OIL POLLUTION

SOUTHERN END OF LAKE MICHIGAN

SEPTEMBER 17-26, 1967

SUMMARY REPORT

OCTOBER 5, 1967

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I

SUMMARY OF INVESTIGATIONS

[redacted]

interfered with water sports in Lake Michigan and with swimming at several of the beaches on Sunday, September 17. A few complaints were received by the FWPCA and the Chicago Program Office made observations of the Lake and beaches between Jackson Park Beach and the Indiana Harbor Ship Canal. No oil pollution was observed at Jackson Park Beach at that time but Coast Guard personnel stated that oil had been observed earlier Monday at Jackson Park but had washed away. Oil pollution was reported to have been heaviest on Sunday.

On the same day, Monday, September 18, Chicago Program Office personnel took two Chicago American reporters from the Calumet Park Coast Guard Station directly across the Lake to Indiana Harbor and up the Indiana Harbor Canal, departing at 9 a.m. On the way, they observed small patches of oil. Upon arrival at Indiana Harbor, they observed minor oil films of less magnitude than normally observed and the stream was cleaner than usual. On the return trip, a few patches of oil were observed on the Lake. Also, some patches of fine silt-like material were observed near

Patches of oil were observed on the Lake and increased in frequency as the crew approached the Indiana Harbor Canal. These oil patches consisted of very thin films of oil gradually increasing to one large oil slick near the mouth of the Indiana Harbor. Passing into the Indiana Harbor Canal, the wake of the boat was chocolate colored with less than [illegible] At the edge of the wake a very black border of oil was observed. Oil spread completely across the Harbor.

Visible oil covered the entire Indiana Harbor Canal, and unusual amounts of surface oil were visible on the Lake George Channel. They also observed that bottom dredging was occurring in the Canal upstream from the Forks and portions of the dredged materials were displaced from the operation and floating down the Canal. They also observed oil pollution [illegible] the Canal.

Over the next several days, newspapers continued to report the oil slick as being the worst case of pollution ever seen in Lake Michigan.

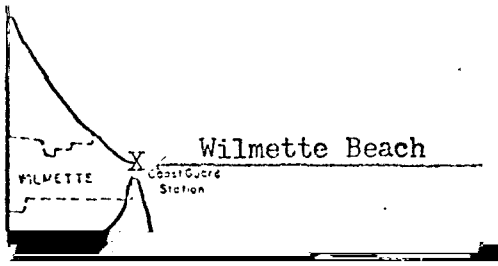


FIG. 1

SAMPLING STATIONS

OIL POLLUTION
LAKE MICHIGAN

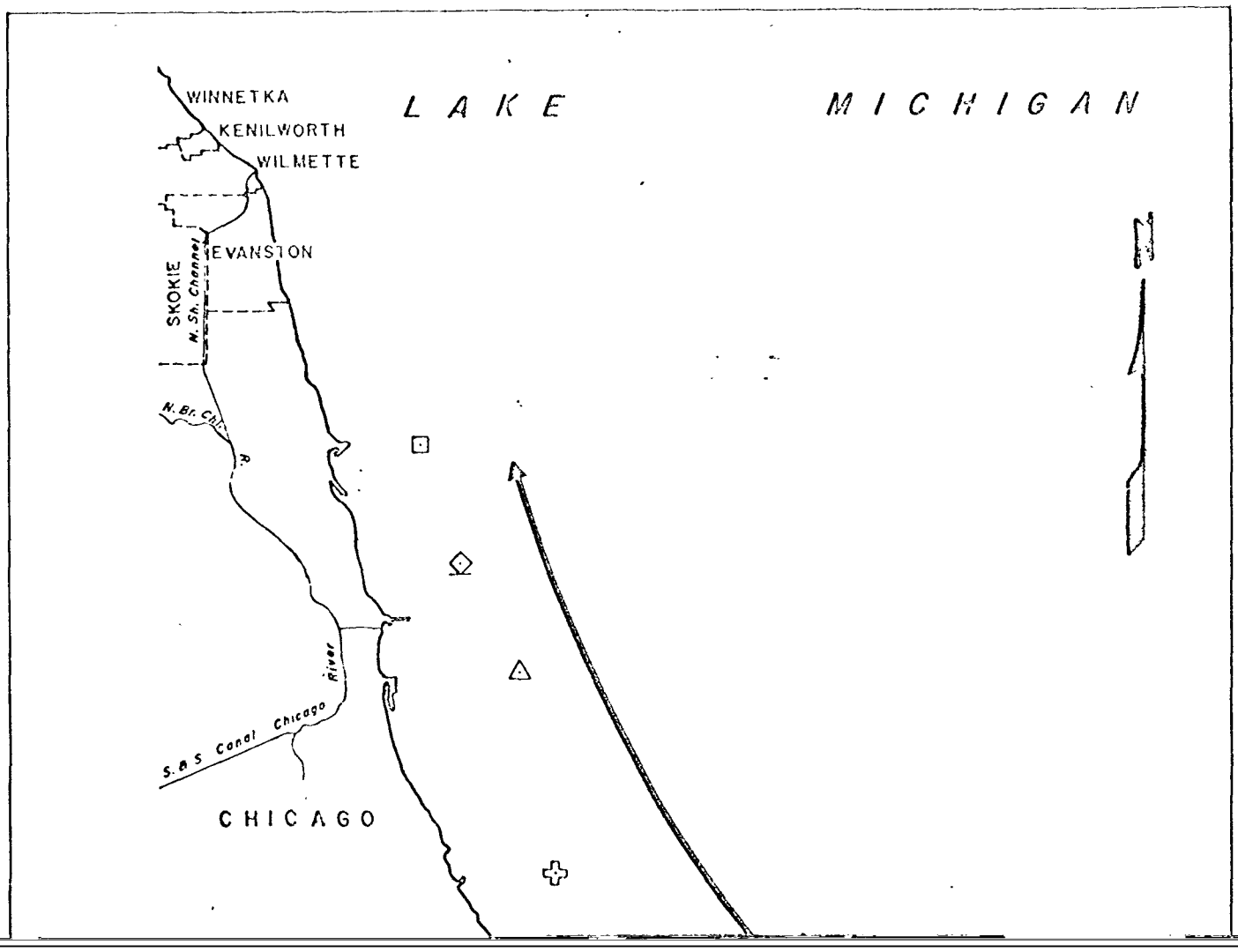
AT MIDWAY AIRPORT

Date	Wind Direction	Wind Speed (Knots)
14	S to SE	10
15	SE	10
16	E	8
17	E	7
18	E	7
19	S	5
20	S	10
21	NW	12
	(Wind Shifted from S to NW) (around noon)	

AT MEIGS FIELD

14	SE	10
15	S	12
16	E	10
17	ENE	10
18	ESE	10
19	S	10
20	SW	15
21	NW	12

The Coast Guard expressed interest in the possible use of chemical


WINNETKA
KENILWORTH
WILMETTE
EVANSTON
SKOKIE
N. Sh. Channel
N. Br. Chi...
River
S. & S. Canal Chicago
CHICAGO
LAKE
MICHIGAN

between 3 and 17%. See Table 1. FWPCA officials were alarmed at this figure and felt that this material should not be placed in the Lake. Corps of Engineers representatives said that if the dredging operation was to be halted it would mean cancellation of a contract with a severe

penalty and would have to be taken up with a higher level of authority within their organization. They requested that we complete our analysis comparing dredged material with the materials found on the beaches as rapidly as possible so that if this dredging operation was one of the

minimum possible time.

The beach conditions observed on September 22 were as follows:

1. Gary Beach - clean.

2. Hammond Beach had a moderate number of globules of this tar-like material. (One piece about 1 inch in diameter and from 1/4" to 1" in thickness per square yard).

3. Whiting Beach. (See 5.)

4. Calumet Park-Inner 100th Street. (See 5.)

Table 1a

ANALYSES OF BOTTOM SEDIMENTS
Indiana Harbor Canal
June 14, 1967
Results expressed as mg/kg

Sample No.	1		2		3		4		5	
	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry
% T. Solids	39.6		37.8		67.8		59.0		54.5	
% T. Vol. Solids		19.7		20.2		9.2		9.5		16.0
NH_3-N	216	545	235	622	48	71	103	175	142	260
[illegible]	[illegible]									

[redacted]

Org-N	630	1591	576	1525	390	575	367	622	908	1665
T. Sol. PO_4	6	15	6	16	2	3	5	8.5	6	11
T. PO_4	1550	3920	3390	8970	1670	2460	444	752	2110	3880
Phenol (ug/kg)	[illegible]									

[redacted]

Table 1b

ANALYSES OF BOTTOM SEDIMENTS
Indiana Harbor Canal
June 14, 1967
Results expressed as mg/kg

Sample No.	6		7		8		9		10	
	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry
% T. Solids	55.1		29.0		29.0		28.2		33.8	
% T. Vol. Solids		8.1		16.2		20.2		18.3		17.0
NH_3-N	49	89	76	262	129	445	184	653	167	495
NO_3-N	3.0	5.4	2.0	6.9	2.0	6.9	1.0	3.5	1.0	3.0
Org-N	950	1721	872	3010	668	2305	936	3320	1053	3120
T. Sol. PO_4	3	5.5	5	17	2	6.9	2	7.1	2	5.9

[redacted]

Phenol (µg/kg)	950	1721	1690	5830	1660	6420	1930	6850	1620	4800
Oil & Grease	22100	40100	37800	129700	32300	111300	31200	111500	27100	80200
T. Fe	47000	85200	60000	207000	45000	155000	73000	259000	85000	251500
Sulfide	304	551	457	1575	910	3140	336	1190	272	805
Cu	13	24	29	100	30	104	15	53	12	36
Cd	125	227	250	863	359	1240	1170	4150	2530	7490

Table 1c

[redacted]

Indiana Harbor Canal
June 14, 1967
Results expressed as mg/kg

Sample No.	11	12	13	14	15
% T. Vol. Solids			12.5		
NH_3-N		62	156		
NO_3-N		1.0	2.5		
Org-N		684	1722		
T. Sol. PO_4		2	5		
T. PO_4		4160	10490		
[redacted]					
Oil & Grease		14900	37600		

13. There was a fair amount of oil present at Evanston Beach (Dempster St.)

14. Wilmette Beach was clean (Lake Ave.).

FWPCA crews again worked in the entire Calumet Area on Monday, September 25, 1967. An FWPCA engineer was on a United States Coast Guard vessel which followed a tug and two barges out into Lake Michigan to dump dredgings from the Indiana Harbor Canal. He observed the dumping operation, took photographs and collected samples prior to dumping. A sample was taken in the wake of the barge to detect leaking, if any. Samples were taken during the period from 12:15 to 12:45 p.m.

Other FWPCA scientists flew over the area to observe the effect of

the barge dumping operation. At 1:30 p.m. the tug and barges were observed

Lake a bad oil slick and severe discoloration of the water was observed

Indiana Harbor Canal dredging materials into Lake Michigan on Monday, October 2. These photographs show clearly the formation of an oil slick on the surface of the Lake as heavier materials darken the waters just

CONCLUSIONS

As a result of the FWPCA investigation and the results of the analysis of samples collected by the FWPCA and the U.S. Coast Guard, the Chicago Program Office of FWPCA draws the following conclusions:

1. The laboratory findings indicated that the major portion

[redacted]

containing some asphaltic products. Some areas of both heavier and lighter oils were found.

RECOMMENDATIONS

Whether or not the September 17 to 20, 1967 oil pollution can be laid at the doorstep of any individual, corporation or ship owner does not alter the fact that oil pollution has been continuing unabated in the Calumet Area both before, during, and after this particular incident.

It is recommended therefore:

1. That all oil pollution be kept out of Lake Michigan.

2. That a boom and curtain be placed across Indiana Harbor to minimize the movement of oil from Indiana Harbor into Lake Michigan with an operating gate to permit navigation.

3. That oil skimmers be placed behind this boom to remove

LABORATORY RESULTS AND FINDINGS

Sampling Background

The first samples received by the laboratories were oil samples collected by the Chicago Program Office from the water surface in Indiana Harbor and Indiana Harbor Canal on September 19. Additional samples were received from the U. S. Coast Guard and submitted to the laboratories on September 20. These samples were the oily wastes collected from the surface of Lake Michigan at twelve points located between Indiana Harbor and Chicago Jackson Park Harbor. One sample was collected on September 11 and the others were collected Sept. 18 and 19. The next group of samples received were collected by Chicago Program Office personnel late on Friday afternoon, September 22. One crew visited the site of dredging operations in the Indiana Harbor Canal at 129th Street. Dredging equipment had caused heavy oily

Daily water sampling was initiated for the purpose of determining

Harbor and Dickey Road.

Sampling locations are shown in Figure 1.

Analyses Performed

The oil and asphalt-like substances were analyzed by the organic chemistry laboratory to obtain infrared spectra, gas chromatography flame ionization profiles and refractive indexes on selected samples. The bottom sediment and water samples were analyzed for the customary domestic

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10^{-3}

th St. each		Ardmore St. Beach 5800 N	
t	Dry	Wet	Dry
T.	N.T.	N.T.	N.T.
T.	N.T.	N.T.	N.T.
T.	N.T.	N.T.	N.T.
400	1,730	2,570	3,840
T.	N.T.	N.T.	N.T.
T.	N.T.	N.T.	N.T.
		67	
	64		80
T.	N.T.	N.T.	N.T.
T.	N.T.	N.T.	N.T.
1,730	224,000	461,230	690,000
T.	N.T.	N.T.	N.T.
T.	N.T.	N.T.	N.T.
T.	N.T.	N.T.	N.T.
T.	N.T.	N.T.	N.T.
T.	N.T.	N.T.	N.T.
T.	N.T.	N.T.	N.T.
T.	N.T.	N.T.	N.T.
T.	N.T.	N.T.	N.T.
T.	N.T.	N.T.	N.T.
T.	N.T.	N.T.	N.T.

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	edgings Street g	
		er mg/l
	y	
	7	3.60
	870	0.18
	850	0.49
		4.09
	600	0.12
		0.88
		232 (mg/l)
	20%)	234 (mg/l)
	,000	16
	210 x 10^3	17 x 10^{-3}
	22,200	9.7
	640	-
		0.35
	T	1.80

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nalyses of Oil in
Bottom Sediments

R. ectra	G.C.Flame Ionization	Refractive Index
		1.6524
		1.6490
or 6	-	1.3312
"	-	1.3311
"	6	1.6545
"	6	1.6581
"	6	1.3302
"	6	1.6540
"	6	1.6507
s.	Ins.	Ins.
or 6	6	1.6513
"	6	1.6519
"	6	1.6528
"	6	1.4882
.	Ins.	Ins.
.	Ins.	Ins.
		1.6496
		1.4986 EX
		1.4960 EX

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in
ts

Flame zation	Refractive Index
	1.6497
	1.6506
	1.6495
	1.4928 EX
	1.4960
	1.6494
	1.6496

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s of Oil in
m Sediments

a	G.C.Flame Ionization	Refractive Index
	6	1.6499
	6	1.6512
	6	1.6524
	6	1.6520
	6	1.6506
	Ins.	1.6520
	"	1.6511

TABLE 5

Refractive Index Values of Mixtures of

Asphalt and #6 Fuel Oil

CPO Sample No.	% Asphalt by wt.	% #6 Fuel Oil by wt.	Refractive Index
739	100 *	0	1.6506
	75	25	1.6530
	50	50	1.6525
	25	75	1.6505
	0	100**	1.6509
740	0	100	1.6490

* Heated 6 hrs. at 100° C.

** Heated 8 hrs. at 100° C and stood on bench top over weekend, exposed to the atmosphere.

The above findings indicate that major portion of the large oil slick which occurred on Lake Michigan the week of September 17 was comprised of No. 6 fuel oil and contained some asphaltic products. However, some areas of both heavier and lighter oils were found.

phenols, sulfides, and oil and grease. The results of metals analysis on the dredging samples are still pending and will be provided in the near future. The two samples of solidified materials taken from the 79th Street Beach and Ardmore Beach showed extremely high volatile solids. Oil and

grease were very high as would be expected.

The sample taken from the bucket of the dredge on September 23 gave much higher results for most parameters than did those taken from the barge. The barge results from September 22 show that there was a consider-