APPENDIX G

Environmental Investigation Loureiro Engineering Associates, Inc.

Armstrong Dam Removal Feasibility Study

Loureiro
Engineering • Construction • EH&S • Energy • Waste

VIA E-Mail

November 30, 2012

F.X. Messina Enterprises
400 Granite Street
Braintree, MA 02184

Attn: Robert St. John

RE: Results of Environmental Investigation
Hollingsworth Pond
Braintree, Massachusetts

Dear Mr. St. John:

Loureiro Engineering Associates, Inc. (Loureiro) prepared this letter report in support of an environmental investigation requested by F.X. Messina Enterprises (Messina Enterprises) regarding the composition of shallow-water sediment from Hollingsworth Pond (the Pond). The Pond is located on the Monatiquot River and is formed by the dam located at the property of 10 Plain Street, Braintree, Massachusetts (the Site), owned by Messina Enterprises. This report has been prepared to provide an understanding of the environmental conditions of the sediment within the pond. This investigation is being completed to evaluate the feasibility of removing the dam at the Site and the potential liabilities associated with the exposure and mobilization of sediment with regard to the Massachusetts Contingency Plan (310 CMR 40.0000) (MCP).

Field Investigation

On November 2, 2012, Loureiro collected shallow sediment samples from four locations in the Pond. Samples were collected using a 2-inch polyvinyl chloride (PVC) tube with an open end (driven end) and a capped end with an air vent. The device was manually driven into the sediment until refusal. Upon which time the air vent was closed and the tube was retrieved. At the surface the air vent was opened and the sample was then released from the tube. This sampling procedure allowed for the collection of sediment samples below the organic mat and into the loosely consolidated pond sediment.

Samples collected were analyzed for Volatile Organic Compounds (VOCs) by EPA Method 8260, Polycyclic Aromatic Hydrocarbons by EPA Method 8270, Extractable Petroleum Hydrocarbons (EPH – carbon chains only) with target PAHs, and Massachusetts's 14 Metals (Total). LEA collected three aliquots of sediment to assure enough material to fill the necessary sample containers. The VOC portion was obtained exclusively from the third aliquot. The aliquots were collected within a three-foot diameter area of the selected sampling location. The fourth sample (LEA-SS-004) was not analyzed for VOCs.

The samples were distributed spatially to capture areas within the pond with sediments that would be exposed or mobilized if the dam was removed and to gather representative information regarding the sediment conditions:

- LEA-SS-001 was located along the eastern portion of the pond adjacent to the parking lot and its stormwater outfall.
- LEA-SS-002 was located along a shallow "sand" bar in the southern portion of the Pond mid-channel with the incoming river; upstream of the main portion of the Pond.
- LEA-SS-003 was located in the northwestern portion of the Pond adjacent to the junction of the channel spanning portion of the building and the portion of the building that occupies the western area of the Site.
- LEA-SS-004 was collected in the western portion of the Pond adjacent to a narrow vegetated buffer between the Pond and the commuter rail tracks.

The samples were collected in water depths of 1.25 feet to 3 feet, and ranged from 2 inches to 3.83 feet below ground surface. Predominantly the sediment observed was dark brown/black silty-fine to medium sand with trace gravel. Sample location LEA-SS-003 had a notable petroleum odor at collection and a sheen was observed in the area.

Results

Table 1 presents the sediment constituent concentrations. The accompanying analytical data can be found in Appendix A.

Four VOCs (1,2,4,-trimethylbenzene, 2-butanone (MEK), acetone, and chlorobenzene) were detected across the three locations sampled. 1,2,4-trimethylbenzene and chlorobenzene were detected at one location only (LEA-SS-003) with concentrations of 0.006 milligrams per kilogram (mg/kg) and 0.016 mg/kg, respectively. Acetone was detected at two locations, LEA-SS-002 and LEA-SS-003, with concentrations of 0.510 mg/kg and 0.62 mg/kg, respectively. 2-Butanone was detected at all three VOC sample locations, LEA-SS-001 to LEA-SS-003, with a range of 0.055 mg/kg to 0.19 mg/kg.

14 PAHs compounds were detected by EPA Method 8270. The concentrations ranged from 1.6 mg/kg to 40 mg/kg. Only three locations: LEA-SS-001, LEA-SS-002, and LEA-SS-003 had detected PAHs. Six (benzo[a]anthracene, benzo[b]fluoranthene, chrysene, fluoranthene, phenanthrene, and pyrene) of the 14 compounds detected were present at the three sampling locations. Acenaphthene and flourene were detected at two of the four sampling locations with concentrations of 1.6 mg/Kg and 2.7 mg/kg; and 2.2 mg/kg and 3.6 mg/kg, respectively. The remaining six compounds were detected at LEA-SS-001 only.

EPH fractions for the C_{11}-C_{22} Aromatics (Adjusted) and C_9-C_{18} Aliphatics ranges were not detected at any location. The C_{19}-C_{36} Aliphatics fraction was detected at three of the four sample locations, the exception being LEA-SS-003, with a range from 22 mg/kg to 100 mg/kg. 14 target

PAH compounds were detected by the MA-EPH method. Target PAH concentrations ranged from 1.5 mg/kg to 33 mg/kg. Of the 14 PAH compounds detected two compounds, chrysene and pyrene, were detected at all four sample locations, with ranges of 4.4 mg/kg to 19 mg/kg and 3.9 mg/kg to 33 mg/kg, respectively. Five of the 14 compounds (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, and fluoranthene) were detected at three of the four sample locations. Phenanthrene was detected at two sample locations, LEA-SS-001 and LEA-SS-002, with concentrations of 28 mg/kg and 3.2 mg/kg, respectively. LEA-SS-003 had elevated reporting limits compared to the other sample locations. Given the associated elevated reporting limits for sample location LEA-SS-003 only two constituents were detected above their reporting limit.

Twelve of the 14 Massachusetts metals were detected. Eight of the 12 metals (arsenic, barium, beryllium, chromium, lead, nickel, vanadium, and zinc) were detected at all four sampling locations. Antimony and cadmium were only detected at three of the four sampling locations, with ranges of 0.72 mg/kg to 2.2 mg/kg and 0.51 to mg/kg to 4.3 mg/kg, respectively. Mercury and selenium were detected at two of the four sample locations. Mercury was detected at LEA-SS-003 and LEA-SS-004 with concentrations of 5.6 mg/kg and 1.4 mg/kg, respectively. Selenium was detected at sampling locations LEA-SS-002 and LEA-SS-003 with concentrations of 0.97 mg/kg and 0.99 mg/kg, respectively. Silver and thallium were not detected at any of the sampling locations. The single highest metal concentration was Zinc with 13,000 mg/kg at sample location LEA-SS-003.

Summary of Constituent Exceedances

LEA compared the sediment constituent concentrations, presented in Table 1, to the MCP Reportable Concentration Standards Reporting Category RCS-1 and RCS-2. For reference, though not immediately relevant, the MCP Method 1 Soil Category S-1 Standards, *310 CMR 40.0975(6)(a): Table 2*; and the MCP Method 3 Upper Concentrations Limits in Soil, *310 CMR 40.0996(7): Table 6* are also provided. In cases were a constituent was not detected but the associated reporting limit was above its respective Reportable Concentration standard or Standard concentration, a conservative approach was applied and the constituent was considered to have exceeded the applicable Reportable Concentration standard or Standard concentration. Note: An elevated method detection limit is often the result of the laboratory needing to dilute a sample due to the presence of one or more compounds at an elevated concentration.

No detected VOC exceed Reportable Concentrations. However, reporting limits above their respective RCS-1 Reportable Concentration standard and Method 1 S-1 GW-1 Standard concentration resulted in three additional VOCs (1,1,2,2-Tetrachloroethane, 1,4-Dioxane, and Chlorodibromomethane) exceeding the MCP standards. Sample location LEA-SS-003 had the most detections and exceedances; while sample location LEA-SS-001 had the least detections and exceedances.

Of the 14 PAHs detected by EPA Method 8270 five (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, dibenzo(a,h)anthracene, and phenanthrene) were detected above the RCS-1 Reportable Concentration in LEA-SS-001. 2-Methlnaphthalene was not detected but due to the higher laboratory reporting limit in sample location LEA-SS-003 it exceeded its RCS-1 Reportable Concentration standard and Method 1 S-1 GW-1 Standard. Additionally, acenaphthylene was not detected in any sample location, but the reporting limit exceeded its RCS-1 Reportable Concentration standard.

Six target PAH compounds (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, dibenzo(a,h)anthracene, indeno[1,2,3-cd]pyrene and phenanthrene) exceeded their respective RCS-1 Reportable Concentration standard and Method 1 S-1 GW-1 Standard concentration. Benzo[a]pyrene also exceeded its RCS-2 Reportable Concentration standard in LEA-SS-001. Four other compounds (2-methylnapthalene, acenaphthene, acenaphthylene, naphthalene) where below their respective reporting limits but exceeded their respective RCS-1 Reportable Concentration standard in one or more locations. Due to the elevated reporting limits associated with LEA-SS-003 this sample location had the largest number of constituents above their respective RCS-1 Reportable Concentration.

Seven of the metals (antimony, barium, cadmium, chromium, lead, nickel, and zinc) were detected above their respective RCS-1 Reportable Concentration. With the exception of chromium at sample location LEA-SS-004, all other exceedances were at sample location LEA-SS-003.

Conclusion

Result of laboratory analysis of sediment samples do not, in LEA's opinion, show evidence of a significant release of oil or hazardous materials to the pond. Instead, the results appear to indicate general degradation of sediment conditions associated with the long history of industry associated with the Armstrong Cork facility and degradation associated with stormwater discharge from upstream.

Based on our inspection of the pond and review of the laboratory analysis, the concentration of PAHs and metals associated with LEA-SS-001 are likely attributable to stormwater runoff from the nearby parking area and incidental spillage / leakage associated with parked cars and emissions. Similar PAHs and metals are present in LEA-SS-002, collected generally from the center of the pond, upstream of LEA-SS-001, and from LEA-SS-004 collected on the west side of the pond and on the interior side of the apparent stream channel. LEA concludes that the concentrations of PAHs and metals at these other locations is likely the result of contribution from upstream stormwater.

LEA concludes that the PAHs and metals detected in LEA-SS-003 are likely the result of contribution of upstream but also contribution from activities conducted at Armstrong Cork. LEA noted a distinct petroleum odor associated with these sediments and given the proximity of

the sample location to the building, activities within the building should be investigated to determine if storage or use of petroleum in this area may have contributed to sediment conditions.

Based on our review and understanding of applicable regulations, LEA concludes that if the water level in the pond is lowered such that sediment is exposed, the sediment would be considered soil for the purpose of the MCP. Given the presence of metals and PAHs above the applicable RCS-1 standard, LEA concludes that a reporting condition associated with the newly exposed soil will exist. With the exception of sediment/soil proximal to LEA-SS-003, LEA does not believe that significant remediation of site soil will be necessary. Based on the limited data to date, LEA believes that any risk associated with the exposure of this soil can be managed through careful planning of use of the area.

We hope that the information contained herein is helpful to your understanding of sediment conditions. LEA appreciates the opportunity to provide our services. If you have any questions please do not hesitate to contact the undersigned. Samuel Butcher can be reached at 781-878-1272.

Sincerely,

LOUREIRO ENGINEERING ASSOCIATES, INC.

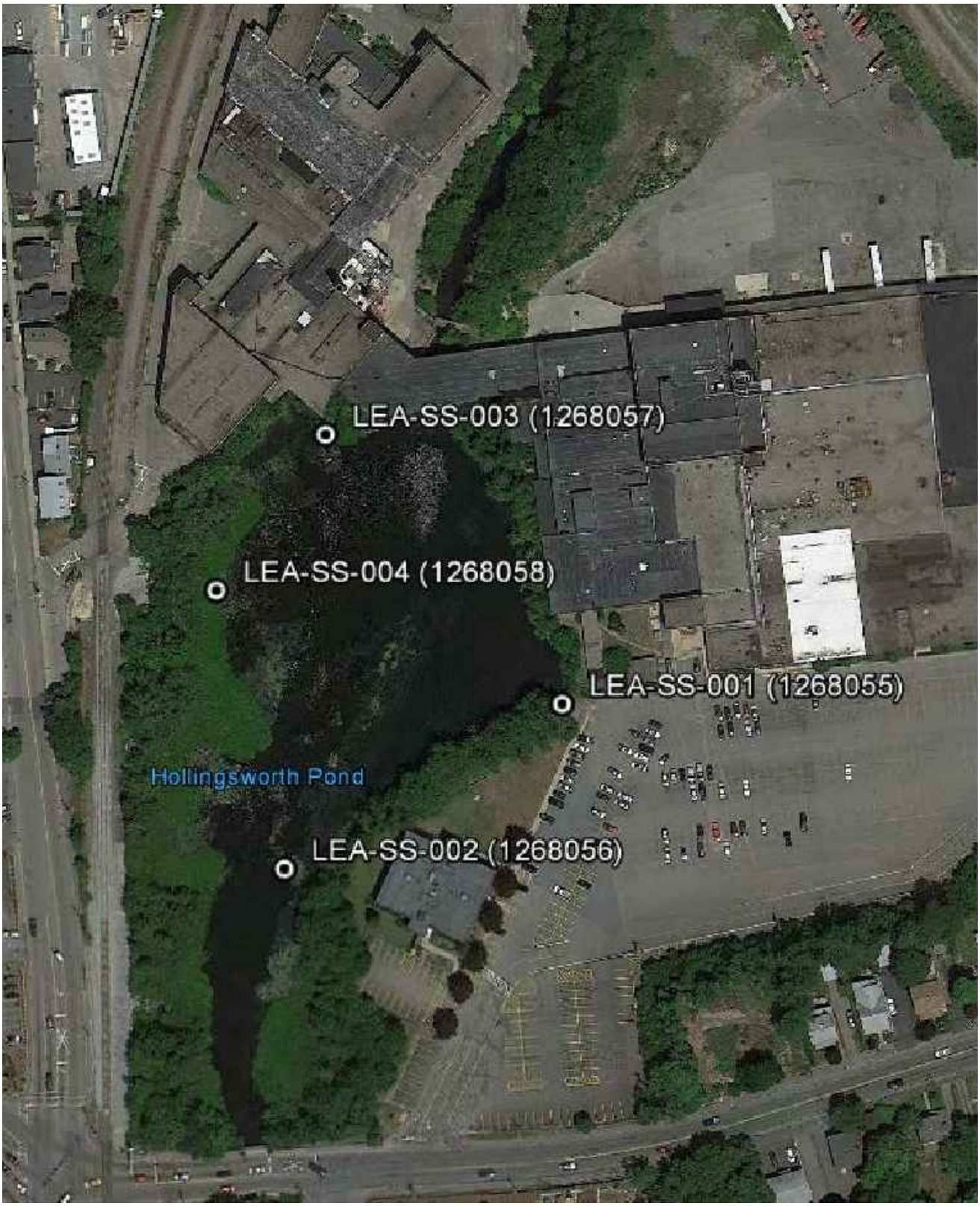
Samuel W. Butcher, LSP,
Vice President

William C. Meagher III, EIT
Engineer

Attachments:

Table 1: Sediment Analytical Data

Appendix A: Laboratory Report 480/27715-1



75 0 75 150 225

APPROXIMATE SCALE IN FEET

MAP NOTES:

MAP IMAGE OBTAINED FROM GOOGLE EARTH, NOVEMBER 5, 2011. DATE OF IMAGERY JUNE 10, 2012.

ALL LOCATIONS ARE APPROXIMATE

ENVIRONMENTAL INVESTIGATION

F.X. MESSINA ENTERPRISES, INC.

SEDIMENT SAMPLING LOCATIONS

Comm.No.		
31BF2.01	FIGURE 1	Loureiro Engineering • Construction • EH&S • Energy • Waste

G:\PROJECTS\31BF201 FX MESSINA ARMSTRONG CORK DAM REMOVAL\FIGURES\2012.11.30.FIG.1.SAMPLING LOCATIONS.DWG Tab:FIGURE 1 Saved: 11/30/2012 4:44 PM Plotted: 11/30/2012 4:47 PM

TABLE 1
SEDIMENT ANALYTICAL DATA SUMMARY OF DETECTS & EXCEEDANCES (November 2, 2012)
HOLLINGSWORTH POND, BRAINTREE, MA

Parameter	Units	LEA-SS-001	LEA-SS-002	LEA-SS-003	LEA-SS-004	MCP Reportable Conc.		MCP Method 1 Standards			
		1268055	1268056	1268057	1268058						
		11/2/2012	11/2/2012	11/2/2012	11/2/2012	RCS1	RCS2	S1GW1	S1GW2	S1GW3	UCLs
Percent Moisture	%	28	36	47	43	NA	NA	NA	NA	NA	NA
VOCs (8260C)											
1,1,2,2-Tetrachloroethane	mg/Kg	< 0.0031	< 0.0043	<0.0058	NA	0.005	0.02	0.005	0.02	0.8	400
1,2,4-Trimethylbenzene	mg/Kg	< 0.0031	< 0.0043	**0.006**	NA	1,000	10,000	NA	NA	NA	NA
1,4-Dioxane	mg/Kg	< 0.310	< 0.430	< 0.5580	NA	0.2	6	0.2	6	70	5,000
2-Butanone (MEK)	mg/Kg	**0.055**	**0.150**	**0.190**	NA	4	50	4	50	400	10,000
Acetone	mg/Kg	< 0.310	**0.510**	**0.620**	NA	6	50	6	50	400	10,000
Chlorobenzene	mg/Kg	< 0.0031	< 0.0043	**0.016**	NA	1	3	1	3	100	10,000
Chlorodibromomethane	mg/Kg	< 0.0031	< 0.0043	< 0.0058	NA	0.005	0.03	0.005	0.03	20	5,000
PAHs (8270D)											
2-Methylnaphthalene	mg/Kg	< 1.3	< 1.4	< 1.8	< 1.7	0.7	80	0.7	80	300	5,000
Acenaphthene	mg/Kg	**1.6**	< 1.4	**2.7**	< 1.7	4	3000	4	1000	1000	10,000
Acenaphthylene	mg/Kg	< 1.3	< 1.4	< 1.8	< 1.7	1	10	1	600	10	10,000
Anthracene	mg/Kg	**5.6**	< 1.4	< 1.8	< 1.7	1000	3000	1000	1000	1000	10,000
Benzo[a]anthracene	mg/Kg	**16**	**1.6**	**2.4**	< 1.7	7	40	7	7	7	3,000
Benzo[a]pyrene	mg/Kg	**15**	< 2.8	< 3.6	< 3.3	2	4	2	2	2	300
Benzo[b]fluoranthene	mg/Kg	**21**	**1.8**	**3.5**	< 1.7	7	40	7	7	7	3,000
Benzo[g,h,i]perylene	mg/Kg	**5**	< 1.4	< 1.8	< 1.7	1000	3000	1000	1000	1000	10,000
Benzo[k]fluoranthene	mg/Kg	**9.7**	< 1.5	< 1.9	< 1.8	70	400	70	70	70	10,000
Chrysene	mg/Kg	**16**	**1.6**	**2.4**	< 1.7	70	400	70	70	70	10,000
Dibenz(a,h)anthracene	mg/Kg	**1.9**	< 1.4	< 1.8	< 1.7	0.7	4	0.7	0.7	0.7	300
Fluoranthene	mg/Kg	**40**	**3.5**	**6.5**	< 1.7	1000	3000	1000	1000	1000	10,000
Fluorene	mg/Kg	**3.6**	< 1.4	**2.2**	< 1.7	1000	3000	1000	1000	1000	10,000
Indeno[1,2,3-cd]pyrene	mg/Kg	**5.7**	< 2.8	< 3.6	< 3.3	7	40	7	7	7	3,000
Phenanthrene	mg/Kg	**31**	**3.2**	**8.2**	< 1.7	10	1000	10	500	500	10,000
Pyrene	mg/Kg	**32**	**2.9**	**5.7**	< 1.7	1000	3000	1000	1000	1000	10,000
EPH (MA-EPH)											
Carbon Fractions											
C11-C22 Aromatics	mg/Kg	**370**	**180**	**1200**	**310**	NA	NA	NA	NA	NA	NA
C11-C22 Aromatics (Adjusted)	mg/Kg	< 4.6	< 5.1	< 6.2	< 5.8	1,000	3,000	1,000	1,000	1,000	10,000
C19-C36 Aliphatics	mg/Kg	**22**	**23**	< 180	**100**	3,000	5,000	3,000	3,000	3,000	20,000
C9-C18 Aliphatics	mg/Kg	< 13	< 14	< 180	< 17	1,000	3,000	1,000	1,000	1,000	20,000
Target PAHs											
2-Methylnaphthalene	mg/Kg	< 1.3	< 1.4	< 18	< 1.7	0.7	80	0.7	80	300	5,000
Acenaphthene	mg/Kg	1.5	< 1.4	< 18	< 1.7	4	3,000	4	1,000	1,000	10,000
Acenaphthylene	mg/Kg	< 1.3	< 1.4	< 18	< 1.7	1	10	1	600	10	10,000
Anthracene	mg/Kg	4.7	< 1.4	< 18	< 1.7	1,000	3,000	1,000	1,000	1,000	10,000
Benzo[a]anthracene	mg/Kg	**13**	**1.9**	< 18	**1.9**	7	40	7	7	7	3,000
Benzo[a]pyrene	mg/Kg	**13**	**2.7**	< 18	**3.1**	2	4	2	2	2	300
Benzo[b]fluoranthene	mg/Kg	**7.1**	**1.9**	< 18	**2.5**	7	40	7	7	7	3,000
Benzo[g,h,i]perylene	mg/Kg	**6.9**	< 1.4	< 18	< 1.7	1,000	3,000	1,000	1,000	1,000	10,000
Benzo[k]fluoranthene	mg/Kg	**19**	**3.1**	< 18	**3.4**	70	400	70	70	70	10,000
Chrysene	mg/Kg	**18**	**3.7**	**19**	**4.4**	70	400	70	70	70	10,000
Dibenz(a,h)anthracene	mg/Kg	**2.1**	< 1.4	< 18	< 1.7	0.7	4	0.7	0.7	0.7	300
Fluoranthene	mg/Kg	**39**	**3.8**	< 18	**2.8**	1,000	3,000	1,000	1,000	1,000	10,000
Fluorene	mg/Kg	3.1	< 1.4	< 18	< 1.7	1,000	3,000	1,000	1,000	1,000	10,000
Indeno[1,2,3-cd]pyrene	mg/Kg	**8.5**	< 1.4	< 18	< 1.7	7	40	7	7	7	3,000
Naphthalene	mg/Kg	< 1.3	< 1.4	< 18	< 1.7	4	40	4	40	500	10,000
Phenanthrene	mg/Kg	**28**	**3.2**	< 18	< 1.7	10	1,000	10	500	500	10,000
Pyrene	mg/Kg	**33**	**3.9**	**18**	**4.9**	1,000	3,000	1,000	1,000	1,000	10,000
METALS(6010/7471A)											
Antimony	mg/Kg	**0.72**	< 0.78	**68**	**2.2**	20	30	20	20	20	300
Arsenic	mg/Kg	**3.7**	**5.3**	**17**	**15**	20	20	20	20	20	200
Barium	mg/Kg	**20**	**48**	**1200**	**56**	1,000	3,000	1,000	1,000	1,000	10,000
Beryllium	mg/Kg	**0.34**	**0.45**	**0.59**	**0.71**	100	200	100	100	100	2,000
Cadmium	mg/Kg	< 0.26	**0.51**	**4.3**	**1.6**	2	30	2	2	2	300
Chromium	mg/Kg	**20**	**6.9**	**35**	**150**	30	200	30	30	30	2,000
Lead	mg/Kg	**110**	**46**	**1400**	**160**	300	300	300	300	300	3,000
Mercury	mg/Kg	< 0.14	< 0.16	**5.6**	**1.4**	20	30	20	20	20	300
Nickel	mg/Kg	**5.2**	**6.5**	**38**	**11**	20	700	20	20	20	7,000
Selenium	mg/Kg	< 0.64	**0.97**	**0.99**	< 0.86	400	800	400	400	400	8,000
Silver	mg/Kg	< 0.64 ^	< 0.78 ^	< 0.89 ^	0.88 ^	100	200	100	100	100	2,000
Thallium	mg/Kg	< 1.3	< 1.6	< 1.8	< 1.7	8	60	8	8	8	800
Vanadium	mg/Kg	**14**	**15**	**24**	**38**	600	1,000	600	600	600	10,000
Zinc	mg/Kg	**79**	**100**	**13000**	**360**	2,500	3,000	2,500	2,500	2,500	10,000

Note G:\Projects\31BF201 FX Messina Armstrong Cork Dam Removal\[2012.11.27.TBL.1.Sediment Results Data Summary.xls]Sediment Data

% - percent

mg/Kg - milligrams per kilogram

BOLD analyte detected above reporting limit

BOLD/SHADE analyte detected above reporting limit and RC and/or Method 1 cleanup standard.

* - LCS or LCSD exceeds the control limits

^ - ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA, DLCK or MRL standard: Instrument related QC exceeds the control limits.

Loureiro
Engineering • Construction • EH&S • Energy • Waste