Town of Oyster Bay
Mill Neck Marina
Environmental Investigation Report

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Submitted to:

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1.0 Introduction

The former Mill Neck Marina property is located on the north side of Hernan Avenue, at its easterly terminus at Oak Neck Creek (a tributary of Mill Neck Creek), in the Locust Valley community in the Town of Oyster Bay (see Figure 1). The subject property covers a total of approximately 1.4 acres of land, which is presently vacant, and comprises a total of 23 individual tax lots (Figure 2) on the Nassau County Land and Tax Map. The attached aerial photograph and lot map indicate the area of interest for this investigation.

The Town is considering acquisition of the former marina site for future use as a passive park, perhaps with some active wetlands restoration to enhance its habitat values. The Town has conducted this environmental investigation as part of pre-acquisition due-diligence for the following related reasons:

1. to determine if the acquired site contains contamination of environmental or human health concern; and

2. to determine the extent of remediation that may be necessary to achieve the Town's stated plans.

2.0 Background

In 2002, Cashin Associates, PC (CA), conducted a Phase I Environmental Review for many of the parcels that comprise the site. Review of the historical data for the past 50 years revealed that the subject property had been occupied by a marina at least as far back as the 1950s. The marina reportedly contained boat storage and maintenance areas, and gasoline storage and dispensing facilities. Marina activities on the site continued until abandoned in 2001. Subsequent to abandonment, the building and stored boats on the site were removed, and the site is now vacant.

During a Phase I investigation, site history was determined based on review of historical aerial photographs; interviews with Mr. Harvey Weisman, owner of most of the subject property; and review of information in the files of the Town of Oyster Bay Building Division. The Phase I suggested that the previous site use relating to boat maintenance and storage may have had impacts on the site. However, no pertinent data or documents were uncovered that could bear on this question. Limited sampling data provided by the owner suggested that some impacts might be discovered on the site, but the documentation associated with the sampling data was not rigorous enough to allow for quantitative use of the information.

Based on the review of historical photographs, the subject property appears to have been developed sometime before 1953 with a large commercial building and was used for the outdoor storage of boats. The property was expanded sometime between 1953 and 1966, and further modified between 1966 and 1976 with the excavation of an inlet area along Oak Neck Creek. Following consultation with the Nassau County Department of Health (NCDH), the locations of some specific structures often related to contaminant presence were sought for. Information sought from NCDH related to the septic system (described by the site owner as having been removed under NCDH supervision in 2001-2002 in association with building demolition) and UST (reportedly removed in the 1970s). The Nassau County Fire Marshall's Office was contacted, and records there were searched in an effort to find the location of the former gasoline islands. No relevant information was uncovered in NCDH files.

The purpose of this environmental investigation is to determine the presence, if any, of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and metals in soil and groundwater at selected locations at the site. A sampling plan was prepared and presented to the NCDH for approval on March 24, 2004. Soil and groundwater sampling was conducted on May 3rd and 4th, 2004 by CA environmental personnel.

In an effort to select the sampling locations, an approximate 100' x 100' grid was laid down over the general area of interest on the aerial map. A total of 16 locations were identified to be sampled. Thirty soil samples and five groundwater

3.0 Sampling Methodology

3.1 Soil Sampling

Soil samples were collected from the following grid components: A2, A4, B2, B5, C2, C4, C5, D2, D3, and D4 to generally characterize the site and identify trends or indicators of contaminant advection, if any. Samples were collected in the center of each grid, unless otherwise specified by NCDH.

In addition to the above sampling locations, six sampling points were collected in specific areas of interest. Two points were selected approximately 120 feet from the centerline of Hernan Avenue, one being at the approximate grid point defined by A4 and A5, and the other approximately opposite the driveway of the last house on the south side of Hernan Avenue as being potential sites for the septic system. The sampling point located along the central western side of grid C4 (SS-BL and SB-BL) was estimated to be in the vicinity of the former boat lift area. This location was based on the review of the Town's Building Division file. Three sampling points along the central eastern portions of grids A2, B2, and C2 were sampled to focus on the potential boat painting area.

Each of the sixteen sampling points had two soil samples collected. The soil samples consisted of a surface sample and a soil boring. Surface samples were collected from the top three inches of soil using a hand auger (see Figure 3). Soil borings were drilled to the water table using a drill-rig and were collected one foot above the water table (see Figure 7). In areas where drill-rig access was difficult, a hand auger was used. All of the soil borings were two inches in diameter.

During the sampling round, visible contamination (soil discoloration) was evident in the northwest portion of grid B2. Upon consultation with NCDH, a sample of the soil (soil sample SS-B2NW) was collected and included in the samples to be analyzed for metals.

The soil samples were collected by CA environmental personnel in the company of Joseph DeFranco (NCDH). Soil borings were performed by Fenley and Nicol Environmental, Inc. All samples were preserved on ice and were analyzed by a New York State certified laboratory (H2M Labs, Inc., Melville, NY) for VOC, SVOC, and metal analysis, with the exception of SS-B2-NW which was analyzed for metals only as recommended by the NCDH representative.

All soil samples were inspected for visible contamination and screened with a photo-ionization detector (PID) in an effort to generate additional information regarding the presence of volatile organic vapors in the soil. PID detections were observed in all soil samples, ranging from 1.1 parts per million (ppm) in grid A4 (SS-A4) to a detection of 9.6 ppm in grid A2 (SS-A2W). At the discretion of the NCDH representative, two samples were split with the County (SS-B2W and SB-SPTC-W).

3.2 Groundwater Sampling

Groundwater samples were collected from five locations (during low tide in the adjacent tidal creek) from the water table using a dedicated disposable Teflon bailer. Because groundwater was relatively shallow (approximately 2-4 ft below land surface), the need to install a temporary PVC well screen was unnecessary.

Groundwater samples were taken from the central grid points in grids B2 and D2, which were presumed to represent upgradient (ambient) water. An additional groundwater sample was collected from the approximate location of the septic system in grid A5. This location was based on previous interviews with the site owner. Based on the review of historical photographs, the location of the former building in grid A5 and the approximate location of previous boat lifting activities in grid C4 were also sampled for groundwater analysis. Figure 11 shows the locations of the groundwater samples.

Groundwater samples were collected by CA environmental personnel in the company of the NCDH representative. Groundwater samples GW-D2 and GW-B2 were split with the NCDH representative. All samples were preserved on ice and were analyzed by a New York State certified laboratory (H2M Labs, Inc., Melville, NY) for VOC, SVOC and metal analysis.

4.0 Results

All samples, with the exception of SS-B2NW, were analyzed for VOCs, SVOCs, and metals. Analytical results were compared to "recent clean-up objectives" as reported in the 1993 NYSDEC TAGM soil clean-ups, and NYSDEC GA standards for groundwater as listed in the 1998 TOGS 1.1.1. Where no for "site background" was listed as the clean-up objective, soil detections were compared to Eastern US Background concentrations, also listed in the TAGM. Metals were detected in all soil and groundwater samples at detections above standards. SVOCs were detected in several surface and subsurface soil samples, with some detections exceeding standards. One VOC, acetone, was detected in several soil and groundwater samples, but at detections below the standard value. A complete list of detected and non-detected analytes for both soil and groundwater is included in the attached laboratory data set.

Metals were detected in all surface and subsurface soil samples. Eleven metals were reported at detections above recommended clean-up values or Eastern US Background concentrations listed in the TAGM in surface samples. These metals include the following: arsenic, barium, cadmium, chromium, copper, iron, lead, magnesium, mercury, nickel, and zinc. Thirteen metals were found in subsurface soil samples at levels that exceed recommended clean-up values or Eastern US Background concentrations listed in the TAGM, which include arsenic, barium, cadmium, calcium, chromium, copper, iron, lead, magnesium, mercury, nickel, selenium, and zinc. CA will hereafter refer to such levels as "elevated". Elevated levels of copper, lead and mercury are shown in Figures 4, 5, and 6, respectively for surface soil samples, and Figures 8, 9, and 10 for subsurface soil samples.

Elevated levels of copper, mercury, arsenic, zinc and lead were found at multiple soil sample locations. Copper is a primary active component found in most antifouling boat bottom paints, and is the metal most often associated with contaminated marina sediments (Fields, 2003). Elevated levels of mercury may be related to previous marina activities involving boat paint. Mercury is known to have been used as an anti-fouling agent in boat paints to reduce organism growth on the bottom of boats. Boat paint is known to also contain other metals such as copper, mercury, arsenic, or tributytin (TBT). Mercury also serves as the contact for float switches in bilge pumps, shower water storage tanks, and thermostats. One float switch can contain as much mercury as 100 fluorescent lamps (Fields, 2003). Arsenic is found in paint pigments as wells as in wood preservatives. Arsenic, chromium and copper leach from docks, pilings and other structures constructed of wood treated with chromated copper arsenate (Fields, 2003). Zinc anodes are used to deter corrosion of metal hulls and other metal boat parts that are exposed to seawater (USEPA).

Four SVOCs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and benzo(k)fluoranthene) were reported at levels above recommended TAGM clean-up concentrations in surface samples SS-B2, SS-D2, SS-D3, and SS-SPTC-E.

Five SVOCs (chrysene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, and benzo(a)pyrene) were detected above recommended TAGM clean-up concentrations in subsurface samples SB-SB-D2, SB-SPTC-E, and SB-SPTC-W. One VOC, acetone, was detected in three soil samples (SS-C4, SB-C4, and SB-A5), but at concentrations below the recommended clean-up value. Tables 1 and 2 show the metals results and organic compound detections for the surface soil and subsurface soil samples, respectively.

Laboratory analysis of groundwater samples reported detections of fifteen metals that exceed NYSDEC GA standards or guidance values. These metals include arsenic, barium, beryllium, cadmium, chromium, copper, iron, lead, magnesium, manganese, mercury, nickel, selenium, sodium, and zinc. All groundwater samples were reported to have multiple detections of metals that exceeded standard values. No SVOCs were reported in the groundwater samples. Groundwater samples GW-SPTC-E and GW-A5 had concentrations of acetone below the GA standard value. Acetone was the only VOC detected in groundwater. Groundwater samples were collected directly from soil borings and were unfiltered, so that the reported concentrations found almost certainly include metals associated with particulates as well as the truly dissolved faction. Table 3 shows the metals results and any detected organic compounds for the groundwater samples.

5.0 Summary and Recommendations

Summary

- Both surface and subsurface soils at the site were found to have elevated levels of metals, including copper, mercury, arsenic, zinc and lead. The metals are known to be associated with marine paints and other marina related materials. The metals were found at levels that exceed New York State cleanup standards and/or guidelines. Several of the metals are regarded as significant environmental and health hazards.
- There was no clear pattern of metal contamination at the site; instead, elevated levels of different metals were found at different sample locations. In other words, the data analysis was not able to delineate any "hot spots".
- The soils were also found to have contamination by Semi-volatile Organic Compounds (SVOCs), at levels that exceeded cleanup standards and/or guidelines.
- Groundwater at the site was found to be contaminated by elevated levels of metals.
- It appears that the prior marina related use of the property has resulted in on-site contamination of soils and groundwater.

Recommendations and Conclusions

- The data presented in this report should be submitted to Nassau County Department of Health for agency review and comment.
- Additional sampling could be needed to further define the extent of contamination by metals and SVOCs at the site, and to define the scope of needed remedial activities.
- Extensive remediation of on-site soils, including removal and disposal of the most contaminated soils, may be required following review and evaluation of the attached data by the Nassau County Department of Health.

6.0 References

Fields, S., The Environmental Pain of Pleasure Boating. April 2003. Environmental Health Perspectives, Volume 11, No. 4

USEPA (n.d.) National Managament Measures Guidance to Control Nonpoint Source Pollution from Marinas and Recreational Boating. Retrieved June 21, 2004 from http://www.epa.gov/owow/nps/mmsp/Section-2.pdf.

Table 1. Surface Soil Detections

Metals mg/kg	Cleanup obj.	East. USA	SS-A2	SS-A2-W	SS-A4	SS-A5	SS-B2	SS-B2W	SS-B2 NW	SS-B5	SS-C2	SS-C2W
Percent moisture			9.3	15.7	12.5	21.2	29.6	33.7	27.1	17.4	49.2	30.5
Aluminum	SB	33000	4990	9470	5450	5310	7270	5020	3070	5020	3420	6130
Barium	300	15-600	22.3	62.1	82.9	286	**2140**	65.7	66.5	< 24.2	115	174
Beryllium	0.16	0-1.75	< 0.55	< 0.59	< 0.57	< 0.64	< 0.71	< 0.75	< 0.69	< 0.60	< 0.98	< 0.72
Cadmium	1	0.1-1	< 0.55	0.82	0.87	**11.3**	**2.17**	**1.16**	**1.27**	0.72	**1.15**	**2.13**
Calcium	SB	130-35000	273	1750	1270	1760	5750	1420	1740	4610	11600	3130
Chromium	10	1.5-40	9.33	**19.8**	9.15	**31.8**	**28**	6.47	**10.8**	9.25	8.73	**13.3**
Cobalt	30	2.5-60	< 5.51	7.69	< 5.71	< 6.35	< 7.10	< 7.54	< 6.85	< 6.05	< 9.84	< 7.19
Copper	25	1-50	16.5	18.4	**150**	**825**	**967**	**160**	**14900**	**1110**	**1330**	**566**
Iron	2000	2000-550000	**11100**	**16500**	**8860**	**13200**	**12900**	**5740**	**6030**	**8960**	**16700**	**12800**
Magnesium	SB	100-5000	808	**30070**	1180	1600	1990	736	724	3390	2070	1110
Manganese	SB	50-5000	149	327	127	165	278	123	73.5	89.3	350	97.2
Nickel	13	0.5-25	8.28	**14.8**	6.76	9.37	**17.6**	6.84	7.81	9.08	9.73	**16**
Potassium	SB	8500-43000	451	1990	423	682	640	247	231	508	301	388
Sodium	SB	6000-8000	24.7	78.2	98.1	527	142	103	77.7	75.7	110	104
Vanadium	150	1-300	15.2	25	12	11	22.5	8.69	9.87	11.5	< 9.84	22.7
Zinc	20	9-50	**26.8**	**54.9**	**131**	**726**	**1260**	**197**	**454**	**192**	**305**	**524**
Antimony	SB		< 6.62	< 7.12	< 6.86	10.4	< 8.52	< 9.05	< 8.23	< 7.26	< 11.8	14.6
Arsenic	7.5	3-12	4.6	3.7	**9.38**	**20.4**	**14.6**	4.4	4.08	3.18	7.5	**10.1**
Lead	SB	200-500	12.9	25.9	110	**3710**	**576**	84.2	354	33.2	85.7	**554**
Selenium	2	0.1-3.9	< 0.55	< 0.59	< 0.57	< 0.64	1.1	< 0.75	< 0.69	< 0.60	< 0.98	0.79
Silver	SB		< 1.10	< 1.19	< 1.14	< 1.27	< 1.42	< 1.51	< 1.37	< 1.21	< 1.97	< 1.44
Thallium	SB		< 1.10	< 1.19	< 1.14	< 1.27	< 1.42	< 1.51	< 1.37	< 1.21	< 1.97	< 1.44
Mercury	0.1	0.001-0.2	< 0.11	< 0.12	**45.3**	**183**	**4.71**	**0.53**	**9.05**	< 0.12	**0.49**	**1.44**
SVOCs ug/kg									N/A	-	-	-
Acenaphthene	50000	-	-	-	-	-	-	-	N/A	-	-	-
Acenapthylene	41000	-	-	-	-	-	-	-	N/A	-	-	-
Anthracene	50000	-	-	-	-	-	-	-	N/A	-	-	-
Benzo(a)anthracene	224	-	-	-	-	-	**980**	-	N/A	-	-	-
Benzo(a)pyrene	61	-	-	-	-	-	**1100**	-	N/A	-	-	-
Benzo(b)fluoranthene	1100	-	-	-	-	-	1100	-	N/A	-	-	-
Benzo(g,h,i)perylene	50000	-	-	-	-	-		-	N/A	-	-	-
Benzo(k)fluoranthene	1100	-	-	-	-	-	1100	-	N/A	-	-	-
Bis(2-ethylhexyl)phthalate	50000	-	-	-	-	-	720	-	N/A	-	680	-
Carbozole		-	-	-	-	-	-	-	N/A	-	-	-
Chrysene	400	-	-	-	-	-	**1000**	-	N/A	-	-	-
1,4-Dichlorobenzene	8500	-	-	-	-	-	-	-	N/A	-	-	-
1,2-Dichlorobenzene	7900	-	-	-	-	-	-	-	N/A	-	-	-
Diethylphthalate	7100	-	-	-	-	-	-	-	N/A	-	-	-
Dimethylphthalate	7100	-	-	-	-	-	-	-	N/A	**9400**	-	-
Di-n-butylphthalate	8100	-	-	-	-	-	-	510	N/A	**18000**	-	-
Fluoranthene	50000	-	-	430	-	-	1800	700	N/A	-	-	-
Indeno(1,2,3-cd)pyrene	3200	-	-	-	-	-	-	-	N/A	-	-	-
2-Methylnaphthalene	36400	-	-	-	-	-	-	-	N/A	-	-	-
Phenanthrene	50000	-	-	-	-	-	820	-	N/A	-	-	-
Pyrene	50000	-	-	-	-	-	1600	680	N/A	-	-	-
Acetone		-	-	-	-	-	-	-	N/A	-	-	-

Metals mg/kg	Cleanup obj.	East. USA	SS-C4	SS-C5	SS-D2	SS-D3	SS-SPTC-W	SS-SPTC-E	SS-BL
Percent moisture			16.1	16	44.9	15.7	30	15.5	18.1
Aluminum	SB	33000	9700	9600	4300	5320	3600	4700	5420
Barium	300	15-600	54.4	57.2	45.2	26.4	55.7	43.3	29
Beryllium	0.16	0-1.75	< 0.60	< 0.60	< 0.91	< 0.59	< 0.71	< 0.59	<0.61
Cadmium	1	0.1-1	0.67	0.73	<0.91	0.61	**5.75**	**2.15**	<0.61
Calcium	SB	130-35000	1160	1460	4390	2520	3640	3890	4810
Chromium	10	1.5-40	**1305**	**18.5**	**11.5**	**17.2**	**17.8**	**108**	**11.3**
Cobalt	30	2.5-60	6.77	7.4	< 9.07	< 5.93	9.84	< 5.92	<6.11
Copper	25	1-50	**42.7**	**26.1**	**289**	14.1	**689**	**549**	**84.4**
Iron	2000	2000-550000	**13800**	**15600**	**7000**	**10200**	**29400**	**10200**	**8650**
Magnesium	SB	100-5000	2200	3250	1070	1510	**5610**	2540	3470
Manganese	SB	50-5000	156	306	368	126	232	182	79.1
Nickel	13	0.5-25	10.7	**14**	8.34	5.97	**32.8**	**26.2**	9.62
Potassium	SB	8500-43000	757	1520	318	432	488	525	587
Sodium	SB	6000-8000	119	310	68.2	39	91.3	98.8	86.4
Vanadium	150	1-300	20.6	23	11.5	15.4	12	12.2	14.4
Zinc	20	9-50	**49.5**	**47.3**	**150**	**41.3**	**368**	**295**	**54.8**
Antimony	SB		< 7.15	< 7.14	< 10.9	< 7.12	< 8.57	< 7.10	<7.33
Arsenic	7.5	3-12	3.82	3.81	5.02	**9.52**	4.63	**12**	2.77
Lead	SB	200-500	10.2	17.7	68.2	28.7	171	324	79
Selenium	2	0.1-3.9	< 0.60	< 0.60	< 1.91	< 0.59	< 0.71	< 0.59	<0.61
Silver	SB		< 1.18	< 1.19	< 1.81	< 1.19	< 1.43	< 1.18	<1.22
Thallium	SB		< 1.19	< 1.19	< 1.81	< 1.19	< 1.43	< 1.18	<1.22
Mercury	0.1	0.001-0.2	**0.13**	< 0.12	**0.44**	< 0.12	**1.13**	**0.41**	<0.12
SVOCs ug/kg			-	-	-	-	-	-	-
Acenaphthene	50000	-	-	-	-	-	-	-	-
Acenapthylene	41000	-	-	-	-	-	-	-	-
Anthracene	50000	-	-	-	-	-	-	-	-
Benzo(a)anthracene	224	-	-	-	**3000**	**490**	-	**710**	-
Benzo(a)pyrene	61	-	-	-	**3100**	**540**	-	**800**	-
Benzo(b)fluoranthene	1100	-	-	-	**4400**	630	580	790	-
Benzo(g,h,i)perylene	50000	-	-	-	1100	-	-	-	-
Benzo(k)fluoranthene	1100	-	-	-	**4700**	620	710	670	-
Bis(2-ethylhexyl)phthalate	50000	-	-	-	-	-	-	550	-
Carbozole		-	-	-	-	-	-	-	-
Chrysene	400	-	-	-	**3900**	**650**		**750**	-
1,4-Dichlorobenzene	8500	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	7900	-	-	-	-	-	-	-	-
Diethylphthalate	7100	-	-	-	-	-	-	-	-
Dimethylphthalate	7100	-	-	-	-	-	-	-	-
Di-n-butylphthalate	8100	-	-	-	-	-	-	-	-
Fluoranthene	50000	-	-	-	2200	1200	520	1300	-
Indeno(1,2,3-cd)pyrene	3200	-	-	-	1200	-	-	-	-
2-Methylnaphthalene	36400	-	-	-	-	-	-	-	-
Phenanthrene	50000	-	-	-	-	590	-	790	-
Pyrene	50000	-	-	-	6400	1000	540	1200	-
Acetone		-	-	-	-	-			

Note:
Bold - indicates detection above standard or guidance value

Table 2. Subsurface Soil Detections

Metals mg/kg	Cleanup obj.	East. USA	SB-A2	SB-A2-W	SB-A4	SB-A5	SB-B2	SB-B2W	SB-B5	SB-C2	SB-C2W
Percent moisture			12.7	20.9	14.4	23.1	38.6	17.3	11	26.4	41.1
Aluminum	SB	33000	6670	10300	4040	6640	9390	5680	4020	4230	9070
Barium	300	15-600	< 22.9	48.7	51.6	41.4	**763**	71.2	30.4	179	247
Beryllium	0.16	0-1.75	< 0.57	< 0.63	< 0.58	< 0.65	0.89	< 0.60	< 0.56	< 0.68	< 0.85
Cadmium	1	0.1-1	< 1.57	0.78	< 0.58	**1.04**	**5.51**	0.75	0.67	**1.01**	**2.22**
Calcium	SB	130-35000	376	2040	2170	744	9960	769	**74100**	7000	2510
Chromium	10	1.5-40	8.26	**16.3**	**13.3**	**14.2**	**31.9**	9.34	7.39	**10.5**	**12.8**
Cobalt	30	2.5-60	< 5.73	< 6.32	< 5.84	< 6.50	14.6	< 6.05	< 5.62	< 6.79	< 8.49
Copper	25	1-50	6.85	**56.6**	**115**	**58.1**	**193**	24.8	**150**	**371**	**212**
Iron	2000	2000-550000	**8130**	**13200**	**8760**	**8460**	**71700**	**9390**	**6110**	**9240**	**18900**
Magnesium	SB	100-5000	742	1900	1810	2100	576	971	**45100**	1120	942
Manganese	SB	50-5000	45.8	245	146	91.6	522	68.4	172	73.1	155
Nickel	13	0.5-25	< 4.58	11.8	6.07	8.15	**33.9**	7.44	6.7	8.69	**13.3**
Potassium	SB	8500-43000	264	785	524	1270	1010	367	526	258	406
Sodium	SB	6000-8000	46.4	59.1	84.8	827	272	72.9	174	111	181
Vanadium	150	1-300	11	23.8	9.8	13.4	33.7	11.3	10.1	12.6	29.9
Zinc	20	9-50	**24**	**96.7**	**117**	**131**	**1260**	**213**	**63.1**	**3156**	**465**
Antimony	SB		< 6.87	< 7.59	< 7.01	< 780	< 9.77	< 7.26	< 6.74	< 8.15	< 10.2
Arsenic	7.5	3-12	2.18	6	5.04	3.17	**25.7**	3.41	3.05	**8.11**	**14.1**
Lead	SB	200-500	4.67	53.4	97.2	60.8	**958**	81.5	51.6	455	253
Selenium	2	0.1-3.9	< 0.57	< 0.63	< 0.58	< 0.65	**3.66**	< 0.60	< 0.56	< 0.68	**2.3**
Silver	SB		< 1.15	< 1.26	< 1.17	< 1.30	< 1.63	< 1.21	< 1.12	< 1.36	< 1.70
Thallium	SB		< 1.15	< 1.26	< 1.17	< 1.30	< 1.63	< 1.21	< 1.12	< 1.36	< 1.70
Mercury	0.1	0.001-0.2	< 0.12	**0.25**	**4.78**	**3.65**	**0.34**	**0.13**	**0.63**	**0.59**	< 0.17
SVOCs ug/kg											
Acenaphthene	50000		-	-	-	440	-	-	-	-	-
Acenapthylene	41000		-	-	-	-	-	-	-	-	-
Anthracene	50000		-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	224		-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	61		-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	1100		-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	50000		-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	1100		-	-	-	-	-	-	-	460	-
Bis(2-ethylhexyl)phthalate	50000		-	-	-	-	-	-	-	-	-
Carbozole			-	-	-	-	-	-	-	-	-
Chrysene	400		-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	8500		-	-	-	-	-	-	-	-	670
1,2-Dichlorobenzene	7900		-	-	-	-	-	-	-	-	970
Diethylphthalate	7100		-	-	-	-	-	-	-	-	-
Dimethylphthalate	7100		-	-	-	-	-	-	-	-	-
Di-n-butylphthalate	8100		-	-	-	-	-	-	-	-	-
Fluoranthene	50000		-	-	-	1300	690	470	-	710	-
Indeno(1,2,3-cd)pyrene	3200		-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	36400		570	-	-	-	-	-	-	-	-
Phenanthrene	50000		-	-	-	-	-	-	-	-	-
Pyrene	50000		570	-	-	930	620	-	-	620	-
Acetone			67	-	-	22	-	-	-	-	-

Metals mg/kg	Cleanup obj.	East. USA	SB-C4	SB-C5	SB-D2	SB-D3	SB-SPTC-E	SPTC-W	SB-BL
Percent moisture			22	10.9	37.9	11.6	14.9	12.2	14.3
Aluminum	SB	33000	4720	8810	2940	5000	2800	5750	6380
Barium	300	15-600	< 25.6	< 22.4	128	29.4	< 23.5	34.7	36.1
Beryllium	0.16	0-1.75	< 0.64	< 0.56	< 0.80	< 0.57	< 0.59	< 0.57	<0.58
Cadmium	1	0.1-1	< 0.64	0.67	0.89	< 0.57	< 0.59	< 0.57	0.61
Calcium	SB	130-35000	580	2470	2820	761	24200	12800	1450
Chromium	10	1.5-40	6.24	**14.9**	6.7	9.06	5.41	9.3	**13.6**
Cobalt	30	2.5-60	< 6.41	6.08	< 8.05	< 5.66	< 5.88	< 5.69	<5.83
Copper	25	1-50	**26.9**	**78**	**81.3**	**55.3**	**78.8**	**67.1**	**79.6**
Iron	2000	2000-550000	**6140**	**13800**	**8000**	**7590**	**4900**	**7780**	**10700**
Magnesium	SB	100-5000	829	3250	482	1130	**13000**	**7320**	1740
Manganese	SB	50-5000	56.8	194	127	112	228	103	129
Nickel	13	0.5-25	5.41	10.6	10.3	7.18	6.82	5.9	11
Potassium	SB	8500-43000	252	647	334	397	357	395	725
Sodium	SB	6000-8000	65.2	417	244	119	80.9	119	88.5
Vanadium	150	1-300	8.35	19.8	15.2	10.8	10.4	13	15.5
Zinc	20	9-50	**34.9**	**42.7**	**141**	**71.1**	**56.6**	**60.2**	**51.9**
Antimony	SB		< 7.69	< 6.73	< 9.66	< 6.79	< 7.05	< 6.83	<7
Arsenic	7.5	3-12	2.59	3.4	**14.1**	2.97	3.44	**9.62**	3
Lead	SB	200-500	17.7	11.6	175	65.1	44.1	105	75
Selenium	2	0.1-3.9	< 0.64	< 0.56	1.39	< 0.57	< 0.59	< 0.57	<0.58
Silver	SB		< 1.28	< 1.12	< 1.61	< 1.13	< 1.18	< 1.14	<1.17
Thallium	SB		< 1.28	< 1.12	< 1.61	< 1.13	< 1.18	< 1.14	<1.17
Mercury	0.1	0.001-0.2	< 0.13	< 0.11	**3.02**	**0.28**	**0.16**	**0.24**	**2.37**
SVOCs ug/kg									
Acenaphthene	50000		-	-	-	-	-	-	
Acenapthylene	41000		-	-	-	-	-	450	
Anthracene	50000		-	-	-	-	-	1100	
Benzo(a)anthracene	224		-	-	**600**	-	**520**	**3100**	
Benzo(a)pyrene	61		-	-	**640**	-	**790**	**2600**	
Benzo(b)fluoranthene	1100		-	-	650	-	710	**2400**	
Benzo(g,h,i)perylene	50000		-	-	-	-	-	740	
Benzo(k)fluoranthene	1100		-	-	750	-	670	**3100**	
Bis(2-ethylhexyl)phthalate	50000		-	-	-	-	-	-	
Carbozole			-	-	-	-	-	410	
Chrysene	400		-	-	**620**	-	**600**	**3300**	
1,4-Dichlorobenzene	8500		-	-	-	-	-	-	
1,2-Dichlorobenzene	7900		-	-	-	-	-	-	
Diethylphthalate	7100		-	390	-	-	-	-	
Dimethylphthalate	7100		-	-	-	-	-	-	
Di-n-butylphthalate	8100		-	-	-	-	-	-	
Fluoranthene	50000		-	-	1300	-	930	7900	
Indeno(1,2,3-cd)pyrene	3200		-	-	-	-	-	910	
2-Methylnaphthalene	36400		-	-	-	-	-		
Phenanthrene	50000		-	-	1100	-	410	4600	
Pyrene	50000		-	-	1200	-	1000	5800	
Acetone			38	-	-	-	-	-	

Note:
Bold - indicates detection above standard or guidance value

Table 3. Groundwater Detections

Parameters	Units	GA Stds.	GW-SPTC-E	GW-D2	GW-A5	GW-B2	GW-C4
Aluminum	mg/L		18.5	13.3	19	12.7	8.42
Antimony	ug/L	3	< 60.0	< 60.0	< 60.0	< 60.0	< 60.0
Arsenic	ug/L	25	**26.4**	**41.3**	**122**	**36.1**	11.2
Barium	mg/L	1	**4.05**	**2.33**	0.917	**1.32**	**1.17**
Calcium	mg/L		400	193	157	111	89.5
Chromium	mg/L	0.05	0.024	0.013	**0.085**	0.031	< 0.010
Cobalt	mg/L		0.104	0.057	0.094	< 0.050	< 0.050
Copper	mg/L	0.2	**33.7**	**0.733**	**21.7**	0.071	**2.27**
Iron	mg/L	0.3	**37.8**	**31.6**	**64.2**	**30.4**	**17.3**
Lead	ug/L	25	**3310**	**1840**	**16600**	**4080**	**722**
Magnesium	mg/L	35	**95.5**	20.8	**94.6**	11.4	21.4
Manganese	mg/L	0.3	**11.1**	**4.01**	**8.46**	**3.23**	**1.41**
Nickel	mg/L	0.1	**0.369**	0.068	**0.202**	0.099	< 0.040
Potassium	mg/L		16.5	10.4	46.9	10.7	19.1
Selenium	ug/L	10	< 5.00	< 5.00	< 5.00	< 5.00	**11.4**
Sodium	mg/L	20	**43.8**	**29.8**	**550**	**49.7**	**52.2**
Thallum	ug/L	0.5	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
Vanadium	mg/L		0.107	0.125	0.124	0.156	< 0.050
Zinc	mg/L	2	**15.4**	**2.75**	**23.5**	**12.2**	0.941
Beryllium	ug/L	3	**8.27**	< 5.00	6.13	< 5.00	< 5.00
Cadmium	ug/L	5	**112**	**20.6**	**224**	**28.4**	**8.66**
Silver	mg/L	0.05	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Mercury	ug/L	0.7	**87.6**	**30.9**	**3100**	**2.44**	**9.2**
Acetone	ug/L	50	12	-	12	-	-

Note:
Bold - indicates detection above standard or guidance value

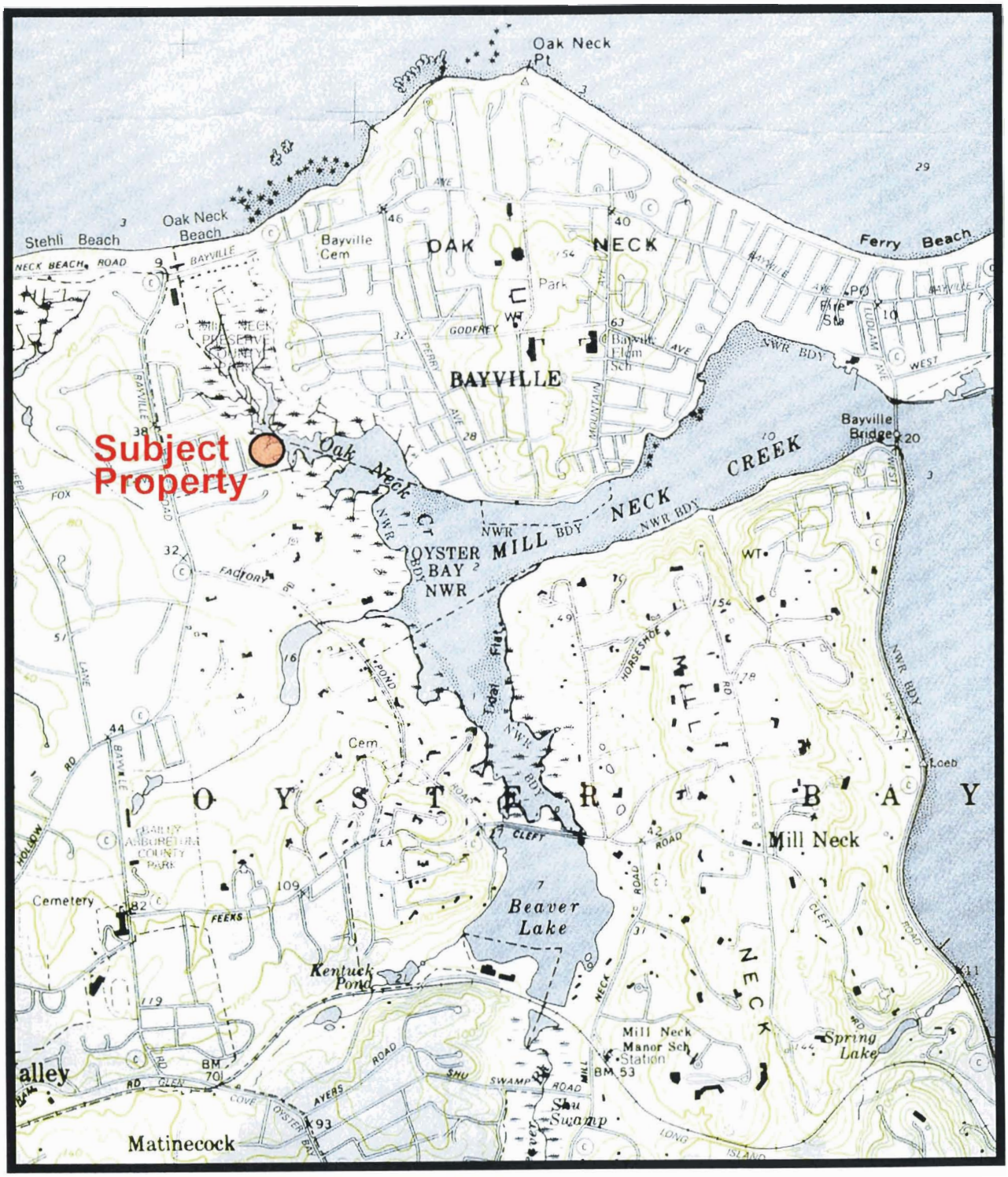

FIGURE 1

SITE LOCATION MAP

FORMER MILL NECK MARINA PROPERTY

DATE OF PHOTO: APRIL 2000

NORTH

FIGURE 2

TOWN OF OYSTER BAY
MILL NECK MARINA
LOT MAP

SCALE: 1" = 200'±

Cashin Associates, P.C.

FIGURE 3
TOWN OF OYSTER BAY
MILL NECK MARINA

SURFACE SOIL
SAMPLE LOCATIONS
JUNE 2004

FIGURE 4
TOWN OF OYSTER BAY
MILL NECK MARINA

SURFACE SOIL SAMPLES
COPPER LEVELS
JUNE 2004

FIGURE 5
TOWN OF OYSTER BAY
MILL NECK MARINA

SURFACE SOIL SAMPLES
LEAD LEVELS
JUNE 2004

FIGURE 6
TOWN OF OYSTER BAY
MILL NECK MARINA

SURFACE SOIL SAMPLES
MERCURY LEVELS
JUNE 2004

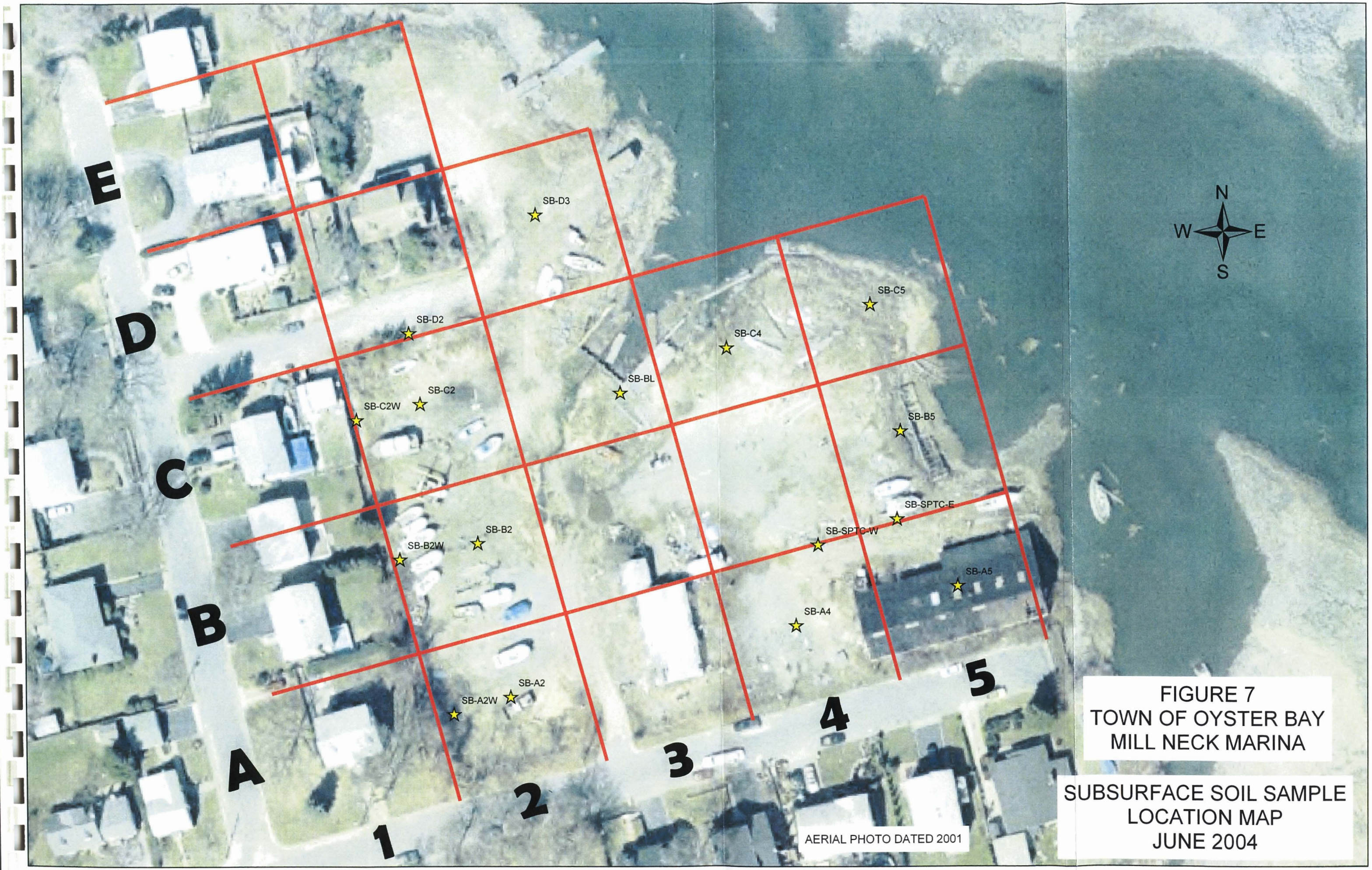

FIGURE 7
TOWN OF OYSTER BAY
MILL NECK MARINA

SUBSURFACE SOIL SAMPLE
LOCATION MAP
JUNE 2004

AERIAL PHOTO DATED 2001

FIGURE 8
TOWN OF OYSTER BAY
MILL NECK MARINA

SUBSURFACE SOIL SAMPLE
COPPER LEVELS
JUNE 2004

FIGURE 9
TOWN OF OYSTER BAY
MILL NECK MARINA

SUBSURFACE SOIL SAMPLE
LEAD LEVELS
JUNE 2004

FIGURE 10
TOWN OF OYSTE
MILL NECK MA

SUBS SURFACE SC
MER RCURY
JU NE

FIGURE 11
TOWN OF OYSTER BAY
MILL NECK MARINA

GROUNDWATER
SAMPLE LOCATIONS
JUNE 2004