



DEPARTMENT OF THE ARMY
BUFFALO DISTRICT, CORPS OF ENGINEERS
1776 NIAGARA STREET
BUFFALO NY 14207-3199

REPLY TO
ATTENTION OF:

MEMORANDUM FOR CELRB-PM-EA

21 November 2013

SUBJECT: Olcott Harbor, Niagara County, New York - 40 CFR 230.11(d) Contaminant Determinations

FROM: CELRB-TD-EE

REFERENCES:

- a. Great Lakes Dredged Material Testing and Evaluation Manual, 1998. Guidance manual prepared by U.S. Environmental Protection Agency (USEPA) and U.S. Army Corps of Engineers.
- b. Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. – Testing Manual (Inland Testing Manual), 1998. USEPA and USACE.
- c. Analytical Report: Olcott Harbor. RTI Laboratories, Inc. October 2013.
- d. Toxicological Evaluation of Sediment Samples: Olcott Harbor. EnviroSystems, Inc. September 2013.

INTRODUCTION

The objective of this memorandum is to evaluate Olcott harbor federal navigation channel sediments to address the contaminant determination portion (40 CFR 230.11[d]) of the larger Clean Water Act Section 404 (b)(1) evaluation of a proposed dredged material discharge to waters of the United States. This evaluation follows the tiered evaluation prescribed by federal guidance, including an assessment of available information, sediment physical and chemical data and biological-effects testing to reach a determination on potential adverse impacts to the environment associated with a dredged material discharge to the open-lake. This evaluation was conducted according to the protocols and guidelines provided in references (a) and (b).

Section 404(b)(1) Guidelines direct that contaminant determinations be made by comparing the dredged material to the sediments at the disposal site; open-lake reference sediments serve as the point of comparison for potential contaminant effects of the proposed dredged material. Based on this comparison a conclusion is reached regarding the suitability of sediments for open-lake placement, with respect to sediment contamination.

BACKGROUND

Figure 1 presents an overview of the project area. Olcott Harbor is a shallow draft recreational harbor located on Lake Ontario at the mouth of Eighteen Mile Creek in the Village of Olcott, Niagara County, New York. The channel is 140 feet wide and approximately 1,400 feet long; authorized depth is 12 feet in the Federal navigation channel. The harbor was last dredged in 1997 when 9,900 cubic yards (CY) of material was removed and placed in the open-lake; the current sediment backlog within the functional harbor areas is estimated at approximately 10,000 CY. Current hydrographic surveys of the harbor are located at: <http://www.lrb.usace.army.mil/Library/MapsandCharts.aspx>.

Sediment grab samples were collected from the federal navigation channel within the harbor and from the open-lake placement and reference areas from August 20 - 21, 2013. Three samples were collected throughout the harbor, OLC-01 through OLC-03 (Figure 2). Two samples were collected from an open-

lake reference area, OLCR-01 and OLCR-02 and two samples were collected from the open-lake disposal area, OLCD-01 through OLCD-02 (Figure 3). Sediment samples were analyzed for bulk grain size (sieve and hydrometer) and percent moisture, target analyte list (TAL) metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, potassium, selenium, silver, sodium, thallium, vanadium and zinc), total cyanide (CN), ammonia-nitrogen (ammonia-N or NH₃), total phosphorus (TP), total Kjeldahl nitrogen (TKN), total organic carbon (TOC), total oil and grease, polychlorinated biphenyls (PCBs) (as Aroclors), pesticides and polycyclic aromatic hydrocarbons (PAHs) (16 USEPA priority pollutants and methylnaphthalenes). Elutriate tests were conducted on the harbor sediment samples and were analyzed for the same parameters; site water was analyzed as OLCD-COMP.

Samples from the open-lake reference and disposal areas were composited for samples OLCR-COMP and OLCD-COMP, respectively. Composite samples were subjected to 10-day *Hyaella azteca* and *Chironomus dilutus* whole sediment acute toxicity tests, with survival and survival and growth as measurement endpoints, respectively. The harbor composite samples were also subjected to 48-hour *Ceriodaphnia dubia* and four-day *Pimephales promelas* water column acute toxicity tests.

These data were used to characterize harbor dredged material and open-lake reference area sediments.

RESULTS

Laboratory analyses were provided by RTI Laboratories, Inc (reference [c]); toxicity tests were provided by EnviroSystems, Inc (reference [d]).

Particle Size

Table 1 presents the particle size distribution for each sample. Sediments within the federal channel consist primarily of coarser grained material, with a sand content range of 87.2% to 95.1%. The open-lake reference and disposal areas predominately consist of finer grained material; sediments are about 90% silt and clay and 10% sand.

Inorganics

Table 2 presents the results of inorganic analyses. Cyanide was not detectable throughout the harbor or lake samples. Concentrations of ammonia-N, TKN, total phosphorus and TOC were generally less in harbor sediments, compared to the open-lake disposal and reference areas. Total oil and grease was generally not detectable in harbor or lake samples; sample OLC-1 had a total oil and grease concentration of 170 mg/kg.

PCBs

Table 3 presents the results of PCB analyses for each sample; PCBs were not detectable throughout the harbor or open-lake areas at reporting limits ranging from 3.6 to 7.5 ug/kg.

Pesticides

Table 4 presents the results of pesticide analyses for each sample. Pesticides were generally non-detectable in harbor sediments, with the exception of DDE at 1.5 ug/kg in sample OLC-01. DDD and DDE were detected in lake sediments; among samples with detectable results, total DDT ranged from 3 to 4.7 ug/L.

Metals

Table 5 presents the results of metals analyses for each sample. Harbor sediment metals concentrations are generally lower or comparable to the range measured for the open-lake reference and disposal areas.

PAHs

Table 6 presents the results of PAH analyses for each sample. Total PAH concentrations within harbor sediments ranged from non detectable to 562 ug/kg; these results are below the range measured for the open-lake reference and disposal areas of 2,311 to 2,932 ug/kg.

Benthic Toxicity Tests

The results of the *H. azteca* and *C. dilutus* solid phase toxicity tests are shown below. Toxicity tests measure the response of sensitive organisms to a mixture of sediment contaminants, through survival and growth (measured as ash free dry weight and ash free dry biomass) endpoints.

SAMPLE	<i>H. AZTECA</i> (% SURVIVAL)	<i>C. DILUTUS</i> (% SURVIVAL)	ASH FREE DRY WEIGHT (MG/LARVAE)	ASH FREE DRY BIOMASS (MG/LARVAE)
LAB CONTROL	80.00	93.75	1.702	1.593
OLCD COMP	77.50	91.25	1.423	1.299
OLCR COMP	47.50	95.00	1.255	1.189
OLC-1	91.25	88.75	1.522	1.316
OLC-2	90.00	97.50	1.098	1.067
OLC-3	91.25	93.75	1.138	1.290

Dredged material is considered to not meet guidelines for open-lake placement when the mortality of test organisms exposed to the dredged material is more than 10 percent greater (20 percent for *C. dilutus*) than the mortality of test organisms exposed to the disposal site sediment and is statistically different at the 95% confidence level. The harbor composite samples did not result in a significant reduction in survival compared to the open-lake reference and disposal areas. Significantly reduced *H. azteca* survival is noted for OLCR-COMP; the cause of this result is unknown, however may be due to ammonia concentrations in pore water (ammonia is a common sediment contaminant).

Dredged material is considered to not meet the guidelines when the mean weight of *C. dilutus* exposed to dredged material is less than 0.6 mg/organism (dry weight) and is more than 10 percent less and statistically different than the mean weight of organisms exposed to lake reference sediments; growth was not significantly different between the harbor composite samples and the open-lake reference and disposal areas.

Elutriate

The standard elutriate test is used to predict the release of contaminants to the water column resulting from open-water disposal. Sediment and water from the dredging site are mixed into a slurry with a sediment-to-water ratio of 1:4, and subsequently allowed to settle for 1 hour. The resultant supernatant is sampled, centrifuged to remove particulates and then analyzed as the elutriate. The elutriate results define the concentration of contaminants released during open-water disposal of the dredged material. The results can be compared to water quality standards to determine compliance.

Tables 7 through 11 present the elutriate test results for each harbor sample. PCBs, pesticides and PAHs were not detected in elutriate. Low releases of metals were detected, along with ammonia, TKN, and total phosphorus. The low dissolved releases indicate that open-lake placement of the dredged material would comply with applicable water quality standards.

Water Column Toxicity Tests

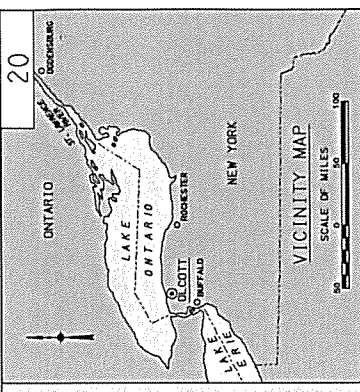
Tier 3 evaluation of dredged material effluent quality provides for water column toxicity testing to assess the potential toxicity of effluent to appropriate sensitive water column organisms. Toxicity tests involve exposing test organisms to a dilution series containing both dissolved and suspended components of the effluent associated with a dredged material disposal operation, simulated through an elutriate preparation. Test organisms are added to the exposure chambers and exposed for a prescribed period, surviving organism are examined at specified intervals and/or the end of the test. These bioassays provide information on the toxicity of contaminants not included in water quality standards and indicate possible interactive effects (additive, synergistic or antagonistic) of multiple contaminants. 48 hr *C. dubia* and 96 hr *P. promelas* water column toxicity tests generally showed 100% survival across all management units (OHCMU and WBCMUE) and dilution series. Adverse impacts to the water column associated with a dredged material disposal operation are not expected.

CONCLUSION

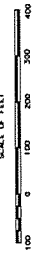
Olcott harbor sediments are toxicologically comparable to open-lake reference area sediments; based on the available information, open-lake placement of Olcott harbor dredged material is not expected to cause unsuitable, adverse, contaminant-related impacts. Open-lake placement of Olcott Harbor dredged material would comply with applicable water quality standards. Per 33 CFR 336, open-lake placement of dredged material would be designated the federal standard for Olcott harbor as it represents the least costly alternative, consistent with sound engineering practices, selected through the 404(b)(1) guidelines.

ANDREW LENOX
Environmental Engineer

FIGURES



OLCOTT HARBOR
NEW YORK
FIGURE 1



U.S. ARMY ENGINEER DISTRICT BUFFALO
MAY 2000

LAKE ONTARIO

PROPOSED WEST DETACHED BREAKWATER

PROPOSED ENTRANCE CHANNEL MODIFICATIONS

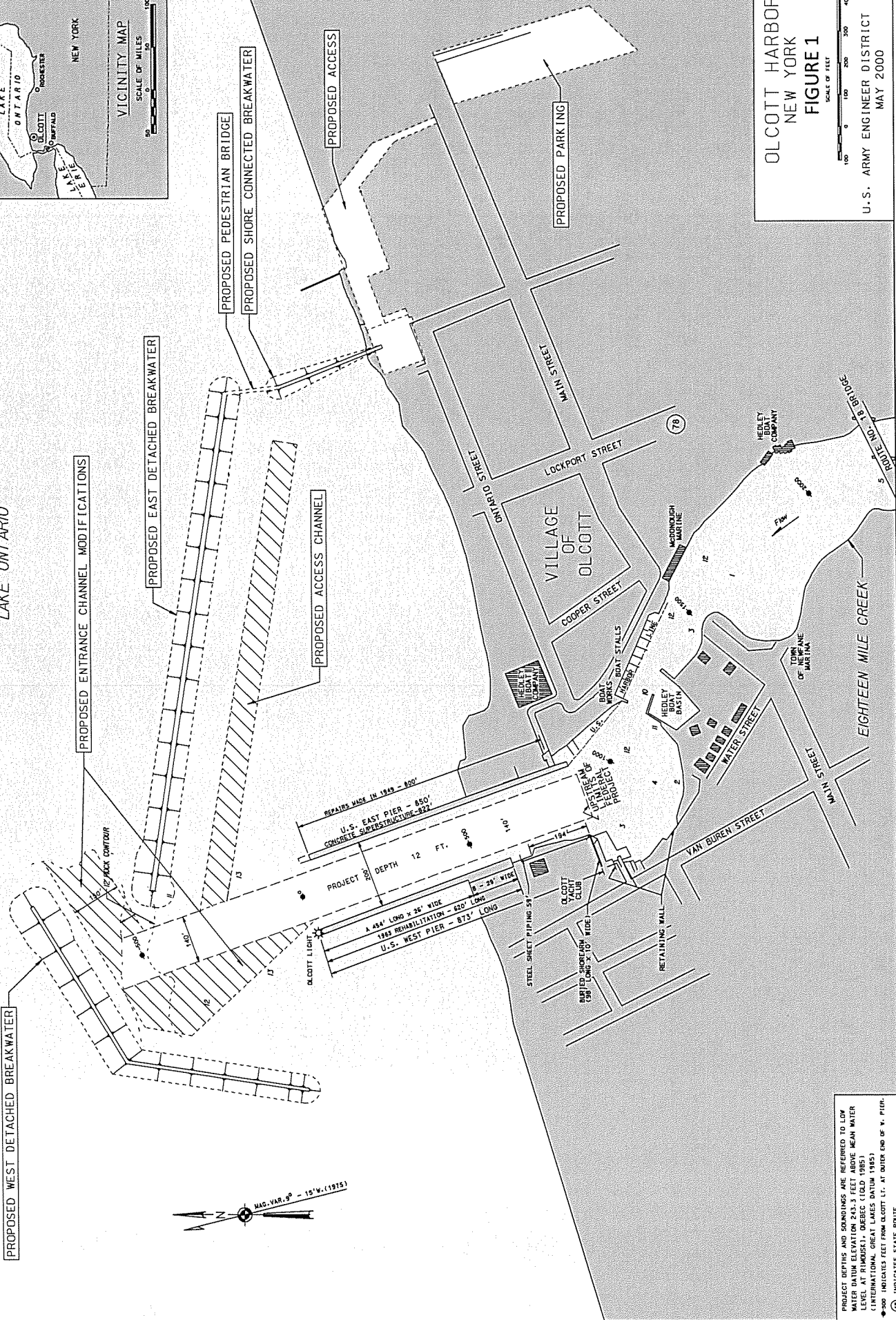
PROPOSED EAST DETACHED BREAKWATER

PROPOSED PEDESTRIAN BRIDGE

PROPOSED SHORE CONNECTED BREAKWATER

PROPOSED ACCESS

PROPOSED PARKING



PROJECT DEPTHS AND SOUNDINGS ARE REFERRED TO LOW WATER DATUM ELEVATION 243.3 FEET ABOVE MEAN WATER LEVEL AT RIMOUSKI, QUEBEC (IGLD 1985) (INTERNATIONAL GREAT LAKES DATUM 1985)
 ● 800 INDICATES FEET FROM OLCOTT LT. AT OUTER END OF Y. PIER.
 ○ INDICATES STATE ROUTE

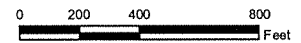


Lake Ontario



Legend

○ Sediment Sample Location



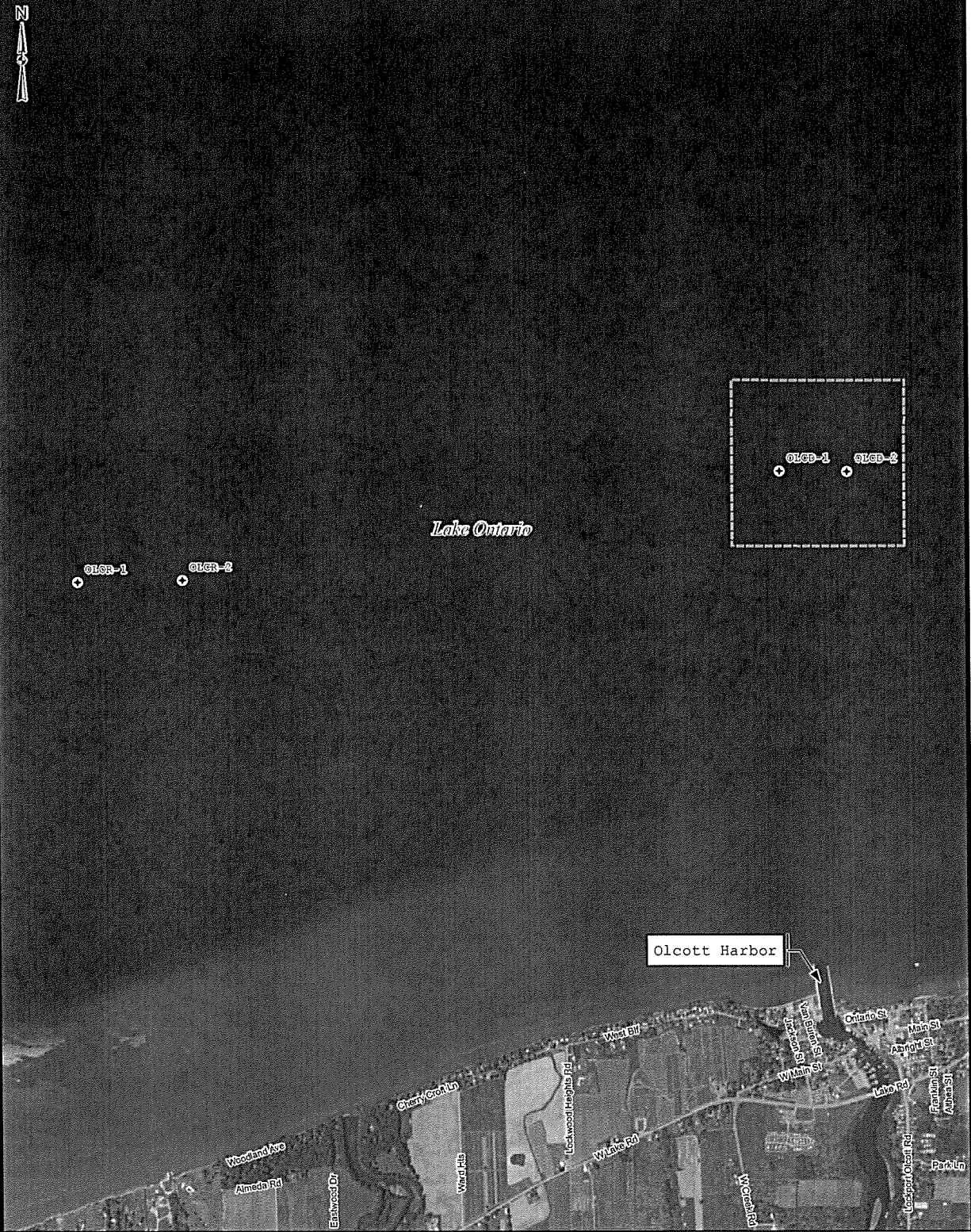
U.S. ARMY ENGINEER DISTRICT
US Army Corps
of Engineers
BUFFALO, NY
Buffalo District

HARBOR SEDIMENT SAMPLE LOCATIONS

Document Name: 101013_OlcottSample.mxd
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OLCOTT HARBOR
OLCOTT, NEW YORK


FIGURE 2



Legend

- ⊕ Lake Sediment Sample Location
- Lake Disposal Area

0 750 1,500 3,000
Feet

 <p>U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS BUFFALO, NY Buffalo District</p>	<p>LAKE SEDIMENT SAMPLE LOCATIONS</p>	
<p>Document Name: 101013_LakeSample.mxd Drawn By: HSTDESPM Date Saved: 10 Oct 2013 Time Saved: 2:05:45 PM</p>	<p>OLCOTT HARBOR OLCOTT, NEW YORK</p>	<p>FIGURE 3</p>

TABLES

TABLE 1: Sediment Particle Size Distribution

PARTICLE SIZE	UNITS	OLC-1	OLC-2	OLC-3	OLCD-1	OLCD-2	OLCD-COMP	OLCR-1	OLCR-2	OLCR-COMP
CLAY	PERCENT	3.4	2.6	2.8	53	40	44	48	34	41
SILT	PERCENT	8.1	2.7	4.8	36	48	46	42	55	49
SAND	PERCENT	87.2	95.1	92.5	10	11.1	9.7	9.1	10.8	10
GRAVEL	PERCENT	0.1U	0.1	0.2	0.2	0.2	0.1U	0.7	0.1U	0.1U

U: Not detected at the specified reporting limit

TABLE 2: Sediment Inorganic Analyses

INORGANIC	UNITS	OLC-1	OLC-2	OLC-3	OLCD-1	OLCD-2	OLCD-COMP	OLCR-1	OLCR-2	OLCR-COMP
CYANIDE	MG/KG	0.43 U	0.41 U	0.42 U	0.83 U	0.86 U	0.83 U	0.81 U	0.83 U	0.85 U
NITROGEN, AMMONIA	MG/KG	54	13	12	320	360	300	310	300	290
NITROGEN, TOTAL KJELDAHL (TKN)	MG/KG	350	160	63	2,400	3,000	2,600	2,300	3,400	2,200
PHOSPHORUS, TOTAL (AS P)	MG/KG	300	140	200	350	240	310	400	430	360
TOTAL OIL & GREASE	MG/KG	170	0.12 U	0.12 U	0.25 U	0.26 U	0.25 U	0.24 U	0.25 U	0.26 U
TOTAL ORGANIC CARBON	PERCENT	0.73	0.47	0.33	2.60	3.60	2.70	2.60	3.00	2.70
PERCENT MOISTURE	PERCENT	24	20	20	60	62	60	59	61	62

U: Not detected at the specified reporting limit

TABLE 3: Sediment PCB Analyses

AROCLOR	UNITS	OLC-1	OLC-2	OLC-3	OLCD-1	OLCD-2	OLCD-COMP	OLCR-1	OLCR-2	OLCR-COMP
PCB-1016	UG/KG	3.9 U	3.7 U	3.7 U	7.5 U	7.8 U	7.6 U	7.4 U	7.6 U	7.7 U
PCB-1221	UG/KG	3.9 U	3.7 U	3.7 U	7.5 U	7.7 U	7.6 U	7.3 U	7.6 U	7.7 U
PCB-1232	UG/KG	5.8 U	5.5 U	5.5 U	11 U	12 U	11 U	11 U	11 U	12 U
PCB-1242	UG/KG	4.8 U	4.6 U	4.5 U	9.3 U	9.6 U	9.4 U	9.1 U	9.4 U	9.6 U
PCB-1248	UG/KG	4.5 U	4.3 U	4.3 U	8.8 U	9.1 U	8.9 U	8.6 U	8.9 U	9 U
PCB-1254	UG/KG	5.5 U	5.2 U	5.2 U	11 U	11 U	11 U	10 U	11 U	11 U
PCB-1260	UG/KG	3.8 U	3.6 U	3.6 U	7.3 U	7.5 U	7.4 U	7.2 U	7.4 U	7.5 U
PCB-1262	UG/KG	5.1 U	4.9 U	4.8 U	9.9 U	10 U	10 U	9.7 U	10 U	10 U
PCB, TOTAL	UG/KG	3.8 U	3.6 U	3.6 U	7.3 U	7.5 U	7.4 U	7.2 U	7.4 U	7.5 U

U: Not detected at the specified reporting limit

TABLE 4: Sediment Pesticides Analyses

PESTICIDE	UNITS	OLC-1	OLC-2	OLC-3	OLCD-1	OLCD-2	OLCD-COMP	OLCR-1	OLCR-2	OLCR-COMP
ALDRIN	UG/KG	0.44 U	0.42 U	0.41 U	0.84 U	0.87 U	0.85 U	0.83 U	0.85 U	0.87 U
ALPHA BHC (ALPHA HEXACHLOROXYCLOHEXANE)	UG/KG	0.38 U	0.36 U	0.36 U	0.73 U	0.75 U	0.74 U	0.72 U	0.74 U	0.75 U
ALPHA ENDOSULFAN	UG/KG	0.49 U	0.46 U	0.46 U	0.94 U	0.97 U	0.95 U	0.92 U	0.95 U	0.97 U
ALPHA-CHLORDANE	UG/KG	0.48 U	0.46 U	0.46 U	0.93 U	0.96 U	0.94 U	0.91 U	0.94 U	0.96 U
BETA BHC (BETA HEXACHLOROXYCLOHEXANE)	UG/KG	0.46 U	0.44 U	0.44 U	0.89 U	0.92 U	0.9 U	0.88 U	0.9 U	0.92 U
BETA ENDOSULFAN	UG/KG	0.48 U	0.46 U	0.46 U	0.93 U	0.96 U	0.94 U	0.91 U	0.94 U	0.96 U
BETA-CHLORDANE	UG/KG	0.48 U	0.46 U	0.46 U	0.93 U	0.96 U	0.94 U	0.92 U	0.95 U	0.96 U
CHLORDANE	UG/KG	4.5 U	4.3 U	4.3 U	8.7 U	9 U	8.8 U	8.5 U	8.8 U	9 U
DDD (1,1-BIS(CHLOROPHENYL)-2,2-DICHLOROETHANE)	UG/KG	0.7 U	0.67 U	0.66 U	1.5	1.4 U	1.4	1.3 U	1.4 U	1.4 U
DDE (1,1-BIS(CHLOROPHENYL)-2,2-DICHLOROETHENE)	UG/KG	1.5	0.39 U	0.39 U	3.2	3.4	3	3	3.3	2.8
DDT (1,1-BIS(CHLOROPHENYL)-2,2,2-TRICHLOROETHANE)	UG/KG	0.45 U	0.43 U	0.43 U	0.88 U	0.91 U	0.89 U	0.86 U	0.89 U	0.9 U
DELTA BHC (DELTA HEXACHLOROXYCLOHEXANE)	UG/KG	0.38 U	0.36 U	0.36 U	0.73 U	0.75 U	0.74 U	0.72 U	0.74 U	0.75 U
DIELDRIN	UG/KG	0.47 U	0.45 U	0.44 U	0.9 U	0.93 U	0.91 U	0.88 U	0.91 U	0.93 U
ENDOSULFAN SULFATE	UG/KG	0.49 U	0.46 U	0.46 U	0.94 U	0.97 U	0.95 U	0.92 U	0.95 U	0.97 U
ENDRIN	UG/KG	0.5 U	0.47 U	0.47 U	0.96 U	0.99 U	0.97 U	0.94 U	0.97 U	0.99 U
ENDRIN ALDEHYDE	UG/KG	0.51 U	0.48 U	0.48 U	0.97 U	1 U	0.99 U	0.96 U	0.99 U	1 U
ENDRIN KETONE	UG/KG	0.47 U	0.45 U	0.45 U	0.91 U	0.94 U	0.92 U	0.89 U	0.92 U	0.94 U
GAMMA BHC (LINDANE)	UG/KG	0.39 U	0.38 U	0.37 U	0.76 U	0.79 U	0.77 U	0.75 U	0.77 U	0.78 U
HEPTACHLOR	UG/KG	0.47 U	0.45 U	0.45 U	0.91 U	0.94 U	0.92 U	0.9 U	0.93 U	0.94 U
HEPTACHLOR EPOXIDE	UG/KG	0.48 U	0.46 U	0.45 U	0.92 U	0.95 U	0.93 U	0.91 U	0.94 U	0.95 U
METHOXYCHLOR	UG/KG	0.5 U	0.47 U	0.47 U	0.95 U	0.99 U	0.97 U	0.94 U	0.97 U	0.98 U
TOXAPHENE	UG/KG	6.5 U	6.2 U	6.1 U	12 U	13 U	13 U	12 U	13 U	13 U
TOTAL DDT	UG/KG	1.5	ND	ND	4.7	3.4	4.4	3	3.3	2.8

U: Not detected at the specified reporting limit

TABLE 5: Sediment Metals Analyses

METAL	UNITS	OLC-1	OLC-2	OLC-3	OLCD-1	OLCD-2	OLCD-COMP	OLCR-1	OLCR-2	OLCR-COMP
ALUMINUM	MG/KG	4,000	3,300	2,900	16,000	16,000	16,000	16,000	16,000	16,000
ANTIMONY	UG/KG	56 U	54 U	43 U	100 U	95 U	86 U	100 U	110 U	88 U
ARSENIC	MG/KG	2.2	1.6	1.4	11	9.5	11	9.8	8.8	11
BARIIUM	MG/KG	30	14	14	96	89	85	92	87	90
BERYLLIUM	UG/KG	30 U	29 U	23 U	180	240	120	240	270	180
CADMIUM	MG/KG	1.4	0.90	1.4	4.7	4.5	4.4	4.4	4.4	4.6
CALCIUM	MG/KG	36,000	46,000	37,000	29,000	28,000	23,000	26,000	27,000	26,000
CHROMIUM, TOTAL	MG/KG	7.0	3.7	5.2	29	27	27	27	28	28
COBALT	MG/KG	2.9	1.8	2.0	11	10	10	10	10	11
COPPER	MG/KG	13	6.2	6.7	35	33	32	32	34	34
IRON	MG/KG	9,300	8,300	10,000	29,000	29,000	29,000	29,000	28,000	30,000
LEAD	MG/KG	11	2.1	2.1	22	20	20	20	22	22
MAGNESIUM	MG/KG	6,100	7,600	6,100	11,000	11,000	11,000	11,000	11,000	12,000
MANGANESE	MG/KG	530	510	550	680	790	670	650	660	700
MERCURY	MG/KG	0.05	0.01	0.01	0.15	0.13	0.13	0.06	0.15	0.10
NICKEL	MG/KG	9.1	5.2	6.0	37	35	34	35	35	37
POTASSIUM	MG/KG	600	370	390	2,600	2,400	2,300	2,700	2,500	2,500
SELENIUM	UG/KG	520 U	500 U	400 U	970 U	890 U	800 U	980 U	1000 U	820 U
SILVER	MG/KG	0.39	0.25	0.67	0.49	0.44	0.39	0.48	0.53	0.44
SODIUM	MG/KG	160	140	130	240	210	190	240	230	210
THALLIUM	MG/KG	0.51	0.67	1.1	1.0	1.7	1.0	1.3	1.6	1.2
VANADIUM	MG/KG	7.8	4.9	12	25	24	23	25	24	25
ZINC	MG/KG	60	18	13	110	100	100	110	110	110

U: Not detected at the specified reporting limit

TABLE 6: Sediment PAHs Analyses

PAH	UNITS	OLC-1	OLC-2	OLC-3	OLCD-1	OLCD-2	OLCD-COMP	OLCR-1	OLCR-2	OLCR-COMP
2-METHYLNAPHTHALENE	UG/KG	11 U	10 U	10 U	23	21 U	21 U	20	20 U	21 U
ACENAPHTHENE	UG/KG	9.6 U	9.1 U	9.1 U	19 U	19 U	19 U	18 U	18 U	19 U
ACENAPHTHYLENE	UG/KG	9.2 U	8.7 U	8.7 U	26	20	18 U	21	26	20
ANTHRACENE	UG/KG	11 U	10 U	10 U	54	53	28	46	63	40
BENZO(A)ANTHRACENE	UG/KG	46	13 U	14	180	170	97	180	220	130
BENZO(A)PYRENE	UG/KG	55	12 U	12 U	250	220	130	240	290	170
BENZO(B)FLUORANTHENE	UG/KG	87	11 U	13	410	380	190	420	410	210
BENZO(G,H,I)PERYLENE	UG/KG	32	14 U	14 U	130	130	62	120	160	93
BENZO(K)FLUORANTHENE	UG/KG	30	21 U	21 U	150	99	69	170	180	120
CHRYSENE	UG/KG	57	12 U	12 U	270	220	130	260	280	160
DIBENZ(A,H)ANTHRACENE	UG/KG	34 U	32 U	32 U	66 U	68 U	67 U	65 U	65 U	67 U
FLUORANTHENE	UG/KG	94	20 U	20	420	330	200	380	450	260
FLUORENE	UG/KG	12 U	12 U	12 U	28	25	24 U	27	30	24 U
INDENO(1,2,3-C,D)PYRENE	UG/KG	27	11 U	11 U	110	90	63	110	150	73
NAPHTHALENE	UG/KG	8.4 U	7.9 U	7.9 U	56	44	32	49	53	47
PHENANTHRENE	UG/KG	40	11 U	11 U	190	170	98	180	200	140
PYRENE	UG/KG	94	12 U	22	400	360	210	420	420	260
TOTAL PAHs	UG/KG	562	NA	69	2,697	2,311	1,309	2,643	2,932	1,723

U: Not detected at the specified reporting limit

TABLE 7: Elutriate PAH Analyses

PAH	UNITS	OLC-1	OLC-2	OLC-3	OLCD-COMP
2-METHYLNAPHTHALENE	UG/L	0.25 U	0.28 U	0.26 U	0.25 U
ACENAPHTHENE	UG/L	0.2 U	0.23 U	0.21 U	0.2 U
ACENAPHTHYLENE	UG/L	0.2 U	0.23 U	0.21 U	0.2 U
ANTHRACENE	UG/L	0.25 U	0.28 U	0.26 U	0.25 U
BENZO(A)ANTHRACENE	UG/L	0.2 U	0.23 U	0.21 U	0.21 U
BENZO(A)PYRENE	UG/L	0.17 U	0.2 U	0.18 U	0.18 U
BENZO(B)FLUORANTHENE	UG/L	0.22 U	0.25 U	0.23 U	0.23 U
BENZO(G,H,I)PERYLENE	UG/L	0.29 U	0.33 U	0.3 U	0.29 U
BENZO(K)FLUORANTHENE	UG/L	0.22 U	0.25 U	0.23 U	0.23 U
CHRYSENE	UG/L	0.22 U	0.24 U	0.22 U	0.22 U
DIBENZ(A,H)ANTHRACENE	UG/L	0.26 U	0.3 U	0.27 U	0.26 U
FLUORANTHENE	UG/L	0.22 U	0.24 U	0.22 U	0.22 U
FLUORENE	UG/L	0.2 U	0.23 U	0.21 U	0.21 U
INDENO(1,2,3-C,D)PYRENE	UG/L	0.25 U	0.29 U	0.27 U	0.26 U
NAPHTHALENE	UG/L	0.22 U	0.25 U	0.23 U	0.23 U
PHENANTHRENE	UG/L	0.14 U	0.16 U	0.14 U	0.14 U
PYRENE	UG/L	0.3 U	0.34 U	0.31 U	0.3 U

U: Not detected at the specified reporting limit

TABLE 8: Elutriate Metals Analyses

METAL	UNITS	OLC-1	OLC-2	OLC-3	OLCD-COMP.
ALUMINUM	UG/L	31	14	11	4.6
ANTIMONY	UG/L	0.56	0.64	0.52 U	0.52 U
ARSENIC	UG/L	2.2	1.8	1	1.3
BARIUM	UG/L	190	140	140	24
BERYLLIUM	UG/L	0.25 U	0.25 U	0.25 U	0.25 U
CADMIUM	UG/L	0.27 U	0.27 U	0.27 U	0.27 U
CALCIUM	UG/L	40000	41000	39000	36000
CHROMIUM, TOTAL	UG/L	0.69	0.97	0.7	0.78
COBALT	UG/L	0.23	0.29	0.13	0.12 U
COPPER	UG/L	1.8	1.5	1.3	2.1
IRON	UG/L	52	48 U	48 U	48 U
LEAD	UG/L	0.32	0.24	0.24 U	0.24 U
MAGNESIUM	UG/L	9400	9700	9500	9700
MANGANESE	UG/L	280	5.6	2.3	0.91
MERCURY	UG/L	0.056 U	0.056 U	0.056 U	0.056 U
NICKEL	UG/L	1.9	2	1.6	1.7
POTASSIUM	UG/L	2200	1800	1800	1700
SELENIUM	UG/L	1.5 U	1.6	1.5	1.5 U
SILVER	UG/L	0.19	0.4	0.18 U	0.18 U
SODIUM	UG/L	16000	16000	15000	13000
THALLIUM	UG/L	0.2	0.22	0.16 U	0.16 U
VANADIUM	UG/L	0.74	0.95	0.74	0.49 U
ZINC	UG/L	41	22	25	8.4

U: Not detected at the specified reporting limit

TABLE 9: Elutriate Inorganics Analyses

INORGANIC	UNITS	OLC-1	OLC-2	OLC-3	OLCD-COMP
CYANIDE, AMENABLE	MG/L	0.002 U	0.002 U	0.002 U	0.002 U
NITROGEN, TKN	MG/L	1.5	0.98	1.1	0.72
NITROGEN, AMMONIA	MG/L	0.98	0.24	0.37	0.022
PHOSPHORUS, TOTAL (AS P)	MG/L	0.19	0.004	0.012	0.001 U
TOTAL OIL & GREASE	MG/L	1.4 U	1.4 U	1.4 U	1.4 U

U: Not detected at the specified reporting limit

TABLE 10: Elutriate PCBs Analyses

AROCLOR	UNITS	OLC-1	OLC-2	OLC-3	OLCD-COMP
PCB-1016	UG/L	0.03 U	0.03 U	0.04 U	0.03 U
PCB-1221	UG/L	0.03 U	0.03 U	0.03 U	0.03 U
PCB-1232	UG/L	0.04 U	0.04 U	0.05 U	0.04 U
PCB-1242	UG/L	0.04 U	0.04 U	0.04 U	0.04 U
PCB-1248	UG/L	0.03 U	0.03 U	0.03 U	0.03 U
PCB-1254	UG/L	0.04 U	0.04 U	0.04 U	0.04 U
PCB-1260	UG/L	0.04 U	0.04 U	0.04 U	0.04 U
PCB-1262	UG/L	0.05 U	0.05 U	0.06 U	0.05 U
PCB-1268	UG/L	0.1 U	0.1 U	0.1 U	0.1 U
PCB, TOTAL	UG/L	0.05 U	0.05 U	0.06 U	0.05 U

U: Not detected at the specified reporting limit

TABLE 11: Elutriate Pesticides Analyses

PESTICIDE	UNITS	OLC-1	OLC-2	OLC-3	OLCD-COMP
ALDRIN	UG/L	0.003 U	0.003 U	0.003 U	0.003 U
ALPHA BHC (ALPHA HEXACHLOROCYCLOHEXANE)	UG/L	0.002 U	0.002 U	0.002 U	0.002 U
ALPHA ENDOSULFAN	UG/L	0.003 U	0.003 U	0.004 U	0.003 U
ALPHA-CHLORDANE	UG/L	0.003 U	0.003 U	0.004 U	0.003 U
BETA BHC (BETA HEXACHLOROCYCLOHEXANE)	UG/L	0.003 U	0.003 U	0.003 U	0.003 U
BETA ENDOSULFAN	UG/L	0.003 U	0.003 U	0.003 U	0.003 U
CHLORDANE	UG/L	0.033 U	0.034 U	0.037 U	0.033 U
DDD (1,1-BIS(CHLOROPHENYL)-2,2-DICHLOROETHANE)	UG/L	0.003 U	0.003 U	0.003 U	0.003 U
DDE (1,1-BIS(CHLOROPHENYL)-2,2-DICHLOROETHENE)	UG/L	0.003 U	0.003 U	0.003 U	0.003 U
DDT (1,1-BIS(CHLOROPHENYL)-2,2,2-TRICHLOROETHANE)	UG/L	0.003 U	0.003 U	0.004 U	0.003 U
DELTA BHC (DELTA HEXACHLOROCYCLOHEXANE)	UG/L	0.002 U	0.002 U	0.002 U	0.002 U
DIELDRIN	UG/L	0.003 U	0.003 U	0.003 U	0.003 U
ENDOSULFAN SULFATE	UG/L	0.003 U	0.003 U	0.003 U	0.003 U
ENDRIN	UG/L	0.003 U	0.003 U	0.003 U	0.003 U
ENDRIN ALDEHYDE	UG/L	0.004 U	0.004 U	0.004 U	0.004 U
ENDRIN KETONE	UG/L	0.003 U	0.003 U	0.004 U	0.003 U
GAMMA BHC (LINDANE)	UG/L	0.002 U	0.002 U	0.002 U	0.002 U
GAMMA-CHLORDANE	UG/L	0.003 U	0.003 U	0.004 U	0.003 U
HEPTACHLOR	UG/L	0.003 U	0.003 U	0.003 U	0.003 U
HEPTACHLOR EPOXIDE	UG/L	0.003 U	0.003 U	0.004 U	0.003 U
METHOXYCHLOR	UG/L	0.003 U	0.003 U	0.003 U	0.003 U
TOXAPHENE	UG/L	0.04 U	0.042 U	0.045 U	0.04 U

U: Not detected at the specified reporting limit