Chicago Area Waterway System (CAWS) Dredged Material Management Plan (DMMP) – Calumet River Sediment Quality

Quick Facts:

- *The DMMP anticipates approx. 600,000 cubic yards will be dredged from the Calumet River over the next 25 years.*
- *.The Calumet River portion of Federal navigation channel is over 6 miles long and extends from Lake Michigan to Lake Calumet.*
- *Sediments from the Calumet River have effectively been confined within the Chicago Area Confined Disposal Facility (CDF) since 1984.*
- *Concentrations of parameters in the Calumet River sediment are elevated in comparison to background, and the DMMP recommends continued confinement in a new upland facility.*

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The Calumet River provides a critical link between the deep-draft Great Lakes Navigation System and the shallow-draft Illinois Waterway and Mississippi River Systems. In order to maintain safe, efficient navigation, the river needs to be dredged periodically. The ongoing maintenance provides cost savings to shippers and supports regional commercial activity.

Causes of Contamination

The Calumet area has a long industrial history that began in the late 1800s. One of the main activities was iron and steel production, and coal was typically used to power the manufacturing process. Other activities included the manufacturing of chemical, paint, and oil products.

Past environmental regulations were not sufficient, and the Calumet River became increasingly polluted. In 1922, the flow through the Calumet River was diverted from Lake Michigan to the Calumet-Sag Channel to prevent further pollution from entering Lake Michigan; the source of the area's drinking water.

The water and sediment in the Calumet River remain impaired due to several reasons, including past as well as current industrial activities, uncontrolled disposal of wastes, combined sewer overflows, surface runoff, seepage of contaminated groundwater, and air pollution (atmospheric deposition).

Dredging History

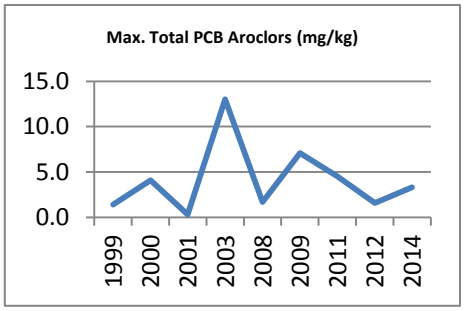
The U.S. Army Corps of Engineers (USACE) has performed dredging to maintain safe navigation through the Calumet Harbor and River project since the late 1800s. The dredged material was initially placed offshore in Lake Michigan. From 1924 to 1967, dredged material was commonly placed in a 90 square mile designated deep water site; the southwest corner of this site was 9 miles due east of the entrance gap in the Calumet Harbor breakwater.

In 1969, the dredged material was determined to be unsuitable for further placement in the open waters of Lake Michigan. Between 1968 and 1980, the dredged material was mostly placed on land at a site near South Stony Island Avenue and 122nd Street, and, during 1970 and 1971, some material was placed along a temporary dike constructed in Lake Calumet.

Since 1984, the dredged material from the maintenance of the Calumet Harbor and River navigation project has been placed into the Chicago Area Confined Disposal Facility (CDF), but this CDF is presently nearing its capacity.

Sediment Testing and Analytical Results

Whenever the dredged material is placed into the CDF, samples are collected prior to placement into the facility on a weekly basis to monitor levels of sediment contamination. Samples have also been collected directly from the bottom of the Calumet River, as in 1999 and 2003.



The table on the reverse provides a summary of recent analytical results for contaminants of concern. As indicated by the graph of PCBs, there is often substantial variability over time. Concentrations also vary spatially because sediment is removed where shoals occur, which vary with time and occur along different areas of the river.

For comparison, the table includes the Illinois Environmental Protection Agency values for maximum allowable concentrations (MAC) in uncontaminated soil used as fill material (35 Ill. Adm. Code 1100, Subpart F) and background concentrations from the Tiered Approach to Corrective Action Objectives (TACO) (35 Ill. Adm. Code 742). Assessment of human health risk associated with this sediment is discussed in a separate fact sheet.

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Sediment Characteristics for Past and Recent Dredging Events[1]

		Sampling	Dredging (Year)		Sampling	Dredging (Year(s) of Operation)							
Sediment Parameters	Units	River (1999)	River (2000-01)	Harbor / River Entrance (2001)	River (2003)	River (2003)	River (2008)	River (2009)	River (2011)	Harbor / River (2012-13)	Harbor / River (2014)	Overall	MAC
Arsenic (mg/kg)	Max	46	57.9	12.7	19	124	--	--	23	12	29	124	
	Mean	21.7	17.4	8.8	15.7	46.9	8.8	44	17	8.7	13.2	20.2	13.0
	Min	11	6.7	4.4	11	<10	--	--	13	6.7	5.8	4.4	
Cadmium (mg/kg)	Max	4.3	6.2	15.5	2.3	2.7	--	--	2.3	1.2	2.4	15.5	
	Mean	2.2	2.5	2.4	1.56	1.7	<1.0	9.2	<1.95	0.7	1.2	2.4	5.2
	Min	0.47	0.2	0.3	0.73	0.88	--	--	<1.0	0.37	0.56	0.2	
Chromium (mg/kg)	Max	99	347	49	96	162	--	--	210	34	64	347	
	Mean	64	68	25	59	52.4	20	110	80	23.7	39.9	54.2	21
	Min	29	19	1.6	38	24	--	--	28	19	20	1.6	
Copper (mg/kg)	Max	320	118	68	140	502	--	--	530	37	120	530	
	Mean	107.9	64	40	86.8	103.8	24	140	180	29.7	50	82.6	2,900
	Min	30	14	15	43	43	--	--	53	21	21	14	
Lead (mg/kg)	Max	550	367	161	840	393	--	--	310	140	270	1200	
	Mean	233.1	179.7	77	293.5	178	56	1,200	210	74.7	112	261.4	107
	Min	52	8.8	33	81	84	--	--	79	28	37	8.8	
Manganese (mg/kg)	Max	2,200	3,980	1,820	3,200	5,050	--	--	5500	1100	1,600	5500	
	Mean	1,547	1,257	780	1732	1,515	760	2,900	2133	710	870	1420	636
	Min	530	394	476	690	717	--	--	1300	400	480	394	
Mercury (mg/kg)	Max	1.1	0.62	0.2	0.012	0.19	--	--	0.41	0.21	0.38	1.1	
	Mean	0.33	<0.19	<0.12	0.01	0.15	0.027	0.32	0.23	0.14	0.16	<0.17	0.1
	Min	0.2	<0.1	<0.1	<0.008	<0.10	--	--	0.11	<0.05	0.043	0.027	
Nickel (mg/kg)	Max	70	61	35	62	100	--	--	130	22	43	130	
	Mean	39.3	43.4	23	38.8	40.5	46	68	55	18.8	27	39.9	100
	Min	27	28.4	12	23	25	--	--	35	13	15	12	
Zinc (mg/kg)	Max	1,600	1,060	481	1,000	4,690	--	--	3500	370	1,000	4690	
	Mean	851.4	511.9	221	628	942	180	4,000	1182	191	411	911.8	5100
	Min	190	54.3	82	230	283	--	--	260	93	120	54.3	
Oil & Grease (mg/kg)	Max	2,800	5,780	3,350	2,210	6,580	--	--	22,700	993	4,410	22700	
	Mean	1,427	<1,394	1405	1343.2	2714	2,200	13,000	5,466	471	1,031	<3,045	NA
	Min	670	<20	258	560	1120	--	--	653	231	82.4	<20	
PCBs[2] (total) (mg/kg)	Max	1.4	4.1	<0.33	4.3	13	--	--	4.5	1.6	3.3	13	
	Mean	0.45	<0.79	<0.33	1.9	2	1.7	7.1	3.4	1.1	1.6	<2.0	1.0
Aroclors	Min	0.099	<0.33	<0.33	0.36	<0.33	--	--	2.4	0.45	0.63	0.099	
# of Samples Collected		7	18	9	6	11	1	1	6	6	7	72	

[1] Notes: The mean concentration was calculated using the detection limit when no concentrations were detected. Inclusion of the "<" symbol indicates at least one non-detect result was included in the calculation of the mean. MAC refers to Illinois Maximum Allowable Concentration table (35 Ill. Adm. Code 1100.Subpart F). NA = Not Available / Not Listed.

[2] The next regulatory threshold for PCBs under the Toxic Substances Control Act (TSCA) is 50 mg/kg.

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