

APPENDIX E

HOUSATONIC RIVER FNP SEDIMENT
CHARACTERIZATION AND CORRESPONDENCE

July 27, 2007

George Wisker
Connecticut Department of Environmental Protection
79 Elm Street
Hartford CT 06106

Dear Mr. Wisker,

In May 2007, you requested an assessment of the health concerns of exposure to chemicals in river sediment, assuming that it would be used as sand on a public bathing beach. The data to be evaluated consists of 23 samples extending along the navigation channel from the mouth of the Housatonic River (Sample A) to Culver Bar in Stratford (Sample W). (Housatonic River Sampling, Fuss & O'Neil; March 2007). This office reviewed results of chemical analysis and concentrations of contaminants were found to be consistently low. In general, we find little justification for concern. However, some discussion of the PAH data is appropriate, and this is presented below.

PAH detects in sample cores:

PAH data suggest that the sampled riverbed (from the river mouth to Culver Bar) can be subdivided into down-river (cores A-E) and up-river (cores F-W) sections. This distinction has been made on the basis that up-river samples are not homogeneous with respect to the distribution of organic and PAH-containing material. While primarily composed of sand, all of these up-river cores contain a small (not quantified) proportion of organic material such as wood, or substances containing PAH's (burnt wood and coal). Considering that the proposed use of this material is beach sand, it is reasonable to consider classifying these bits wood and coal as "foreign objects". EPA method 3545 calls for the removal of "any foreign objects" before extraction (<http://www.epa.gov/sw-846/pdfs/3545a.pdf>) and it is not apparent that the bits of coal and burnt wood were removed from the cores before they were analyzed for semi-volatiles. This likely artifact of analysis confounds any further interpretation of the PAH content in up-river cores, and precludes further assessment (e.g.; an exposure/risk estimate) at this time.

Subsequent dredging and processing of the material will change the physical composition of the material dredged from the river bottom (eliminating much of the aforementioned "foreign objects"). PAH concentrations in the processed product (beach sand) should therefore be much lower as these data confirm that PAH contamination is only found in cores where organic carbon content is above non-detect. Thus while some limited re-sampling of the dredged/processed upriver material may be needed, the existing PAH data (non-detect) indicates that down-river sediments could be used as fill on a public beach without further screening or testing.

The following table shows the relationship between PAH occurrence and the presence of burnt wood or coal in the up-river and down-river cores.

Total Organic Carbon and PAH concentrations by sample area: Tests indicate that the river bottom changes composition. Up-river areas contain organic matter and associated PAHs, while down-river areas are non-detect for organic carbon and PAHs. Cores A-F, H & V were non-detect for both organic carbon and total PAHs. Cores G, J, L, J, and U contained organic carbon, but were non-detect for PAHs.

Sample*	Down-river cores	Up-river Cores containing “wood”, “burnt wood”, or “coal”
Sample IDs	A-E	F-W
Total organic carbon (mean; mg/kg)**	ND (<100)	953 **
Sum PAH (ug/kg)***	ND	4429 ***

* Phthalates (a common laboratory contaminant) were detected in the analysis for cores V and K. Results from non-phthalate containing replicates were included instead.

** Range of detects for organic carbon was 300 – 2500 mg/kg.

*** Range for sum of PAHs was 430- 12560 ug/kg.

Conclusions and recommendations:

Although this data cannot be used as the basis of an exposure/risk assessment, this office believes that there is little justification for concern should the sand from the river bottom be used as fill on a public beach. Our review of the sample cores concludes that contamination was by-and-large below the threshold of detection. All sample cores were found free of volatiles, pesticides, herbicides, and PCBs. Metals that could pose a health concern were also non-detect, or in the case of lead, found at trace levels. PAHs were present at low levels relative the Residential RSR values, and the data strongly suggests that PAH detects were associated with the presence of burnt wood or coal. Thus to improve the quality of the beach sand, we recommend that the DEP take measures to insure that the fill material does not contain wood or coal (and the associated PAHs). Dredged material from up-river locations should therefore be screened and retested for total organic carbon. The purpose of doing this is to insure that fill from up-river locations is as clean as the material from the down-river locations.

Should you have any questions, please feel free to call me at 509-7758.

Regards,

Stewart Chute, Ph.D.
 Toxicologist
 CT DPH

cc: Suzanne Blancaflor, CT DPH
 Meg Harvey, EOHA



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May 3, 2007

Ms. Tammy Talbot
State of Connecticut
Department of Environmental Protection/State Parks Division
79 Elm Street, 6th Floor
Hartford, CT 06106

Re: Housatonic River Sediment Sampling Results

Dear Ms. Talbot:

Enclosed are the results of sediment sampling in the lower Housatonic River in Stratford, Connecticut performed on March 21 and 22, 2007. The purpose of the sampling program was to collect sediment samples to assist the Connecticut Department of Environmental Protection assess the suitability of proposed dredge sediments for use as beach nourishment sand at Hammonasset Beach. This information will be used in the ongoing erosion feasibility study and Environmental Impact Evaluation for Hammonasset Beach. Further evaluation of the data and a findings summary will be included in subsequent project submittals.

If you have any questions or need additional information, please call me at 413-452-0445 x4433.

Sincerely,

Erik V. Mas, P.E.
Project Manager

78 Interstate Drive
West Springfield, MA
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Attachments

c: Kirk Bosma, Woods Hole Group

Massachusetts

Connecticut

New York

Rhode Island

North Carolina

South Carolina



TABLES CHEMISTRY RESULTS

TABLE 1
Soil Analytical Data
Housatonic River
Sediment Sampling
March 2007

Parameter	Remediation Standard Regulations Residential Direct Exposure Criteria	Sample Location	HR-A	HR-B	HR-C	HR-D	HR-E	HR-F	HR-G	HR-H	HR-I	HR-J	HR-K	HR-K	HR-L
		Depth (feet)	0-2.4	0-2.2	0-2	0-3.5	0-3	0-3.4	0-3.6	0-5.2	0-4.3	0-3.7	0-4.2	0-4.2	0-6.2
		F&O Sample ID	867070321-04	867070321-05	867070321-01	867070321-02	867070321-03	867070321-06	867070321-07	867070321-08	867070321-09	867070321-10	867070322-12	867070322-13	867070322-14
Date	3/21/2007	3/21/2007	3/21/2007	3/21/2007	3/21/2007	3/21/2007	3/21/2007	3/21/2007	3/21/2007	3/21/2007	3/21/2007	3/22/2007	3/22/2007	3/22/2007	
<i>Residential Direct Exposure Criteria</i>															
VOCs 8260	ug/Kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOCs 8270	ug/Kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene	1,000,000 ug/Kg	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410
Benzofluoranthene	1,000 ug/Kg	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	540	430	ND<410
Benzofluoranthene	1,000 ug/Kg	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	620	490	ND<410
Benzofluoranthene	1,000 ug/Kg	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	740	590	ND<410
Benzofluoranthene	1,000 ug/Kg	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410
Benzofluoranthene	8,400 ug/Kg	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410
Benzyl butyl phthalate	1,000,000 ug/Kg	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410
Bis(2-ethylhexyl)phthalate	44,000 ug/Kg	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	950	ND<410	ND<410
Chrysene	ug/Kg	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	520	ND<410	ND<410
Dibenzofluoranthene	ug/Kg	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	460	ND<410	ND<410
Fluoranthene	1,000,000 ug/Kg	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	850	750	ND<410
Indeno(1,2,3-cd)pyrene	ug/Kg	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410
Phenanthrene	1,000,000 ug/Kg	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410
Pyrene	1,000,000 ug/Kg	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	850	750	ND<410
Pesticides 8081	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Herbicides 8151	ug/Kg	ND<30	ND												
Pesticide 8141	ug/Kg	ND<30	ND<80												
PCBs	1,000 ug/Kg	ND<250	ND<250	ND<240	ND<260	ND<280	ND<260	ND<270	ND<250	ND<270	ND<270	ND<270	ND<270	ND<260	ND<260
ETPH	500 mg/Kg	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10
Antimony	27 mg/Kg	ND<0.39	ND<0.4	ND<0.43	ND<0.44	ND<0.46	ND<0.47	ND<0.41	ND<0.41	ND<0.46	ND<0.42	ND<0.41	1.41	1.25	ND<0.39
Arsenic	10 mg/Kg	ND<0.78	ND<0.8	ND<0.86	ND<0.88	ND<0.91	ND<0.94	ND<0.82	ND<0.82	ND<0.91	1.24	ND<0.8	ND<0.88	ND<0.88	ND<0.78
Asbestos	%	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Beryllium	2 mg/Kg	ND<0.31	ND<0.32	ND<0.34	ND<0.35	ND<0.37	ND<0.38	ND<0.33	ND<0.33	ND<0.37	ND<0.33	ND<0.32	ND<0.35	ND<0.35	ND<0.31
Cadmium	34 mg/Kg	ND<0.39	ND<0.4	ND<0.43	ND<0.44	ND<0.46	ND<0.47	ND<0.41	ND<0.41	ND<0.46	ND<0.42	ND<0.4	ND<0.44	ND<0.44	ND<0.39
Total Chromium	mg/Kg	3.9c	5.8	4.59	12.8	23.5	18.3	17.9	14.5	24.2	28.3	23.2	23	17.7	3.9c
Trivalent Chromium	3,900 mg/Kg	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Hexavalent Chromium	100 mg/Kg	ND<0.56	ND<0.57	ND<0.56	ND<0.59	ND<0.62	ND<0.59	ND<0.61	ND<0.58	ND<0.60	ND<0.60	ND<0.57	ND<0.58	ND<0.58	ND<0.56
Copper	2,500 mg/Kg	4.9c	11.2	5.3	31.9	85.1	55	50.3	28.9	62	96.9	56.9	57	40.2	4.9c
Total Cyanide	1,400 mg/Kg	ND<C.63	ND<0.64	ND<0.62	0.67	ND<0.69	ND<0.67	ND<0.68	ND<0.65	ND<0.68	ND<0.68	ND<0.64	ND<0.65	ND<0.67	ND<0.63
Lead	500 mg/Kg	1.73	2.56	1.5	5.55	7.57	6.54	8.37	5.32	9.81	11.8	7.75	7.71	6.22	1.73
Mercury	20 mg/Kg	ND<C.10	ND<0.10												
Nickel	1,400 mg/Kg	2.68	2.79	2.38	3.93	6.67	7.47	5.77	4.72	8.51	9.73	6.65	6.89	5.43	2.68
Selenium	340 mg/Kg	ND<1.95	ND<2	ND<2.14	ND<2.19	1.13	ND<2.35	ND<2.04	ND<2.05	ND<2.28	ND<2.09	ND<2	ND<2.19	ND<2.19	ND<1.95
Silver	340 mg/Kg	ND<C.39	ND<0.4	ND<0.43	ND<0.44	ND<0.46	ND<0.47	ND<0.41	ND<0.41	ND<0.46	ND<0.42	ND<0.4	ND<0.44	ND<0.44	ND<0.39
Thallium	5 mg/Kg	ND<3.91	ND<4.01	ND<4.28	ND<4.39	ND<4.57	ND<4.69	ND<4.08	ND<4.11	ND<4.57	1.2	ND<2	ND<4.39	ND<4.39	ND<3.91
Vanadium	470 mg/Kg	4.41	4.53	4.01	4.68	7.14	6.57	8.17	4.99	8.09	10.4	7.69	7.68	4.71	4.41
Zinc	20,000 mg/Kg	10.8	13.4	8.38	28.8	61.5	48.4	49.8	35	80.7	76.8	55	49.1	42.6	10.8
Percent Solid	%	79	78	80	75	72	75	73	77	74	74	78	77	75	79
Total Organic Carbon	mg/Kg	ND<100	ND<100	ND<100	ND<100	ND<100	ND<100	ND<100	400	ND<100	1100	1500	1600	700	2500
Salinity	ppt	2.8	2.3	2.1	2.5	2.7	2.7	2.5	2.5	2.6	2.4	2.7	2	2.4	2.8

Notes:
ND = not detected above analytical detection limit
BDL = Below Detection Limit

TABLE 1
Soil Analytical Data
Housatonic River
Sediment Sampling
March 2007

Parameter	Remediation Standard Regulations Residential Direct Exposure Criteria	Sample Location	HR-M	HR-N	HR-O	HR-P	HR-Q	HR-R	HR-S	HR-T	HR-U	HR-V	HR-W	
		Depth (feet)	0-3.2	0-3.5	0-3.5	0-5.4	0-3.5	0-4.2	0-5.2	0-4.2	0-3.0	0-4.0	0-4.0	0-5.3
		F&O Sample ID	867070322-15	867070322-16	867070322-17	867070322-18	867070322-19	867070322-20	867070322-21	867070322-22	867070322-23	867070322-24	867070322-25	867070322-26
		Date	3/22/2007	3/22/2007	3/22/2007	3/22/2007	3/22/2007	3/22/2007	3/22/2007	3/22/2007	3/22/2007	3/22/2007	3/22/2007	3/22/2007
<i>Residential Direct Exposure Criteria</i>														
YOCs 8260	ng/Kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
SVOCs 8270	ng/Kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Anthracene	1,000,000 ng/Kg	680	ND<410											
Benz(a)anthracene	1,000 ng/Kg	3100	ND<410	630	1200	910	ND<410							
Benz(a)pyrene	1,000 ng/Kg	850	550	640	1100	1000	ND<410							
Benzofluoranthene	1,000 ng/Kg	1000	580	680	950	900	ND<410							
Benzofluoroperylene	ng/Kg	ND<410	ND<410	ND<410	640	560	ND<410							
Benzofluoranthene	8,400 ng/Kg	440	ND<410	ND<410	720	540	ND<410							
Benzyl butyl phthalate	1,000,000 ng/Kg	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	5100	ND<410	
Bis(2-ethylhexyl)phthalate	44,000 ng/Kg	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	58000	ND<410	
Chrysene	ng/Kg	970	430	660	1200	820	ND<410							
Dibenz(a,h)anthracene	ng/Kg	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	
Fluoranthene	1,000,000 ng/Kg	2400	760	1400	2200	1400	860	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	
Indeno(1,2,3-cd)pyrene	ng/Kg	ND<410	ND<410	ND<410	550	470	ND<410							
Phenanthrene	1,000,000 ng/Kg	2600	500	1000	1400	1300	720	ND<410	ND<410	ND<410	ND<410	ND<410	ND<410	
Pyrene	1,000,000 ng/Kg	2000	820	1400	2600	2300	810	430	ND<410	ND<410	ND<410	ND<410	510	
Pesticides 8081	ng/Kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Herbicides 8151	ng/Kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Pesticide 8141	ng/Kg	ND<80	ND<80	ND<80	ND<80	ND<80	ND<80	ND<80	ND<80	ND<80	ND<80	ND<80	ND<80	
PCBs	1,000 ng/Kg	ND<250	ND<240	ND<240	ND<240	ND<250	ND<230	ND<240	ND<240	ND<240	ND<240	ND<240	ND<250	
ETPH	500 ng/Kg	ND<10	ND<10	ND<10	ND<10	140	ND<10							
Antimony	27 mg/Kg	ND<0.4	1.35	ND<0.38	ND<0.41	ND<0.39	1.08	1.36	ND<0.42	ND<0.37	1.03	1.1	1.08	
Arsenic	10 mg/Kg	ND<0.79	ND<0.84	ND<0.76	ND<0.81	1.17	ND<0.84	ND<0.81	ND<0.84	ND<0.73	ND<0.85	ND<0.75	1.07	
Asbestos	%	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Beryllium	2 mg/Kg	ND<0.32	ND<0.33	ND<0.31	ND<0.33	ND<0.31	ND<0.34	ND<0.32	ND<0.33	ND<0.29	ND<0.34	ND<0.3	ND<0.32	
Cadmium	34 mg/Kg	ND<0.4	ND<0.42	ND<0.38	ND<0.41	ND<0.39	ND<0.42	ND<0.41	ND<0.42	ND<0.37	ND<0.42	ND<0.38	ND<0.41	
Total Chromium	mg/Kg	14.6	22	24.9	36.7	39.7	20.8	19.7	20.1	13.7	15.1	15.9	29.7	
Trivalent Chromium	3,900 mg/Kg	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	
Hexavalent Chromium	100 mg/Kg	ND<0.57	ND<0.54	ND<0.53	ND<0.54	ND<0.56	ND<0.53	ND<0.55	ND<0.54	ND<0.55	ND<0.54	ND<0.55	ND<0.56	
Copper	2,500 mg/Kg	31.3	54.6	34.6	86.6	115	39.2	38	35.3	19.4	16.9	17.7	102	
Total Cyanide	1,400 mg/Kg	ND<0.64	ND<0.61	ND<0.60	ND<0.61	ND<0.63	ND<0.60	ND<0.62	ND<0.61	ND<0.62	ND<0.60	ND<0.62	ND<0.63	
Lead	500 mg/Kg	5.6	7.64	12.2	13.2	15.4	5.51	5.65	5.29	4.33	4.33	4.75	12	
Mercury	20 mg/Kg	ND<0.10	ND<0.10	ND<0.10	ND<0.10	ND<0.10	ND<0.10	ND<0.10	ND<0.10	ND<0.10	ND<0.10	ND<0.10	ND<0.10	
Nickel	1,400 mg/Kg	4.66	6.99	6.53	10.4	6.29	6.1	4.95	4.74	4.98	5	11.5		
Selenium	340 mg/Kg	ND<1.98	ND<2.09	ND<1.91	ND<2.03	ND<1.95	ND<2.1	ND<2.03	ND<2.09	ND<1.84	ND<2.12	ND<1.88	ND<2.03	
Silver	340 mg/Kg	ND<0.4	ND<0.42	ND<0.38	ND<0.41	ND<0.39	ND<0.42	ND<0.42	ND<0.42	ND<0.37	ND<0.42	ND<0.38	ND<0.41	
Thallium	5 mg/Kg	ND<3.96	ND<4.18	ND<3.82	ND<4.07	ND<3.91	ND<4.19	ND<4.06	ND<4.18	ND<3.67	ND<4.24	ND<3.76	ND<4.06	
Vanadium	470 mg/Kg	4.33	6.11	5.45	7.68	8.25	4.78	5.75	4.59	3.93	4.34	4.04	7.27	
Zinc	20,000 mg/Kg	36.5	52.6	57.4	97.3	51.1	37.2	53.6	40.9	31.6	37.2	36.1	90.5	
Percent Solid	%	78	82	84	82	79	84	81	82	81	83	81	79	
Total Organic Carbon	mg/Kg	200	400	800	1700	2700	400	600	400	300	ND<100	ND<100	600	
Salinity	ppt	1.6	1.4	1.5	1.8	1.8	1.6	1.4	1.8	1.6	2	1.5	1.2	

Notes:
ND = not detected above analytical detection limit
BDL = Below Detection Limit

TABLE 1
Sediment Analytical Data
Housatonic River
Sediment Sampling
March 2007

Parameter	GA Area Groundwater Protection Criteria	Sample Location Depth (feet)	HR-M	HR-N	HR-O	HR-P	HR-Q	HR-R	HR-S	HR-T	HR-U	HR-V	HR-V	HR-W
		HR&O Sample ID Date												
<i>C.A. Groundwater Protection Criteria</i>														
SPLP VOC 8270	mg/L		ND											
Phenanthrene	200 mg/L		ND											
SPLP Pesticide 8081	mg/L		ND											
SPLP Herbicide 8151	mg/L		ND											
SPLP Pesticide 8141	mg/L		ND											
SPLP PCBs	0.5 mg/L		ND											
SPLP ETPH	0.500 mg/L		ND											
SPLP Antimony	0.006 mg/L		ND											
SPLP Arsenic	0.050 mg/L		ND											
SPLP Barium	1,000 mg/L		ND											
SPLP Beryllium	0.004 mg/L		ND											
SPLP Cadmium	0.005 mg/L		ND											
SPLP Chromium	0.050 mg/L		ND											
SPLP Copper	1.500 mg/L		ND											
SPLP Cyanide	0.200 mg/L		ND											
SPLP Lead	0.075 mg/L		ND											
SPLP Mercury	0.002 mg/L		ND											
SPLP Nickel	0.100 mg/L		ND											
SPLP Selenium	0.050 mg/L		ND											
SPLP Silver	0.036 mg/L		ND											
SPLP Thallium	0.005 mg/L		ND											
SPLP Vanadium	0.050 mg/L		ND											
SPLP Zinc	5,000 mg/L		ND											

Notes:
ND = not detected above analytical detection limit
BDL = Below Detection Limit

TABLE 1
Sediment Analytical Data
Housatonic River
Sediment Sampling
March 2007

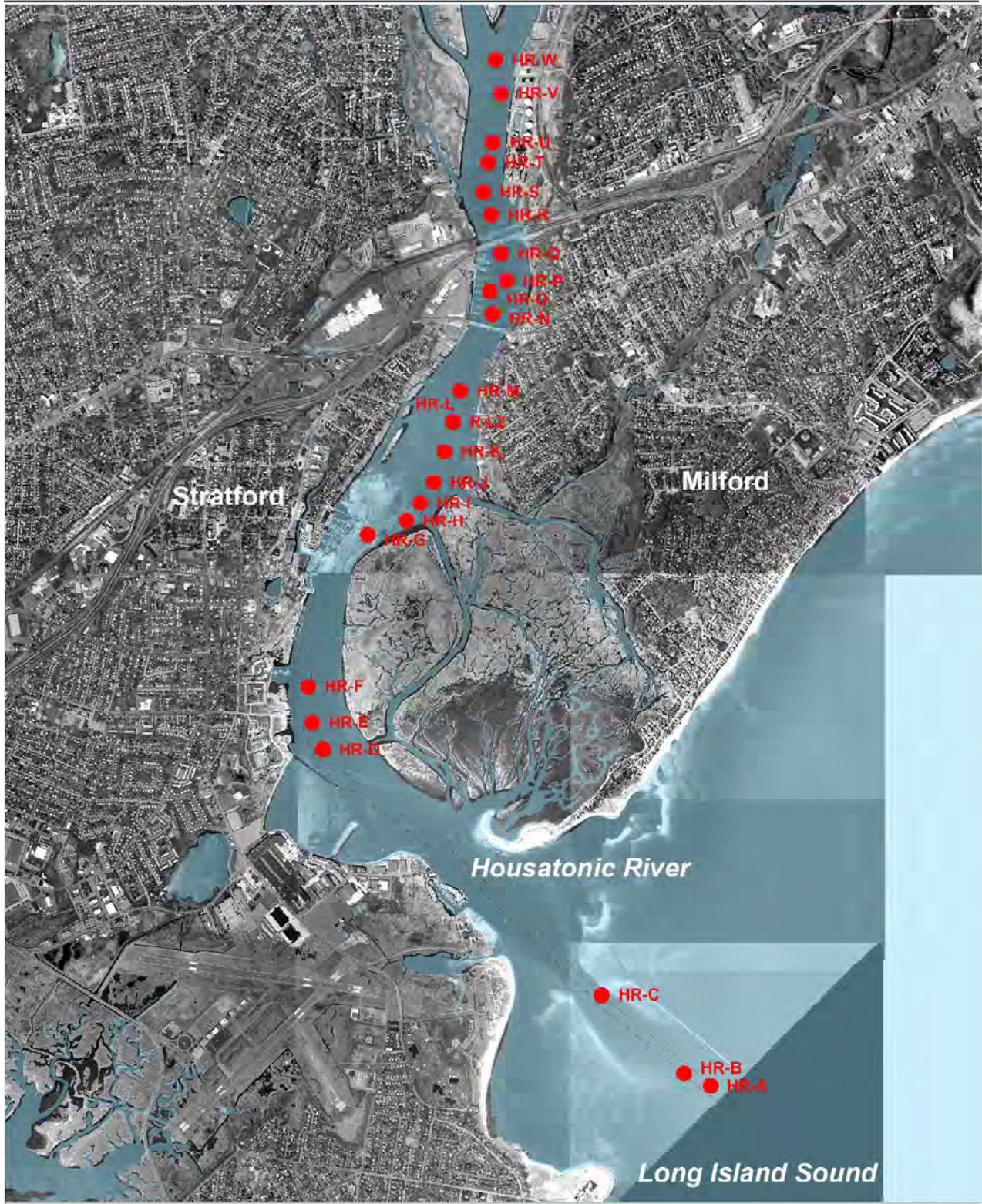
Parameter	GA Area Groundwater Protection Criteria	Sample Location	HR-A	HR-B	HR-C	HR-D	HR-E	HR-F	HR-G	HR-H	HR-I	HR-J	HR-K	HR-K	HR-L
		Depth (feet)	0-2.4	0-2.2	0-2	0-3.5	0-3	0-3.4	0-3.6	0-5.2	0-4.3	0-3.7	0-4.2	0-4.2	0-6.2
		F&O Sample ID	867070321-04	867070321-05	867070321-01	867070321-02	867070321-03	867070321-06	867070321-07	867070321-08	867070321-09	867070321-10	867070322-12	867070322-13	867070322-14
		Date	3/21/2007	3/21/2007	3/21/2007	3/21/2007	3/21/2007	3/21/2007	3/21/2007	3/21/2007	3/21/2007	3/21/2007	3/22/2007	3/22/2007	3/22/2007
<i>GA Groundwater Protection Criteria</i>															
SPLP SVOCs 8270			ND	ND	ND	ND		ND	ND	ND	ND		ND	ND	ND
Phenanthrene	200 ug/L		ND<0.2	ND<0.2	ND<0.2	ND<0.2	0.24	ND<0.2	ND<0.2	ND<0.2	ND<0.2	0.38	ND<0.2	ND<0.2	ND<0.2
SPLP Pesticides 8081			ND												
SPLP Herbicides 8151			ND												
SPLP Pesticide 8141			ND<10												
SPLP PCBs	0.5 ug/L		ND<0.5	ND<0.50	ND<0.50										
SPLP ETPH	0.500 ug/L		ND<0.25												
SPLP Antimony	0.006 ug/L		ND<0.005	0.006	ND<0.005										
SPLP Arsenic	0.050 ug/L		ND<0.01												
SPLP Barium	1.000 ug/L		ND<0.01	ND<0.01	ND<0.01	0.014	ND<0.01	0.01	ND<0.01	ND<0.01	0.011	0.011	0.012	0.012	0.013
SPLP Beryllium	0.004 ug/L		ND<0.001												
SPLP Cadmium	0.005 ug/L		ND<0.002	ND<0.002	ND<0.002	ND<0.002	ND<0.002	BL	ND<0.002						
SPLP Chromium	0.050 ug/L		ND<0.01												
SPLP Copper	1.300 ug/L		ND<0.01	ND<0.01	ND<0.01	0.013	0.033	0.01	0.011	ND<0.01	0.018	0.079	0.052	0.029	0.02
SPLP Cyanide	0.200 ug/L		ND<0.01												
SPLP Lead	0.015 ug/L		ND<0.007												
SPLP Mercury	0.002 ug/L		ND<0.001												
SPLP Nickel	0.100 ug/L		ND<0.01												
SPLP Selenium	0.050 ug/L		ND<0.05												
SPLP Silver	0.036 ug/L		ND<0.01												
SPLP Thallium	0.005 ug/L		ND<0.005												
SPLP Vanadium	0.050 ug/L		ND<0.01	ND<0.01	ND<0.01	ND<0.01	ND<0.01	ND<0.01	0.014	ND<0.01	ND<0.01	0.013	ND<0.01	ND<0.01	ND<0.01
SPLP Zinc	5.000 ug/L		0.01	ND<0.01	ND<0.01	0.012	0.012	ND<0.01	0.014	ND<0.01	0.022	0.154	0.113	0.025	0.017

Notes:
ND = not detected above analytical detection limit
BDL = Below Detection Limit



SAMPLE LOCATION MAP

Housatonic River Sampling





SAMPLE LOCATION COORDINATES

Table 1: Proposed Housatonic River Core Locations
Coordinates in Connecticut State Plane, NAD83, Horizontal Units in Feet.

Target Name	Easting/X	Northing/Y
HR-A	905100	619000
HR-B	904675	619320
HR-C	903075	620875
HR-D	897600	625575
HR-E	897400	626150
HR-F	897375	626900
HR-G	898500	629875
HR-H	899200	630145
HR-I	899550	630475
HR-J	899780	630900
HR-K	899950	631500
HR-L	900120	632050
HR-M	900310	632650
HR-N	900900	634160
HR-O	900860	634600
HR-P	901160	634800
HR-Q	901110	635275
HR-R	900870	636089
HR-S	900660	636520
HR-T	900820	637090
HR-U	900900	637505
HR-V	901050	638490
HR-W	901010	639090

**Table 2: Actual Housatonic River Core Locations
Coordinates in Connecticut State Plane, NAD83, Horizontal Units in Feet.**

Target Name	Easting/X	Northing/Y	Time	Date	Depth, Penetration, Recovery, Notes
core HR-C	903041.38	620825.77	9:24:49	3/21/2007	depth:20' pen:2' recovery:1.5'
core HR-D	897589.96	625618.81	10:30:24	3/21/2007	depth:14' pen:8' recovery:0' empty barrel, oyster shell in head
core HR-D2	897594.45	625620.05	10:36:40	3/21/2007	depth:14' pen:6' recovery:3'
core HR-D3	897595.16	625621.84	10:55:54	3/21/2007	depth:15' pen:6' recovery:3'
core HR-E	897400.81	626156.80	11:14:55	3/21/2007	depth:19' pen:5' recovery:0' empty barrel
core HR-E2	897390.01	626152.81	11:21:39	3/21/2007	depth:19' pen:5' recovery:2'
core HR-E3	897385.70	626149.03	11:40:55	3/21/2007	depth:19' pen:6' recovery:4'
core HR-F	897321.18	626867.26	12:54:20	3/21/2007	depth:22' pen:5' recovery:1.5'
core HR-F2	897322.63	626867.71	13:06:39	3/21/2007	depth:23' pen:8' recovery:2.5'
core HR-F3	897310.97	626862.56	13:18:43	3/21/2007	depth:24' pen:7' recovery:3.5'
core HR-B	904655.63	619284.79	14:04:31	3/21/2007	depth:21' pen:5' recovery:2'
core HR-A	905164.86	619043.34	14:27:52	3/21/2007	depth:19' pen:5' recovery:3'
core HR-G	898470.03	629827.10	15:16:35	3/21/2007	depth:22' pen:5' recovery:3'
core HR-H	899230.32	630098.36	16:04:32	3/21/2007	depth:17' pen:5' recovery:2'
core HR-H2	899229.12	630102.94	16:20:18	3/21/2007	depth:15' pen:5' recovery:2'
Core HR-H3	899225.11	630105.28	16:32:46	3/21/2007	depth:15' pen:6' recovery:5'
core HR-I	899495.01	630452.98	16:53:05	3/21/2007	depth:14' pen:6' recovery:4'
core HR-J	899757.00	630866.65	17:08:36	3/21/2007	depth:16' pen:5' recovery:4'
core HR-K	899973.60	631470.75	7:52:47	3/22/2007	depth:13' pen:5' recovery:3'
core HR-K2	899971.22	631467.92	8:08:34	3/22/2007	depth:13' pen:6' recovery:4.5'
core HR-L	900145.56	632059.97	8:31:38	3/22/2007	depth:13' pen:5' recovery:2.5'
coreHR-L2	900138.68	632058.65	8:48:43	3/22/2007	depth:13' pen:8' recovery:6'
core HR-M	900295.49	632641.83	9:15:41	3/22/2007	depth:14' pen:5' recovery:0' no good
core HR-M2	900279.49	632656.53	9:31:18	3/22/2007	depth:14' pen:5' recovery:3.5'
core HR-N	900900.39	634165.24	10:11:05	3/22/2007	depth:13' pen:7' recovery:0' lost liner
core HR-N2	900911.92	634159.14	10:21:21	3/22/2007	depth:14' pen:5' recovery:3'
core HR-O	900862.58	634595.60	10:46:31	3/22/2007	depth:15' pen:6' recovery:4'
core HR-P	901178.04	634801.05	11:07:39	3/22/2007	depth:12' pen:8' recovery:6'
core HR-Q	901084.05	635338.61	12:19:47	3/22/2007	depth:19' pen:6' recovery:4' Location moved because of underground cable.
core HR-R	900884.62	636103.85	12:42:59	3/22/2007	depth:19' pen:6' recovery:4'
core HR-S	900721.25	636543.87	13:03:59	3/22/2007	depth:16' pen:7' recovery:5'
core HR-T	900819.08	637109.10	13:25:46	3/22/2007	depth:16' pen:6' recovery:3'
core HR-T2	900828.42	637118.27	13:38:42	3/22/2007	depth:17' pen:6.5' recovery:4'
core HR-U	900914.35	637517.46	14:06:41	3/22/2007	depth:21' pen:7' recovery:0' lost liner
core HR-U2	900913.95	637522.25	14:31:19	3/22/2007	depth:21' pen:5' recovery:3'
core HR-V	901082.41	638479.28	15:11:16	3/22/2007	depth:19' pen:7' recovery:5'
core HR-W	900968.13	639125.76	15:32:07	3/22/2007	depth:9' pen:8' recovery:6'

Attachments for this appendix were omitted for brevity and are available upon request.