L concentration indicated by ecoregion data for this size watershed. Nitrates were also equal to or below the ecoregion concentration (0.05 mg/L) at all stations. Phosphorus values were also very low at all stations. However, the total phosphorus concentration at Brushy 2 (0.53 mg/L) is elevated slightly above the ecoregion value of 0.28 mg/L. At Brushy 4, just above Brushy Lake, the total phosphorus concentration had reduced to only 0.14 mg/L. Lake nutrient concentrations were comparably low. Complete water quality data can be found in Appendix A.

Dissolved Metals

All of the water quality samples taken during this study were analyzed for dissolved metals. Some samples contain elevated metals concentrations. Copper was detected below Baird at Brushy 1 and Brushy 3 at concentrations of 13.9 μg/L and 11.5 μg/L, respectively. Copper concentrations downstream in the tributary and in Brushy Lake, were below the laboratory detection limit of 0.5 μg/L. Chromium concentrations were slightly elevated immediately below Baird Manufacturing. Chromium levels at Brushy 1 and Brushy 3 were 6.3 μg/L and 5.6 μg/L, respectively. At Brushy 4, the concentration was 1.0 μg/L. The concentration was further reduced in the Brushy Lake to 0.4 μg/L. This compares well with the chromium concentration of First Old River Lake (0.5 μg/L). Manganese was present in elevated concentrations in all of the water samples taken below Baird Manufacturing. Brushy 1 had a manganese concentration of 485.5 μg/L. This elevation in manganese concentrations is still evident in the Brushy Lake Complex. The water sample collected in Brushy Lake indicated Manganese levels of 402.5 μg/L. This differs greatly from the concentration in First Old River Lake (6.0 μg/L). Although the first station downstream from Baird Manufacturing exhibited elevated manganese levels, it is noteworthy that the highest concentration (577 μg/L) was collected at Brushy 2. Nickel was also found in elevated concentrations. The Brushy 1 sample yielded 8.2 μg/L nickel. Downstream in Brushy Lake, nickel concentrations were below the detection limit of 2.0 μg/L. Vanadium was detected below Baird at concentrations of 10.0 μg/L and 8.6 μg/L at Brushy 1 and Brushy 3, respectively. Vanadium was not detected in Brushy Lake. However, it did occur in samples taken from First Old River Lake. The zinc concentration at Brushy 1 (18.9 μg/L) was elevated 300 % over the level detected in the upstream sample (5.5 μg/L). Zinc concentrations in Brushy Lake and First Old River Lake were comparable with concentrations of 6.2 μg/L and 4.5 μg/L, respectively. Boron and sodium were also found in noticeably elevated concentrations.

At Brushy 1 and Brushy 3 boron concentrations were 400.9 µg/L and 377.4 µg/L, respectively. Sodium concentrations at those stations were 814.4 mg/L and 654.5 mg/L, respectively. Calcium was also present in elevated amounts. Below Baird Manufacturing at Brushy 1 and Brushy 3 the concentrations of calcium were 222.4 µg/L and 198.0 µg/L, respectively. The elevated levels of boron below the Baird facility could be attributed to certain types of cleaning agents. Elevated concentrations of sodium and calcium are most likely resulting from compounds used in the metals finishing process for such things as acid neutralization. Calculation of acutely toxic metals values were accomplished using the metals criteria from Regulation No. 2 which were previously promulgated in the National Toxics Rule. Using ecoregion hardness values for calculating toxic levels as prescribed in the implementation procedure, none of the dissolved metals were found at toxic concentrations during this study. All metals data can be found in Appendix B.

SEDIMENT

Sediment samples were collected from unnamed tributaries at three locations downstream of Baird Manufacturing. One additional sample was collected from the unnamed tributary upstream of Baird. Sediment was also collected from depositional areas in Brushy Lake and in First Old River Lake. Sediment samples collected were analyzed for pesticides, metals and semivolatiles.

Pesticides

The sediment samples collected during this study were analyzed for 48 specific pesticides or the degradation products of pesticides. A complete pesticide parameter list can be found in Appendix D. Lake sediment collected during this study yielded only one detection. The sample taken at Brushy Lake produced a DDE concentration of 0.004 µg/g. No pesticide detections were noted at Brushy 1. At Brushy 2, the sediment contained 0.003 µg/g molinate and 0.553 µg/g chlorpyrifos. Chlorpyrifos was the only detection at Brushy 3 (0.017 µg/g). This concentration is considerably less than the value from Brushy 2 (0.553 µg/g). Brushy 4 had detections of six very commonly detected pesticides. Molinate (0.002 µg/g), trifluralin (0.0002 µg/g), atrazine (0.0011 µg/g), metolachlor (0.0025 µg/g), chlorpyriphos (0.0034 µg/g), and DDE (0.0017 µg/g). It is not surprising that this station had the highest number of pesticide detections during the study. Brushy 4 is in the unnamed tributary south of the City of Clarendon and receives irrigation water and stormflow from approximately 100 agricultural acres. All of the pesticides represented at this station (exception DDE) are commonly used agricultural pesticides sold as Ordram, Treflan, Dursban, and Dual. Complete sediment pesticide data can be found in Appendix C.

Semivolatiles

The six sediment samples collected during this study were analyzed for 85 semivolatile compounds. These 516 analyses yielded 92 detections for semivolatile compounds. Ten semivolatile compounds appeared below the Baird Manufacturing facility at Brushy 1 but did not occur at the upstream station Brushy 2:

Acenaphthene	Flourene
Benzo(a)anthracene	Benzo(b)fluoranthene
Benzo(a)pyrene	Indo(1-2-3-cd)pyrene
Di-n-butyl-phthalate	Chrysene
Bis(2 ethlyhexyl)phthalate	Benzo(g-h-i)perylene

Acenapthene was detected at Brushy 1 at a concentration of 0.0181 μg/g and was below the laboratory detection limit of 0.00058 μg/g at Brushy 2. This compound was also detected downstream at Brushy 3 (0.0022 μg/g) and Brushy 4 (0.0010 μg/g) although it was not detected in either lake sample. Flourene was also found at Brushy 1 (0.0512 μg/g), Brushy 3 (0.0029 μg/g) and Brushy 4 (0.0012 μg/g). However, it was not detected at the upstream station Brushy 2 or in either lake sediment samples. The concentration of benzo(b)flouranthene (0.6266 μg/g) at Brushy 1 was the highest semivolatile concentration detected during this survey. It was also present at Brushy 3 (0.0904 μg/g) and at Brushy 4 (0.1298 μg/g). The concentration of benzo(a)pyrene at Brushy 1 was 0.3452 μg/g, 0.0454 μg/g at Brushy 3 and 0.0376 μg/g at Brushy 4. Again, neither benzo(b)flouranthene nor benzo(a)pyrene occurred at Brushy 2 or in either lake sample. The chrysene concentration at Brushy 1 was 0.4586 μg/g this was reduced to 0.0424 μg/g and 0.0464 μg/g at Brushy 3 and Brushy 4, respectively. Although chrysene was not detected downstream in Brushy Lake, it was present at a concentration of 0.0049 μg/g in the First Old River sample. Bis(2 ethylhexyl)phthalate was present at Brushy 1(0.2186 μg/g) and also in all downstream stations including the Brushy Lake sample (0.1574 μg/g). This compound was also detected in the First Old River Lake sample, although the concentration (0.03166 μg/g) was the lowest of the six stations. The 92 semivolatile compound detections from this study were all of very low concentration. Only one semivolatile concentration (fluoranthene at Brushy 1) was greater than 1.0 μg/g.

Benzoic acid was detected at Brushy 1 (0.2544 μg/g), at Brushy 3 the concentration had reduced to 0.0153 μg/g. The concentration of benzoic acid (0.02323 μg/g) at Brushy 4 remained above the detection limit. The most elevated level of benzoic acid was detected in the sample taken from Brushy Lake (0.9863 μg/g), this concentration is much elevated over that from First Old River which was 0.0229 μg/g. The concentration at Brushy 2, upstream of Baird Manufacturing, was 0.0448 μg/g. This upstream concentration is considerably below what was detected at Brushy 1 (0.2544 μg/g). Complete sediment semivolatile data can be found in Appendix E, a complete sediment semivolatile parameter list can be found in Appendix F.

Metals

Sediment samples collected at the six stations during this project were analyzed for 12 metals: aluminum, arsenic, copper, total chromium, cobalt, cadmium, iron, manganese, nickel, lead, selenium, and zinc. Several samples indicated substantially elevated concentrations of these metals in the sediment. Sediment from Brushy 1, below Baird, indicated elevated concentrations of aluminum, arsenic, copper, iron, nickel, lead, and zinc. The concentration of copper in the sediment at Brushy 1 (177.0 μg/g) is elevated nearly eight fold above the concentration at the upstream station Brushy 2 (23.60 μg/g). However, the concentration of copper in the sediment of Brushy Lake (18.30 μg/g) is comparable with the copper concentration of First Old River Lake (13.40 μg/g). Arsenic concentrations at Brushy 1 were the highest of the six stations. Sediment analyses from Brushy 1 indicated an arsenic concentration (9.10 μg/g) three times the level in the sample taken upstream at Brushy 2, 2.80 μg/g. The samples from the lakes indicate elevation in Brushy Lake which had an arsenic concentration of 8.75 μg/g. This is somewhat elevated over the arsenic concentration in First Old River Lake (6.80 μg/g). The concentrations of chromium and zinc in the sediment at Brushy 1 may be of more concern. Sediment collected from Brushy 1 had a chromium concentration (707.0 μg/g) 60 times greater than the concentration in the sediment upstream at Brushy 2 (11.80 μg/g). This increase below Baird has contributed to a 37 % increase in the sediment chromium level in Brushy Lake (30.30 μg/g) over the concentration of chromium in First Old River Lake (18.9 μg/g). The concentration of zinc at Brushy 1 (11680.0 μg/g) was 165 times the concentration at the upstream station Brushy 2 (70.6 μg/g). As a result, the concentration of zinc downstream in Brushy Lake (109.0 μg/g) is elevated 28 % above the concentration seen in First Old River Lake (78.5 μg/g). Lead was detected at Brushy 1 at a concentration of 72.9 μg/g. Analysis of the sediment from the upstream station indicated concentrations below the ADPC&E laboratory detection limit. Lead also was detected downstream at Brushy 3 and Brushy 4, although concentrations were less than 10 μg/g. Lead concentrations in the sediment of both lakes proved to be below detection limits. The metals data collected during this study can be found in Appendix B.

FISH TISSUE

On July 21, 1998, largemouth bass *Micropterus salmoides* were collected from Brushy Lake and from First Old River Lake. Collections from each lake consisted of five adult bass not less than 12 inches in length and another sample from each lake of bass greater than 16 inches in length. The edible filets of each fish were removed, composited with the other fish of comparable size and analyzed for pesticides, semivolatiles, and metals at the ADPC&E laboratory.

Pesticides

Fish tissue collected during this study was analyzed for 48 pesticides. Those 192 analyses resulted in zero detections for pesticides. Fish tissue pesticide data is listed in Appendix G. Appendix H contains a complete fish tissue parameter list.

Semivolatiles

Fish tissue collected from Brushy Lake and First Old River Lake were also analyzed for 85 semivolatile compounds. Those 340 analyses resulted in one detection for semivolatiles. The Brushy Lake fish tissue sample of largemouth bass < 16" indicated an acetophenone concentration of 0.0497 μg/g. Acetophenone is commonly found in aquatic and semiaquatic plant material such as mosses and algae. Appendix I contains all fish tissue semivolatile data. Appendix J is a complete fish tissue semivolatile parameter.

Metals

Fish tissue collected during this study was subjected to analysis for five toxic metals: arsenic, chromium, cadmium, lead, and mercury. The analyses indicated concentrations below the laboratory detection limit for each, excluding mercury. These analyses yielded detections for mercury in each of the four samples. The mercury concentrations of the fish tissue sampled during this study are represented below. All mercury detections were well below the ADPC&E action level of 1 ppm. All metals data can be found in Appendix B.

Sample Description	Mercury Concentration mg/KG
Brushy Lake Largemouth Bass < 16"	0.50
Brushy Lake Largemouth Bass > 16"	0.61
First Old River Lake Largemouth Bass < 16"	0.42
First Old River Lake Largemouth Bass > 16"	0.54

CONCLUSIONS

A review of the dissolved and sediment metals analyses conducted indicates elevated concentrations of chromium, copper, lead, nickel, and zinc in the water and/or sediment at Brushy 1, below the Baird Manufacturing facility. However, no dissolved metals were found in toxic concentrations in the waters of the unnamed tributary or the two lakes sampled. Sediment metals and dissolved metals are also somewhat elevated downstream at other stations in the unnamed tributary. Copper, chromium, and zinc were noticeably elevated in the sediment of Brushy Lake above the concentrations of First Old River Lake. Fish tissue analyses did not indicate the bioaccumulation of metals due to the discharge of Baird Manufacturing at this time. No water quality violations were found during the course of this study.

APPENDICES

APPENDIX A - WATER QUALITY

Station_ID	BRUSHY 1	BRUSHY 2	BRUSHY 3	BRUSHY 4	BR. LAKE	F.O.R. LAKE
Date	980727	980727	980727	980727	980721	980721
Time	1200	1100	1030	925	1130	1530
DO (mg/L)	2.2	1.0	0.3	0.4	3.8	14.5
pH (s.u.)	8.37	7.37	7.12	7.13	6.98	8.89
TEMP (C)	33.8	28.1	27.0	26.5	31.1	35.2
BOD (mg/L)	>7.93	3.6	>7.47	1.3	1.8	3.4
TOC (mg/L)	14.3	25.4	25.0	2.8	5.4	5.7
NH3-N (mg/L)	<0.005	<0.005	<0.005	0.17	0.01	0.01
TKN (mg/L)	1.80	1.60	2.27	0.42	0.92	0.52
NO3-N (mg/L)	<0.010	0.05	<0.010	0.01	0.01	0.02
O-PHOS	0.02	0.28	0.24	0.11	0.02	0.02
T-PHOS (mg/L)	0.19	0.53	0.53	0.14	0.07	0.06
Br (mg/L)	1.39	0.07	0.05	0.04	<0.03	0.14
F (mg/L)	2.50	0.27	0.19	0.11	<0.005	<0.005
SO4 (mg/L)	767.0	12.70	3.41	14.60	0.15	2.06
Cl (mg/L)	1150.0	45.10	21.20	13.30	3.24	4.14
TDS (mg/L)	3005.0	418.0	330.0	256.0	153.0	173.0
TSS (mg/L)	30.50	13.00	17.50	5.50	4.50	7.50

APPENDIX B - METALS DATA

METALS-WATER, SEDIMENT, AND FISH TISSUE																								
Lake samples collected on July 21, 1998, Brushy 1-4 collected on July 27, 1998																								
Station_ID	Time	DO	pH	Temp	Al	As	Ba	Be	B	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn	Ni	K	Se	Na	V	Z	Hardness
		mg/L	s.u.	C	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	mg/L	ug/L	ug/L	ug/L	ug/L	ug/L	mg/L	ug/L	ug/L	mg/L	ug/L	mg/L	ug/L	ug/L	mg/L
BRUSHY 1	1200	2.2	8.37	33.8	<127	3.4	85.3	<0.11	400.9	<0.14	222.4	6.3	0.7	13.9	371.4	0.3	6.3	485.5	8.2	28.3	<3	814.4	10.0	18.9	581.0
BRUSHY 2	1100	1.0	7.37	28.1	<127	11.7	142.1	<0.11	45.4	<0.14	64.3	3.4	<0.50	0.5	610.9	<0.3	13.8	577.8	2.1	36.4	<3	27.1	2.5	5.5	217.0
BRUSHY 3	1030	0.3	7.12	27.0	<127	3.8	314.5	<0.11	377.4	<0.14	198.0	5.6	1.1	11.5	218.1	<0.3	7.4	477.7	5.4	23.5	<3	654.5	8.6	6.8	525.0
BRUSHY 4	925	0.4	7.13	26.5	<127	3.8	200.3	<0.11	8.2	<0.14	55.0	1.0	<0.50	<0.5	151.1	0.5	12.5	257.6	<2	2.3	<3	19.0	<1.0	18.1	189.0
BR.LAKE	1130	3.8	6.98	31.1	<127	3.2	59.9	<0.11	7.4	<0.14	26.2	0.4	<0.50	<0.5	128.7	<0.3	11.4	402.5	<2	1.6	<3	4.3	<1.0	6.2	112.1
O.R. LAKE	1530	14.5	8.89	35.2	<127	5.8	12.4	<0.11	9.1	<0.14	33.9	0.5	<0.50	<0.5	16.7	<0.3	15.3	6.0	<2	1.9	<3	3.2	1.4	4.5	147.7

Sediment Metals Concentration																								
Lake samples collected on July 21, 1998, Brushy 1-4 collected on July 27, 1998																								
Station_ID				Time	Al	As	Cu	Cr	Co	Cd	Fe	Mn	Ni	Pb	Se	Zn								
					mg/KG	mg/KG	mg/KG	mg/KG	mg/KG	mg/KG	mg/KG	mg/KG	mg/KG	mg/KG	mg/KG	mg/KG								
BRUSHY1				1200	12400	9.10	177.00	707.0	7.50	0.73	16360	318	32.7	72.90	6.30	11680								
BRUSHY2				1100	9891	2.80	23.60	11.8	6.30	0.25	10120	435	11.0	<2.0	<5.0	71								
BRUSHY3				1030	10680	5.09	16.60	22.6	6.24	0.23	10790	531	11.3	2.80	<5.0	502								
BRUSHY4				925	9461	5.46	11.50	10.6	5.92	<0.16	9401	436	11.4	7.02	<5.0	49								
B-LAKE				1130	28490	8.75	18.30	30.3	13.20	0.96	26560	1041	26.0	<2.0	<5.0	109								
O-R LAKE				1530	13720	6.80	13.40	18.9	12.70	0.63	18760	1473	20.2	<2.0	<5.0	79								

FISH TISSUE METALS																								
Collected on 980721				Time		As		Cr		Cd				Pb	Hg									
						mg/KG		mg/KG		mg/KG				mg/KG	mg/KG									
BRUSHY LAKE LMB < 16 "				0900		<0.5		<0.2						<0.2	0.50									
BRUSHY LAKE LMB > 16 "				0900		<0.5		<0.2		<0.04				<0.2	0.61									
FIRST OLD RIVER LAKE < 16"				1400		<0.5		<0.2		<0.04				<0.2	0.42									
FIRST OLD RIVER LAKE > 16"				1400		<0.5		<0.2		<0.04				<0.2	0.54									

APPENDIX C - SEDIMENT PESTICIDE DATA

Station_ID	Date	Time	Mol-	Prop-	Trif-	Alph-	Altr-	Prom-	Sima-	Atra-	Prop-	Beta-	Gamm-	Diel-
			ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g
BRUSHY1	980727	1200	<.06284	<.19690	<.06257	<.38140	<.23559	<.10995	<.51154	<.15242	<.18501	<.47486	<.37939	<.55338
BRUSHY2	980727	1100	0.003	<.09958	<.06834	<.19262	<.22074	<.06499	<.63338	<.12326	<.08855	<.23982	<.19161	<.28721
BRUSHY3	980727	1030	<.00077	<.00060	<.00028	<.00070	<.00048	<.00056	<.00186	<.00042	<.00032	<.00087	<.00069	<.00822
BRUSHY4	980727	925	0.002	<.00063	0.0002	<.00046	<.00013	<.00039	<.00124	0.0011	<.00023	<.00057	<.00045	<.00443
B-LAKE	980721	1130	<.00103	<.00113	<.00039	<.00096	<.00110	<.00160	<.00203	<.00052	<.00042	<.00119	<.00095	<.00479
O-R LAKE	980721	1530	<.00051	<.00062	<.00040	<.00077	<.00030	<.00039	<.00156	<.00062	<.00027	<.00096	<.00077	<.00189
Station_ID	**Date**	**Time**	**Terbutryn**	**Meto-**	**Mala-**	**Dipr-**	**Chlo-**	**Cyan-**	**Aldr-**	**Pend-**	**HeptEp-**	**Endo-**	**DDE-**	**Tech-**
			ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g
BRUSHY1	980727	1200	<.07776	<.15134	<.38572	<.32171	<.17014	<.53894	<.31956	<.17502	<.09194	<1.1710	<.15040	<.33671
BRUSHY2	980727	1100	<.09481	<.11055	<.32497	<.11714	0.5527	<.42077	<.33057	<.08919	<.11549	<1.3025	<.09688	<.39241
BRUSHY3	980727	1030	<.00029	<.00074	<.00438	<.00056	0.0171	<.00068	<.00091	<.00053	<.00164	<.00905	<.00028	<.00732
BRUSHY4	980727	925	<.00024	0.0025	<.00098	<.00026	0.0034	<.00078	<.00112	<.00024	<.00043	<.00413	0.0017	<.00425
B-LAKE	980721	1130	<.00028	<.00045	<.00122	<.00096	<.00138	<.00218	<.00304	<.00080	<.00183	<.03008	0.0041	<.03434
O-R LAKE	980721	1530	<.00041	<.00035	<.00157	<.00068	<.00054	<.00078	<.00245	<.00062	<.00121	<.01162	<.00022	<.01009
Station_ID	**Date**	**Time**	**Terb-**	**Diaz-**	**Fluc-**	**Feno-**	**Delt-**	**Cypr-**	**Metr-**	**Meth-**	**Alac-**	**Amet-**	**Prometryn-**	**Hept-**
			ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g
BRUSHY1	980727	1200	<.57993	<.11906	<.12403	<.16574	<.52934	<.12384	<.21202	<.18676	<.21865	<.21577	<.12064	<.16829
BRUSHY2	980727	1100	<.42823	<.18343	<.14065	<.08173	<.26733	<.18157	<.17373	<.19320	<.15512	<.15603	<.12610	<.09429
BRUSHY3	980727	1030	<.00094	<.00120	<.00051	<.00113	<.00097	<.00051	<.00034	<.00053	<.00068	<.00038	<.00027	<.00114
BRUSHY4	980727	925	<.00092	<.00032	<.00035	<.00097	<.00063	<.00022	<.00018	<.00065	<.00024	<.00021	<.00037	<.00047
B-LAKE	980721	1130	<.00176	<.00180	<.00076	<.00344	<.00133	<.00059	<.00055	<.00178	<.00074	<.00065	<.00092	<.00991
O-R LAKE	980721	1530	<.00132	<.00106	<.00075	<.00092	<.00107	<.00032	<.00038	<.00143	<.00029	<.00055	<.00034	<.00107
Station_ID	**Date**	**Time**	**Endr-**	**Endo2-**	**DDD**	**EndoSul-**	**DDT**	**Hexa-**	**Methox-**	**PCB1**	**PCB2**	**PCB3**	**PCB4**	**PCB5**
			ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g
BRUSHY1	980727	1200	<.77423	<1.6240	<.09536	<.45574	<.07528	<.22577	<.07113	<.53422	<1.1056	<5.2604	<14.502	<2.7958
BRUSHY2	980727	1100	<.64169	<1.3081	<.10218	<.22795	<.08067	<.21201	<.04121	<.37900	<.78441	<3.4932	<9.6304	<1.7824
BRUSHY3	980727	1030	<.00206	<.00504	<.00032	<.00085	<.00026	<.00037	<.00012	<.00166	<.00343	<.00785	<.02164	<.00831
BRUSHY4	980727	925	<.00231	<.00215	<.00019	<.00062	<.00015	<.00036	<.00006	<.00060	<.00123	<.00626	<.01725	<.01277
B-LAKE	980721	1130	<.00597	<.01495	<.00059	<.00189	<.00047	<.00088	<.00017	<.00181	<.00374	<.01052	<.02901	<.03818
O-R LAKE	980721	1530	<.00529	<.00660	<.00030	<.00078	<.00024	<.00058	<.00016	<.00072	<.00149	<.01313	<.03620	<.04536

APPENDIX D - SEDIMENT PESTICIDE PARAMETERS

Alac-	Alachlor	Hept-	Heptachlor
Aldr-	Aldrin	HeptEp-	Heptachlor-Epoxide
Alph-	Alpha-BHC	Hexa-	Hexazinone
Altr-	Atraton	Mala-	Malathion
Amet-	Ametryn	Meth-	Methyl-Parathion
Atra-	Atrazine	Methox-	Methoxychlor
Beta-	Beta-BHC	Meto-	Metolachlor
Chlo-	Chlorpyrifos	Metr-	Metribuzin
Cyan-	Cyanazine	Mol-	Molinate
Cypr-	Cyprazine	PCB1	PCB-as-AR1221
DDD	p-p'-DDD	PCB2	PCB-as-AR1232
DDE-	p-p'-DDE	PCB3	PCB-as-AR1242
DDT	p-p'-DDT	PCB4	PCB-as-AR1248
Delt-	Delta-BHC	PCB5	PCB-as-AR1254
Diaz-	Diazinon	Pend-	Pendimethalin
Diel-	Dieldrin	Prom-	Prometon
Dipr-	Dipropetryn	Prometry	Prometryn
Endo-	Endosulfan-I	Prop-	Propachlor
Endo2-	Endosulfan-II	Prop-	Propazine
EndoSul-	Endosulfan-Sulfate	Sima-	Simazine
Endr-	Endrin	Tech-	Technical-Chlordane
Feno-	Fonofos	Terb-	Terbuthylazine
Fluc-	Fluchloralin	Terbutryn	Terbutryn
Gamm-	Gamma-BHC	Trif-	Trifluralin

APPENDIX E - SEDIMENT SEMIVOLATILES

Station_ID	Date	Time	2Pic-	Anil-	Phenol	BisE-	2Chl-	13Di-	14Di-	Benzyl-	12Di-	2Meth-	Acet-
			ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g
BRUSHY1	980727	1200	<.01445	<.00641	0.0299	<.01904	<.00316	<.00166	0.00116	<.01111	<.00173	<.01312	0.01424
BRUSHY2	980727	1100	<.00455	<.00202	0.01045	<.00600	<.00110	<.00155	0.00154	<.01169	<.00162	<.00320	0.00449
BRUSHY3	980727	1030	<.02367	<.01050	0.01029	<.03119	<.00161	<.00241	0.00303	<.00292	<.00252	<.00628	0.00331
BRUSHY4	980727	925	<.00414	<.00184	0.00528	<.00546	<.00095	<.00139	<.00129	<.00672	<.00146	<.00206	<.00084
BR-LAKE	980721	1130	<.02499	<.01108	0.37528	<.03293	<.01625	<.01180	<.01090	<.03167	<.01233	<.01271	0.28315
OLD-RIV	980721	1530	<.02296	<.01018	0.00539	<.03025	<.01065	<.00456	<.00422	<.01942	<.00477	<.00697	<.00218
Station_ID	Date	Time	NNit-	4Meth-	Hexa-	Nitr-	NNitro-	Isop-	2Nitr-	24Dim-	Benz-	Bism-	24Dic-
			ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g
BRUSHY1	980727	1200	<.13614	0.07704	<.01079	<.01220	<.00285	<.00295	<.00251	<.00867	0.25442	<.00795	<.00409
BRUSHY2	980727	1100	<.01406	0.02538	<.00660	<.00448	<.00141	<.00096	<.00174	<.00237	0.0448	<.00238	<.00095
BRUSHY3	980727	1030	<.01239	<.00505	<.00445	<.00597	<.00236	<.00223	<.00301	<.00198	0.0153	<.01174	<.00249
BRUSHY4	980727	925	<.01169	<.00165	<.00246	<.00196	<.00223	<.00104	<.00303	<.00140	0.02323	<.00212	<.00145
BR-LAKE	980721	1130	<.02045	<.01021	<.01145	<.02038	<.01677	<.00980	<.01079	<.02222	0.98633		<.01479
OLD-RIV	980721	1530	<.02405	<.00560	<.00721	<.01394	<.00868	<.00490	<.01413	<.00634	0.02299		<.00686
Station_ID	Date	Time	124Tri-	26Dich-	4Chlo-	Naph-	Hexbut-	NNitrobut-	4Chlor-	2Methyl-	Hexpen-	1245Tet-	246Tri-
			ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g
BRUSHY1	980727	1200	<.00139	<.00456	<.00109	0.01071	<.00065	<.04119	<.00813	0.00985	<.00189	<.00085	<.00135
BRUSHY2	980727	1100	<.00112	<.00106	<.00106	0.00158	<.00086	<.00538	<.00188	0.00494	<.00121	<.00067	<.00111
BRUSHY3	980727	1030	<.00145	<.00278	<.00040	0.00056	<.00070	<.00744	<.00351	0.00115	<.00152	<.00055	<.00098
BRUSHY4	980727	925	<.00136	<.00162	<.00088	0.00056	<.00050	<.00409	<.00118	0.00087	<.00071	<.00104	<.00162
BR-LAKE	980721	1130	<.01062	<.01652	<.00524	0.00069	<.00974	<.02296	<.00716	<.00545	<.00972	<.01145	<.01247
OLD-RIV	980721	1530	<.00477	<.00766	<.00417	0.00013	<.00575	<.00836	<.00395	<.00306	<.01204	<.00364	<.00530
Station_ID	Date	Time	245Tri-	2Chlnaph-	1Chlo-	2Nito-	Dimeth-	26Dinitro-	Acenap-	Dibenz-	Benper-	24diphen-	
			ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	
BRUSHY1	980727	1200	<.00120	<.00157			<.00107	<.00570	0.09357	<.00032	0.25664	<.00569	
BRUSHY2	980727	1100	<.00098	<.00034			<.00123	<.00683	0.00551	<.00025	<.00012	<.00313	
BRUSHY3	980727	1030	<.00087	<.00093			<.00135	<.00397	0.00416	<.00027	0.03308	<.00880	
BRUSHY4	980727	925	<.00144	<.00056			<.00064	<.00620	0.00916	<.00014	0.02523	<.00473	
BR-LAKE	980721	1130	<.01107	<.00592	<.00875	<.01666	<.00679	<.03444	<.00774	<.00251	<.00154	<.01779	
OLD-RIV	980721	1530	<.00471	<.00259	<.00384	<.01732	<.00319	<.01214	<.00633	<.00075	<.00179	<.02228	

APPENDIX E - SEDIMENT SEMIVOLATILES CONTINUED

Station_ID	DATE	Time	3Nitro-	Acen-	Penta-	Dibenzo-	24Dinitro-	4Nitro-	2Nap-	2346Tet-	1Nap-	Diethyl-	Flourene
			ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g
BRUSHY1	980727	1200	<.00529	0.0181	<.00106	<.00059	<.00390	<.01728	<.00349	<.00123	<.00379	<.00111	0.05115
BRUSHY2	980727	1100	<.00407	<.00058	<.00062	<.00045	<.00467	<.00723	<.00130	<.00086	<.00141	0.01884	<.00084
BRUSHY3	980727	1030	<.00156	0.00217	<.00068	<.00025	<.00272	<.00856	<.00180	<.00172	<.00196	<.03424	0.00287
BRUSHY4	980727	925	<.00248	0.00099	<.00059	<.00024	<.00425	<.00693	<.00136	<.00094	<.00148	0.0134	0.00115
BR-LAKE	980721	1130	<.03680	<.00328	<.01725	<.00730	<.02358	<.04015	<.01355	<.01401	<.01471	<.00916	<.00532
OLD-RIV	980721	1530	<.01252	<.00411	<.00472	<.00164	<.00832	<.02474	<.00732	<.00438	<.00794	0.01704	<.00435
Station_ID	DATE	Time	4Chph-	4Nitroan-	46Din-	Diph-	12Diph-	Phena-	4Brom-	Hexaben-	Penchl-	Penchni-	4Amino-
			ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g
BRUSHY1	980727	1200	<.00536	<.00588	<.00186	<.00054	<.00407	<.00370	<.00044	<.00076	<.00203	<.00153	<.00101
BRUSHY2	980727	1100	<.00058	<.00452	<.00099	<.00034	<.00158	<.00391	<.00059	<.00070	<.00115	<.00353	<.00063
BRUSHY3	980727	1030	<.00136	<.00174	<.00116	<.00048	<.00196	<.00086	<.00037	<.00089	<.00165	<.00173	<.00090
BRUSHY4	980727	925	<.00056	<.00276	<.00134	<.00073	<.00066	<.00212	<.00049	<.00036	<.00068	<.00174	<.00135
BR-LAKE	980721	1130	<.02534	<.04091	<.01742	<.00388	<.00751	<.01062	<.00397	<.00405	<.00922	<.02720	<.00723
OLD-RIV	980721	1530	<.00705	<.01392	<.00775	<.00165	<.00469	<.00598	<.00203	<.00402	<.00727	<.00944	<.00307
Station_ID	DATE	Time	Pron-	Phen-	Anth-	Dibut-	Flour-	Pyrene-	Dimetam-	Butyl-	Benzo-	33Dich-	Chrysene-
			ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g
BRUSHY1	980727	1200	<.00662	0.37552	0.13901	0.03928	1.52	0.93047	<.00042	<.00126	0.34329	<.00051	0.45864
BRUSHY2	980727	1100	<.00122	0.01523	0.01523	<.00082	0.06093	0.05518	<.00048	<.00126	<.00018	<.00042	<.00017
BRUSHY3	980727	1030	<.00097	0.02407	0.00731	0.02309	0.17918	0.08096	<.00039	<.03414	0.04213	<.00022	0.04244
BRUSHY4	980727	925	<.00251	0.00469	0.01091	0.02195	0.03588	0.02862	<.00027	0.00647	0.03498	<.00017	0.04645
BR-LAKE	980721	1130	<.01119	<.00759	<.00928	0.0586	<.00650	<.00502	<.00523	<.00830	<.00260	<.00220	<.00241
OLD-RIV	980721	1530	<.00646	<.00278	<.00340	0.03327	0.00785	0.00487	<.00312	0.01232	<.00098	<.00082	0.00498
Station_ID	DATE	Time	Bisphth-	Dinoct-	Benb-	Benk-	Bena-	Dianth-	3Methch-	Dibenacr-	Indpyr-		
			ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g		
BRUSHY1	980727	1200	0.21856	<.00040	0.62661	<.00027	0.34528	<.00078	<.00055	<.00037	0.29928		
BRUSHY2	980727	1100	<.00087	<.00045	<.00028	<.00025	<.00033	<.00074	<.00026	<.00019	<.00015		
BRUSHY3	980727	1030	0.09995	<.01663	0.09042	<.00017	0.04548	<.00090	<.00027	<.00020	0.04109		
BRUSHY4	980727	925	0.0502	<.00048	0.12976	<.00013	0.03767	<.00100	<.00028	<.00008	0.0401		
BR-LAKE	980721	1130	0.1574	<.00430	<.00214	<.00188	<.00251	<.01391	<.00252	<.00135	<.00187		
OLD-RIV	980721	1530	0.03166	<.00144	<.00072	0.00736	<.00084	<.00405	<.00149	<.00140	<.00218		

APPENDIX F - SEMIVOLATILE PARAMETER LIST

1245Tet-	1-2-4-5-Tetrachlorobenzene
124Tri-	1-2-4-Trichlorobenzene
12Di-	1-2-Dichlorobenzene
12Diph-	1-2-Diphenylhydrazine
13Di-	1-3-Dichlorobenzene
14Di-	1-4-Dichlorobenzene
1Chlo-	1-Chloronaphthalene
1Nap-	1-Naphthylamine
2346Tet-	2-3-4-6-Tetrachlorophenol
245Tri-	2-4-5-Trichlorophenol
246Tri-	2-4-6-Trichlorophenol
24Dic-	2-4-Dichlorophenol
24Dim-	2-4-Dimethylphenol
24Dinitro-	2-4-Dinitrotoluene
24diphen-	2-4-dinitrophenol
26Dich-	2-6-Dichlorophenol
26Dinitro-	2-6-Dinitrotoluene
2Chl-	2-Chlorophenol
2Chlnaph	2-Chloronaphthalene
2Meth-	2-Methylphenol
2Methyl-	2-Methylnaphthalene
2Nap-	2-Naphthylamine
2Nito-	2-Nitroaniline
2Nitr-	2-Nitrophenol
2Pic-	2-Picoline
33Dich-	3-3'-Dichlorobenzidine
3Methch-	3-Methylcholanthrene
3Nitro-	3-Nitroaniline
46Din-	4-6-Dinitro-2-methylphenol
4Amino-	4-Aminobiphenyl
4Brom-	4-Bromophenyl-phenyl-ether
4Chlo-	4-Chloroaniline
4Chlor-	4-Chloro-3-methylphenol
4Chph-	4-Chlorophenyl-phenyl-ether
4Meth-	4-Methylphenol
4Nitro-	4-Nitrophenol
4Nitroan-	4-Nitroaniline
Acen-	Acenaphthene
Acenap-	Acenaphthylene
Acet-	Acetophenone
Anil-	Aniline
Anth-	Anthracene
Bena-	Benzo(a)pyrene
Benb-	Benzo(b)fluoranthene
Benk-	Benzo(k)fluoranthene
Benper-	Benzo(g-h-i)perylene
Benz-	Benzoic-acid
Benzo-	Benzo(a)anthracene
Benzyl-	Benzyl-alcohol
BisE-	Bis(2-chloroethyl)-Ether
Bism-	Bis(2-chloroethoxy)methane
Bisphth-	Bis(2-ethylhexyl)phthalate
Butyl-	Butyl-benzyl-phthalate
Chrysene	Chrysene
Dianth-	Dimethylbenzo(a)anthracene
Dibenacr-	Dibenzo(a-j)acridine
Dibenz-	Dibenz(a-h)anthracene
Dibenzo-	Dibenzofuran
Dibut-	Di-n-butyl-phthalate
Diethyl-	Diethyl-phthalate
Dimetam-	Dimethylaminoazobenzene
Dimeth-	Dimethyl-phthalate
Dinoct-	Di-n-octyl-phthalate
Diph-	Diphenylamine
Flour-	Fluoranthene
Flourene	Fluorene
Hexa-	Hexachloroethane
Hexaben-	Hexachlorobenzene
Hexbut-	Hexachlorobutadiene
Hexpen-	Hexachlorocyclopentadiene
Indpyr-	Indeno(1-2-3-cd)pyrene
Isop-	Isophorone
Naph-	Naphthalene
Nitr-	Nitrobenzene
NNit-	N-Nitroso-di-n-propylamine
NNitro-	N-Nitrosopiperidine
NNitrobut	N-Nitrosodibutylamine
Penchl-	Pentachlorophenol
Penchni-	Pentachloronitrobenzene
Penta-	Pentachlorobenzene
Phen-	Phenanthrene
Phena-	Phenacetin
Phenol	Phenol
Pron-	Pronamide
Pyrene-	Pyrene

APPENDIX G - FISH TISSUE PESTICIDES

Station ID	Date	Time	Mol-	Prop-	Trif-	Alph-	Altr-	Prom-	Sima-	Atra-	Prop-	Beta-	Gamm-	Terb-	Diaz-	Fluc-	Feno-	Delt-
			ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g
B. LAKE LMB < 16 "	980721	900	<.01821	<.02608	<.00842	<.03783	<.02421	<.03595	<.06086	<.02653	<.01852	<.04710	<.03763	<.08134	<.02534	<.01668	<.02583	<.05250
B. LAKE LMB > 16 "	980721	900	<.01772	<.03854	<.01764	<.03533	<.03015	<.01769	<.10606	<.02640	<.02070	<.04399	<.03514	<.10392	<.03531	<.03432	<.01576	<.04903
F.O.R.LAKE LMB < 16"	980721	1400	<.00920	<.01550	<.01525	<.02058	<.02896	<.02959	<.12595	<.02700	<.03540	<.02562	<.02047	<.03679	<.03810	<.03002	<.01898	<.02856
F.O.R.LAKE LMB > 16"	980721	1400	<.00892	<.02211	<.00913	<.01055	<.01763	<.01422	<.08886	<.01613	<.02137	<.01313	<.01049	<.13333	<.03775	<.01677	<.01164	<.01464
Station ID	Date	Time	Cypr-	Metr-	Meth-	Alac-	Amet-	Prometryn-	Hept-	Terbutryn	Meto-	Mala-	Dipr-	Chlo-	Cyan-	Aldr-	Pend-	HeptEp-
			ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g
B. LAKE LMB < 16 "	980721	900	<.02101	<.01971	<.08194	<.02350	<.03273	<.01580	<.01429	<.01695	<.01358		<.02850	<.02479	<.06004	<.14020	<.01832	<.09222
B. LAKE LMB > 16 "	980721	900	<.02954	<.02370	<.04979	<.04430	<.03045	<.03463	<.01181	<.01751	<.01407	<.04761	<.04530	<.03960	<.03165	<.08520	<.02201	<.06458
F.O.R.LAKE LMB < 16"	980721	1400	<.02495	<.02834	<.01419	<.03329	<.03822	<.02302	<.01072	<.02231	<.02075	<.05995	<.02319	<.04021	<.03805	<.02427	<.02116	<.06422
F.O.R.LAKE LMB > 16"	980721	1400	<.01966	<.01208	<.02957	<.01515	<.02026	<.02812	<.01657	<.01725	<.00634	<.02381	<.01803	<.03937	<.02663	<.05059	<.01118	<.04292
Station ID	Date	Time	Endo-	DDE-	Diel-	Endr-	Endo2-	DDD	EndoSul-	DDT	Hexa-	Methox-	PCB1	PCB2	PCB3	PCB4	PCB5	Tech-
			ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g
B. LAKE LMB < 16 "	980721	900	<.36657	<.01492	<.04817	<.30133	<.17208	<.01219	<.03546	<.00962	<.02842	<.00957	<.05741	<.11881	<.53713	<1.4808	<1.2767	<.49539
B. LAKE LMB > 16 "	980721	900	<.28192	<.00838	<.07482	<.17176	<.40368	<.01823	<.06773	<.01439	<.03150	<.00835	<.10824	<.22401	<.34251	<.94426	<1.8705	<.70679
F.O.R.LAKE LMB < 16"	980721	1400	<.27783	<.01424	<.04931	<.04942	<.20145	<.01390	<.06082	<.01097	<.03882	<.01059	<.08133	<.16832	<.43281	<1.1932	<.65509	<.54845
F.O.R.LAKE LMB > 16"	980721	1400	<.26417	<.01468	<.05912	<.10154	<.13287	<.00731	<.03343	<.00577	<.01905	<.00553	<.03702	<.07662	<.25426	<.70097	<.98936	<.35227

APPENDIX H - FISH TISSUE PESTICIDE PARAMETER LIST

Alac-	Alachlor	Hept-	Heptachlor
Aldr-	Aldrin	HeptEp-	Heptachlor-Epoxide
Alph-	Alpha-BHC	Hexa-	Hexazinone
Altr-	Atraton	Mala-	Malathion
Amet-	Ametryn	Meth-	Methyl-Parathion
Atra-	Atrazine	Methox-	Methoxychlor
Beta-	Beta-BHC	Meto-	Metolachlor
Chlo-	Chlorpyrifos	Metr-	Metribuzin
Cyan-	Cyanazine	Mol-	Molinate
Cypr-	Cyprazine	PCB1	PCB-as-AR1221
DDD	p-p'-DDD	PCB2	PCB-as-AR1232
DDE-	p-p'-DDE	PCB3	PCB-as-AR1242
DDT	p-p'-DDT	PCB4	PCB-as-AR1248
Delt-	Delta-BHC	PCB5	PCB-as-AR1254
Diaz-	Diazinon	Pend-	Pendimethalin
Diel-	Dieldrin	Prom-	Prometon
Dipr-	Dipropetryn	Prometryn-	Prometryn
Endo-	Endosulfan-I	Prop-	Propachlor
Endo2-	Endosulfan-II	Prop-	Propazine
EndoSul-	Endosulfan-Sulfate	Sima-	Simazine
Endr-	Endrin	Tech-	Technical-Chlordane
Feno-	Fonofos	Terb-	Terbuthylazine
Fluc-	Fluchloralin	Terbutryn	Terbutryn
Gamm-	Gamma-BHC	Trif-	Trifluralin

APPENDIX I - FISH TISSUE SEMIVOLATILES

Station_ID	Date	Time	2Pic-	Anil-	Phenol	BisE-	2Chl-	13Di-	14Di-	12Di-	2Meth-	Acet-	NNit-	4Meth-	Hexa-	Nitr-	Phena-
			ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g
B. LAKE LMB < 16 "	980721	900	<.06114	<.02711	<.02252	<.08057	<.02991	<.03106	<.02869	<.03245	<.06144	0.04969	<.13275	<.04937	<.09221	<.06765	<.04618
B. LAKE LMB > 16 "	980721	900	<.06323	<.02804	<.02622	<.08333	<.01674	<.06046	<.05584	<.06316	<.04145	<.02040	<.04326	<.03331	<.14582	<.07066	<.03200
F.O.R.LAKE LMB < 16"	980721	1400	<.08001	<.03548	<.01672	<.10544	<.02750	<.07370	<.06807	<.07700	<.07479	<.02493	<.09428	<.06010	<.04459	<.08023	<.03967
F.O.R.LAKE LMB > 16"	980721	1400	<.07198	<.03192	<.05220	<.09485	<.00821	<.05877	<.05428	<.06140	<.02424	<.01187	<.06395	<.01948	<.04792	<.04011	<.03731
Station_ID	Date	Time	NNitro-	Isop-	2Nitr-	24Dim-	Bism-	24Dic-	124Tri-	26Dich-	4Chlo-	Naph-	Hexbut-	NNitrob	4Chlor-	2Methyl-	12Diph-
			ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g
B. LAKE LMB < 16 "	980721	900	<.05520	<.02762	<.09024	<.06932	<.03256	<.04841	<.04044	<.05405	<.01209	<.00963	<.03544	<.07661	<.03681	<.02125	<.02327
B. LAKE LMB > 16 "	980721	900	<.02559	<.05766	<.04264	<.06445	<.03508	<.04851	<.03267	<.05415	<.01051	<.00561	<.01807	<.04227	<.02587	<.02953	<.02512
F.O.R.LAKE LMB < 16"	980721	1400	<.01669	<.02674	<.05901	<.06005	<.03856	<.07245	<.05820	<.08089	<.01664	<.00801	<.02200	<.05158	<.04056	<.01957	<.02818
F.O.R.LAKE LMB > 16"	980721	1400	<.04614	<.01847	<.04902	<.01838	<.03220	<.02343	<.02262	<.02616	<.01998	<.00222	<.01630	<.03091	<.01220	<.01892	<.01331
			Hexpen-	1245Tet-	246Tri-	245Tri-	2Chlnap	1Chlo-	2Nito-	26Dinitr	Acenap-	3Nitro-	Acen-	Penta-	Dibenz-	24Dinitro-	Benb-
Station_ID	Date	Time	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g
B. LAKE LMB < 16 "	980721	900	<.08145	<.02201	<.02947	<.02616	<.01727	<.02553	<.03508	<.07595	<.01292	<.07066	<.02403	<.02225	<.00765	<.05200	<.00915
B. LAKE LMB > 16 "	980721	900	<.08118	<.04972	<.03686	<.03273	<.01797	<.02656	<.07194	<.10543	<.01580	<.10075	<.02358	<.02567	<.01127	<.07219	<.01023
F.O.R.LAKE LMB < 16"	980721	1400	<.04205	<.02091	<.03701	<.03286	<.02771	<.04095	<.05002	<.05566	<.01258	<.07645	<.01162	<.01616	<.00920	<.03811	<.01037
F.O.R.LAKE LMB > 16"	980721	1400	<.04522	<.03685	<.02361	<.02096	<.00887	<.01311	<.05546	<.08607	<.01463	<.10264	<.02506	<.01577	<.00931	<.05893	<.00529
			Bena-	Dianth-	Dibenacr	Indpyr-	Benk-	4Nitro-	2Nap-	2346Tet-	1Nap-	Flouren	4Chph-	4Nitro-	46Din-	Diph-	
Station_ID	Date	Time	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	
B. LAKE LMB < 16 "	980721	900	<.01072	<.02831	<.01313	<.01024	<.00805	<.14585	<.01273	<.03922	<.01382	<.01603	<.01832	<.07856	<.04229	<.00942	
B. LAKE LMB > 16 "	980721	900	<.01199	<.05775	<.01329	<.00878	<.00900	<.08942	<.03492	<.05410	<.03791	<.02596	<.02331	<.11200	<.05087	<.01173	
F.O.R.LAKE LMB < 16"	980721	1400	<.01215	<.04046	<.00699	<.00712	<.00912	<.11255	<.02647	<.02606	<.03091	<.01916	<.02209	<.08498	<.06082	<.00983	
F.O.R.LAKE LMB > 16"	980721	1400	<.00620	<.04770	<.00836	<.00569	<.00465	<.07232	<.03509	<.01927	<.03809	<.02288	<.00947	<.11410	<.02593	<.00646	
			4Brom-	Hexa-	Penchl-	Penchni	4Amino-	Pron-	Phen-	Anth-	Flour-	Pyrene-	Dimetam	Benzo-	33Dich-	Chrysene-	
Station_ID	Date	Time	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	
B. LAKE LMB < 16 "	980721	900	<.03424	<.02714	<.02127	<.08182	<.01753	<.03920	<.01945	<.02377	<.00883	<.00756	<.01973	<.00598	<.00981	<.00555	
B. LAKE LMB > 16 "	980721	900	<.03078	<.02480	<.04919	<.06430	<.02184	<.04919	<.02355	<.02878	<.01799	<.01445	<.00976	<.00948	<.01105	<.00880	
F.O.R.LAKE LMB < 16"	980721	1400	<.03380	<.03260	<.04081	<.06890	<.01830	<.05383	<.01625	<.01985	<.00540	<.00438	<.01185	<.01083	<.01073	<.01005	
F.O.R.LAKE LMB > 16"	980721	1400	<.01128	<.01709	<.02206	<.04712	<.01202	<.03595	<.01260	<.01539	<.00757	<.00605	<.00817	<.00812	<.00559	<.00753	

APPENDIX J - FISH TISSUE SEMIVOLATILE PARAMETER LIST

1245Tet-	1-2-4-5-Tetrachlorobenzene
124Tri-	1-2-4-Trichlorobenzene
12Di-	1-2-Dichlorobenzene
12Diph-	1-2-Diphenylhydrazine
13Di-	1-3-Dichlorobenzene
14Di-	1-4-Dichlorobenzene
1Chlo-	1-Chloronaphthalene
1Nap-	1-Naphthylamine
2346Tet-	2-3-4-6-Tetrachlorophenol
245Tri-	2-4-5-Trichlorophenol
246Tri-	2-4-6-Trichlorophenol
24Dic-	2-4-Dichlorophenol
24Dim-	2-4-Dimethylphenol
24Dinitro-	2-4-Dinitrotoluene
24diphen-	2-4-dinitrophenol
26Dich-	2-6-Dichlorophenol
26Dinitro-	2-6-Dinitrotoluene
2Chl-	2-Chlorophenol
2Chlnaph-	2-Chloronaphthalene
2Meth-	2-Methylphenol
2Methyl-	2-Methylnaphthalene
2Nap-	2-Naphthylamine
2Nito-	2-Nitroaniline
2Nitr-	2-Nitrophenol
2Pic-	2-Picoline
33Dich-	3-3'-Dichlorobenzidine
3Methch-	3-Methylcholanthrene
3Nitro-	3-Nitroaniline
46Din-	4-6-Dinitro-2-methylphenol
4Amino-	4-Aminobiphenyl
4Brom-	4-Bromophenyl-phenyl-ether
4Chlo-	4-Chloroaniline
4Chlor-	4-Chloro-3-methylphenol
4Chph-	4-Chlorophenyl-phenyl-ether
4Meth-	4-Methylphenol
4Nitro-	4-Nitrophenol
4Nitro-	4-Nitroaniline
Acen-	Acenaphthene
Acenap-	Acenaphthylene
Acet-	Acetophenone
Anil-	Aniline
Anth-	Anthracene
Bena-	Benzo(a)pyrene
Benb-	Benzo(b)fluoranthene
Benk-	Benzo(k)fluoranthene
Benper	Benzo(g-h-i)perylene
Benz-	Benzoic-acid
Benzo-	Benzo(a)anthracene
Benzyl	Benzyl-alcohol
BisE-	Bis(2-chloroethyl)-Ether
Bism-	Bis(2-chloroethoxy)methane
Bispht	Bis(2-ethylhexyl)phthalate
Butyl-	Butyl-benzyl-phthalate
Chryse	Chrysene
Dianth-	Dimethylbenzo(a)anthracene
Dibena	Dibenzo(a-j)acridine
Dibenz	Dibenz(a-h)anthracene
Dibenz	Dibenzofuran
Dibut-	Di-n-butyl-phthalate
Diethyl	Diethyl-phthalate
Dimeta	Dimethylaminoazobenzene
Dimeth	Dimethyl-phthalate
Dinoct-	Di-n-octyl-phthalate
Diph-	Diphenylamine
Flour-	Fluoranthene
Floure	Fluorene
Hexa-	Hexachloroethane
Hexa-	Hexachlorobenzene
Hexbut	Hexachlorobutadiene
Hexpe	Hexachlorocyclopentadiene
Indpyr-	Indeno(1-2-3-cd)pyrene
Isop-	Isophorone
Naph-	Naphthalene
Nitr-	Nitrobenzene
NNit-	N-Nitroso-di-n-propylamine
NNitro-	N-Nitrosopiperidine
NNitro	N-Nitrosodibutylamine
Penchl	Pentachlorophenol
Pench	Pentachloronitrobenzene
Penta-	Pentachlorobenzene
Phen-	Phenanthrene
Phena-	Phenacetin
Phenol	Phenol
Pron-	Pronamide
Pyrene	Pyrene