TABLE 9 SUMMARY OF TOC/TC AND TOTAL SOLIDS DATA

Core Depth	Sand			SediMite™			Biochar			GAC		
	TOC	TC	TS	TOC	TC	TS	TOC	TC	TS	TOC	TC	TS
0-1				0.02 U	0.02 U	76.0	0.02 U	0.02 U	78.7	0.02 U	0.02 U	77.8
1-2				0.02 U	0.02 U	76.2	0.02 U	0.02 U	77.3	0.02 U	0.02 U	78.1
2-3	0.02 U	0.02 U	73..3	**7.28**	**7.30**	72.5	**5.47**	**6.21**	77.6	**12.0**	**12.9**	75.4
3-4				0.02 U	0.02 U	76.6	0.028	0.022	77.2	3.44	4.11	77.0
4-5				0.02 U	0.02 U	75.5	0.02 U	0.023	77.0	0.02 U	0.024	77.2

In addition to physical analysis, the deepest section of each core was analyzed for SVOCs to establish if the contaminant layer was migrating through the cap. The results of this analysis are provided in Table 10. The SVOCs were detected at a much higher concentration in the sand cap (10,590 ug/kg dry wt.) than the amendments. All of the amended sediment had reduced concentrations of SVOCs compared to the sand cap by at least 25 and as much as 50-fold. Biochar appeared to be the most efficient at reducing the migration of the contaminated layer followed by GAC and then SediMite™ (approximately half the concentrations observed in the other amended sand cap treatments).

The dominant compounds within the different treatments changed depending on treatment type; phenanthrene was found at the highest concentration in the sand, GAC, and biochar treatments whereas naphthalene compounds were the most dominant in the SediMite™ treatment. This observation may be related to SediMite™ pellets moving somewhat vertically through the cap and absorbing or entraining the contaminants. In any case, the sand cap had higher concentrations of contaminants than any of the amended treatments; therefore if the restorative layer is selected as the preferred option for the Ashland waterfront site, the restorative layer should include the addition of an amendment.

CONCLUSIONS

The summary findings as a result of laboratory studies conducted on selected cores from Chequamegon Bay, Lake Superior are:

1. There is a distinct silty sand contamination layer of free floating product mixed with pebbles varying in depth from approximately 1 ft to 3 ft below the sediment surface depending on the station location. This layer is comprised of PAH compounds similar to sediment samples collected from URS in 2001; most likely derived from petrogenic sources related to on-shore activities. *Based on boring logs advanced both on shore at Kreher Park and off shore in the bay sediments, this sandy material corresponds to granular materials underlying the wood chip/ reworked sediments at varying depths from elevation 591 to 595 msl. This granular unit is in turn underlain by soft to firm silts and/or stiff to hard clay. At some sediment sample points contaminants have penetrated the silt. Monitoring wells screened in the sand at the shoreline have historically encountered both dissolved and more recently free-phase hydrocarbon. Prior to initiating any sediment dredging or removal operation, the granular materials at Kreher Park should be contained*
2. The measured PAH compounds within the contamination layer are mobile and move within the sediment column both in an upward as well as downward direction.
3. The PAH compounds will migrate from the sediment to the water surface during dredging operations (4% of measured compounds were found in the elutriate preparations). *Mitigation measures such as containment booms should be employed to address floatable products that will surface during dredgi*ng. Under this method at least 4% of the contamination in the sediment will be mobilized to the surface of the water.

4. The concentrations in the sand cap were more than fifty times as high as the biochar treatment and more than 20 times higher than the GAC or SediMite amendment. *A restorative layer should include a sand cap amended with a carbon source. Additionally, the biochar amendment appears to enhance the carbon nutrient quality of the sand which could promote more rapid recolonization of the returning benthic community.*

TABLE 10 SUMMARY RESULTS FOR SEDIMENT CORES

Analyte *(conc. = ug/kg,dry)*	Clean sand	SediMite™	Biochar	GAC
Phenol	< 60	< 63	< 64	< 64
2-Methylphenol	< 60	< 63	< 64	< 64
4-Methylphenol	< 60	< 63	< 64	< 64
2,4-Dimethylphenol	< 60	< 63	< 64	< 64
Naphthalene	**84**	**270**	< 64	< 64
2-Methylnaphthalene	**780**	**130**	< 64	**80**
1-Methylnaphthalene	**580**	**96**	< 64	< 64
Dimethylphthalate	< 60	< 63	< 64	< 64
Biphenyl	**120 J**	**12 J**	< 64	< 64
Acenaphthylene	< 60	< 63	< 64	< 64
Acenaphthene	**1200**	< 63	< 64	< 64
Dibenzofuran	**77**	< 63	< 64	< 64
Diethylphthalate	< 60	< 63	< 64	< 64
Fluorene	**520**	< 63	< 64	< 64
Pentachlorophenol	< 300	< 320	< 320	< 320
Dibenzothiophene	**120 J**	< 63	< 64	< 64
Phenanthrene	**2100**	< 63	**140**	**160**
Carbazole	< 60	< 63	< 64	< 64
Anthracene	**550**	< 63	< 64	< 64
C(1)-Ph/An's	**920 J**	< 63	< 64	< 64
Cyclopentaphenanthrene	**180 J**	< 63	< 64	< 64
Di-n-butylphthalate	< 60	< 63	< 64	< 64
Fluoranthene	**620**	< 63	< 64	< 64
CyclopentaPh/An	**240 J**	< 63	< 64	< 64
Pyrene	**990**	< 63	**72**	**86**
Butylbenzylphthalate	< 60	< 63	< 64	< 64
Benzo(a)anthracene	**270**	< 63	< 64	< 64
bis(2-Ethylhexyl)phthalate	< 60	< 63	< 64	< 64
Chrysene	**250**	< 63	< 64	< 64
Di-n-octylphthalate	< 60	< 63	< 64	< 64
total Benzofluoranthenes	**240**	< 63	< 64	< 64
Benzo(a)fluoranthene	**70 J**	< 63	< 64	< 64
Benzo(e)pyrene	**140 J**	< 63	< 64	< 64
Benzo(a)pyrene	**240**	< 63	< 64	< 64
Perylene	**40 J**	< 63	< 64	< 64
Indeno(1,2,3-cd)pyrene	**89**	< 63	< 64	< 64
Dibenzo(a,h)anthracene	< 60	< 63	< 64	< 64
Benzo(g,h,i)perylene	**120**	< 63	< 64	< 64
Anthanthrene	**50 J**	< 63	< 64	< 64
Sum of detected SVOC	**10590**	**508**	**212**	**326**