

Final Report on the
Investigation of PCBs in the
Sheboygan River System

July 12, 1978

Prepared By:

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Introduction

The Department of Natural Resources monitored Lake Michigan fish near Sheboygan in 1975 and 1977, and monitored Sheboygan Harbor fish in 1976 (Appendix 1). The average PCB levels found in these samples were similar to PCB levels found in Lake Michigan fish sampled at other locations along the coast. In March, 1978, the Department tested fish from the Sheboygan River (three miles upstream from Sheboygan Harbor) and found high levels of PCBs.

A Summary of Events leading to and following the discovery of high levels of PCBs in Sheboygan River fish is as follows:

1. On September 9, 1977 fish samples were collected for the first time in the Sheboygan River at Kiwanis Park in the City of Sheboygan. This new location was one of the 29 stations which comprise Wisconsin's share of the New National Water Quality Monitoring Network. Water samples are to be taken from the 29 stations each month and fish samples are to be collected and analyzed for contaminants annually.
2. During March of 1978 these fish samples were routinely analyzed at the State Laboratory of Hygiene. The test results for whole fish samples were as follows:

Species & Length	PCB ug/g (ppm)	Fat* (%)
5 Carp (12-23")	750	24.0
5 Northern Pike (18-25")	55	3.7
5 White Sucker (10-14.5")	26	3.4

Because these levels were well in excess of the U.S. Food and Drug Administration tolerance level of 5 ppm (for fish sold in Interstate Commerce), we requested that the location be sampled again and the high test values confirmed.

*PCBs are fat-soluble and tend to accumulate in the lipid portion of fish tissue. A positive correlation exists between PCB burdens and fat concentrations in fish tissue. Because different species of fish differ markedly in fat content, it is more meaningful to include fat percentages with PCB concentrations.

3. On March 31, 1978 fish samples were again collected from the Sheboygan River at Kiwanis Park. The test results for whole fish samples were reported by the laboratory on April 18, 1978 as follows:

Species & Length	PCB ug/g (ppm)	Fat (%)
17 Black Bullheads (3.5-9")	41.8	7.0
12 Black Bullheads (4-9")	34.3	5.2
1 Rock Bass (8")	10.0	1.9
2 Common Shiners (4")	49.8	2.3
1 Coho Salmon (23")	8.3	0.5
2 Walleye (17")	241.5	8.9
3 Carp (10-18.5")	180.0	5.4
4 Carp (23-24")	158.4	8.7
5 Suckers (12-21")	30.0	5.4
4 Northern Pike (21-27")	62.6	4.0

The test results confirmed the elevated PCB levels in fish at this location. The values ranged from 8.3 ppm for a Coho Salmon which may have just entered the river to 241.5 ppm for 2 walleyes which probably lived in the lower river most of the year.

4. On April 20, 1978 a telephone conference call was held between the Central Office, the Southeast District Office and the Plymouth Office to discuss the situation. Following the conference call, the data were reviewed with the Department of Health and Social Services and a joint press release (Appendix 2) was prepared and mailed announcing the findings and recommending that the public not eat fish caught in the following waters until further notice:

Sheboygan River - from the Sheboygan Marsh Dam to the Coast Guard Station in Sheboygan.

Mullet River - from the lower mill pond dam, Plymouth, to the junction with the Sheboygan River.

Onion River - from the Waldo mill pond dam to the junction with the Sheboygan River.

Signs providing this information were posted on the rivers on April 21, 1978 (Appendix 3).

The Natural Resources Board was appraised of the Sheboygan River PCB situation at its April 26, 1978 meeting, after which Secretary Earl appointed the technical committee to coordinate the Sheboygan River PCB Investigation (Appendix 4). The investigation included the collection and testing of many samples from the drainage basin including fish, river bottom sediment, municipal/industrial effluents, and river water. This report summarizes the findings of the Sheboygan River Investigation.

PCB Data on Sheboygan River Fish Samples

The levels of PCBs found in fish collected at 11 locations in the drainage basin (Fig. 1.) are listed in Table 1. Forty samples of fish taken from the Sheboygan River below the Sheboygan Falls Dam to the confluence with Lake Michigan, including the Weeden's Creek and Greendale Creek tributaries, averaged 155 ppm PCBs. Thirty-eight samples of fish from the Sheboygan River upstream from the Sheboygan Falls Dam, the Mullet River, and the Onion River were found to contain levels below the FDA tolerance of 5 ppm.

A collaborative study was conducted by the State Laboratory of Hygiene and the State Department of Agriculture, Trade and Consumer Protection, Bureau of Laboratory Services, to confirm the accuracy of PCB analyses in fish samples. Appendix 5 contains the results of the study. The independent analyses of split fish samples closely agreed.

PCB Data on Sheboygan River Bottom Sediment Samples

Table 2 lists the levels of PCBs found in bottom sediment samples collected at 13 locations in the drainage basin. The highest concentration of PCBs was detected immediately downstream from the Tecumseh Products Die-Casting Plant in Sheboygan Falls. Lower but significant amounts of PCB were detected farther downstream in the reach from Sheboygan Falls to Sheboygan. Low levels of PCB were found in the Sheboygan River upstream from the Sheboygan Falls Dam, the Mullet River, and the Onion River.

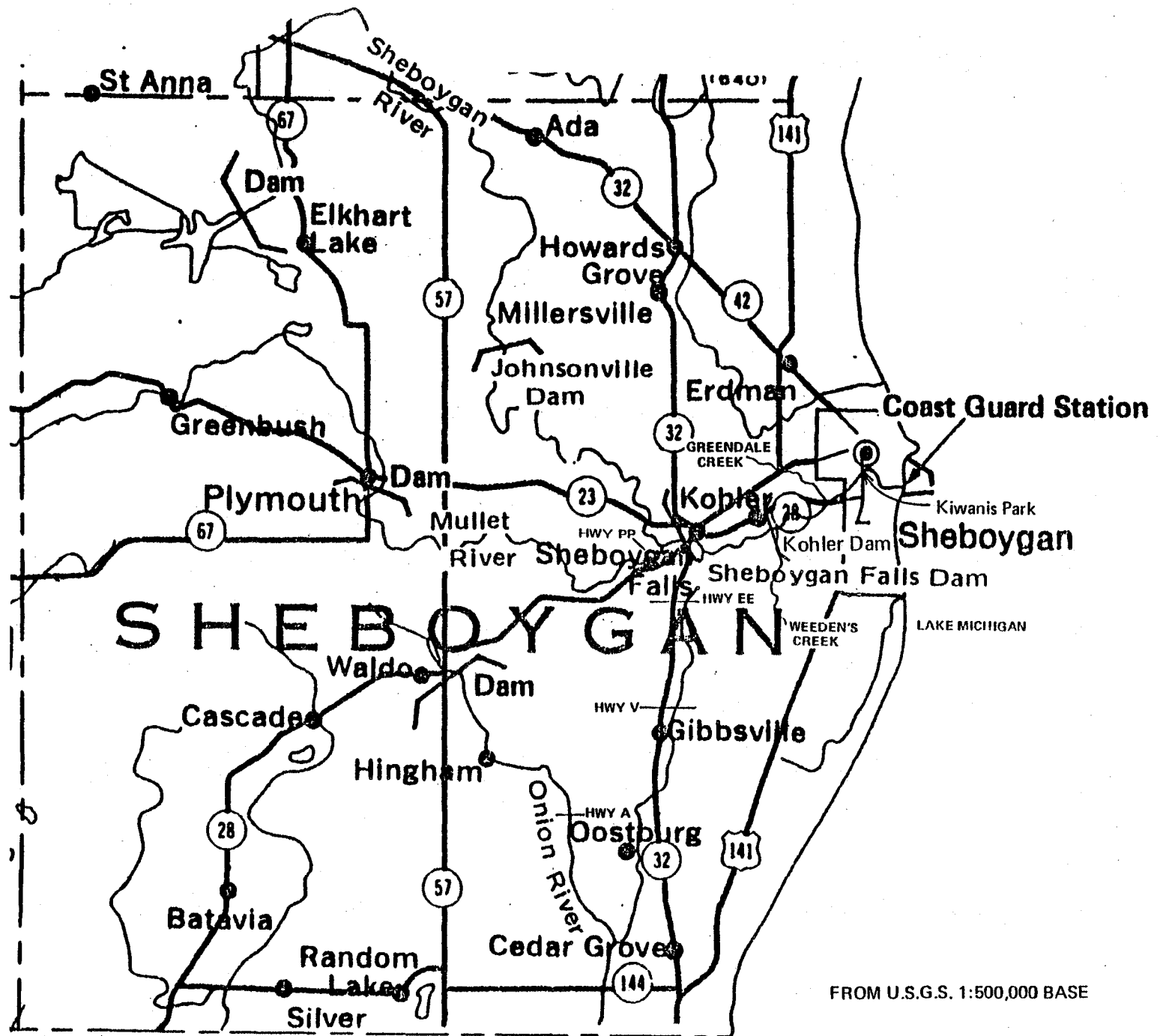
Municipal/Industrial PCB Point Source Samples

Table 3 lists the concentrations of PCBs found in municipal and industrial effluents collected from facilities in the drainage basin. Also listed are the concentrations of PCBs found in river water, and hydraulic fluid taken from 3 aluminum die-casting plants. No significant PCB point source to the Sheboygan River was detected by monitoring these municipal and industrial discharges.

PCB Analysis of Soil Samples From The Tecumseh Products Company At Sheboygan Falls

Table 4 lists the levels of PCBs found in soil samples collected on the Tecumseh property (Fig. 2) in Sheboygan Falls. Granular oil absorbent material deposited on the property contained up to 120,000 ug/g (ppm) PCB (12%).

This PCB-contaminated waste deposited on the dike bordering the Sheboygan River is a significant source of PCBs to the lower Sheboygan River. During periods of high water the Sheboygan River flows along the dike and is in direct contact with highly contaminated fill materials. During rains PCBs in the dike are subject to washing into the stream. PCBs at other locations on the plant property are likely to soak into the ground and reach the river via ground water discharge. The area is subject to periodic flooding which occurred as recently as May, 1978.



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Figure 1. Sheboygan River Drainage Basin (PCB Investigation Area).

TABLE 1. PCB DATA ON SHEBOYGAN RIVER FISH SAMPLES

Kiwanis Park Samples

Drainage Area	Sample Location	Collection Date	No. / Species	Type of Sample	Average Total Length	PCB ug/g (ppm)	Fat (%)
Lk. Michigan	Kiwanis Pk.-Sheboygan	5-16-78	1 Carp	F*	27"	15.3	9.5
Lk. Michigan	Kiwanis Pk.-Sheboygan	5-16-78	1 Carp	F	23"	17.0	10.7
Lk. Michigan	Kiwanis Pk.-Sheboygan	5-16-78	1 Carp	F	22"	12.1	15.4
Lk. Michigan	Kiwanis Pk.-Sheboygan	5-16-78	1 Carp	F	25"	2.0	11.2
Lk. Michigan	Kiwanis Pk.-Sheboygan	5-16-78	1 Carp	F	23.5"	333.0	9.5
Lk. Michigan	Kiwanis Pk.-Sheboygan	5-16-78	1 Carp	F	24.5"	970.0	16.3
Lk. Michigan	Kiwanis Pk.-Sheboygan	5-16-78	4 W. Suckers	** WF	14"	23.9	4.7

GREENDALE & WEEDEN'S CREEK SAMPLES

Drainage Area	Sample Location	Collection Date	No./Species	Type of Sample	Average Total Length	PCB ug/g (ppm)	Fat (%)
Lk. Michigan	Greendale Creek	4-28-78	1 N. Pike	WF	15.0"	169	3.0
"	"	"	8 Minnows	WF	6.0"	5.9	4.1
"	"	"	17 Minnows	WF	4.5"	14.0	2.8
"	Weeden's Creek	4-28-78	1 C. Salmon	WF	14.5"	0.9	.5
"	"	"	6 Creek Chubs	WF	6.0"	150.0	3.9
"	"	"	18 Minnows	WF	5.0"	61.0	2.1

* F indicates boneless fillet sample

** WF indicates whole fish sample

TABLE 1. (Con't.)

Kohler Dam Samples

Drainage Area	Sample Location	Collection Date	No./Species	Type of Sample	Average Total Length	PCB ug/g (ppm)	Fat (%)
Lk. Michigan	Above Kohler Dam-Kohler	4-26-78	1 Carp	F	25"	240.0	9.3
Lk. Michigan	Above Kohler Dam-Kohler	4-26-78	1 Carp	F	25"	180.0	3.8
Lk. Michigan	Above Kohler Dam-Kohler	4-26-78	1 Carp	F	22"	150.0	6.4
Lk. Michigan	Above Kohler Dam-Kohler	4-26-78	1 Carp	F	25"	250.0	5.6
Lk. Michigan	Above Kohler Dam-Kohler	4-26-78	3 Carp	WF	22-25"	350.0	11.6
Lk. Michigan	Above Kohler Dam-Kohler	4-26-78	1 Carp	F	27"	250.0	12.2
Lk. Michigan	Above Kohler Dam-Kohler	4-26-78	5 Carp	WF	18.5-20"	460.0	11.7
Lk. Michigan	Above Kohler Dam-Kohler	4-26-78	3 Carp	WF	21.5-22"	320.0	9.0
Lk. Michigan	Above Kohler Dam-Kohler	4-26-78	5 Suckers	F	12.5-13"	88.0	.7
Lk. Michigan	Above Kohler Dam-Kohler	4-26-78	5 Suckers	WF	9-10.5"	130.0	2.5
Lk. Michigan	Above Kohler Dam-Kohler	4-26-78	5 Suckers	WF	10.5-11"	39.0	.9
Lk. Michigan	Above Kohler Dam-Kohler	4-26-78	5 Suckers	F	10-11"	40.0	.5
Lk. Michigan	Above Kohler Dam-Kohler	4-26-78	5 Rock Bass	WF	4.5-7.5"	190.0	3.1
Lk. Michigan	Above Kohler Dam-Kohler	4-26-78	12 Common Shiners	WF	5"	100.0	2.5

TABLE 1. (Con't.)

**** Sheboygan Lagoon Samples (Above Sheyboygan Falls)**

Drainage Area	Sample Location	Collection Date	No./Species	Type of Sample	Average total length	PCB ug/g (ppm)	Fat (%)
Lk. Michigan	Above Sheb. Falls Dam (Sheb. Lagoon)	4-27-78	38 Bluegills	WF	3.5"	< 5.0	1.0
"	"	"	10 Redhorse	WF	8.0"	< .5	2.2
"	"	"	2 Crappies	WF	6.5"	< 2.0	1.1
"	"	"	6 Rock Bass	WF	8.0"	< 2.0	.9
"	"	"	4 N. Pike	F	16.0"	< 1.0	.4
"	"	"	7 Redhorse	F	15.0"	< 1.0	1.5
"	"	"	1 Carp	F	25.5"	< 1.0	.5
"	"	"	1 Carp	F	23.5"	< .8	1.0
"	"	"	4 Carp	F	17.0"	< 1.0	1.6
"	"	"	5 Carp	WF	17.0"	< 3.0	3.4
"	"	"	5 Carp	WF	16.0"	< 4.0	4.9
"	"	"	8 Carp	WF	15.0"	< 2.0	7.1
"	"	"	8 Carp	WF	14.0"	< 2.0	3.7

** There is Chlordane interference in fish samples from Sheboygan Lagoon, making it difficult to quantify an exact PCB number. Therefore these values are listed as 'less than' the given number. In most cases, the real PCB level in the sample would be less than the given number.

JOHNSONVILLE DAM SAMPLES

Drainage Area	Sample Location	Collection Date	No./Species	Type of Sample	Average Total Length	PCB ug/g (ppm)	Fat (%)
Lk. Michigan	Above Johnsonville Dam	4-28-78	4 Carp	WF	20"	.8	3.3
"	"	"	4 Carp	WF	17"	.8	5.1
"	"	"	1 Carp	F	21.5"	.4	1.4
"	"	"	1 Carp	F	23.5"	.6	2.2
"	"	"	14 Suckers	WF	10.0"	.2	2.3
"	"	"	9 Rock Bass	WF	6.5"	.5	2.4
"	"	"	3 Crappies	WF	6.0"	< .5	.4
"	"	"	1 L.M. Bass	WF	9.5"	.7	1.6
"	"	"	14 Stonecats	WF	5.0"	< .4	1.1
"	"	"	60 Minnows	WF	3.0"	< .4	2.3

TABLE 1. (Con't.)

**** MULLET RIVER SAMPLES**

Drainage Area	Sample Location	Collection Date	No./Species	Type of Sample	Average Total Length	PCB ug/g (ppm)	Fat (%)
Lk. Michigan	2 Miles Upstream From Plymouth	5-4-78	5 Carp	WF	13.0"	<.2	1.2
"	"	"	5 Carp	WF	12.5"	<.2	2.2
"	"	"	1 W. Sucker	WF	10.5"	<.2	.6
"	"	"	10 W. Suckers	WF	7.5"	<1.0	2.1
"	"	"	14 Bullheads	WF	6.5"	<3.0	1.6
"	"	"	9 Creek Chubs	WF	5"	<.2	3.2
"	2 Miles Downstream From Plymouth STP	"	5 Carp	WF	15.5"	<5.0	3.7
"	"	"	5 Carp	WF	12.5"	<5.0	4.1

**There is Chlordane interference in fish samples from below the Plymouth STP, making it difficult to quantify an exact PCB number. Therefore these values are listed as 'less than' the given number. In most cases, the real PCB level in the sample would be less than the given number.

ONION RIVER SAMPLES

Drainage Area	Sample Location	Collection Date	No./Species	Type of Sample	Average Total Length	PCB ug/g (ppm)	Fat (%)
Lk. Michigan	At Hwy. V	4-28-78	5 Rock Bass	WF	6.5"	.2	2.0
"	At Hwy. A	4-28-78	3 Carp	WF	13.0"	.4	1.8
"	"	"	5 Carp	WF	15.0"	.2	2.2
"	Below Waldo	4-28-78	1 N. Pike	F	20.5"	<.2	.5
"	"	"	5 Carp	WF	13.0"	.2	2.0
"	"	"	5 Carp	WF	18.0"	<.2	1.3
"	"	"	3 Carp	F	24.0"	<.2	.4

TABLE 2. PCB CONCENTRATIONS IN SHEBOYGAN RIVER WATERSHED BOTTOM SEDIMENTS*

Name	Date of Collection	Date of Analysis	Type of Sample(time)	PCB ug/g (ppm)	Water depth
Sheboygan River Kiwanis Park	5-9-78	6-7-78	Grab (11:00)	9.6	2.5'
Sheboygan River Between 8th & 14th St., Sheboygan	4-27-78	6-7-78	Grab (10:30)	3.6	7-11'
Sheboygan River Upstream From USGS Gauging Station	4-27-78	5-10-78	Grab (13:45)	2.4	4'
Kohler Landfill	4-27-78	5-15-78	Grab (13:15)	1.3	
Kohler Landfill	5-9-78	6-7-78	Grab(12:30)	< .2	NA
Sheboygan River Upstream From Kohler Dam	4-27-78	5-10-78	Grab (14:30)	52	2'
Sheboygan River Upstream From Kohler Dam	4-27-78	5-10-78	Grab (14:30)	81	2'
Sheboygan River Upstream From Kohler Dam	5-9-78	6-7-78	Grab (11:50)	27	2'
Sheboygan River 100 feet Downstream From Tecumseh	5-9-78	6-7-78	Grab (14:00)	190	3"
Sheboygan River 70 yards Upstream From Tecumseh	5-9-78	6-7-78	Grab (13:00)	2.4	6"
Upstream From Sheboygan Falls Dam	4-27-78	6-7-78	Grab (15:15)	< .2	4'
Upstream From Johnsonville Dam	4-27-78	6-7-78	Grab (19:30)	< .2	2'
Mullet River Hwy. PP	4-27-78	6-7-78	Grab (16:30)	3.4	
Mullet River - Hwy. PP	5-9-78	6-7-78	Grab (15:00)	< .2	2'
Mullet River Upstream from Plymouth	4-27-78	6-7-78	Composite(17:45)	< .2	3'
Mullet River Below Plymouth STP	4-27-78	6-7-78	Grab (17:00)	< .1	2'
Onion River at Hwy. EE	4-27-78	6-7-78	Grab (15:45)	< .1	3'

* A complete sample description is provided in Appendix 6

TABLE 3. PCB CONCENTRATIONS IN MUNICIPAL AND INDUSTRIAL POINT SOURCES,
RIVER WATERS, AND HYDRAULIC FLUIDS

Municipal Sewage Treatment Plants

Name	Collection Date	Date of Analysis	PCB ug/1 (ppm)	Comments
Sheboygan STP *	3-31-78	4-14-78	<.4	Final Effluent
Sheboygan Falls STP	3-31-78	4-12-78	<1.0	Final Effluent
Kohler STP	3-31-78	4-14-78	<.2	Final Effluent
Plymouth STP	4-4-78	4-11-78	9.0	Final Effluent (Flood Stage)
Plymouth STP	4-27-78	5-15-78	<.2	Final Effluent (Normal)
Belgium STP	4-21-78	5-8-78	<2.0	Final Effluent
Kiel STP	4-24-78	5-8-78	<1.0	Final Effluent
Sheboygan Incinerator	4-21-78	5-8-78	<1.0	Final Effluent

* STP means Sewage Treatment Plant

TABLE 3. (Con't.)

Name	Collection Date	Date of Analysis	Industrial Effluents Type of Sample (time)	PCB ug/l (ppb)	Comments
J.L. French Co. (S)*	4-4-78	4-14-78	Grab	21	Effluent to STP
Thomas Industries (S)	4-4-78	4-7-78	Grab	140	Effluent to STP
Thomas Industries	5-3-78	5-23-78	Grab (11:00)	.2	Surface water Discharge
Tecumseh Prod. (SF)**	4-4-78	4-20-78	Grab	2.2	Effluent to STP
Tecumseh Prod. (SF)	4-4-78	4-11-78	Grab	<.4	Effluent to Surface Waters
Kohler Co.	4-6-78	4-13-78	Grab	<.2	Effluent to Surface Waters
Kohler Landfill	4-21-78	5-8-78	Grab (09:30)	<1.0	Effluent to Surface Waters
Gilson Co. (P) ***	4-21-78	5-8-78	Grab	<.5	Effluent to STP
Ametek (S)	4-24-78	5-8-78	Grab (11:00)	<2.0	Effluent to Surface Waters
Bemis Mfg. (SF)	4-24-78	5-8-78	Grab (14:00)	<.3	Effluent to Surface Waters
Schrier Malting (S)	4-24-78	5-8-78	Grab (10:00)	<1.0	Effluent to Surface Waters
Vollrath Inc. (S)	4-24-78	5-8-78	Grab (11:30)	<.3	Effluent to Surface Waters
Plastic Engineering (S)	4-24-78	5-8-78	Grab (13:00)	<.3	Effluent to Surface Waters
Plastic Engineering (15th Avenue) (S)	4-24-78	5-8-78	Grab (13:30)	<1.0	Effluent to Lake Michigan

* Sheboygan

** Sheboygan Falls

*** Plymouth

TABLE 3. (Con't.)

<u>River Water Samples</u>					
Name	Date of Sample Collection	Date of Analysis	Type of Sample (time)	PCB ug/1 (ppm)	Comments
Junction of Hwy. 28 & Sheboygan River	4-4-78	4-12-78	Grab	3.0	Flood Stage
Sheboygan River above Sheboygan Falls Dam	4-4-78	4-6-78	Grab	<.5	Flood Stage
Sheboygan River above Sheboygan Falls Dam	4-27-78	5-15-78	Grab (15:15)	<.3	
Sheboygan River above Kohler Dam	4-27-78	5-15-78	Grab (13:25)	<.2	
Sheboygan River below Johnsonville Dam	4-27-78	5-15-78	Grab (19:30)	<.2	
Onion River at Hwy. EE	4-27-78	5-15-78	Grab (15:46)	<.2	
Kohler Landfill	4-27-78	5-15-78	Grab (13:10)	<.3	Leachate
Mullet River above Plymouth Dam	4-27-78	5-15-78	Grab (18:00)	<.2	
Sheboygan River ¼ mile upstream from USGS gaging station	4-27-78	5-15-78	Grab (13:30)	.3	
Sheboygan River & 14th St in Sheboygan	4-27-78	5-15-78	Grab (21:00)	.3	
Sheboygan River immedi- ately downstream from Tecumseh Products	5-10-78	6-7-78	Grab (01:15)	<.4	
Sheboygan River immedi- ately upstream from Tecumseh Products	5-10-78	6-16-78	Grab (01:15)	<.2	

TABLE 3. (Con't.)

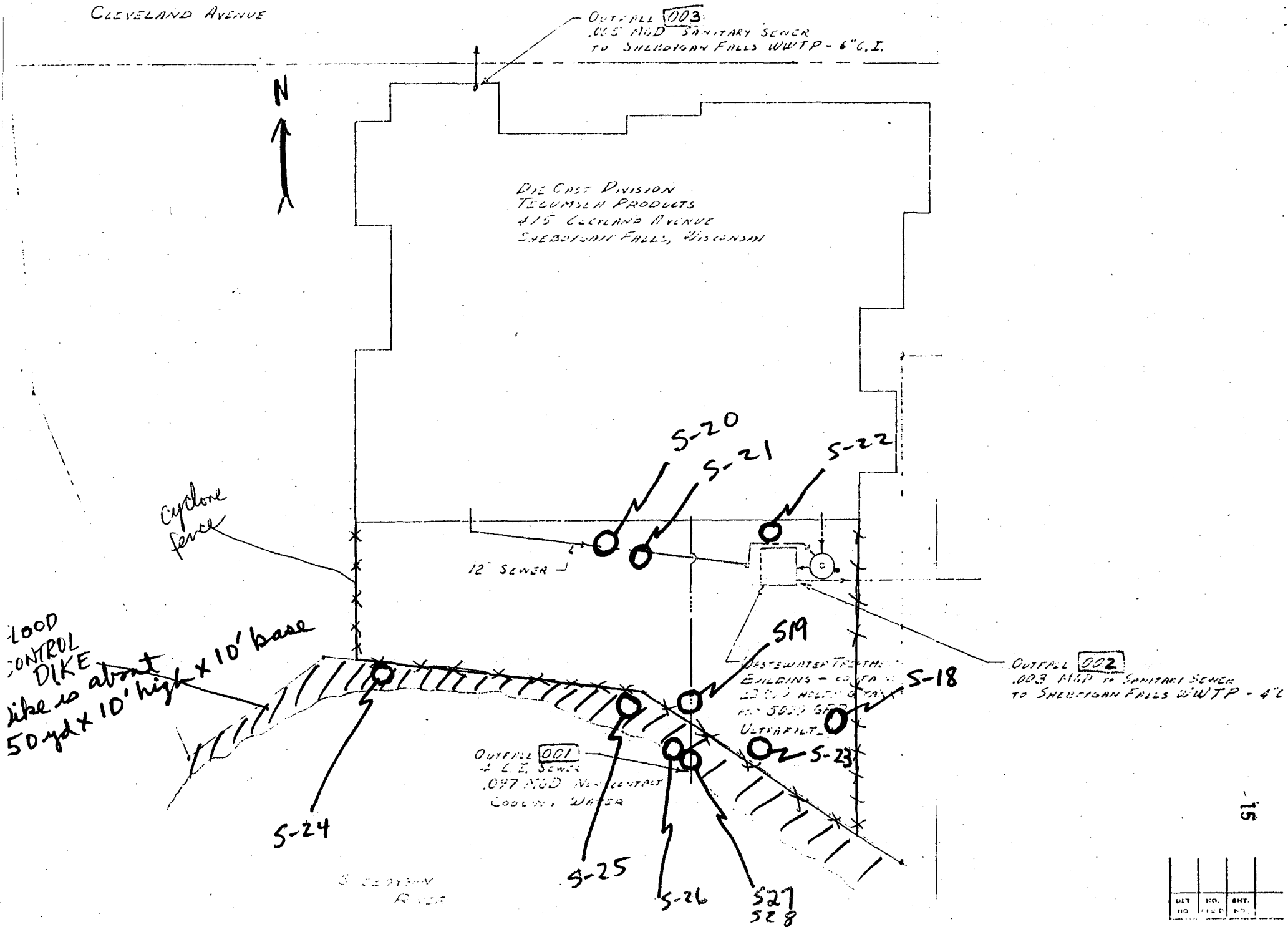
Name	Collection Date	Date of Analysis	Type of Sample (time)	<u>Hydraulic Fluids</u>		Comments
				PCB ug/g (ppm)		
J.L. French Co. (Sheboygan)	8-26-76	9-16-76	Grabs	10, 42, 104, 175, 21, 94, 72, 19, 12, 19, 14, 10		Hydraulic Fluids were obtained from on-line aluminum die-cast machines
Thomas Industries (Sheboygan)	4-4-78	4-19-78	Grabs	.8, 3.3, 3.0		"
Tecumseh Products (Sheboygan Falls)	4-4-78	4-19-78	Grabs	6.0, 2.5, 7.0		"

TABLE 1. TECUMSEH PRODUCTS SOIL SAMPLES*

Location	Sample Description	Sample Depth	Collection Date Collector	PCB ug/g (ppm)
S-18	8' from east fence, dark oily spot on ground. Pic. 1	topsoil - surface to 2" deep	5-11-78 Sheffy	390.0
S-19	5' from south fence, granular oil absorbent material, alum. bits. Pic. 2	6" deep	5-11-78 Sheffy	120,000.0
S-20	10' from bldg., sandy soil, oil dump area only soil. Pic. 3	surface to 3" deep	5-11-78 Sheffy	2,300.0
S-21	10' from bldg., sandy gravelly soil, oil dump area oily sample. Pic. 4	surface to 3" deep	5-11-78 Sheffy	660.0
S-22	3' from bldg., between oil sep. & bldg., black tarry soil sample, oil dump area. Pic. 5	surface to 3" deep	5-11-78 Sheffy	380.0
S-23	3' from south fence, low area below rubble pile, topsoil sample. Pic. 6	topsoil - surface to 4" deep	5-11-78 Sheffy	1,500.0
S-24	Granular oil absorbent material, alum. bits, outside of south fence on dike. Pic. 7	4-8" deep	5-11-78 Sheffy	120,000.0
S-25	Granular oil absorbent material, alum. bits, 2' outside of south fence. Pic. 8	4-8" deep	5-11-78 Sheffy	78,500.0
S-26	Granular oil absorbent material & alum. bits on river side of dike. Pic. 9	4-8" deep	5-11-78 Sheffy	54,000.0
S-27	Granular oil absorbent material & alum. bits, hydraulic hose on river side of dike. Pic 10	4-8" deep	5-11-78 Sheffy	43,800.0

*Laboratory analysis for these samples was performed by soaking .5-20 grams of sample in acetone for 1-8 hours. The extract was then injected directly into the gas chromatograph. This procedure is a more rapid procedure for detecting high levels of PCB than the standard column elution method.

Figure 2.
SOIL SAMPLE LOCATIONS AT TECUMSEH PRODUCTS COMPANY



DLT NO.	NO. FIELD	ENT. NO.

Subsequent to the discovery of highly contaminated PCB waste deposits at the Tecumseh Products site, the Department of Natural Resources issued an order on May 12, 1978 banning further disposal of solid waste on Tecumseh property (Appendix 7). On June 21, 1978 the Department issued a second order requiring the excavation, collection and proper storage of all materials likely to contain PCBs from the dike on the Sheboygan River behind the Tecumseh Plant. PCB-containing materials include oil absorbent material, scrap pressure hose, and oil soaked debris (Appendix 8).

On June 21, 1978 the Department together with the Department of Health and Social Services lifted the warning against fish consumption in the following sections of the river basin: the Sheboygan River from the Sheboygan Marsh to the Sheboygan Falls Dam, the Mullet River from Plymouth to the junction with the Sheboygan River at Sheboygan Falls and the Onion River from Waldo to Gibbsville. (Appendix 9).

However, the PCB warning will continue in the Onion River from Gibbsville to Sheboygan Falls, on the Sheboygan River from the Sheboygan Falls dam to the Coast Guard Station at Lake Michigan and on two tributaries of the Sheboygan--Weeden's Creek and Greendale Creek. The Onion, Weeden's Creek and Greendale Creek were included because they are accessible to migrating main channel fish.

Conclusions

1. Fish sampled in the Sheboygan River (and its tributaries, Weeden's Creek and Greendale Creek) downstream from the Sheboygan Falls dam, to its confluence with Lake Michigan are contaminated with PCBs well in excess of the FDA standard of 5 ppm. Fish in the Sheboygan River above the Sheboygan Falls dam, the Mullet River, and the Onion River are below the FDA tolerance level for PCBs.
2. Sheboygan River bottom sediment is contaminated with PCBs from the Sheboygan Falls dam downstream to its confluence with Lake Michigan. Bottom sediment from the Sheboygan River above the Sheboygan Falls dam, the Mullet River, and the Onion River contains low levels of PCB.
3. A survey of municipal and industrial PCB point sources indicates no significant PCB concentrations in effluent discharges to the drainage basin.
4. A survey of soil from the Tecumseh Products Aluminum Die-Cast property at Sheboygan Falls revealed a significant source of PCBs to the Sheboygan River. This source is highly contaminated solid waste deposited adjacent to the Sheboygan River.
5. The highest levels of PCB detected in fish and river bottom sediments in the Sheboygan River System occur in the reach from the Tecumseh property downstream to Lake Michigan.

Recommendations of the Technical Committee

Based on available data, the Technical Committee for the Sheboygan River PCB Investigation recommends:

1. The PCB consumption advisory of April 21, 1978 should continue on the Onion River from Gibbsville to Sheboygan Falls, on the Sheboygan River from the Sheboygan Falls dam to the Coast Guard Station at Lake Michigan, and on two tributaries of the Sheboygan--Weeden's Creek and Greendale Creek. This recommendation was implemented on June 21, 1978.
2. The Department of H&SS and DNR should lift the fish consumption advisory of April 21, 1978, on the Mullet River, the Onion River from Waldo to Gibbsville, and on the Sheboygan River above the Sheboygan Falls Dam because fish from these locations are below the 5 ppm tolerance level for PCBs established by FDA. This recommendation was implemented on June 21, 1978.
3. The Department of Natural Resources should expand its monitoring studies to include the following:
 - A. Salmon and other migratory fish that enter the Sheboygan River should be tested for PCBs, and the results should be reported promptly to keep fishermen informed.
 - B. A thorough and systematic river bottom sediment study should be conducted on the Sheboygan River from Sheboygan Falls to Sheboygan Harbor to estimate the amounts of PCBs in river sediments.
 - C. Monitoring studies for PCBs and other Toxic Substances should be continued on other river systems of the State, particularly the streams passing through industrial areas.

A special budget appropriation of \$34,100 has been made by the Joint Finance Committee of the legislature to implement these expanded studies. The appropriated funds will cover the cost of these studies through July 1, 1979.

4. A Formal Proposal should be written and submitted in the DNR budget to provide continued support for item 3 after the 1 year appropriation runs out. The total cost of implementing the three studies in item 3 will be approximately \$78,000 for fiscal year 1980, and \$82,000 for fiscal year 1981. It is essential that this program be budgeted on a continuing basis beyond the 1978 special appropriation.
5. The Tecumseh Products Company and the City of Sheboygan Falls should expeditiously remove PCB wastes from their property along the bank of the Sheboygan River. An immediate clean up of the entire property should proceed and contaminated wastes properly stored until an approved suitable disposal site becomes available. The U.S. EPA has licensed only one PCB disposal site in the U.S. as required by the February 17, 1978 Federal Register. This site is located in Alabama. The Committee recommends that Secretary Earl assign the Bureau of Solid Waste Management the responsibility of coordinating with EPA to ensure that additional disposal sites for PCBs be licensed to handle the PCB wastes which will be generated in Wisconsin and other states.

At this time Tecumseh is proceeding with the clean-up as specified in the Department's Order of June 21, 1978. Contaminated wastes from the dike are being placed in sealed drums and stored according to State and Federal regulations until a suitable disposal site becomes available.

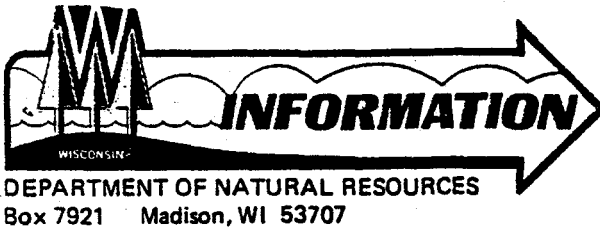
PCB ANALYSIS ON LAKE MICHIGAN FISH
COLLECTED OFFSHORE FROM SHEBOYGAN

Lake Michigan Samples

										length	PPM	%
											PCB	FAT
290	60	LK	MICH	SHEBOYGAN#1502	05/14/75	HYG*	70169	BROWN TROUT	F	13.8	.003	08.0
290	60	LK	MICH	SHEB BEACH STH	07/24/75	HYG	56367	BROWN TROUT	F	19.6	05.1	12.2
290	60	LK	MICH	SHEBOYGAN#1502	05/15/75	HYG	70168	BROWN TROUT	F	24.4	03.4	0015
290	60	LK	MICH	SHEBOYGAN#1502	05/14/75	HYG	70159	LAKE TROUT	F	12.2	0.50	01.1
290	60	LK	MICH	SHEBOYGAN#1502	05/14/75	HYG	70160	LAKE TROUT	F	16.7	02.4	04.3
290	60	LK	MICH	SHEBOYGAN#1502	05/14/75	HYG	70146	LAKE TROUT	F	19.5	01.8	06.0
290	60	LK	MICH	SHEBOYGAN#1502	05/14/75	HYG	70147	LAKE TROUT	F	20.0	0.09	05.3
290	60	LK	MICH	SHEBOYGAN#1502	05/25/75	HYG	70165	LAKE TROUT	F	20.4	09.0	12.1
290	60	LK	MICH	SHEBOYGAN#1502	05/15/75	AG**	13944	LAKE TROUT	F	21.8	04.4	10.0
290	60	LK	MICH	SHEBOYGAN#1502	05/15/75	AG	13945	LAKE TROUT	F	25.9	10.6	19.4
290	60	LK	MICH	SHEBOYGAN#1502	05/14/75	AG	13946	LAKE TROUT	F	28.7	18.2	21.0
290	60	LK	MICH	SHEB BEACH	07/24/75	HYG	56368	CARP	F	23.8	02.8	09.5
290	60	LK	MICH	SHEB BEACH NTH	07/22/75	HYG	57166	CARP	F	24.2	28.0	08.0
290	60	LK	MICH	SHEB BEACH NTH	07/22/75	HYG	57170	CARP	E	30.5	12.0	22.0
290	60	LK	MICH	SHEBOYGAN#1503	05/14/75	HYG	70154	BLOATER CHUB	F	10.7	0.25	04.5
AVERAGE											6.57	10.6
290	60	LK	MICH	SHEBOYGAN HARB	06/24/76	HYG	05533	5 ALEWIFES	EP		03.4	04.0
290	60	LK	MICH	SHEBOYGAN HARB	06/24/76	HYG	05534	3 W SUCKER	F	14.7	22.0	02.4
290	60	LK	MICH	SHEBOYGAN HARB	06/24/76	HYG	05536	3 WHITEFISH	F	17.0	07.7	05.4
290	60	LK	MICH	SHEBOYGAN HARB	06/24/76	HYG	05535	BROOK TROUT	F	12.5	07.8	04.8
290	60	LK	MICH	SHEBOYGAN HARB	06/24/76	HYG	05540	K TROUT	F	17.8	05.4	10.1
290	60	LK	MICH	SHEBOYGAN HARB	06/24/76	HYG	05542	2 BR TROUT	F	18.3	06.3	12.6
290	60	LK	MICH	SHEBOYGAN HARB	06/24/76	HYG	05543	2 BR TROUT	F	19.7	05.1	15.3
290	60	LK	MICH	SHEBOYGAN HARB	06/24/76	HYG	05541	BROWN TROUT	F	29.0	12.0	12.0
290	60	LK	MICH	SHEBOYGAN HARB	06/24/76	HYG	05539	LAKE TROUT	F	22.7	07.9	12.2
290	60	LK	MICH	SHEBOYGAN HARB	06/24/76	HYG	05538	LAKE TROUT	F	31.0	25.0	12.1
290	60	LK	MICH	SHEBOYGAN HARB	06/24/76	HYG	05532	COHO SALMON	F	18.4	26.0	05.7
290	60	LK	MICH	SHEBOYGAN HARB	06/24/76	HYG	05537	CHINOOK	F	34.5	11.0	02.6
AVERAGE											11.6	8.26
290		LK	MICH	10 MI SE SHEB	04/19/77	HYG	67539	5 CHUBS	WF	08.7	02.0	04.9
290		LK	MICH	10 MI SE SHEB	04/19/77	HYG	67538	5 CHUBS	WF	09.5	01.8	07.3
290		LK	MICH	10 MI SE SHEB	04/19/77	HYG	67536	5 CHUBS	WF	10.0	01.5	11.5
290		LK	MICH	10 MI SE SHEB	04/19/77	HYG	67535	5 CHUBS	WF	10.3	02.6	13.3
290		LK	MICH	10 MI SE SHEB	04/19/77	HYG	67534	5 CHUBS	WF	11.1	01.7	15.5
290		LK	MICH	10 MI SE SHEB	04/19/77	HYG	67537	5 CHUBS	WF	12.0	02.3	13.3
AVERAGE											1.98	10.9

*State Laboratory of Hygiene

**State Department of Agriculture Laboratory



MADISON, WI--No fish taken from the lower Sheboygan River watershed should be eaten until further notice because of "extremely high" PCB contamination. Department of Health and Social Services (HSS) and Department of Natural Resources (DNR) officials warned today.

In a joint release today HSS Secretary Donald Percy and DNR Secretary Anthony S. Earl warned the public to stop eating fish taken from the Sheboygan River between Sheboygan Marsh Dam and the coast guard station at Lake Michigan, the Onion River from Waldo Dam to its junction with the Sheboygan River, and the Mullet River between lower Mill Pond Dam at Plymouth and its junction with the Sheboygan, until additional test results explain the PCB contamination. Approximately 129 river miles are included in the warning.

The levels of polychlorinated biphenyls (PCBs) discovered through routine fish testing "are greater than anything we've discovered before," according to Stanton Kleinert, who directs DNR's hazardous substance surveillance.

Health officials said that they are concerned about long-lasting, lifetime exposures to PCBs rather than any short term exposure.

An annual warning in Wisconsin's fishing regulations asks the public to eat only one meal a week (1/2 pound) of fish from certain waters, including Lake Michigan, because of high PCB content. This advisory further recommends that lactating mothers, expectant mothers, females who anticipate bearing children, and children less than six-years-old not eat these fish. Federal regulations prohibit the sale of fish with higher than 5 parts per million (ppm) PCB concentration.

In testing on the lower Sheboygan River at Kiwanis Park, however, DNR found an average of 126 ppm PCBs in 13 fish samples. Researchers found an average of 59 ppm in northern pike, 28 ppm in suckers, 241 ppm in walleye, 38 ppm in bullheads, 8.3 ppm in coho salmon, and one catch of carp containing 750 ppm PCBs. The levels are the highest recorded in live fish sampled in Wisconsin.

(more)

APPENDIX 2

Kleinert said the DNR was initiating an investigation to determine the source of the contamination but, at present, "there are few leads," Kleinert said.

"We are not certain where the pollution is coming from," the official said. "Several weeks will be required to complete our investigation. We will be concentrating our efforts on testing river waters and river sediments to pin down the source or sources of contamination. We will also be testing many fish samples from various locations in the river system."

DNR Secretary Anthony Earl ordered reassignment of toxic investigators and fish management specialists onto the case, saying "this effort demands the prompt attention of personnel with diverse skills whose cooperation is essential to protect the public health and natural resource."

Earl notified HSS Secretary Donald Percy of the discovery, which came about through a routine, cooperative program between the DNR's fish management and water quality personnel.

The DNR Secretary also ordered notification of local officials, sportsmen's organizations, local news media and others of the existing problem. Affected areas will be posted with health warnings until the problem is resolved.

Elevated PCB levels were first detected by routine test results in March. DNR toxic substances specialists ordered immediate additional testing at several sites to verify the PCB problem.

More testing for PCB concentrations and the source or sources of the contaminant will have to wait at least one week according to Kleinert. He said previous rains will probably keep the river at flood stage at least that long.

"Flood waters make it difficult to trace down PCBs because we can't easily sample fish and the diluted water makes it tougher to track down the source," he said.

DNR researchers face a tough job in locating the source of the PCB buildup, he said. The toxin could be buried in riverbed sediments or seeping in from neighboring industries, or landfills, which will require extreme checking.

(more)

APPENDIX 2. (Con't.)

Researchers will test sediment core samples, water, land sites, and fish to try and pinpoint the PCB problem. Four sewage treatment plants and four industries have already been tested with inconclusive results. Many more sites along the river will be tested.

PCBs concentrate in fatty tissues of fish which are exposed to the pollutant over a long time period.

"Smelt and stream trout which many anglers are now fishing probably won't contain high concentration of PCBs," Kleinert said, "but why take the chance until we know more from our testing. We hope this is a localized problem confined to fish which live the entire year in the lower Sheboygan River system. We have not seen these excessive levels in lake-run fish which don't live in the river for long periods of time."

Tests show that large, fatty fish like carp, salmon, and lake trout concentrate more PCBs than leaner fish like stream trout and smelt. In previous studies, Lake Superior smelt measured 0.3 ppm PCBs, Green Bay smelt had 3 ppm PCBs and Lake Michigan smelt contained 0.6 ppm PCBs. Experienced anglers know that careful trimming of back, belly, and side fat can remove some of the PCBs from infected fish.

Human health effects from PCB exposure, especially long term, low level exposures from eating infected fish, are not clearly understood. U.S. workers who received long term occupational exposures to PCBs developed skin rashes. Similar long term tests in rats and monkeys produced liver tumors, skin lesions, and reproductive impairment. That's why the Food and Drug Administration considers continual exposure to PCBs a health risk.

PCBs were manufactured in the U.S. from 1929 to 1966 before any deliterious effects were noticed. The compounds are highly stable -- nonflammable; resistant to heat, acids, and bases - therefore, they had many industrial uses. PCBs have been used as dielectric fluids in transformers and capacitors, electrical wiring insulation, plasticizers, hydraulic fluids, lubricants, sealants, molding waxes, epoxy paints, and in many other

(more)

APPENDIX 2 (Con't.)

products. The chemical can enter the water from fallout, by vaporizing, through incineration, leaching from landfills, sludge disposal, treated sewage effluent, and accidental spills.

"It takes a continuing, careful monitoring effort throughout the state to discover toxic concentration like this in areas where we have not expected to find these problems," Kleinert said. The DNR provides its fish testing data to the Department of Health and Social Services which reviews the data and makes public health recommendations on PCB-contaminated fish. PCB warnings for some fish in specified Wisconsin locations are listed on page 22 of the 1978 fishing regulations.

Contact: Stan Kleinert, DNR Director of Surveillance
(608) 266-7721

Ivan Imm, Acting Director, HSS Bureau of Prevention
(608) 266-2548



APPENDIX 2 (Cont)

WARNING

Wisconsin Department of Natural Resources water quality sampling has identified PCB's (polychlorinated biphenyls) in fish in this area. Based on this information, the Wisconsin Department of Health and Social Services recommends that the public not eat fish caught in the following waters until further notice:

Sheboygan River—From the Sheboygan Marsh Dam to the Coast Guard Station in Sheboygan.

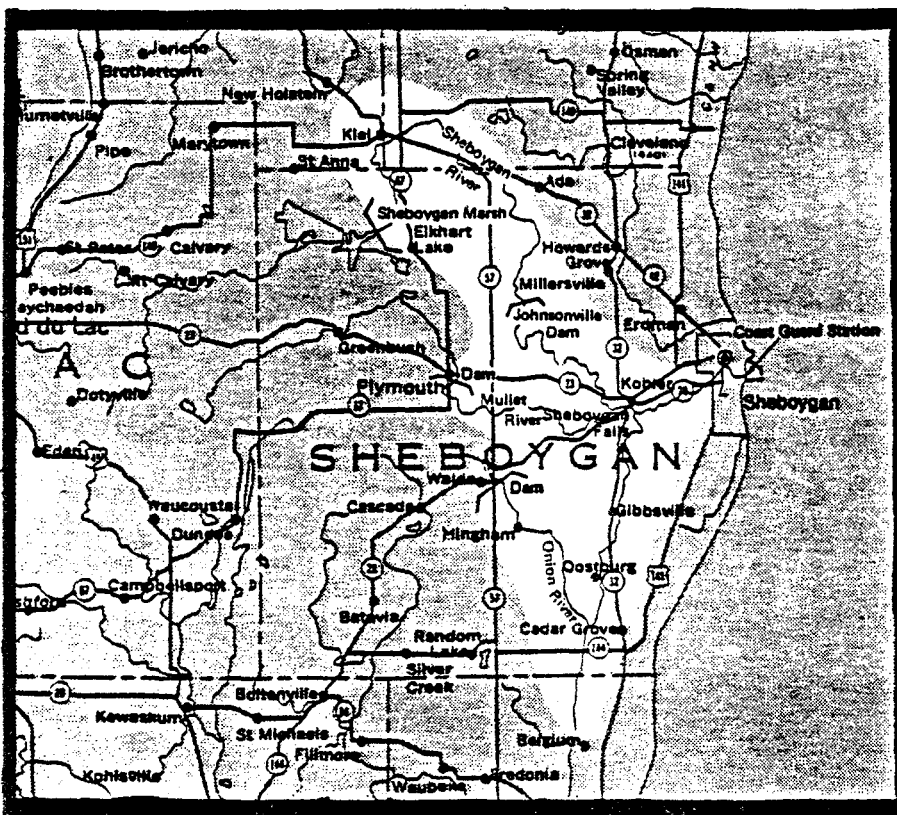
Mullet River—From the lower mill pond dam, Plymouth, to the junction with the Sheboygan River.

Onion River— From the Waldo mill pond dam to the junction with the Sheboygan River in Sheboygan Falls.

Anthony S. Earl

Anthony S. Earl,
Secretary
Department of
Natural Resources

April 21, 1978



CORRESPONDENCE/MEMORANDUM

Date: May 4, 1978

File Ref: 3210-3

To: Stan Kleinert - 10
Tom Sheffy - 10
Jim Addis - 6

Lloyd Lueschow - 14
Jeff Bode - SE Dist.
Paul Shultz - SE Dist.

Joe Delfino - Lab. of
Hygiene

From: Anthony S. Earl *AE*

MAY 05 1978

Subject: Technical Committee for the Sheboygan River PCB Investigation

I am requesting your participation on a technical committee to review the data that is being gathered in the Sheboygan River Investigation. By copy of this letter, I am also asking that Dr. Delfino of the Laboratory of Hygiene be a member of the committee.

Stan Kleinert will act as the committee chairman and the first meeting will be held in Room 1306 of the Pyare Square Building at 9:30 a.m., on Monday, May 22, 1978. If you are unable to attend, please send an alternate.

The Surveillance Section will be responsible for assembling the investigation findings into a report. Each of you as members of the technical committee will be requested to review the report prior to its release by the Department. We hope this investigation will proceed as swiftly as possible and the report can be issued by the target date of July 1, 1978.

SJK:km

APPENDIX 4

COLLABORATIVE STUDY OF PCB IN FISH

Wisconsin State Laboratory of Hygiene

Wisconsin Department of ATCP
Bureau of Laboratory Services

May 1978

Laboratory Number		PCB, concentration (ug/g)			Fat, percent	
SLH	ATCP	SLH	ATCP 1	ATCP 2	SLH	ATCP
71105	6805	333	335	306	9.5	10
71106	6806	970	848	839	16.3	16.9
71107	6807	2	2.5	2.1	11.2	10.8
68119	6810	15	10.3	9.1	9.5	9.4
68120	6811	17	16	13.8	10.7	10.9
68121	6812	16.5	16.6	13.3	15.4	15.2

METHODS

STATE LABORATORY OF HYGIENE

Handbook of Procedures for Pesticide Residue Analysis,
US Dept of Interior, Fish and Wildlife Service, August 1972.

Dept. of ATCP 1

Pesticide Analytical Manual (PAM) 211.13 F, JAOC (Vol. 56,
No. 4, 1973), Bulletin of Environmental Contamination and
Toxicology, Vol. 7, No. 2, 1972.

Dept. of ATCP 2

PAM 211.13 F, 211.14 A, 211.14 D, 211.15 D, 330

Appendix 5

SHEBOYGAN RIVER

Table 1: Sediment Sampling Locations

<u>Sample Number</u>	<u>Sample Location</u>	<u>Sample Site Access</u>	<u>Reach</u>	<u>Sample Type</u>	<u>Sample Taken</u>
SHE 1	Upstream Johnsonville Dam	STH 23 to CTH M to CTH JM	D	Composite	Grab
SHE 2	Upstream Sheboygan Falls Dam	STH 28 to STH 32	D-C	Composite	Composite
SHE 3	Upstream Kohler Dam	STH 28	C-B	Composite	Grab
SHE 4	Upstream U.S.G.S. Station	STH 28 & U.S. 141	B-A	Grab	Grab
SHE 5	Downstream 14th St. to 8th St., Sheboygan	STH 28 to N. 14th to 8th St.	A	Composite	Composite Start Sampling at Penn Ave.
SHE 6	Onion River above Confluence with Sheboygan River	STH 28 to CTH EE	Trib.	Grab	Grab
SHE 7	Mullet River above Confluence with Sheboygan River	CTH PP to Willow Road	Trib.	Grab	Grab
SHE 8	Mullet River below Plymouth STP	CTH PP to CTH AC	Trib.	Composite	Composite
SHE 9	Mullet River upstream Plymouth Dam	CTH AC to STH 23	Trib.	Composite	Composite
SHE 10	Kohler Landfill Point Source Composite	STH 28 at U.S. Geological Survey	Point Source	Composite	Composite

SHEBOYGAN RIVER
Sediment Survey - April 27, 1978
Field Data

Sample Time	Sample Type (Grab or Composite)	Sample Site	Sampling Depth Approx. Feet	Sample Color	Sample Texture	Sample Odor	Type of Benthic Organisms Present	Other Remarks
<u>Sampling Site 1</u>								
19:30	Sediment grab	10 ft. from left bank, 30 yds. upstream of dam	2 ft.	Black	Mucky, very wet sample	Septic-type smell	None	Lots of detritus in sediment-Rt. bank gravel
21:00	Water sample grab		Surface					
<u>Sampling Site 2</u>								
15:15	Sediment grab	100 yds. upstream of dam, rt. bank #2, 1	4 ft.	Brown & gray	Muck & fine sand	Natural decaying smell	None	Oil present in sediment sample
15:25	"	250 yds. upstream of dam, rt. bank #2, 2	3 ft.	"	" "	" "	"	Detritus in sample
15:30	Water sample grab	100 yds. upstream of dam	Surface					
<u>Sampling Site 3</u>								
14:25	Grab sediment	7 ft. from rt. bank	2 ft.	Gray & brown	Sandy, some muck, medium courseness	Organic odor	None	Detritus, oil in sediments
14:35	Grab sediment	" "	"	"				
14:40	Water sample grab	Mid-stream	Surface					Water turbid, high in suspended solids

SHEBOYGAN RIVER
Sediment Survey - April 27, 1978
Field Data

Sample Time	Sample Type (Grab or Composite)	Sample Site	Sampling Depth Approx. Feet	Sample Color	Sample Texture	Sample Odor	Type of Benthic Organisms Present	Other Remarks
<u>Sampling Site 4</u>								
13:25	Sediment grab	5 ft. from right bank, 1/4 mi. upstream of U.S.G.S. gaging station at Hwy, 28	4 ft.	Gray & brown	Sandy, medium coarseness, detritus	Natural decaying odor	No benthic organisms present	Observed several dying bullheads
13:30	Water grab	10 ft. from left bank, 1/4 mi. upstream of U.S.G.S. gaging station at Hwy. 28	Surface					Water turbid, high in suspended solids
13:45	Water grab	At U.S.G.S. gaging station	Surface					Water turbid, high in suspended solids
<u>Sampling Site 5</u>								
10:15	Sediment grab	30 ft. from left bank, Site #5, 1	7 ft.	Grayish brown	Mucky, some sand, fine detritus	Natural decaying odor	No benthic organisms	Used rubber gloves to handle sample oil in sample (1/10th of total sample)
10:30	Sediment grab	50 ft. from rt. bank, Site #5, 2	11 ft.	Grayish brown	Muck, 50% sand Detritus	Natural odor	Few Oligochaetes present	Some oil in sample
10:35	Sediment Grab	30 ft. from left bank, Site #5, 3	8 ft.	Grayish brown	Muck Fine sand 50%	Fishy odor	No Oligochaetes	Water turbid
10:45	Sediment Grab	45 ft. from left bank, Site #5, 4	8 ft.	Grayish brown	Muck sand	Fishy odor	Few Oligochaetes	Granular or more coarse type sand

SHEBOYGAN RIVER
Sediment Survey - April 27, 1978
Field Data

Sample Time	Sample Type (Grab or Composite)	Sample Site	Sampling Depth Approx. Feet	Sample Color	Sample Texture	Sample Odor	Type of Benthic Organisms Present	Other Remarks
<u>Sampling Site 6 - Onion River</u>								
15:45	Sediment grab	50 ft. upstream of CTH EE, 5 ft. from left bank	3 ft.	Light brown	Wet, clayey	Fishy odor	None	High amount of clay, bank erosion, right bank sandy bottom
	Water sample grab	Mid-stream	Surface					Water turbid
<u>Sampling Site 7 - Mullet River</u>								
16:30	Grab Sediment	50 ft. downstream from CTH PP, 5 ft. from left bank	3 ft.	Light brown	Muck sand	Decaying odor		Sandy bottom in most of stream
16:20	Grab water sample		Surface					Dead algae on water surface (mats), water turbid, Richarsons Furniture factory upstream
<u>Sampling Site 8 - Plymouth WWTP</u>								
16:45	Sediment grab	Mullet River below Plymouth WWTP 25 ft. upstream from CTH AC bridge, 3 ft. from left bank. Sample #8, 1	2.5 ft.	Light brown	Very sandy, muck	Natural odor	None	Floating dead algae mats, frog
17:00	Sediment grab	60 ft. upstream from bridge, 1.5 ft. from left bank. Sample #8, 2	1.5 ft.	Light brown	Very sandy, muck	Natural odor	None	Water not very turbid, sandy bottom

SHEBOYGAN RIVER
Sediment Survey - April 27, 1978
Field Data

Sample Time	Sample Type (Grab or Composite)	Sample Site	Sampling Depth Approx. Feet	Sample Color	Sample Texture	Sample Odor	Type of Benthic Organisms Present	Other Remarks
17:00	Water sample grab	Plymouth Wastewater Treatment Plant Outfall						Sample taken at Plymouth WWTP Water clear
<u>Sampling Site 9</u>								
17:45	Sediment composite	All sediment samples taken 100 yd. upstream of Plymouth Dam	3 ft.	Black	Fine muck	Organic odor	None	Pond algae floating on surface
		1st sample 20 ft. off rt. bank Sample #9, 1	3 ft.	Black	Fine muck	Organic odor	None	Very turbid water fish jumping out of water
		2nd sample 50 ft. off left bank Sample #9, 2	3 ft.	Black	Fine muck	Organic odor	None	
18:00	Water sample grab	Taken at water surface at dam spillway						Some oil observed in water sample
<u>Sampling Site 10 Kohler Landfill Point Sources</u>								
13:00	Shovel grab sediment and grab water sample	KLF-1 ≈ 50 ft. upstream U.S. Geological Survey Gaging Station (USGS)	1 in.	Brown	Wet, muck sand	None	None	Point source, 20% of water sample taken here
13:05	Shovel grab sediment	KLF-3 ≈ 500 ft. upstream of USGS, at dead tree	1/2-1 in.	Dark brown	Dry soil; i.e. top soil	None	None	Point source

Appendix 6 (cont)

SHEBOYGAN RIVER
Sediment Survey - April 27, 1978
Field Data

Sample Time	Sample Type (Grab or Composite)	Sample Site	Sampling Depth Approx. Feet	Sample Color	Sample Texture	Sample Odor	Type of Benthic Organisms Present	Other Remarks
13:10	Shovel grab sediment	KLF-4 Opening in berm to stream, ≈ 800 ft. upstream USGS, landfill culverts drain to area behind berm	1/4 in.	Light brown surface, reddish brown below surface	Dry mud surface, below surface 75% sandy	None	None	Point source
13:15	Shovel grab sediment	KLF-5 - Opening in berm, ≈ 900 ft. upstream USGS, drains landfill culvert and pond	1/2 in.	Brown	Wet muck, sand	None	None	Point source, 80% of water sampled here

Sheboygan River Sediment Survey
April 27, 1978
Supplemental Field Information

Sediment sampling survey conducted on the Sheboygan River April 27, 1978; had mild weather condition with temperatures ranging in mid fifties. Cloud cover was 0% with sunny skies. Winds were out of the northeast at 0-5 mph. These conditions prevailed throughout the duration of the sampling period.

Sampling Site 1: Johnsonville Meats - landfill material encroaching on stream bank at the Johnsonville Meat Store on the Sheboygan River; odor coming from Johnsonville Meats.

Sampling Site 2: Sample #2, 1 taken 100 yards upstream of Sheboygan Falls dam at Highway 32, 10 ft. from right bank. Sample #2, 2 taken 250 yards upstream of dam, 10 ft. from right bank. Samples #2, 1 and #2, 2 composited to make one sediment sample (50%) each. Left side of river mostly gravel and stone.

Sampling Site 3: River bed almost entirely gravel and rock, water turbid, weather conditions same as Site 5. Site 3 located \approx 1/2 mile upstream of Kohler dam.

Sampling Site 4: Stream reach from Esslingen Park to the USGS gauging station at Hwy. 28 was all rubble and gravel bottom. Current too swift for boat and engine to go upstream. No samples taken. Sediment sample taken 1/4 mi. upstream of USGS gauging station, 5 ft. from left bank. Several dying bull-heads seen in water. Water very turbid.

Sampling Site #5: Weather conditions, sunny; 0% cloud cover; winds 0-5 mph NE.

Sampling Site #5, 1: Taken 30 ft. off of left bank, approximately 150 feet downstream of Pennsylvania Avenue Bridge in City of Sheboygan.

Sampling Site #5, 2: Taken 50 ft. off of right bank, 300 yards downstream of Pennsylvania Avenue Bridge, midway between blue boat house.

Sampling Site #5, 3: Taken 30 ft. from left bank, 350 yards downstream of Pennsylvania Avenue Bridge.

Sampling Site #5, 4: Taken 45 feet from left bank, 450 yards downstream of Pennsylvania Avenue Bridge.

Samples taken at Site 5 were composited to make 1 sediment sample; Sample #5-1, 10% of total sample; Sample #5-2, 25% of total sample; Sample #5-3, 55% of total sample; and Sample 5-4, 20% of total sample. Sampling ended at the 8th Street Bridge, where an oil film was observed floating on the water.

Sampling Site 8: Sample #8, 1 taken 25 ft. upstream of bridge at CTH AC. Sample #8, 2 taken 60 ft. upstream of bridge at CTH AC. These 2 samples were combined to make 1 sediment sample (50% each).

Sampling Site 9: Samples #9, 1 and #9, 2 at Plymouth Dam were composited to make 1 sediment sample (50% each). Sediment here was a very fine organic silt or muck.

Sampling Site 10: Water samples only taken at Sites #10-1 and #10-5; other sites did not have flowing water.

SHEBOYGAN RIVER

Table 2: Sediment Sampling Locations II

<u>Sample Number</u>	<u>Sample Location</u>	<u>Sample Site Access</u>	<u>Sample Taken</u>
SHE 11	Kiwanis Park from boat launch pier.	Kiwanis Park Ave. in City of Sheboygan	Grab
SHE 12	Kohler landfill upstream of U.S.G.S. Station.	STH 28 & U.S. 141	Composite made up of 4 grabs
Site 13	50 yds. upstream of Kohler Dam	STH 28	Grab
Site 14,15,16,17	Tecumseh Products Co., Sheboygan Falls	Cleveland Ave.	Grabs

SHEBOYGAN RIVER
Sediment Survey II - May 9, 1978
Field Data

Sample Time	Sample Type (Grab or Composite)	Sample Site	Sampling Depth Approx. Feet	Sample Color	Sample Texture	Sample Odor	Type of Benthic Organisms Present	Other Remarks
<u>Site 11</u>								
11:00	Sediment grab	Kiwanis Park boat launch on Kiwanis Park Ave. Sample taken at end of pier about 25 feet from lt. bank	2.5 ft.	Grayish Brown	Silty with fine sand	Organic decaying odor some oily smell	Oligocheate present	Some oil in sample. Drizzling rain - water turbid
<u>Site 12 Kohler Landfill</u>								
11:35	Shovel grabs of sediment leachate to make 1 sediment composite	KLF about 500 ft. upstream of U.S.G.S. at dead tree	1/2"-1"	Reddish Brown, Gray-Brown, Gray-Black	Fine soil sand & silt	Septic odor some oily smell	None	Kohler landfill 4 samples 25% each to make 1 composite sample U.S.G.S. reading 3.79
<u>Site 13</u>								
11:50	Sediment grab	40 yds. upstream of Kohler Dam 2-1/2 ft. off of lt. bank	1-1/2 ft.	Brown, Gray-Black	Silt & muck, some fine sand	Very organic decaying odor	None observed	Some oil in sample, water turbid
<u>Site 14 at Tecumseh Products</u>								
12:00	Shovel grab from berm	Behind Tecumseh Product on Cleveland Ave., Sheboygan Falls berm between river & building-20 ft. from river mid-length of building	Surface to 6" below surface	Brown, Whitish-green	Sandy & coarse	Strong chemical odor	None	Chemical odor - oxidizing material in sample oil dry or speedy dry material-aluminum pieces in sample & other scraps

SHEBOYGAN RIVER
Sediment Survey II - May 9, 1978
Field Data

Sample Time	Sample Type (Grab or Composite)	Sample Site	Sampling Depth Approx. Feet	Sample Color	Sample Texture	Sample Odor	Type of Benthic Organisms Present	Other Remarks
<u>Site 15</u>								
12:20	Grab sample sediment from river	70 yds. upstream of Tecumseh Products outfall 3 ft. from lt. bank.	6"	Brown & Black	Silty & muck organic detritus	Hydrogen sulfide odor	None	Water turbid-a lot of dead crayfish shells. Large amount of debris along banks
<u>Site 16</u>								
12:35	Shovel grab sediment	100 ft. downstream of Tecumseh Products outfall 1 ft. from lt. bank	3"	Brown	Watery, sandy	Natural decaying odor	No benthics present	Watery sample
<u>Site 17</u>								
12:40	Shovel grab from berm	Behind Tecumseh Products	Surface to 6" below surface	Brown, Whitish-green	Sandy, gravel or coarse	Chemical smell	No benthics present	Oil dry or speedy dry material present. Scrap aluminum present in sample & white crystal material

Sheboygan River Sediment Survey II
May 9, 1978
Supplemental Field Information

A second sediment sampling survey was conducted on the Sheboygan River on May 9, 1978. Weather conditions were moderate with temperatures ranging in the high forties to mid-fifties. A slight amount of precipitation (rain) occurred in the morning, ending by noon. Sky conditions were 100 percent overcast with winds out of the east, north-east from 15-20 miles per hour (mph), gusting to 35-40 mph. These conditions prevailed throughout the duration of the survey period.

Site 12

At Kohlers landfill, four (4) shovel grab samples were taken of landfill leachate and combined to make one sediment sample (25% of each). Samples were taken approximately 500 feet upstream of U.S.G.S. at dead tree.

Site 14, 15, 16, 17

These sampling sites were in the vicinity of the Tecumseh Products Co.

Samples 14 and 17 were samples taken from the berm built up between the river and building. Both samples had aluminum scraps in them, a whitish-green crystalline like substance, made up of speedy dry material, and had a heavy chemical odor. The berm had apparently been built from waste products of the company and used as fill material.

Samples 15 and 16 were upstream and downstream sediment samples from the river, respectively. The upstream sample was approximately 70 yards from the Tecumseh Products outfall. The downstream sample was 100 feet from the outfall.



State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Anthony S. Earl
Secretary

BOX 7921
MADISON, WISCONSIN 53707

May 12, 1978

IN REPLY REFER TO: 4530

Mr. Dee Sherman, Plant Manager
Diecast Division of Tecumseh Products Company
415 Cleveland Street
Sheboygan Falls, Wisconsin 53085

Honorable Gladys Morken
Mayor of Sheboygan Falls
Municipal Building
Sheboygan Falls, Wisconsin 53085

Dear Mr. Sherman and Mayor Morken:

Enclosed is a special order issued by the Department of Natural Resources relating to operations of your solid waste management facilities.

This order is issued pursuant to Section 144.35, Wisconsin Statutes, and Chapter NR 151, Wisconsin Administrative Code. It is based on a field investigation and finding that your solid waste management operations are not in full compliance with State standards.

If a public hearing on this order is desired, written notice must be given to the Department no later than 10 days after the date the notice and order are served.

Should the order become delinquent, your attention is directed to Section 144.536 and Section 144.57, Wisconsin Statutes, which provide for enforcement of the order by the Attorney General and forfeitures of from \$10 to \$5,000 per day for each day of violation, failure or refusal to obey the provisions of the order.

If you have any questions with regard to this matter, please contact Mr. Bernard Schultz, Asst. Director, Southeast District Headquarters, 9722 West Watertown Plank Road, Milwaukee, Wisconsin 53226.

Sincerely,

Andrew C. Damon
Deputy Director

Enc.

cc: Tecumseh Products Company
Tecumseh, Michigan 49286

APPENDIX 7



State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Anthony S. Earl
Secretary

BOX 7921
MADISON, WISCONSIN 53707

IN REPLY REFER TO: 4530

May 12, 1978

Tecumseh Products Company; and
City of Sheboygan Falls

Order Number 2A-78-1190

FINDINGS OF FACT

THE DEPARTMENT FINDS:

1. That the Diecast Division of Tecumseh Products Company, 415 Cleveland Street, Sheboygan Falls, Wisconsin operates an aluminum diecasting plant located in the NW 1/4 of the SE 1/4, Section 36, T15N, R22E, Sheboygan County, Wisconsin.
2. That a dike is located between the diecasting plant and the Sheboygan River.
3. That on information and belief the dike is owned by Tecumseh Products Company and is maintained by Tecumseh Products Company and/or the the City of Sheboygan Falls.
4. That the dike and the property between the dike and the diecasting plant are within the floodplain of the Sheboygan River.
5. That solid waste materials have been deposited on the dike and in areas directly adjacent to the plant on property owned by Tecumseh Products Company.
6. That these solid waste materials contain significant concentrations of polychlorinated biphenols.
7. That concentrations of polychlorinated biphenols have been found in fish in the Sheboygan River, well in excess of United States Food and Drug Administration tolerance levels.
8. That because of these significant concentrations of polychlorinated biphenols in fish tissue, the Department of Natural Resources in conjunction with the Department of Health and Social Services has advised consumers not to eat fish taken from the Sheboygan River until further notice.

APPENDIX 7 (Con't)

CONCLUSION OF LAW

1. That Section 144.44, Wisconsin Statutes, and Chapter NR 151, Wisconsin Administrative Code, prohibit disposal of solid waste except in a licensed landfill facility.
2. That Section 144.50, Wisconsin Statutes, and Chapter NR 157, Wisconsin Administrative Code, establish criteria for proper storage, transportation and disposal of polychlorinated biphenols and products containing polychlorinated biphenols.

ORDER

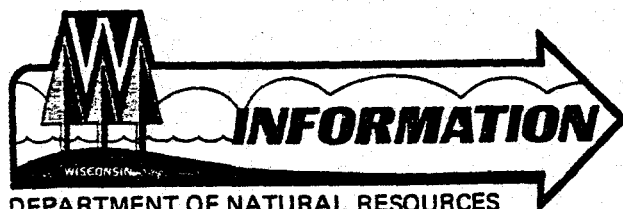
1. That Tecumseh Products Company discontinue any disposal of solid waste material except at a licensed solid waste disposal facility.
2. That any solid waste materials containing polychlorinated biphenols be stored, transported and disposed of in conformance with the provisions of Section 144.50, Wisconsin Statutes and Chapter NR 157, Wisconsin Administrative Code.
3. That the City of Sheboygan Falls neither construct nor maintain any dikes in the floodplain of the Sheboygan River with materials which contain polychlorinated biphenols.

Dated at Madison, Wisconsin, this 12TH day of MAY, 1978.

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES
For the Secretary

By Andrew C. Damon
Andrew C. Damon, Deputy Secretary

cc: Southeast District



DEPARTMENT OF NATURAL RESOURCES
Box 7921 Madison, WI 53707

MADISON, WI. -- The Department of Natural Resources has ordered an immediate halt to industrial waste dumping on a Sheboygan Falls site that toxic investigators say contains "substantial amounts" of PCB contaminants. Some samples exceeded 1% or 10,000 parts per million PCBs.

Stanton Kleinert, director of DNR hazardous substance surveillance, said the order affects the Diecast Division of Tecumseh Products Co. and the City of Sheboygan Falls, which maintains a dike adjoining the firm's property on the Sheboygan River.

Kleinert said it appears that industrial wastes used as fill and dike materials deposited in the river's floodplain are "an important source" of PCB contamination.

Tecumseh is located at 415 Cleveland Ave. The firm's land extends from Cleveland Avenue toward the river. A fence and 10-foot-wide dike separate the property from the Sheboygan River.

Rains or periodic flooding could have washed the PCB materials into the river and downstream, Kleinert said. Federal and state laws regulate floodplain use to protect life and property as well as to prevent uses incompatible with periodic flooding. Kleinert said PCBs could enter the river through runoff or seepage underground.

(more)

APPENDIX 7 (Con't.)

one add

Three weeks ago, the DNR's discovery of "extremely high" PCB levels in Sheboygan River fish triggered an intensive environmental detective effort to find possible sources of contamination. Kleinert said that investigation would continue, as would an advisory not to eat fish in 129 miles of the Sheboygan, Mullet and Onion Rivers.

Deputy DNR Secretary Andrew Damon, who signed the Tecumseh order, said the agency also was asking the Attorney General for advice on whether other legal action was warranted against the firm or any other party.

The department found that "the dike and property between the plant and river are in the river's floodplain" and that waste materials containing "significant concentrations of polychlorinated biphenyls" were deposited in the area and on the dike.

The order directed Tecumseh, whose parent offices are in Tecumseh, Michigan, to "discontinue any disposal of solid waste material except at a licensed solid waste disposal facility." It specifically directed that PCB materials be disposed of in accordance with regulations governing that kind of toxic waste.

Kleinert said the PCB contamination was found in soils and solid waste material from plant property. Until 1971, hydraulic fluids and some industrial oils were manufactured with high concentrations of PCBs, which are highly stable, nonflammable and resistant to heat.

The department was particularly concerned that PCBs were incorporated in the dike and, therefore, the city was added to the order, according to Charles Hammer, a DNR attorney.

Kleinert said tests of the hydraulic fluid now being used by Tecumseh failed to show a PCB problem. He said further analysis of the area's wastes would continue and plans for remedial actions would be investigated.

(more)

two add

Kleinert emphasized that the DNR would continue its investigation throughout the area originally posted as having a potential PCB problem. "We will continue sampling fish, water and soil within the watershed until we feel we have a full understanding of the situation," he said. "A full report outlining sampling data, PCB sources and recommendations for the Sheboygan River Watershed is planned for July release."

Test results from four recent carp samples collected between the Kohler Dam and Sheboygan Falls show that filleted fish averaged 205 parts per million (ppm) of PCBs. Filleted fish have lower levels of PCBs than whole fish because fattier portions are trimmed.

Earlier testing at Kiwanis Park in Sheboygan found an average of 126 ppm in 13 samples.

The U.S. Food and Drug Administration prohibits sale of fish with higher than 5 ppm PCBs. An April 21st advisory against eating fish from a 129-mile portion of the Sheboygan River Watershed is still in effect.

For Further Information:

Stan Kleinert

(608) 266-7721

Charles Hammer, DNR Attorney

(608) 266-0024

5-15-78

ask

APPENIX 7 (Con't)



State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Anthony S. Earl
Secretary

June 21, 1978

BOX 7921
MADISON, WISCONSIN 53707

IN REPLY REFER TO: 4530

Mr. Dee Sherman, Plant Manager
Diecast Division of Tecumseh Products Company
415 Cleveland Street
Sheboygan Falls, Wisconsin 53085

Honorable Gladys Morken
Mayor of Sheboygan Falls
Municipal Building
Sheboygan Falls, Wisconsin 53085

Dear Mr. Sherman and Mayor Morken:

Enclosed is a special order issued by the Department of Natural Resources relating to operations of your solid waste management facilities.

This order is issued pursuant to Section 144.35, Wisconsin Statutes, and Chapter NR 151, Wisconsin Administrative Code. It is based on a field investigation and finding that your solid waste management operations are not in full compliance with State standards.

If a public hearing on this order is desired, written notice must be given to the Department no later than 10 days after the date the notice and order are served.

Should the order become delinquent, your attention is directed to Section 144.536 and Section 144.57, Wisconsin Statutes, which provide for enforcement of the order by the Attorney General and forfeitures of from \$10 to \$5,000 per day for each day of violation, failure or refusal to obey the provisions of the order.

At this stage it appears that Chapter 30 permits are not required prior to the commencement of excavation.

If you have any questions with regard to this matter, please contact Mr. Bernard Schultz, Asst. Director, Southeast District Headquarters, 9722 West Watertown Plank Road, Milwaukee, Wisconsin 53226.

Sincerely,
Division of Enforcement

Andrew C. Damon
Andrew C. Damon
Administrator

Enc.

cc: Tecumseh Products Company
Mary Ann Calef, Assistant A.G.
Bureau of Legal Services
Allen Williams - Foley & Lardner

Bureau of Waste Management
Bureau of Water Quality
Southeast District



State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

June 21, 1978

Anthony S. Earl
SecretaryTecumseh Products Company; and
City of Sheboygan FallsBOX 7921
MADISON, WISCONSIN 53707

IN REPLY REFER TO: _____

Order Number 2A-78-1191

FINDINGS OF FACT

THE DEPARTMENT FINDS:

1. That the Diecast Division of Tecumseh Products Company, 415 Cleveland Street, Sheboygan Falls, Wisconsin operates an aluminum diecasting plant located in the NW 1/4 of the SE 1/4, Section 36, T15N, R22E, Sheboygan County, Wisconsin.
2. That a dike is located between the diecasting plant and the Sheboygan River.
3. That on information and belief the dike is owned by Tecumseh Products Company and is maintained by Tecumseh Products Company and/or the City of Sheboygan Falls.
4. That the dike and the property between the dike and the diecasting plant are within the floodplain of the Sheboygan River.
5. That solid waste materials have been deposited on the dike and in areas directly adjacent to the plant on property owned by Tecumseh Products Company.
6. That some of these solid waste materials contain significant concentrations of polychlorinated biphenyls.
7. That concentrations of polychlorinated biphenyls have been found in fish in the Sheboygan River, well in excess of United States Food and Drug Administration tolerance levels.
8. That because of these significant concentrations of polychlorinated biphenyls in fish tissue, the Department of Natural Resources in conjunction with the Department of Health and Social Services has advised consumers not to eat fish taken from the Sheboygan River until further notice.

CONCLUSION OF LAW

1. That Section 144.44, Wisconsin Statutes, and Chapter NR 151, Wisconsin Administrative Code, prohibit disposal of solid waste except in a licensed landfill facility.
2. That Section 144.50, Wisconsin Statutes, and Chapters NR 151 and 157, Wisconsin Administrative Code, establish criteria for proper storage, transportation and disposal of polychlorinated biphenyls and products containing polychlorinated biphenyls.

ORDER

1. That the order recipients shall by July 15, 1978 excavate and collect all materials on the dike bordering the Sheboygan River, which based on visual examination would appear likely to contain PCB. These wastes include but are not limited to oil absorbent materials, scrap pressure hoses, and other oil soaked debris. The excavation of this material shall be done in such a manner so as to prevent runoff, erosion and further water quality contamination of the river.
2. That the concentrated PCB wastes shall be stored in accordance with the requirements of Chapters NR 151 and 157, Wisconsin Administrative Code and the federal regulations contained in Part V of February 17, 1978 CFR.
3. That the order recipient shall by July 30, 1978 submit to the Department a report delineating the following actions which have been taken with respect to:
 - A. Types and quantities of waste materials excavated and stored.
 - B. Types of containers used for storage.
 - C. Labeling of containers identifying the types of waste contained and the location from which they were excavated.
 - D. Plot map of the site at a scale of 1"-50' showing the following:
 - a. Location of the waste excavated relative to barrel identification accompanied by appropriate pictures and narrative description
 - b. Location of Tecumseh Products Company
 - c. Property lines
 - d. Location of Sheboygan River
 - e. Surface water drainage patterns
 - f. Ground surface elevations
 - g. Fence Lines
 - h. Other prominent features
 - E. Map or aerial photograph of the area showing land use and zoning within 1/4 mile of the Tecumseh Products Company facility. The map or aerial photograph shall be of sufficient scale to show all homes, industrial buildings, wells, water courses, dry runs, rock outcroppings, roads, and other applicable details. All such details plus the general topography shall be identified and indicated on the map or aerial photograph.

Tecumseh Products Company; and
City of Sheboygan Falls
Order Number 2A-7B-1191
Page 3

47

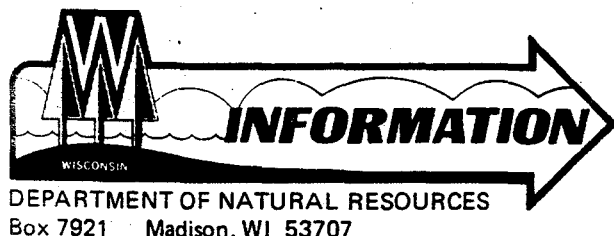
F. Descriptions for on-site and/or off-site storage of the barrels.

Dated at Madison, Wisconsin this 21 day of June, 1978.

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES
For the Secretary

By Andrew C. Damon RLP
Andrew C. Damon, Deputy Secretary

cc: Tecumseh Products Company
Mary Ann Calef, Assistant Attorney General
Bureau of Waste Management
Bureau of Water Quality
Southeast District
Allen Williams, Foley and Lardner
Bureau of Legal Services



MADISON, WI---State natural resources and health officials today reduced the area covered by a fish consumption warning following the discovery two months ago of high PCB levels in the Lower Sheboygan River.

The warning will be lifted, effective immediately, for 105 miles of Sheboygan County rivers now declared safe from PCB contamination, according to officials of the Departments of Natural Resources and Health and Social Services. The officials say investigations and tests have isolated the PCB problem in the Sheboygan Falls area and indicated about 24 miles of streams in the Lower Sheboygan River basin would be included in the revised advisory.

Stanton Kleinert, director of the DNR's hazardous substance surveillance unit, said the warning against fish consumption would be lifted in the following rivers: the Sheboygan from the Sheboygan Marsh to Sheboygan Falls dam; the Mullet from Plymouth to Sheboygan Falls and the Onion from Waldo to Gibbsville.

However, the PCB warning will continue in the Onion River from Gibbsville to Sheboygan Falls, on the Sheboygan River from the Sheboygan Falls dam to the Coast Guard Station at Lake Michigan and on two tributaries of the Sheboygan--Weeden's Creek and Greendale Creek. Kleinert said the Onion, Weeden's Creek and Greendale Creek were included because they are accessible to migrating or itinerant main channel fish.

At the same time, the DNR today ordered cleanup activities near the Tecumseh Products Company, a Sheboygan Falls aluminum die casting firm which once used PCB-containing hydraulic fluids.

DNR hazardous substance investigators discovered high levels of PCB materials in the Sheboygan River floodplain behind the Tecumseh plant and in a dike along the river near the plant. The removal order was directed to both the firm and the City of Sheboygan Falls.

(more)

APPENDIX 9

one add

Last month, DNR ordered the firm and the City to cease any disposal of PCB materials in the river area. The City was included in both orders because there is some uncertainty as to who owns and maintains portions of the dike which contained materials with a PCB concentrations up to 12 percent or 120,000 parts per million.

The new order followed a meeting among attorneys for the DNR, State Justice Department and Tecumseh. Tecumseh Products Company "fully cooperated" with DNR in devising cleanup guidelines, DNR officials said.

The order directs the excavation and collection of "all visible materials which are likely to be contaminated with PCB on the dike bordering the Sheboygan River." The wastes include, but are not limited to, "oil absorbent materials, scrap pressure hoses and other oil soaked debris," according to the order. The cleanup must be done by July 15.

The DNR said the removal of the PCB materials must be undertaken with care to prevent further runoff, erosion and "further water quality contamination." Periodic flooding apparently washed PCB materials from the firm's property and dike into the river, according to investigators.

The DNR said the PCB materials must be placed in sealed containers and properly labeled and stored. A detailed report of cleanup activities, including a listing of the volume of PCB material, site excavation charts, maps, pictures and written commentary, is due by July 30, according to the order.

"Laboratory analyses of sampled fish show that PCB contamination is confined to the segment of the Sheboygan River below the Sheboygan Falls dam," Kleinert said.

Fish samples which were analyzed at the State Lab of Hygiene show that fish from outside of this restricted area contain less than five parts per million PCBs. Kleinert said DNR tests of river bottom sediments, river water and river bank soils confirm the fish sampling results. He said a full report on data, PCB sources and more complete recommendations on the Sheboygan River watershed is planned for July release.

Earlier testing on the Lower Sheboygan River found an average of 126 ppm PCBs in 13 fish samples. The levels are the highest recorded in live fish sampled in Wisconsin.

(more)

APPENDIX 9 (Con't.)

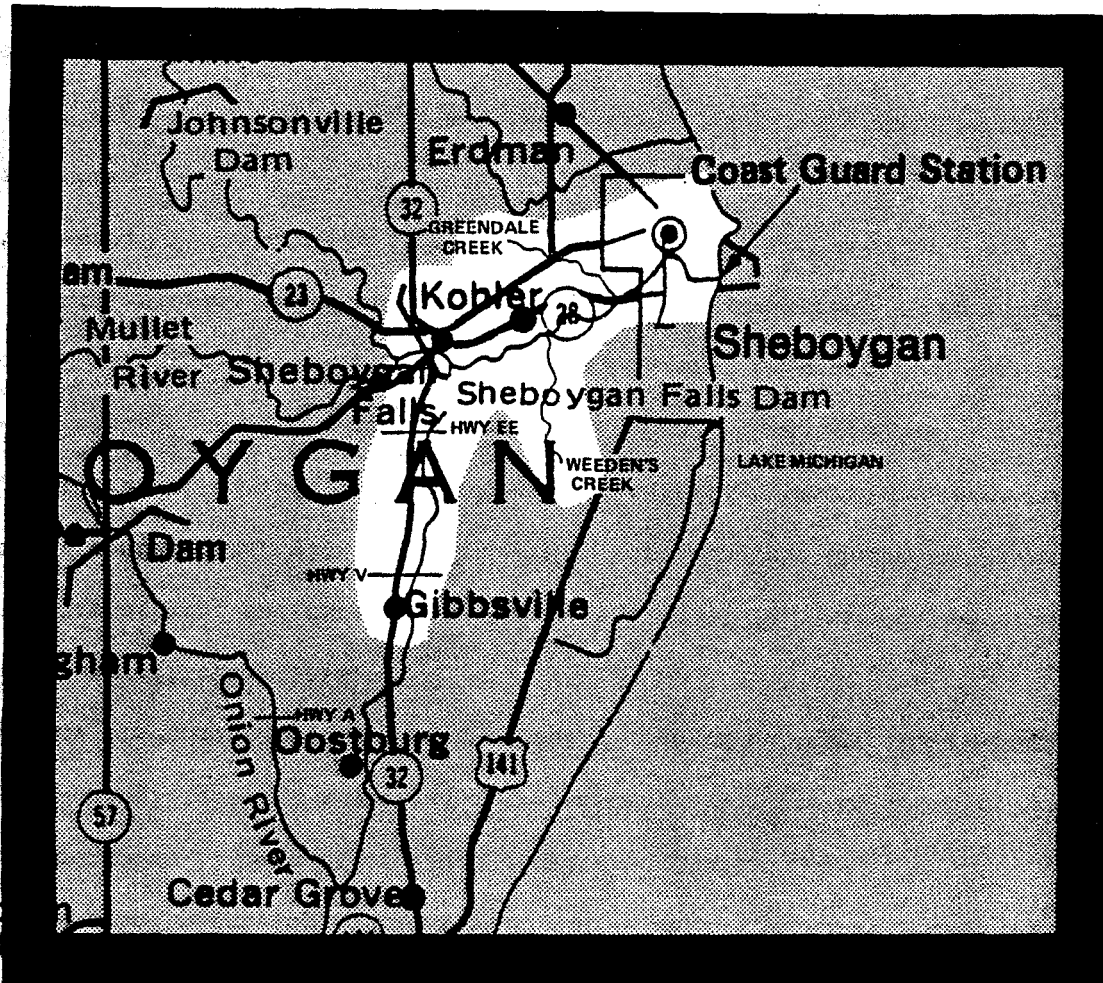
two add

Health officials said that they are concerned about long-lasting, lifetime exposures to PCBs rather than any short term exposure. Federal regulations prohibit the sale of fish with higher than 5 parts per million (ppm) PCB concentration.

FOR MORE INFORMATION CONTACT:

Stanton Kleinert, Chief
Surveillance Section
Phone: Code 608, 266-7721

Thomas Sheffy, Chemist
Surveillance Section
Phone: Code 608, 266-8343



Acknowledgments

The Committee would like to thank the following personnel for their efforts in this study. Samples were collected by Tom Petri, John Schultz, Terry Yakich, Frank Schultz, Chris Magruder, Collin Beveridge, Brian Belonger, Dave Vetrano, Roy Kalmerton, Kent Logan and Jerry Raeder of the Southeast District. Fish samples were prepared for analysis by Mike Gappa of the Surveillance Section, Madison. PCB analyses were performed at the State Laboratory of Hygiene, Madison, by Tom Gibson, Nancy Korda, Wayne Carter, Frank Priznar, Mary Ellan Ley, Paul Peterman, and Doug Dube.

CORRESPONDENCE/MEMORANDUM

STATE OF WISCONSIN

Date: August 20, 1979

File Ref: 3210

To: Gary Nelson

From: Neal O'Reilly *NOR*

data file

Subject: Report of Findings, Sediment Samples, Sheboygan Harbor, Wisconsin (U.S. Army Engineers)

The report findings of the Army Engineers bottom sediment sampling for heavy metals and polychlorinated biphenyls (PCBs) show the sampling sites of "a" through "f" to be heavily contaminated with lead, copper and PCBs, and moderately to heavily contaminated with chromium and zinc. Samples collected at sample sites "g" through "i" were found to be nonpolluted for all parameters sampled, based on U.S. EPA harbor sediment guidelines (U.S. EPA, 1977).

It can generally be assumed that if dredged, the bottom sediment material from the Sheboygan Harbor will be disposed of in a proper manner under solid waste disposal guidelines and should pose minimal impact to the environment. An issue of major concern, however, is the impact of the material that will be left behind. Results of the Army Engineers sediment sampling and sediment sampling conducted by the Wisconsin Department of Natural Resources (Bode and O'Reilly, 1979) show that dredging to the proposed project depth will expose a substrate surface layer higher in heavy metals and PCBs than the surface layer present. Based on Army Engineers data, the newly exposed bottom surface layer will expose hazardous concentrations of heavy metals and PCBs (Table 1).

Table 1. Exposed Substrate Surface Concentration (Mg/Kg) of PCBs and Heavy Metals After the Proposed Dredging of Sheboygan Harbor

<u>Sample Site</u>	<u>PCB</u>	<u>Pb</u>	<u>Zn</u>	<u>Cu</u>	<u>Cr</u>
Heavily Polluted Sediment Guideline (U.S. EPA, 1977)	≥10	> 60	>200	> 50	>75
a*	13.6	356	108	54	58
b	7.8	135	69	23	28
c	44.0	309	186	76	292
d*	31.2	117	147	60	61
e	9.1	59	79	30	27

*No sediment samples were collected at the project depth at the two sites; therefore, the concentration reported is for the c' sediment layer sampled.

The re-exposed lower bottom sediments would pose a stronger threat of contamination to Sheboygan River fish and other aquatic life and their consumers. Therefore, if the areas from sample sites "a" through "e" are to be dredged to maintain a navigational channel, a total dredging of all contaminated bottom sediments may be environmentally warranted.

The bottom sediment sampling study conducted by the Army Engineers fills in many of the data gaps and gives a good perspective of the contaminants located in the bottom sediments of the Sheboygan River and Harbor. However, the sampling program does not identify the depth to clean, uncontaminated bottom sediment.

Recommendations

Further bottom sediment sampling should be conducted to determine the total depth of the contaminated bottom sediment. Since the major areas of contamination appear to be located between the Pennsylvania Avenue bridge and the river mouth (sample site "e"), this additional sample effort should concentrate in this area.

NO:av

Chem-Trend Incorporated
3700 E. Grand River
Howell, Michigan 48843
Telephone (313) 466-4500
Tele: (313) 455

April 28, 1978

Mr. Ken Wachal
Lawson Division
Tecumseh Products
1604 Michigan Avenue
New Holstein, WI 53061

Dear Mr. Wachal:

This is an addition to the information I gave you in a letter yesterday concerning PCB's. In reviewing the history of Chem-Trend sales of hydraulic fluids to the Sheboygan Falls die casting plant, we find that they used two Chem-Trend products previous to HF-20.

In 1970 and 1971, we sold a fire-resistant hydraulic fluid called HF-30. This product was about 85 percent PCB. In 1970 there was beginning to be evidence that PCB's were being found widely in the environment, so Chem-Trend elected to stop selling HF-30 well before any restrictions were placed on use or sale of PCB. The last shipment of HF-30 to Sheboygan Falls was in March, 1971. After that, they used HF-31, a synthetic fluid based on chlorinated paraffins. Unlike PCB, the chlorinated paraffins are non-toxic and biodegradable, so they are not in the same hazard or persistence category as PCB.

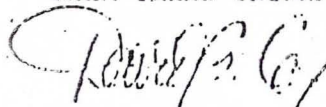
Next, over a period from October 1972 to May 1973, the Sheboygan Falls plant converted to use of HF-20, a water-glycol based hydraulic fluid. The conversion requires a drain and flushing procedure, since water-glycol HF is not compatible with synthetic (non-aqueous) types. Our experience with analysis of hydraulic fluid from one other die casting shop whose history of fluid use is similar shows that our recommended drain and flush procedure reduces PCB content of the remaining hydraulic fluid to the level of about 10 to 20 parts per million.

This history shows that there was at least one PCB source although it ended in 1971. You probably also had a source in Monsanto hydraulic fluids used previous to HF-30, although I do not know which Monsanto fluid was used. How this information fits with your current situation will have to be determined by your company, of course.

If you have any further questions, please feel free to ask us.

Very truly yours,

CHEM-TREND INCORPORATED



David B. Cox
Technical Director

DBC/dmc
cc: D. Durben
Mr. Snoeyenbos

CLEVELAND AVENUE



OUTFALL 003
100% 1140' SECONDARY SEWER
TO SHEBOYGAN FALLS WWTP - 6 1/2 MI.

DIE CAST DIVISION
TECUMSEH PRODUCTS
415 CLEVELAND AVENUE
SHEBOYGAN FALLS, WISCONSIN

Soil Sampling Locations
AT Tecumseh Products
on 5-11-78:
6 samples on
Tecumseh Property
4 samples on
City of Sheb. Falls
Dike

Cyclone
fence

40' wide
property and dike
line is about
50 yd x 10' high x 10' base

12" SEWER

S-20

S-21

S-22

S-19

S-18

S-23

S-24

S-25

OUTFALL 001
12" S.S. SEWER
1087' 1100' TO CONDUIT
COOLING WATER

OUTFALL 002
100% 1140' TO CONDUIT
TO SHEBOYGAN FALLS WWTP

SHEBOYGAN



The following water samples were collected by Tom Sheffy + John Schul
 (Name)
Surveillance Chemist on 5-11-78
 (Title) (Date)

The samples were carried by Tom Sheffy
 (Initials and Title)
 to the State Laboratory of Hygiene on 5-11-78 for ~~phenol~~ PCE
 (Date) analysis.

Teconseh Products Sheb. Falls, Wis

Sample Number

Sample Description

(see map of collection sites)

Sample Number	Sample Description	Picture
S-18	8' from East fence, dark oily spot on ground	PIC. 1
S-19	5' from South fence, oil absorbent material, alum bits	PIC. 2
S-20	10' from Bldg., sandy soil, oil dump area oily soil	PIC. 3
S-21	10' from Bldg, sandy gravelly soil, oil dump area oily sample	PIC. 4
S-22	3' from Bldg, between oil sep. & bldg, black tar soil sample, oil dump area	PIC. 5
S-23	3' from South fence, low area below rubble pile, top soil sample	PIC. 6
S-24	oil absorbent material, alum. bits, outside of South fence on dike	PIC. 7
S-25	oil absorbent material, alum. bits, outside of South fence	PIC. 8
S-26	oil absorbent material & alum bits on river side of dike	PIC. 9
S-27	oil absorbent material & alum bits, hydraulic line on river side of dike	PIC. 10
S-28	red hydraulic line line buried in dike	

I, Thomas Nelson Chemist III, received the samples described
 (Name and Title)

above on 5/11/78
 (Date)

SHEBOYGAN RIVER
Sediment Survey II - May 9, 1978
Field Data

Sample Time	Sample Type (Grab or Composite)	Sample Site	Sampling Depth Approx. Feet	Sample Color	Sample Texture	Sample Odor	Type of Benthic Organisms Present	Other Remarks
<u>Site 15</u>								
12:20	Grab sample sediment from river	70 yds. upstream of Tecumseh Products outfall 3 ft. from lt. bank	6"	Brown & Black	Silty & muck organic detritus	Hydrogen sulfide odor	None	Water turbid-a lot of dead crayfish shells. Large amount of debris along banks
<u>Site 16</u>								
12:35	Shovel grab sediment	100 ft. downstream of Tecumseh Products outfall 1 ft. from lt. bank	3"	Brown	Watery, sandy	Natural decaying odor	No benthics present	Watery sample
<u>Site 17</u>								
12:40	Shovel grab from berm	Behind Tecumseh Products	Surface to 6" below surface	Brown, Whitish-green	Sandy, gravel or coarse	Chemical smell	No benthics present	Oil dry or speedy dry material present. Scrap aluminum present in sample & white crystal material.

SHEBOYGAN RIVER
Sediment Survey II - May 9, 1978
Field Data

Sample Time	Sample Type (Grab or Composite)	Sample Site	Sampling Depth Approx. Feet	Sample Color	Sample Texture	Sample Odor	Type of Benthic Organisms Present	Other Remarks
<u>Site 11</u>								
11:00	Sediment grab	Kiwanis Park boat launch on Kiwanis Park Ave. Sample taken at end of pier about 25 feet from lt. bank	2.5 ft.	Grayish Brown	Silty with fine sand	Organic decaying odor some oily smell	Oligocheate present	Some oil in sample. Drizzling rain - water turbid
<u>Site 12 Kohler Landfill</u>								
11:35	Shovel grabs of sediment leachate to make 1 sediment composite	KLF about 500 ft. upstream of U.S.G.S. at dead tree	1/2"-1"	Reddish Brown, Gray-Brown, Gray-Black	Fine soil sand & silt	Septic odor some oily smell	None	Kohler landfill 4 samples 25% each to make 1 composite sample U.S.G.S. reading 3.79
<u>Site 13</u>								
11:50	Sediment grab	40 yds. upstream of Kohler Dam 2-1/2 ft. off of lt. bank	1-1/2 ft.	Brown, Gray-Black	Silt & muck, some fine sand	Very organic decaying odor	None observed	Some oil in sample, water turbid
<u>Site 14 at Tecumseh Products</u>								
12:00	Shovel grab from berm	Behind Tecumseh Product on Cleveland Ave., Sheboygan Falls berm between river & building-20 ft. from river mid-length of building	Surface to 6" below surface	Brown, Whitish-green	Sandy & coarse	Strong chemical odor	None	Chemical odor - oxidizing material in sample oil dry or speedy dry material-aluminum pieces in sample & other scraps.

SHEBOYGAN RIVER

Table 2: Sediment Sampling Locations II

<u>Sample Number</u>	<u>Sample Location</u>	<u>Sample Site Access</u>	<u>Sample Taken</u>
SHE 11	Kiwanis Park from boat launch pier.	Kiwanis Park Ave. in City of Sheboygan	Grab
SHE 12	Kohler landfill upstream of U.S.G.S. Station.	STH 28 & U.S. 141	Composite made up of 4 grabs
Site 13	50 yds. upstream of Kohler Dam	STH 28	Grab
Site 14,15,16,17	Tecumseh Products Co., Sheboygan Falls	Cleveland Ave.	Grabs

Ambient River Contamination

The spring sampling period with high river discharge and velocity was a less than optimal season for a PCB survey in the Sheboygan River system. Ambient PCB concentrations in the water column were diluted to low, hard to detect levels (Table 4), and river water samples were a poor indicator of PCB contamination. Bottom sediments proved a more reliable sample media for delineation of PCB contaminated river sections and provided a good record of recent PCB source contamination. Bottom sediment PCB analytical results are listed in Table 4 and classified into pollution categories according to Bowden (1976).

The Sheboygan River above the Sheboygan Falls Dam was not severely contaminated with PCB as bottom sediment samples (sites 1 and 2) measured less than 0.2 mg/kg. Likewise, the PCB concentrations in the Mullet River and Onion River tributary sediments were low with only the downstream most station on the Mullet River (site 9) showing a detectable PCB level of 3.4 mg/kg. The PCB level of the bottom sediments in the upper sections of the Sheboygan River (above Sheboygan Falls Dam) and her two major tributaries did not reach 10 mg/kg and were not classified as polluted according to EPA guidelines.

The three downstream bottom sediment sample stations (sites 3, 4 and 5) on the main stem of the Sheboygan River contained high to moderate levels of PCB contamination. The highest levels of PCB measured during the survey were recorded in the bottom sediments between the Sheboygan Falls Dam and the Kohler Dam, and were classified as polluted. The PCB level in the bottom sediments dropped dramatically below the Kohler Dam and then remained at approximately the same level. This up to downstream contamination pattern indicated the most significant source of PCB contamination to lie in the river reach between the Sheboygan Falls Dam and the Kohler Dam.

Two additional bottom sediment samples in the vicinity of the Tecumseh Products' landfill dike (sites 15 and 16) were collected in a follow-up survey. The PCB concentrations in the bottom sediments collected immediately downstream of the dike showed approximately a 150 fold increase from the upstream bottom sediment contamination level. The results from this pair of bottom sediment sample stations evidenced the fact that the Tecumseh Products' landfilled dike and grounds were a major source of PCB contamination to the Sheboygan River.

CONCLUSIONS

Severe PCB contamination was restricted to the lower reaches of the Sheboygan River below the Sheboygan Falls Dam. Bottom sediments provided a good sampling media for documentation of the PCB contaminated area, and the heavily polluted bottom sediments trapped by the Kohler Dam indicated a major PCB source was located immediately upstream. The PCB level in the bottom sediments below the Kohler

water samples were collected in glass bottles prior to sediment sampling. Both water and sediment samples were stored in individual glass containers with aluminum foil insulated caps and transported to the State Laboratory of Hygiene (University of Wisconsin) for PCB analysis according to Standard Methods (APHA, 1975).

Field notes taken at the time of the survey are summarized in Appendices A and B.

RESULTS AND DISCUSSION

Point Source Investigation

Most of the municipal and all of the industrial permitted effluent waters at the time of sampling showed PCB levels below laboratory detectability (Table 2). However, the Plymouth Wastewater Treatment Plant discharge waters contained 9.0 ug/l of PCB's on April 4, 1978. An investigation of the Plymouth sewer service area, however, revealed no apparent PCB source. A resampling of the Plymouth plant effluent revealed a below detectable PCB level. Permitted point source dischargers were not a major source of PCB material to the Sheboygan River Basin.

Three industrial wastewater discharges to the City of Sheboygan sanitary sewer systems had detectable levels of PCB's (Table 2). Thomas Industries, J. L. French Company, and Tecumseh Products discharged wastewater with concentrations of 140, 21 and 2.1 ug/l, respectively. Further investigation of these industries, however, showed only low, remnant levels of PCB's remained in the industrial processes.

Nonpoint Source Investigation

Warehousing of PCB's in the Sheboygan Basin was not found, and nonpoint source monitoring focused on solid waste disposal sites. Two composited sediment samples (sites 10 and 12) from Kohler landfill drainage paths contained 1.3 mg/kg and mg/kg (Table 3). These levels indicated some waste PCB material was leaching to the Sheboygan River from the Kohler landfill site. Soil samples collected from Tecumseh Products' grounds and landfilled dike areas showed strong PCB contamination (Table 3). PCB levels in the topsoil and dike area ranged between 380 mg/kg and 120,000 mg/kg. Oil, tar, hydrolic hose, granular oil absorbent material, and aluminum bits littered the soil sample sites. These same grounds and dike area, which are in the Sheboygan River floodway, were under water on May 15, 1978, at a river discharge of 3,270 cfs (USGS record, 1978). The Tecumseh Products' grounds and landfill dike area in the lower portion of the Sheboygan River Basin held reservoirs of waste PCB's and were considered to have a strong PCB contamination potential.

SHEBOYGAN RIVER

Table ¹X: Sediment Sampling Locations II

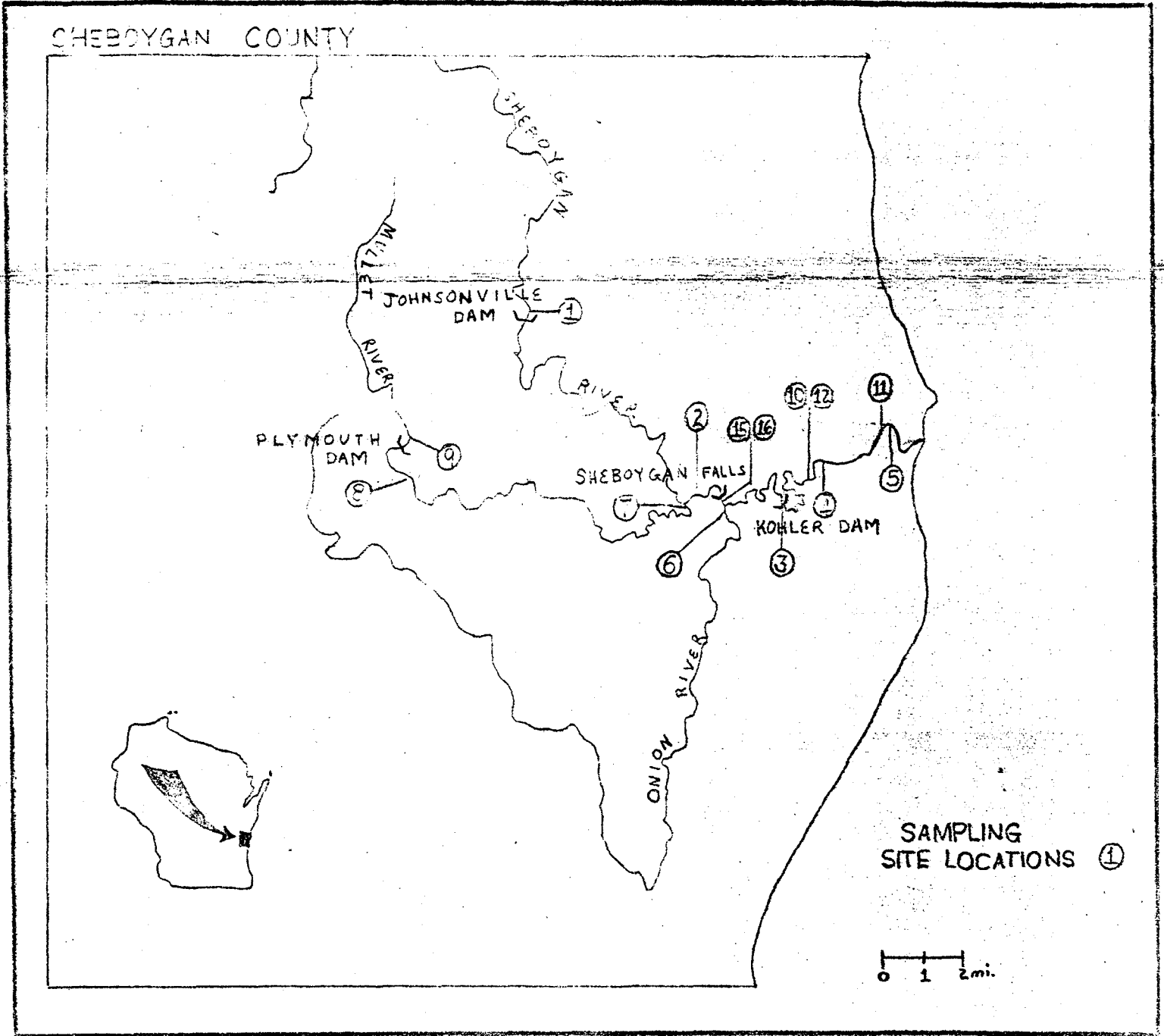
<u>Sample Number</u>	<u>Sample Location</u>	<u>Sample Site Access</u>	<u>TYPE</u> <u>Sample Taken</u>
Site 11	Kiwanis Park from boat launch pier.	Kiwanis Park Ave. in City of Sheboygan	Grab
Site 12	Kohler landfill upstream of U.S.G.S. Station.	STH 28 & U.S. 141	Composite made up of 4 grabs
Site 13	50 yds. upstream of Kohler Dam	STH 28	Grab
Site 14,15,16,17	Tecumseh Products Co., Sheboygan Falls	Cleveland Ave.	Grabs

SHEBOYGAN RIVER

Table 1: Sediment Sampling Locations IN THE SHEBOYGAN BASIN

<u>Sample Number</u>	<u>Sample Location</u>	<u>Sample Site Access</u>	<u>Reach</u>	<u>Sample Type</u>	<u>Sample Taken</u>
<u>SHEBOYGAN RIVER</u>					
302 1	Upstream Johnsonville Dam	STH 23 to CTH M to CTH JM	D	Composite	Grab
302 2	Upstream Sheboygan Falls Dam	STH 28 to STH 32	D-C	Composite	Composite
302 3	Upstream Kohler Dam	STH 28	C-B	Composite	Grab
302 4	Upstream U.S.G.S. Station	STH 28 & U.S. 141	E-A	Grab	Grab
302 5	Downstream 14th St. to 8th St., Sheboygan	STH 28 to N. 14th to 8th St.	A	Composite	Composite Start Sampling at Penn Ave.
<u>TRIBUTARIES</u>					
302 6	Onion River above Confluence with Sheboygan River	STH 28 to CTH EE	Trib.	Grab	Grab
302 7	Mullet River above Confluence with Sheboygan River	CTH PP to Willow Road	Trib.	Grab	Grab
302 8	Mullet River below Plymouth STP	CTH PP to CTH AC	Trib.	Composite	Composite
302 9	Mullet River upstream Plymouth Dam	CTH AC to STH 23	Trib.	Composite	Composite
302 10	Kohler Landfill NON-Point Source Composite	STH 28 at U.S. Geological Survey	Point Source	Composite	Composite

FIGURE 1. SHEBOYGAN RIVER PCB SURVEY SAMPLING LOCATIONS



PCB SOURCE INVESTIGATION IN THE SHEBOYGAN RIVER

Jeff Bode, Southeast District Water Quality Planning and Monitoring Unit.

INTRODUCTION

High levels of PCB found in the body tissue of the resident fish population and in the water column of the Sheboygan River prompted an intensive PCB source investigation survey. This investigation focused on suspect point and nonpoint sources. Ambient PCB levels in the Sheboygan River and her tributaries were measured to define the extent of the contaminated area.

Study Area

The Sheboygan River lies largely within Sheboygan County, but it does receive additional drainage from Fond du Lac, Manitowoc and Ozaukee Counties. The total drainage area is 1,158 square kilometers of predominantly agricultural land use becoming more urbanized as the river flows east into Lake Michigan. The Mullet River and the Onion River are tributary to the Sheboygan river along with numerous smaller tributaries.

SAMPLING AND METHODS

Suspect point sources and nonpoint sources of PCB materials were sampled in a source investigation survey. All five municipal wastewater treatment plant effluent waters, which discharge to the Sheboygan River or her tributaries, were grab sampled in April, 1978 and analyzed for PCB. Eleven suspected industrial wastewaters were similarly tested. Nonpoint investigation keyed on two land uses, warehousing sites and solid waste disposal areas. Numerous landfill sites were investigated; however, only two sites warranted a detailed survey. Sediment from several seepage discharge channels from the Kohler landfill were composited and analyzed for PCB's, and ten individual soil samples collected from a Tecumseh Products disposal area analyzed.

Nine ambient monitoring sites were selected for river water and bottom sediment analysis - one site on the Onion River, three on the Mullet River, and five on the main stem of the Sheboygan River (Figure 1) (Table 1). These sites were chosen because of their relation to suspect PCB sources and the availability of recently deposited bottom material. Two additional river sediment samples were collected in the vicinity of Tecumseh Products.

Bottom sediment samples were collected and classified according to EPA guidelines (Bowden, 1977). Ekman dredge samples from areas of sediment deposition were composited in an aluminum bucket at each river survey site and then transferred to a glass bottle. Instantaneous river

Sheboygan River Sediment Survey II
May 9, 1978
Supplemental Field Information

A second sediment sampling survey was conducted on the Sheboygan River on May 9, 1978. Weather conditions were moderate with temperatures ranging in the high forties to mid-fifties. A slight amount of precipitation (rain) occurred in the morning, ending by noon. Sky conditions were 100 percent overcast with winds out of the east, north-east from 15-20 miles per hour (mph), gusting to 35-40 mph. These conditions prevailed throughout the duration of the survey period.

Site 12

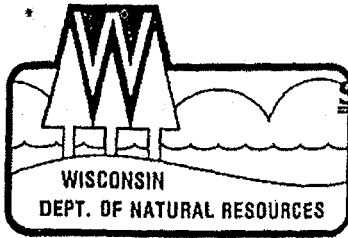
At Kohlers landfill, four (4) shovel grab samples were taken of landfill leachate and combined to make one sediment sample (25% of each). Samples were taken approximately 500 feet upstream of U.S.G.S. at dead tree.

Site 14, 15, 16, 17

These sampling sites were in the vicinity of the Tecumseh Products Co.

Samples 14 and 17 were samples taken from the berm built up between the river and building. Both samples had aluminum scraps in them, a whitish-green crystalline like substance, made up of speedy dry material, and had a heavy chemical odor. The berm had apparently been built from waste products of the company and used as fill material.

Samples 15 and 16 were upstream and downstream sediment samples from the river, respectively. The upstream sample was approximately 70 yards from the Tecumseh Products outfall. The downstream sample was 100 feet from the outfall.



State of Wisconsin | DEPARTMENT OF NATURAL RESOURCES

George E. Meyer
Secretary

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May 8, 1995

File Ref: 3500

Jame Schaefer
3741 Koehler Drive
Sheboygan, WI 53083

SUBJECT: Kohler Company Landfill

Dear Jame:

Thank you for your March 30, 1995 letter asking whether the WDNR agrees with a statement made by Kohler Company in a March 14, 1995 press release regarding the presence of PCBs in the Kohler Company Landfill. The press release stated: "Kohler Co has not generated any PCB contaminants nor has it contributed to the PCB contamination of the river. Any PCBs in the Kohler landfill came from dredging of contaminated riverbed and flood plain sediments. They were placed in the landfill with the approval of the Wisconsin Department of Natural Resources (WDNR). Their amount is insignificant compared with PCBs upstream."

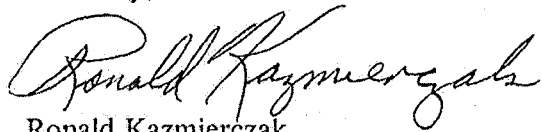
After receiving your letter, we asked for assistance from WDNR's Bureau of Solid and Hazardous Waste, where all technical data related to the Kohler Company Landfill are located. Philip Fauble from the Bureau reviewed all technical information regarding PCBs in the landfill. A summary of his findings is attached (attachment 1).

After reviewing the available information, Philip concluded that it is unlikely that Kohler Company Landfill disposal events documented in WDNR records contributed PCBs in the concentrations that are found in the landfill. According to Philip's memo: "The concentrations of PCBs measured in the floodplain soils and river sediments are not high enough to account for the 540 ppm PCB Aroclor 1242 sample taken from the landfill. The highest level of PCBs detected in the force main spoils was 37.5 ppm."

Please note that although PCBs have been found in relatively high concentrations in the Kohler Company Landfill, we have not determined whether these contaminants are currently moving through the groundwater to the Sheboygan River. The data from groundwater monitoring wells closest to the Sheboygan River suggest that PCBs are not entering the river from the landfill. Please keep in mind that there are other contaminants associated with the groundwater near the landfill that are of concern. We are in the process of determining what effects contaminated groundwater flow associated with the landfill is having on the Sheboygan River (please see attachment 2).

Again, thank you for your letter and your continued interest in ongoing projects affecting the Sheboygan River. If you have any questions about the technical information included in this letter, please contact Jack Connelly at (608) 267-7574.

Sincerely,



Ronald Kazmierczak
Assistant District Director

c: Kevin Kessler - SW/3 (letter only)
Philip Fauble - SW/3 (letter only)
John Lillesand - Kohler Company

RECEIVED
MAY 1999
MAY 19 1999

CORRESPONDENCE/MEMORANDUM**State of Wisconsin**

Department of Natural Resources

DATE: April 20, 1995

FILE REF: 460015380

TO: Ron Kasmierczak - ADD, SED

FROM: Philip Fauble - SW/3

SUBJECT: PCB Contamination At the Kohler Company Landfill, Kohler, Wisconsin License #01508

This memo is in response to Southeast District's request for assistance in replying to a March 30, 1995, letter sent to you by Jame Schaefer. Ms. Schaefer asked for the Department's reaction to statements made by John W. Lillesand, Senior Vice President-Technical Services for the Kohler Company, concerning the occurrence and origin of polychlorinated biphenyls (PCBs) concentrations detected in the existing Kohler Company Landfill.

Ms. Schaefer specifically inquired as to our reaction to the following statement made by Mr. Lillesand: "Kohler Co has not generated any PCB contaminants nor has it contributed to the PCB contamination of the river. Any PCBs in the Kohler landfill came from dredgings of contaminated riverbed and floodplain sediments. They were placed in the landfill with the approval of the Wisconsin Department of Natural Resources (WDNR). Their amount is insignificant compared with PCBs upstream."

Kohler Company and the Department agree that PCB compounds are present within the Kohler Landfill. Attached to this letter is a summary of PCB compounds detected in the landfill. PCBs were detected in several soil borings within the waste fill area, in floodplain soil samples and in some unfiltered ground water samples. The highest level of PCBs detected was 540 parts per million (ppm) of Aroclor 1242 obtained from a soil sample in boring SB-6. This boring is located in the southern corner of what was referred to in the report as the "Northern Burn Pit".

After reviewing the information in the Department's files, I discovered documentation of two activities that could have introduced PCB-contaminated floodplain or river sediments into the Kohler landfill. The August 30, 1976 Plan Approval for the Kohler Company Landfill contains a condition, Condition #2(d), that states, "Foundry waste materials filled within the limits of the floodplain shall be removed and deposited in the old burning pit as specified in the Kohler plan of operation and engineering drawing #3881-AT-7.". During excavation of these materials, some floodplain soils could have been removed along with the fill and placed in the "old burning pit". It is unclear whether or not the "old burning pit" corresponds to the "Northern Burn Pit" described in the ECA document.

As for the riverbed sediments, a letter from Tim Krueger, Solid Waste Management Chief, to Larry Hanson of Donohue and Associates, Inc. dated September 26, 1978, describes a phone conversation between the two men concerning appropriate disposal sites for some PCB-contaminated dredge spoils. The dredge spoils would be produced during installation of a 12-inch force

12

main for the Village of Kohler across the Sheboygan River. After reviewing a list of potential disposal sites provided by Donohue, Mr. Krueger stated that the Kohler Company Landfill was the only acceptable disposal alternative.

In a follow-up letter to John Choren of the Kohler Company dated September 25, 1978, Mr. Krueger described the project in more detail. To construct the main, approximately 75 to 85 cubic yards of river bed sediments would have to be dredged from the Sheboygan River. The letter states that, "The Department has determined through collection and analysis of river bottom sediments that the spoil material to be excavated contains between 1.3 ppm and 37.5 ppm PCB's." Because the PCB levels in the sediment were, "...below 50 ppm as determined by samples collected by Department personnel...", it was determined that the spoils could be disposed of in the Kohler landfill. The exact disposal location within the landfill was not specified, but the amount of river sediment, 75 to 85 cubic yards, would constitute only a small fraction of the approximately 90,000 cubic yards of material disposed of at the Kohler Landfill every year.

Based on the information available, my opinion is that it is unlikely that all PCB contamination detected in the landfill was the result of these two disposal events. The concentrations of PCBs measured in the floodplain soils and river sediments are not high enough to account for the 540 ppm PCB Aroclor 1242 sample taken from the landfill. The highest level of PCBs detected in the force main spoils was 37.5 ppm. The ECA report describes the levels of PCBs in floodplain soils near the landfill as ranging from 2.2 to 4.3 ppm of Aroclor 1248. The Alternative Specific Remedial Investigation for the Sheboygan River and Harbor Superfund Site (March, 1992) indicates that PCB levels in the floodplain soils near the Kohler landfill range from 0.07 ppm to 4.8 ppm. River sediment samples taken closest to the actual location of the force main crossing, indicate PCB levels of between 0.9 ppm and 7.1 ppm. Floodplain soils taken near the forcemain crossing indicate PCB levels of between 0.13 ppm and 2.4 ppm.

If the two documented disposal events cannot explain the PCB levels at the landfill, could the Kohler Company be in any other way responsible for the PCB concentrations in the landfill? Information from our files can neither confirm nor rule out the possibility that PCB wastes may have inadvertently been disposed of within the Kohler Company landfill.

The "Report On Inspection To Determine Compliance With The Federal PCB Disposal And Marking Regulations - Kohler Company" dated June 9, 1983 prepared by Versar, Inc. for the U.S. EPA, indicates that the Kohler Company stored and used PCB oils and PCB-contaminated fluids during the early 1980s and possibly earlier. Specifically, a comprehensive PCB inventory prepared by Triad Engineering, Inc. at the request of the Kohler Company indicated that, as of December 31, 1982, the Kohler Company had 8 PCB transformers (pure PCB product), 19 PCB-contaminated transformers, 1,272 PCB capacitors, and 7 PCB-contaminated hydraulic systems. It was calculated that, at the time of the PCB item survey, there was 2,278 gallons of PCB dielectric fluid, 2,910 gallons of PCB-contaminated dielectric fluid, and 22,710 kilograms of PCB material from capacitors present either in use or in storage at the Kohler plant.

The report documented two PCB waste disposals, both to out-of-state waste disposal facilities. One waste disposal was on May 28, 1980 consisting of 36 55-gallon drums, and another on January 8, 1982 consisting of 24 55-gallon drums of PCB capacitors. In addition, the inspectors observed a PCB waste

5

storage area within Building 89 of the Kohler plant that contained 35 55-gallon drums of PCB-contaminated hydraulic fluids, 3 drums containing PCB fluid from drained transformers and 4 drums of PCB capacitors. The inspectors also noted PCB spills from several transformers. A PCB sample from one of the spills detected PCB concentrations as high as 800,000 ppm. It is unknown exactly how the transformer and capacitor fluids from leaks or draining of the units were disposed of prior to 1980.

The Kohler Company had no records of any PCB fluid purchases dating back to at least 10 years prior to the inspection (1983), but an extensive sampling effort of the hydraulic systems in 1982 revealed that 7 hydraulic die cast machine systems had PCB concentrations of between 50 ppm and 130 ppm. This may suggest a possible pathway for PCB contamination in the Kohler landfill.

Prior to 1975, the Kohler Company disposed of their waste oil products, including lubricating, cutting and crank case oils as well as hydraulic fluid, into at least one, possibly more, waste pits located within the fill limits of the Kohler landfill. During the second quarter of 1974 alone, over 8,000 gallons of lubrication oils and hydraulic fluids were disposed of in a landfill waste pit. After use of the waste pit was discontinued, approximately 30,000 gallons of waste oil product was "skimmed" off of the pit and transported off-site for reprocessing. If any of these PCB-contaminated hydraulic fluids were disposed of within the waste pits, remnant fluids that remained after the pit was pumped out or that had infiltrated into the waste mass could account for the high PCB levels detected within the landfill.

If you have any further questions concerning this letter, please contact me at (608) 267-3538.

PF:pcblet

Attachment

cc: Kevin Kessler - SW/3
Lakshmi Sridharan - SW/3
Jack Connelly - SW/3
Jane Lemcke - SW/3
Marsha Jones - SED

PCBs Detected At The Kohler Landfill

FLOODPLAIN SOILS

<u>Sample Points</u>	<u>Levels</u>	<u>Aroclor</u>
KL-SD-03	Ranges from	Aroclor-1248
KL-SD-04	2.2 - 4.3	Aroclor-1248
KL-SD-05	mg/Kg (ppm)	Aroclor-1248

LANDFILL BORINGS

<u>Sample Points</u>	<u>Levels</u>	<u>Aroclor</u>
SB-2	0.29 ppm	Aroclor-1242
SB-4	10 ppm	Aroclor-1242
SB-4(b)	3.7 ppm	Aroclor-1242
SB-5	1.2 ppm	Aroclor-1254
SB-5(b)	0.82 ppm	Aroclor-1260
SB-6	540 ppm	Aroclor-1242 (N. Burn Pit)
SB-8	0.11 ppm	Aroclor-1242
SB-8(b)	0.42 ppm	Aroclor-1254

MONITORING WELLS

<u>Sample Points</u>	<u>Levels</u>	<u>Aroclor</u>
OW-2	0.15 ppb	Aroclor-1232 (unfil.)
11	0.67 ppb	Aroclor-1242 (unfil.)
11D	0.27 ppb	Aroclor-1242 (unfil.)

Notes:

- NR 140 Enforcement Standard (ES) for PCBs in ground water is 0.03 ppb; Preventative Action Level (PAL) is 0.003 ppb
- Kohler states that two floodplain soil samples collected upgradient of the landfill contained pure Aroclor-1242. Kohler's position is that PCBs found in the landfill are the result of soil spoils from floodplain excavations being disposed of within the landfill.
- All data was obtained from Geraghty & Miller's "Environmental Contamination Assessment and Ground Water Remedial Action Alternatives" report dated November, 1992.