Sampling and Analysis Report

#2 Fuel Oil

"North Cape" Barge Oil Spill

January 19-26, 1996

Prepared by:

EPA, Region I
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U.S. ENVIRONMENTAL PROTECTION AGENCY
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EMORANDUM

DATE: August 1, 1996

SUBJ: Northcap Oil Spill Report

FROM: Tom Faber Tom Faber

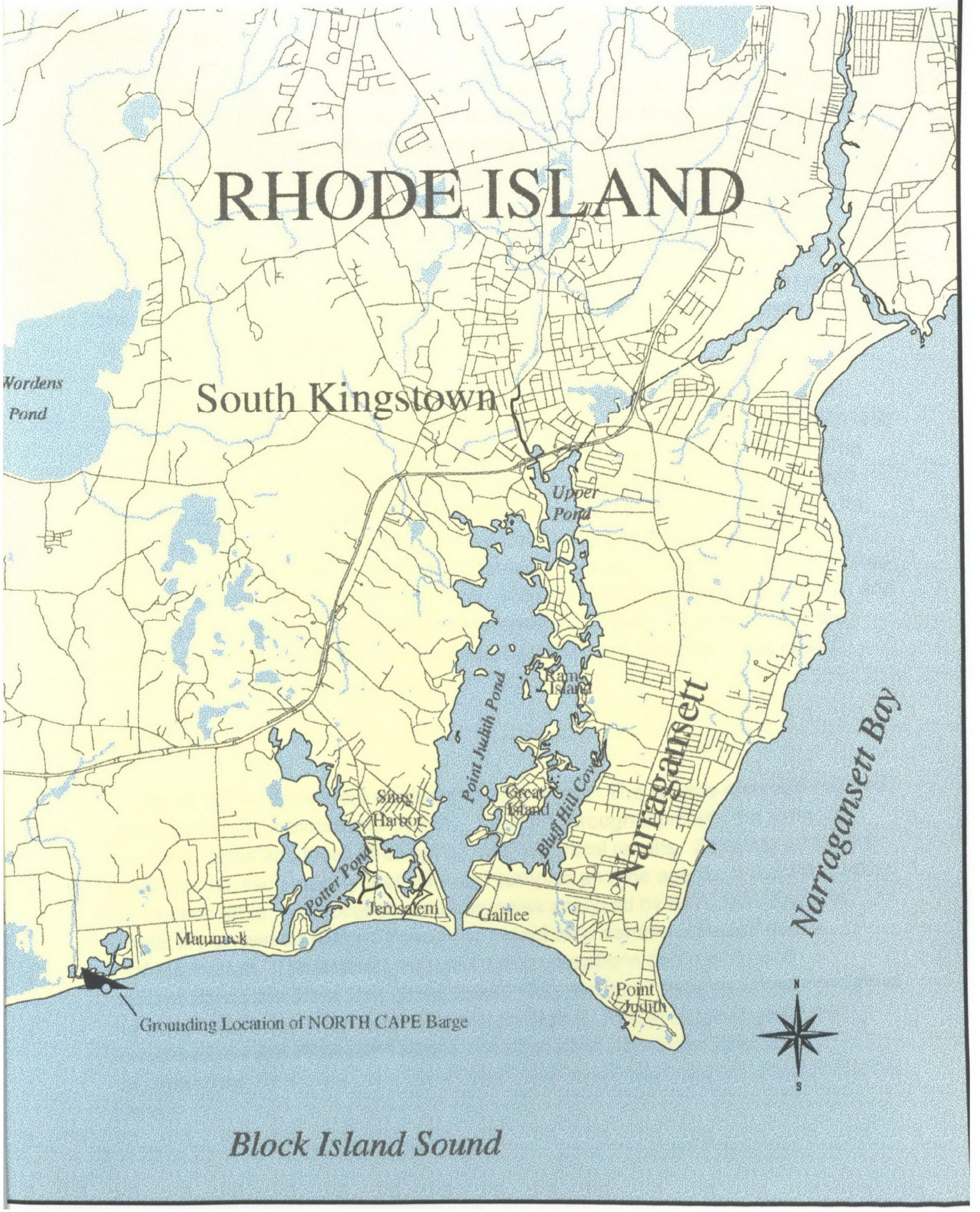
TO: Bonnie Moon

Enclosed is a library copy of the Sampling and Analysis Report for the North Cape Barge oil spill. This report includes all samples analyzed by USEPA\OEME Laboratory. This report was prepared by Tim Bridges and Tom Faber from OEME. Jim Fritz from Signal Corporation, in support of EPA New England GIS, designed the maps.

If you have any questions please contact Tim Bridges at (617) 860-4603 or myself at (617) 860-4672.

Enclosures

Locus Map


RHODE ISLAND
South Kingstown
Wordens Pond
Upper Pond
Point Judith Pond
Ram Island
Great Island
Bluff Hill Cove
Narragansett
Narragansett Bay
Sting Harbor
Potter Pond
Jerusalem
Galilee
Matunuck
Point Judith
Grounding Location of NORTH CAPE Barge
N
S
Block Island Sound

INTRODUCTION

On Friday January 19, 1996 the tugboat "Scandia" towing the "North Cape" Barge caught fire and became disabled off Moonstone Beach in Matunuck, RI. The tug crew could not extinguish the engine room fire and had to abandon ship, leaving the tug and the barge carrying 4 million gallons of home heating oil (# 2 fuel) drifting in a severe winter storm. Heavy winds pushed the burning tug onto Moonstone Beach, and the barge hit Nebraska Shoal about 200 yards offshore in 18 feet of water. On the evening of January 19 the damaged single hull barge began leaking what eventually would total 828,000 gallons of #2 fuel oil into Rhode Island's coastal waters. The oil quickly spread onto barrier beaches and into coastal ponds resulting in the worst oil spill disaster in the State's history.

On January 20, the EPA Office of Environmental Measurement and Evaluation (OEME) was asked to assist the EPA Response Coordinators. OEME sampling and laboratory crews immediately began mobilizing for the spill. The OEME sampling crew arrived at the response Command Center in Galilee, RI on January 21, and departed the site on January 28. The following agencies were also involved in the initial response sampling: EPA Environmental Research Laboratory (Narragansett), Atlantic Ecology Division; EPA Environmental Response Team (ERT); United States Fish and Wildlife; Rhode Island Fish and Wildlife; Moonstone Oysters Company; and National Oceanic and Atmospheric Administration (NOAA). Data from samples collected by these agencies and analyzed by OEME are included in this report.

RESULTS

A total of 167 samples were analyzed for this report. The sample matrices included water, sediment, lobsters and oysters. Tables 1 through 6 provide the sampling locations, dates and times of sampling, and analytical results. Separate tables are presented for each agency that collected samples and the agency is identified at the top of each table. The locations of all samples analyzed by EPA, New England, OEME are shown on Maps 1 through 5, except for a sample collected from a seafood market. The ambient aqueous sample locations and their fuel oil concentrations are presented on the maps. The sediment samples were collected at the same locations as the water samples on Map 5. The associated sediment concentrations are shown on Table 5. The sampling information and fuel oil concentrations for the lobster tank, lobsters, and oyster samples are shown in Tables 1 and 6.

Repeat sampling of a number of locations was conducted on different days to gather comparative data for assessing the change in environmental conditions over time.

The locational data for each sampling station (latitude and longitude) were collected and are included in the attached tables. These data were used to plot sampling locations on the attached maps. The participating agencies used different methods to collect locational data. These methods included global positioning system (GPS), Loran, and NOAA charts. The method used is specified on each table.

SAMPLE COLLECTION

EPA/Region I/OEME, Lexington, MA

OEME, with assistance from the EPA Response Coordinators, collected 53 water samples during January 22 - 28. Samples were not collected on January 24 and 27 because of stormy weather and rough seas. EPA Region I, New England used a 22 foot and 13 foot Boston Whaler for sampling.

When OEME personnel arrived at a sampling site the boat was anchored and the engines were shut off. The site location was determined using GPS. Salinity, temperature, and conductivity measurements were made using calibrated field instruments at selected sites. These data are presented in Table 2. In addition, surface water samples were collected at 34 sites. At most sites two samples were collected, one at 5-15 cm below the water surface, and a depth sample at approximately 0.5 meters above the bottom. All samples were preserved with sulfuric acid to a pH < 2 within 4 hours of the sample being collected. OEME's chain of custody procedures were followed for all samples. The analytical results for the surface samples are presented on Table 1 and Map 1. The depth samples are presented on Table 1 and Map 2.

The GPS locational data collected at each site was differentially corrected using data from OEME's GPS base station at Lexington MA. Accuracy of the post-processed GPS data is 2 - 5 meters.

On January 25, a water sample was collected from a lobster tank inside Champlain's Seafood Market at 256 Great Island Road in Point Judith, RI. The market pumps water from Galilee Harbor through the lobster tank and discharges it back to the harbor. The sampling information and analytical result are presented in Table 1.

EPA Atlantic Ecology Division, Narragansett, RI

The EPA Atlantic Ecology Division collected a total of 36 water samples from the long island sound for #2 fuel oil analysis by OEME. Four samples were collected by the research vessel "*Cyprindon*", fifteen samples were collected by the *"Capt. Bert Cruise"* and seventeen samples were collected by staff on board the NOAA Vessel "*Albatross IV*". The results are presented in Table 3 and Map 3.

EPA Emergency Response Team(ERT), Edison, NJ

ERT collected 14 water samples for #2 fuel oil analysis by OEME. Four samples were collected on January 22, in the Point Judith Harbor of Refuge. Eight samples were collected on January 26, off Moonstone Beach. The results of ERT sampling are presented in Table 4 and Map 4.

U.S. Fish and Wildlife, Concord, NH

U.S. Fish and Wildlife collected 46 samples for #2 fuel oil analysis by OEME. Water and sediment samples were collected at 23 stations. The samples were collected in the coastal salt water ponds from west to east, starting at Winnapaug Pond on January 23, and ending in Point Judith Pond on January 26. The analytical results from the U. S. Fish and Wildlife sampling are presented in Table 5 and Map 5.

RI Fish and Wildlife, Jerusalem, RI

On Saturday, January 20, RI Fish and Wildlife collected 19 whole lobsters which had washed up on Moonstone Beach. On January 20, these samples were transferred to EPA personnel in Galilee, RI for #2 fuel oil analysis. The sample preparation is discussed below. Table 6 contains the analytical results for these samples. Map 1 shows the location of the collected samples.

Moonstone Oyster Company, Galilee, RI

On the morning of January 21, the Moonstone Oyster Company collected 6 common oysters *(Crassostera virginica)* from its company's aquaculture site located between Plato Island and Ram Island. The oysters were collected from cages located on the bottom of the ocean floor. On January 22, a representative from Moonstone Oysters relinquished the oysters to EPA personnel in Galilee, RI. The sample preparation is discussed below. Table 6 presents the analytical results for the oysters and Map 1 shows the location of the collected samples.

LOBSTER AND OYSTER SAMPLE PREPARATIONS

On January 20, at 11:45 p.m. the OEME laboratory received 19 whole lobster samples collected by RI Fish and Wildlife. On Sunday, January 21, at 7:00 a.m. the conditions of the lobsters were as follows: one was dead (had a small crack in the carapace, but the membrane lining was intact); 10 lobsters did not respond to external stimuli; 8 lobsters were alive.

The lobsters were prepared for analysis as follows: The external dorsal exoskeleton of each lobster was wiped using filter paper soaked with methylene chloride. The ventral portions were excluded. All lobster samples were homogenized using a blender with a precleaned glass bowl and stainless steel blades. Whole lobsters were homogenized for samples 54947, 54948, 54952, and 54953. Samples 54947 and 54948 were individual lobsters. Samples 54952 and 54953 were composites of two and ten whole lobsters respectively. Sample 54949 was a composite sample containing three lobster tails including their exoskeleton. Sample 54946 was comprised of the tail meat from the two largest lobsters. Gills and the thoracic tissue were also composited from these 2 lobsters for sample 54945.

On January 23, OEME laboratory received 6 oysters collected by Moonstone Oysters Company. They were opened with a precleaned stainless steel oyster knife and all soft tissue was removed, combined and homogenized for analysis. A precleaned glass blender with stainless steel blades was used to homogenize the sample. No detectable concentration of number 2 fuel oil was found in the composite sample.

OEME LABORATORY AND ANALYTICAL PROCEDURES

Except for the lobsters and oysters, chain of custody documentation accompanied all samples delivered to the OEME laboratory. Upon arrival at the laboratory all samples were recorded in accordance with OEME's chain of custody procedures. The holding times were met for all samples. The maximum allowable holding times for sample extraction are 7 days for aqueous and tissue (lobster and oyster) samples and 14 days for sediment. After extraction the holding time is 40 days for the extract. The majority of the samples were extracted within 24 hours of delivery to OEME's Laboratory.

The analytical procedure used for the aqueous samples was the OEME's Low Level Method for #2 Fuel Oil/Diesel in Aqueous Samples. The reference methods for the extraction were EPA RCRA method 3510B, Liquid Extraction by Separatory Funnel

method and EPA method 610 (July, 1982), Test Method For Polyaromatic Hydrocarbons.

Processing of the sediment samples was done using the EPA Consensus Protocol, Organic Analysis, Multi-Media, Multi-Concentration, Low Level Preparation for Screening and Analysis of Semivolatiles, (EPA CLP method OLM01.2, January, 1991). The sample extracts were cleaned using silica gel/alumina column chromatography prior to the gas chromatography analysis.

The analytical procedures used for the tissue samples, were the Sampling and Analytical Methods of National Status Trends Program, (NOAA AOS ORCA 71, July, 1993) and the Ultrasonic Extraction Method (RCRA method 3550A). Extracts were cleaned using silica gel/alumina column chromatography prior to the gas chromatography analysis.

The extracts were analyzed on a Hewlett Packard 5890 gas chromatograph equipped with a J&W DB-1, 30 meter and 0.32 millimeters inside diameter capillary column. Target compounds were detected by a flame ionization detector. The quantitation was based on a six point calibration with concentrations ranging from 0.1 to 5.0 mg/ml.

The eleven major hydrocarbon peaks found in #2 fuel oil range from C-12 through C-22 and were used in the calibration group. The retention times for these eleven major peaks bracketed the entire range of hydrocarbons found in #2 fuel oil. The final concentrations were calculated by using the average of the eleven peaks. This eliminated any false positive or negative results caused by weathering. A visual comparison of the sample chromatogram against a #2 fuel oil standard provided a qualitative analysis.

Table 1

EPA OEME Sampling Data "North Cape" Barge Oil Spill, RI

Sampling Location	Date	Latitude			Longitude			Surface ID	Time	#2 Fuel Oil	Depth	Depth ID	Time	#2 Fuel Oil
		Deg	Min	Sec	Deg	Min	Sec	(OEME#)	(EST)	(ppm)	(meters)	(OEME#)	(EST)	(ppm)
		GPS												
PT Judith Pond by GC"1"	01/22/96	41	23	3.6	71	30	30.1	05431T	1125	0.34	4.0	05431B	1125	0.27
PT Judith Pond NE of Beef Island	01/22/96	41	23	55.0	71	30	40.9	05432T	1210	0.14	2.6	05432B	1210	0.20
PT Judith Pond, Turner Cove	01/22/96	41	24	19.9	71	30	36.7	05433T	1225	0.14	2.0	05433B	1225	0.20
S of Beach Is. E of Plato Is.	01/22/96	41	24	16.2	71	30	20.5	05434T	1238	<0.10	2.1	05434B	1238	0.25
PT Judith Pond Snug Harbor	01/22/96	41	23	8.3	71	30	59.9	05435T	1301	0.29	3.0	05435B	1301	0.46
PT Judith Harbor inside breakwater	01/22/96	41	21	46.4	71	29	32.5	05436T	1517	1.20	3.6	05436B	1517	0.42
Pt Judith Harbor Seaweed Beach	01/22/96	41	22	6.5	71	29	55.1	05437T	1541	0.42	2.4	05437B	1541	3.90
PT Judith Harbor Sand Hill Cove	01/22/96	41	22	26.6	71	30	30.5	05438T	1604	2.20	1.8	05438B	1604	1.40
PT Judith Harbor N of RN"4"	01/22/96	41	22	6.8	71	30	50.7	05439T	1623	0.51	2.0	05439B	1623	0.56
PT Judith Pond State Pier Jerusalem	01/22/96	41	22	43.7	71	30	53.8	05440T	1706	0.57	2.0	05440B	1706	0.59
Potter Pd W of Champlin Cove@Narrows	01/23/96	41	23	31.7	71	32	0.4	05441	1136	<0.09	---	---	---	---
Potter Pond, Sycamore Cove	01/23/96	41	22	59.7	71	32	3.6	05442	1150	<0.09	---	---	---	---
Potter PD N of Meadows PT	01/23/96	41	23	15.9	71	31	51.6	05443	1203	0.19	---	---	---	---
Card PD off Card PD RD N	01/23/96	41	22	37.7	71	33	56.0	05444	1314	0.44	---	---	---	---
Trustom Pond S @ Breach	01/23/96	41	22	13.5	71	34	47.6	05445	1400	0.69	---	---	---	---
Green Hill PD Flat Meadow Cove	01/23/96	41	22	20.9	71	36	35.7	05446	1443	<0.10	---	---	---	---
Green Hill PD Inlet	01/23/96	41	21	51.6	71	37	32.9	05447	1508	<0.09	---	---	---	---
Charlestown PD off Charlestown Beach	01/23/96	41	22	5.8	71	37	59.3	05448	1532	<0.09	---	---	---	---
Quonochontaug PD @ Landing	01/23/96	41	20	25.5	71	42	44.6	05449	1750	<0.10	---	---	---	---
Bluff Hill Cove off Ram's Head	01/25/96	41	23	21.9	71	29	44.4	05450	1125	0.16	1.0	05451	1126	0.16
Bluff Hill Cove @ Bridge E side	01/25/96	41	23	2.8	71	30	25.1	05452	1145	0.47	4.0	05453	1148	0.61
Bluff Hill Cove off Locke PT	01/25/96	41	23	51.1	71	29	42.9	05454	1312	0.30	---	---	---	---
Spring Cove At NUN"30"	01/25/96	41	25	2.0	71	29	49.5	05455	1450	<0.10	2.0	05456	1455	<0.10
Upper Pond off Ram PT	01/25/96	41	25	27.6	71	29	49.1	05457	1523	<0.10	---	---	---	---
Champlin's Lobster tank, 256 Great Is Rd	01/25/96	---	---	---	---	---	---	05458	1750	0.46	---	---	---	---
Bluff hill Cove @ Bridge W side,Can5	01/26/96	41	23	3.8	71	30	32.3	05469	1225	0.20	4.0	05470	1230	0.26
PT Judith Pond NE of Beef Island	01/26/96	41	23	59.1	71	30	39.7	05459	900	0.20	---	---	---	---
Dup @ PT Judith Pond NE of Beef IS	01/26/96	41	23	59.1	71	30	39.7	05460	900	0.15	---	---	---	---
PT Judith Pond, Turner Cove	01/26/96	41	24	20.3	71	30	35.0	05461	923	0.12	1.5	05462	925	0.12
S of Beach Is. E of Plato Is.	01/26/96	41	24	14.7	71	30	21.0	05463	946	0.11	1.5	05464	952	0.11
PT Judith Pond State Pier Jerusalem	01/26/96	41	22	49.1	71	30	58.0	05465	1135	0.25	3.0	05466	1140	0.25
PT Judith Pond Snug Harbor	01/26/96	41	23	9.1	71	31	3.3	05467	1157	0.28	1.0	05468	1200	0.23
Upper Pond off Ram PT	01/28/96	41	25	28.6	71	29	47.7	05471	1005	<0.10	---	---	---	---
PT Judith Pond, Turner Cove	01/28/96	41	24	20.5	71	30	35.4	05472	1059	<0.10	---	---	---	---
PT Judith Harbor of Refuge S cove	01/28/96	41	21	28.6	71	30	28.8	05473	1448	0.36	---	---	---	---

Table 2

EPA,OEME, Field Data "NorthCape" Barge Oil Spill, RI

Sampling Location	Date	Time (EST)	Salinity (PPTh)	Temp (C)	Conductivity (ms/cm)	Salinity (PPTh)	Temp (C)	Conductivity (ms/cm)	Salinity (PPTh)	Temp (C)	Conductivity (ms/cm)	Salinity (PPTh)	Temp (C)	Conductivity (ms/cm)	Salinity (PPTh)	Temp (C)	Conductivity (ms/cm)
			(0.1 meters)			(1meter)			(2 meters)			(3 meters)			(4 meters)		
PT Judith Pond by GC"1"	01/22/96	1125	25.0	1.0	270	31.5	1.0	270	30.5	1.0	270	38.5	1.0	270	31.0	1.0	275
PT Judith Pond NE of Beef Island	01/22/96	1210	29.0	1.0	260	30.0	1.0	265	30.0	1.0	270	31.0	1.0	280	---	---	---
PT Judith Pond, Turner Cove	01/22/96	1225	30.0	1.0	260	30.0	1.0	270	31.0	1.0	280	---	---	---	---	---	---
S of Beach Is. E of Plato Is.	01/22/96	1238	29.5	1.0	260	30.0	1.0	260	31.0	1.0	280	---	---	---	---	---	---
PT Judith Pond Snug Harbor	01/22/96	1301	31.0	1.0	275	31.0	1.0	275	31.0	1.0	280	31.0	1.0	280	---	---	---
PT Judith Harbor inside breakwater	01/22/96	1517	32.0	2.0	280	32.0	1.5	285	32.0	1.5	285	33.0	2.0	280	---	---	---
Pt Judith Harbor Seaweed Beach	01/22/96	1541	32.0	1.0	280	33.0	1.0	290	33.0	1.0	290	---	---	---	---	---	---
PT Judith Harbor Sand Hill Cove	01/22/96	1604	33.0	1.0	290	33.0	1.0	290	33.0	1.0	290	---	---	---	---	---	---
PT Judith Harbor N of RN"4"	01/22/96	1623	31.0	1.0	280	31.0	1.0	280	32.0	1.0	280	32.0	1.0	280	---	---	---
PT Judith Pond State Pier Jerusalem	01/22/96	1706	32.0	1.0	290	31.0	1.0	285	32.0	1.0	300	---	---	---	---	---	---
Potter Pd W of Champlin Cove@Narrows	01/23/96	1136	29.0	2.0	260	31.5	2.5	280	---	---	---	---	---	---	---	---	---
Potter Pond, Sycamore Cove	01/23/96	1150	29.0	2.0	260	31.0	2.0	275	---	---	---	---	---	---	---	---	---
Potter PD N of Meadows PT	01/23/96	1203	31.0	2.5	275	32.5	2.0	285	---	---	---	---	---	---	---	---	---
Bluff Hill Cove off Ram's Head	01/25/96	1125	30.0	3.5	275	30.0	3.5	275	31.0	3.0	275	---	---	---	---	---	---
Bluff Hill Cove @ Bridge E side	01/25/96	1145	31.0	3.5	275	31.0	3.0	278	31.5	3.0	280	31.5	3.0	280	31.5	3.0	280
Spring Cove At NUN"30"	01/25/96	1450	17.5	3.0	105	18.5	3.0	170	17.5	3.0	195	---	---	---	---	---	---
Upper Pond off Ram PT	01/25/96	1523	10.5	2.8	105	10.5	2.8	105	25.5	3.5	230	---	---	---	---	---	---
Bluff hill Cove @ Bridge W side,Can5	01/26/96	1225	29.9	2.9	270	29.9	2.9	270	29.9	2.9	270	30.0	2.5	271	30.1	2.5	272
PT Judith Pond NE of Beef Island	01/26/96	900	27.0	1.0	245	27.5	1.1	250				---	---	---	---	---	---
PT Judith Pond, Turner Cove	01/26/96	923	26.2	1.0	240	27.5	1.1	250	29.2	2.0	265	---	---	---	---	---	---
S of Beach Is. E of Plato Is.	01/26/96	946	27.1	1.0	248	27.5	1.2	250	30.2	2.0	271	---	---	---	---	---	---
PT Judith Pond State Pier Jerusalem	01/26/96	1135	30.9	1.9	275	30.9	1.9	278	31.0	1.8	278	31.0	1.7	278	31.1	1.5	280
PT Judith Pond Snug Harbor	01/26/96	1157	30.0	3.8	272	30.0	3.0	270	30.0	3.0	270	---	---	---	---	---	---
Upper Pond off Ram PT	01/28/96	1005	4.2	3.5	60	---	---	---	---	---	---	---	---	---	---	---	---
PT Judith Pond, Turner Cove	01/28/96	1059	28.8	3.1	254	---	---	---	---	---	---	---	---	---	---	---	---
PT Judith Harbor of Refuge S cove	01/28/96	1448	28.5	2.5	262	---	---	---	---	---	---	---	---	---	---	---	---

Table 3

EPA's, Atlantic Ecology Division, Sampling Data "North Cape" Barge Oil Spill, RI

Sample ID (OEME#)	Station ID	Date	Time (EST)	Latitude		Longitude		#2 Fuel Oil (ppm)	Total Depth (meters)	Temp (C)
				Deg	Min	Deg	Min			
Capt. Bert Cruise				GPS						
A1	—	1/21/96	09:57 AM	41	21.30	71	36.14	3.3	—	—
A2	—	1/21/96	10:40 AM	41	20.51	71	36.37	1.5	—	—
A3	—	1/21/96	10:51 AM	41	19.85	71	36.21	0.1	—	—
B1	—	1/21/96	11:54 AM	41	21.67	71	34.75	3.6	—	—
B2	—	1/21/96	11:45 AM	41	21.18	71	35.89	1.4	—	—
B3	—	1/21/96	11:24 AM	41	19.91	71	35.68	1.8	—	—
C1	—	1/21/96	12:04 PM	41	21.93	71	33.52	6.0	—	—
C2	—	1/21/96	12:24 PM	41	21.32	71	33.45	1.6	—	—
C3	—	1/21/96	01:05 PM	41	20.02	71	33.20	1.1	—	—
D1	—	1/21/96	02:14 PM	41	22.00	71	33.20	4.0	—	—
D2	—	1/21/96	02:03 PM	41	21.50	71	32.90	1.3	—	—
D3	—	1/21/96	01:48 PM	41	20.34	71	31.85	5.5	—	—
E1	—	1/21/96	02:32 PM	41	22.00	71	30.32	1.9	—	—
E2	—	1/21/96	02:42 PM	41	21.43	71	30.30	1.2	—	—
E3	—	1/21/96	02:59 PM	41	20.15	71	29.35	0.6	—	—
Research Vessel Cyprinodon										
A1	—	1/22/96	01:30 PM	41	21.73	71	35.44	4.6	—	—
B3	—	1/22/96	02:40 PM	41	20.20	71	36.50	1.4	—	—
E3 Deposition	—	1/22/96	11:24 AM	41	22.00	71	32.20	1.1	—	—
E3 Bottom	—	1/22/96	11:24 AM	—	—	—	—	1.1	—	—
NOAA Vessel Albatross IV				(Loran)						
WC1	STA8	1/23/96	03:35 AM	41	2.5	71	41.0	ND 0.10	49	3.9
WC2	STA7	1/23/96	07:05 AM	41	11.9	71	39.8	ND 0.10	36	3.4
WC3	STA6	1/23/96	09:15 AM	41	15.4	71	40.2	ND 0.10	37	3.7
WC4	STA5	1/23/96	11:16 AM	41	19.3	71	38.9	ND 0.10	19	3.5
WC5	STA10	1/23/96	01:22 PM	41	19.7	71	35.4	<0.1	21	3.5
WC6	STA10	1/23/96	01:22 PM	41	19.7	71	35.4	<0.1	21	3.5
WC7	STA9	1/23/96	04:11 PM	41	18.5	71	30.4	0.1	27	2.6
WC8	STA11	1/23/96	07:03 PM	41	17.5	71	35.1	ND 0.10	40	3.6
WC9	STA12	1/23/96	10:17 AM	41	12.9	71	29.3	ND 0.10	35	2.9
WC10	STA13	1/24/96	06:21 AM	41	15.9	71	26.2	ND 0.10	39	2.3
WC11	STA14	1/24/96	08:41 AM	41	7.6	71	31.4	ND 0.10	30	2.9
WC-1	STA1	1/25/96	11:40 PM	41	9.2	71	14.3	ND 0.10	41	---
WC-2	STA2	1/25/96	04:31 PM	41	13.8	71	21.6	ND 0.10	33	---
WC-3	STA3	1/25/96	02:34 PM	41	19.8	71	20.9	ND 0.10	32	---
WC-4	STA4	1/25/96	12:39 PM	41	19.6	71	24.8	ND 0.10	33	---
WC-15	STA15	1/25/96	07:02 PM	41	11.6	71	24.8	<0.11	38	---
WC-16	STA16	1/25/96	08:55 PM	41	10.5	71	20.7	ND 0.10	40	---

Table 4

EPA ERT Sampling Data "North Cape" Oil Spill, Mattunuck, RI

Sampling Location	Date	Latitude			Longitude			Surface (meters)	Surface ID (OEME#)	#2 Fuel Oil Top meter (ppm)	Depth ID (OEME#)	#2 Fuel Oil Depth (ppm)	Depth (meters)
		Deg	Min	Sec	Deg	Min	Sec						
		Plotted on NOAA chart											
ERT2	1/22/96	41	21	52.5	71	30	17	0.1	6586	0.54	6587	2.5	7.0
ERT1	1/22/96	41	21	25.8	71	30	32	0.1	6589	0.52	6588	1.1	4.6
		Loran Measurements											
Test-1,Test-2	1/26/96	41	21	53	71	30	39	1.0	6514	0.15	6513	0.38	8.5
Test3	1/26/96	41	21	30	71	34	52	1.0	6515	0.28	---	---	---
Test 4, Test 5	1/26/96	41	21	41	71	34	49	0.1	6517	3.30	6516	0.42	1.0
Test 6, Test 7	1/26/96	41	21	47	71	34	34	0.1	6518	0.72	6519	0.71	5.5
Test 8, Test 9	1/26/96	41	21	51	71	34	18	1.0	6521	0.82	6520	0.62	5.6
Test 10	1/26/96	41	21	53	71	33	52	1.0	6522	<0.1	---	---	---

Table 5

U.S. Fish & Wildlife Sampling Data "North Cape" Barge Oil Spill, RI

SITE ID	Description	Date	Time (EST)	Latitude			Longitude			#2 Fuel Oil Water (ppm)	#2 Fuel Oil Wet Sediments (mg/kg)
				Deg	Min	Sec	Deg	Min	Sec		
				GPS							
WINN1	Winnapaug Pond, w end. 11 Saunders Rd., about 15 yd offshore	1/23/96	—	71	48	27.6	41	19	30.9	0.22	ND 9.5
WINN2	Winnapaug Pd, #468 Atlantic Ave, across salt marsh on driveway, near house	1/23/96	—	71	47	0.4	41	19	45.7	ND 0.2	ND 8.1
WINN3	Winnapaug Pond, end of Ricci Road, north of breachway	1/23/96	—	71	46	8.8	41	20	6.6	ND 0.2	ND 8.8
QUON1	W end of Quonochontaug Pd, 3rd parking lot on sand road, Weekapaug beac	1/23/96	—	71	44	44.7	41	19	49.4	<0.2	ND 8.1
QUON2	Quonochontaug Pond, end of Warren Rd., Westerly-Charlestown town line.	1/23/96	—	71	43	42.4	41	20	44.2	<0.2	ND 9.4
QUON3	Quonochontaug Pond, E end, right of way off Sunset Drive, E of Bill's Is.	1/23/96	—	71	42	35.5	41	20	24.2	<0.2	ND 10
NIN1	Ninigret Pond, west end. Ninigret Conservation Area, parking lot, north end	1/23/96	—	71	42	43.6	41	20	22.1	ND 0.2	ND 8.5
NINN3	Ninigret Pond, north end. Fort Ninigret. Access from parking lot of state park	1/24/96	—	71	38	46.2	41	20	27.6	0.20	ND 19
NIN2	Ninigret Pond, Ninigret NWR, end of airfield	1/24/96	—	71	39	16.8	41	21	50.6	0.24	ND 12
NIN4	Ninigret Pd, N of the Charlestown breachway boat ramp ~ 50 m off foot path	1/24/96	—	71	38	15.4	41	21	33.2	0.41	ND 8.4
GH1	Green Hill Pd, @ RD to Charlestown Breachway, Eof bridge near tide gate	1/24/96	—	71	37	27.8	41	21	48.4	0.78	ND 15
GH2	Green Hill Pond @ Cedar Island	1/24/96	—	71	36	31.5	41	22	38.2	0.13	ND 8.9
CARD2	Card Pond, north side off Card Pond Road	1/25/96	11:00 AM	71	33	57.1	41	22	37.2	0.81	21
CARD1	Card Pond, west side near opening to fresh water pond.	1/25/96	11:45 AM	71	34	16.7	41	22	16.3	0.24	<9.4
TRU1	Trustom Pond, east side of breach, 10 m out	1/25/96	12:30 PM	71	34	43.0	41	22	14.3	5.40	6.7
TRU2	Trustom Pond, North of observation tower	1/25/96	02:00 PM	71	34	58.1	41	22	36.9	<1.0	ND 15
POT1	Potter Pond	1/25/96	04:30 PM	71	35	11.3	41	22	34.3	0.17	28
POT2	Potter Pond, #35 E. Matunuck Beach Rd	1/25/96	05:00 PM	71	32	8.7	41	23	54.8	0.10	ND 5.0
PJ1	Pt Judith Pd, end of Succotash Rd., west of dock, just inside entrance to cove	1/26/96	01:00 PM	71	31	7.8	41	23	6.2	0.18	70
PJ2	Point Judith Pond, end of Camp Fuller Road, shoreline north of camp beach	1/26/96	02:00 PM	71	30	33.6	41	24	26.4	0.36	11
PJ2	Duplicate of PJ2C Water RPD=100%	1/26/96	02:00 PM	71	30	33.6	41	24	26.4	0.12	14
PJ3	Point Judith Pond, Galilee Access Rd, off culvert in escape route	1/26/96	03:20 PM	71	29	54.9	41	22	46.6	0.12	24
PJ4	Point Judith Pond, Thomas Point, NW tip of Great Island	1/26/96	04:20 PM	71	29	54.9	41	22	46.6	0.15	12

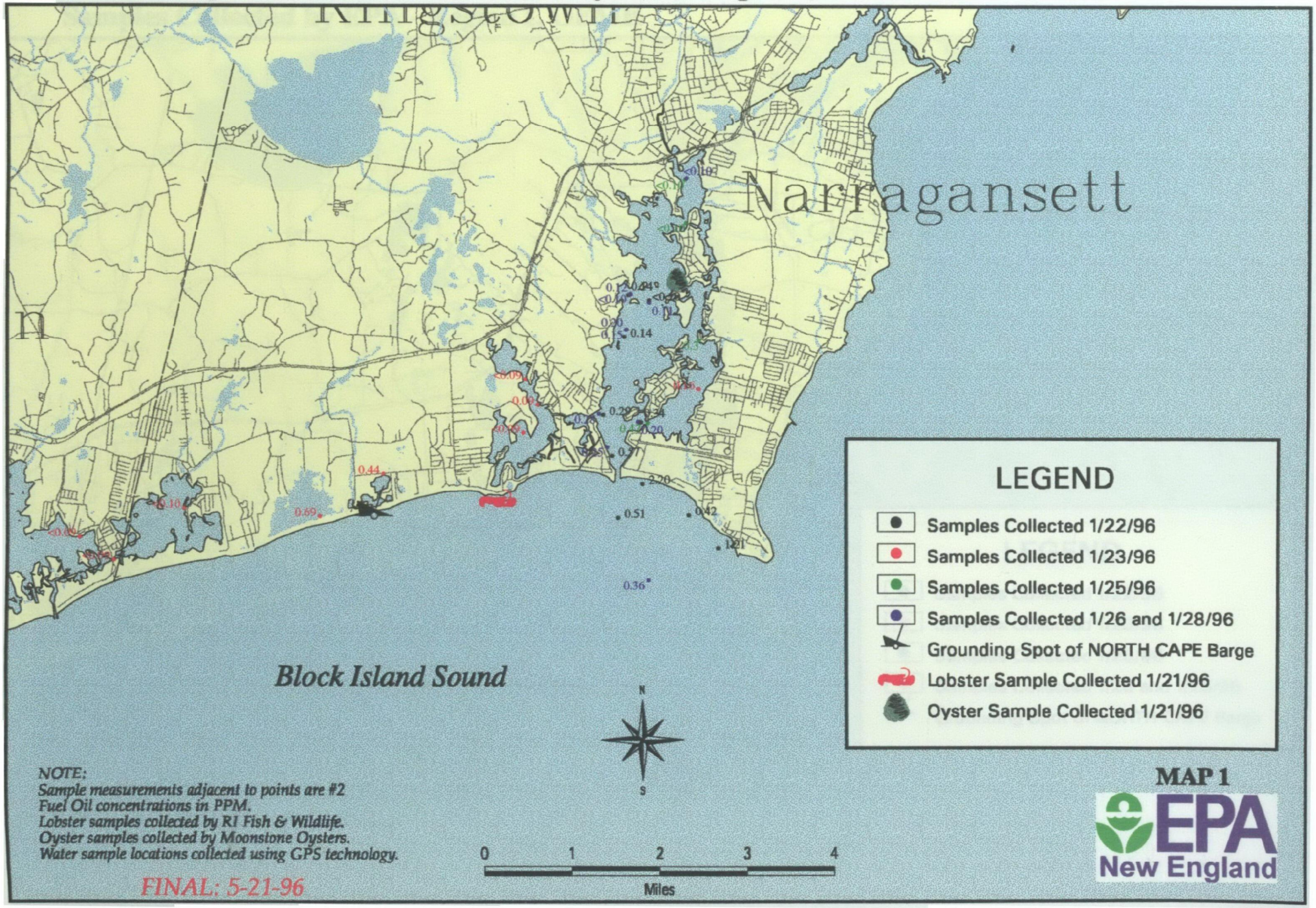
Note: All water samples collected at sub surface; Detection Limits change based on wet weight of samples.
Sediment collected in first 2-4cm with a ponar dredge.

Table 6

Other Samples to OEME "North Cape" Barge Oil Spill, RI

Sample Type	Date	Sample # (OEME#)	#2 Fuel Oil wet weight (mg/Kg)	#2 Fuel Oil dry weight (mg/Kg)	% Moisture (%)	Latitude (Deg)	Latitude (Min)	Latitude (Sec)	Longtitude (Deg)	Longtitude (Min)	Longtitude (Sec)
Lobsters collected by RI Fish & Wildlife											
						NOAA Chart					
2 lobsters, composite-gills/organs	1/20/96	54945	160	640	75	41	22	16	71	32	30
2 lobsters, composite-tails	1/20/96	54946	29	150	80						
1 lobster, whole individual	1/20/96	54947	150	460	67						
1 lobster, whole individual	1/20/96	54948	100	360	71						
3 lobster, composite-tails	1/20/96	54949	43	130	67						
2 lobsters, composite-whole	1/20/96	54952	96	280	66						
10 lobsters, composite-whole	1/20/96	54953	93	220	58						
Oysters collected by Moonstone Oysters, Rob Rheault, President											
						NOAA Chart					
6 oysters, composite-whole	1/21/96	54954	ND 10	ND 10	92	41	24	28	71	22	16
duplicate	1/21/96	54954	ND 10	ND 10	92						

Concentrations of #2 Fuel Oil Samples (PPM)
Water Samples Collected at the Surface by EPA - Region I, OEME



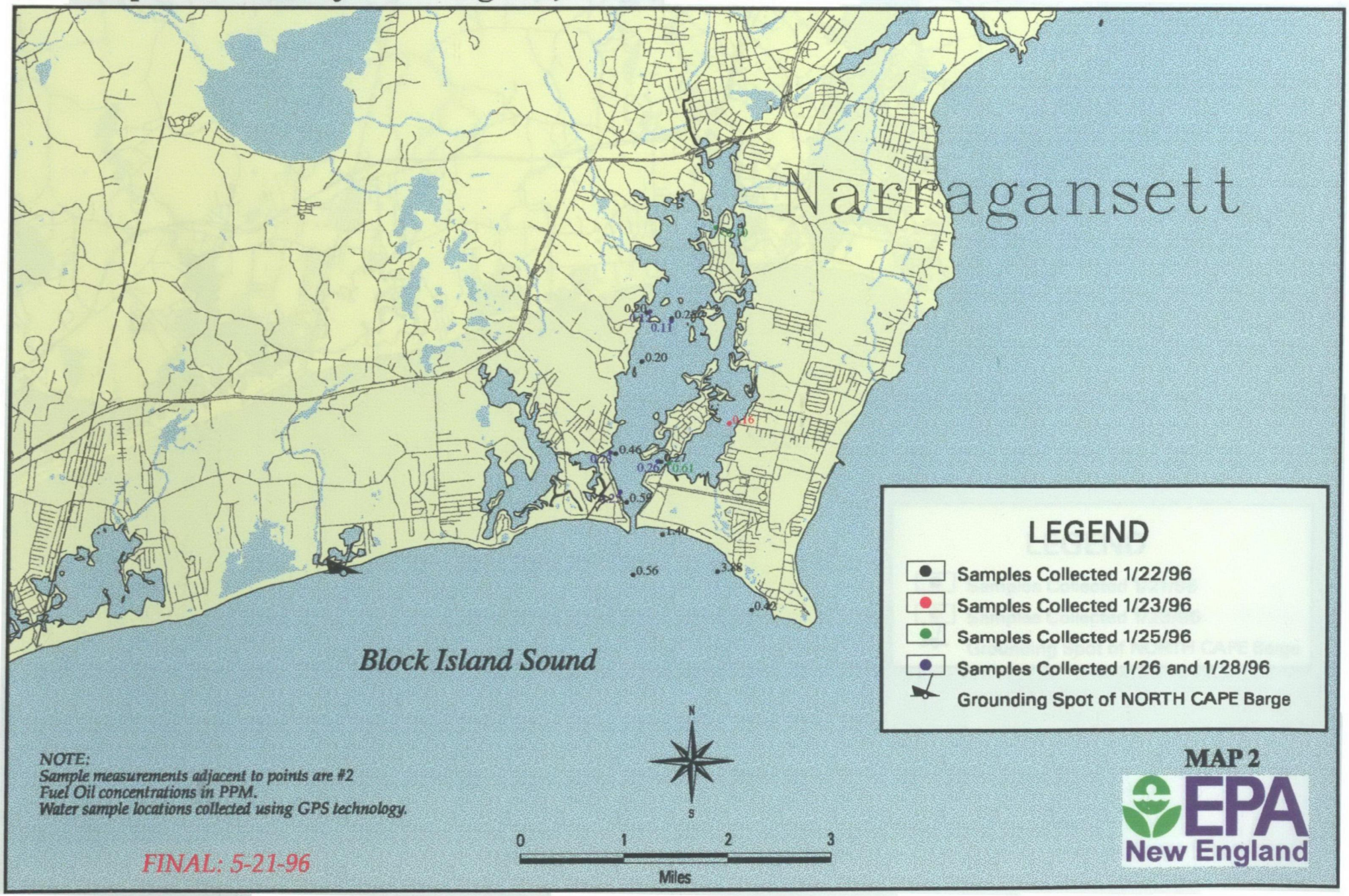
NOTE:
Sample measurements adjacent to points are #2 Fuel Oil concentrations in PPM.
Lobster samples collected by RI Fish & Wildlife.
Oyster samples collected by Moonstone Oysters.
Water sample locations collected using GPS technology.

FINAL: 5-21-96

MAP 1

EPA New England

Concentrations of #2 Fuel Oil Samples (PPM)
Water Samples Collected One Meter Off the Bottom
Samples Collected by EPA - Region I, OEME



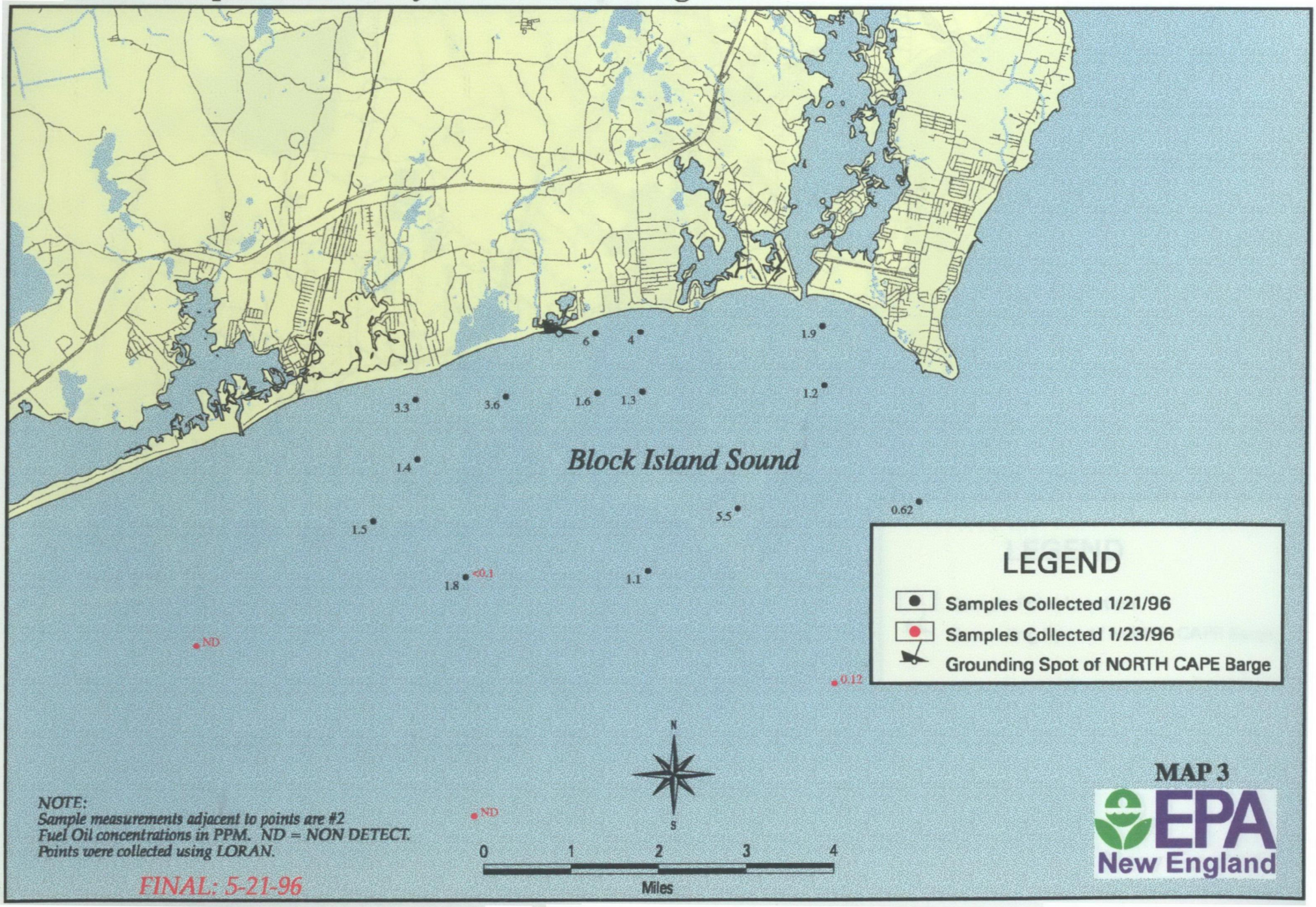
NOTE:
Sample measurements adjacent to points are #2 Fuel Oil concentrations in PPM.
Water sample locations collected using GPS technology.

FINAL: 5-21-96

MAP 2

EPA New England

Concentrations of #2 Fuel Oil Samples (PPM)
Water Samples Collected by NOAA/EPA Narragansett



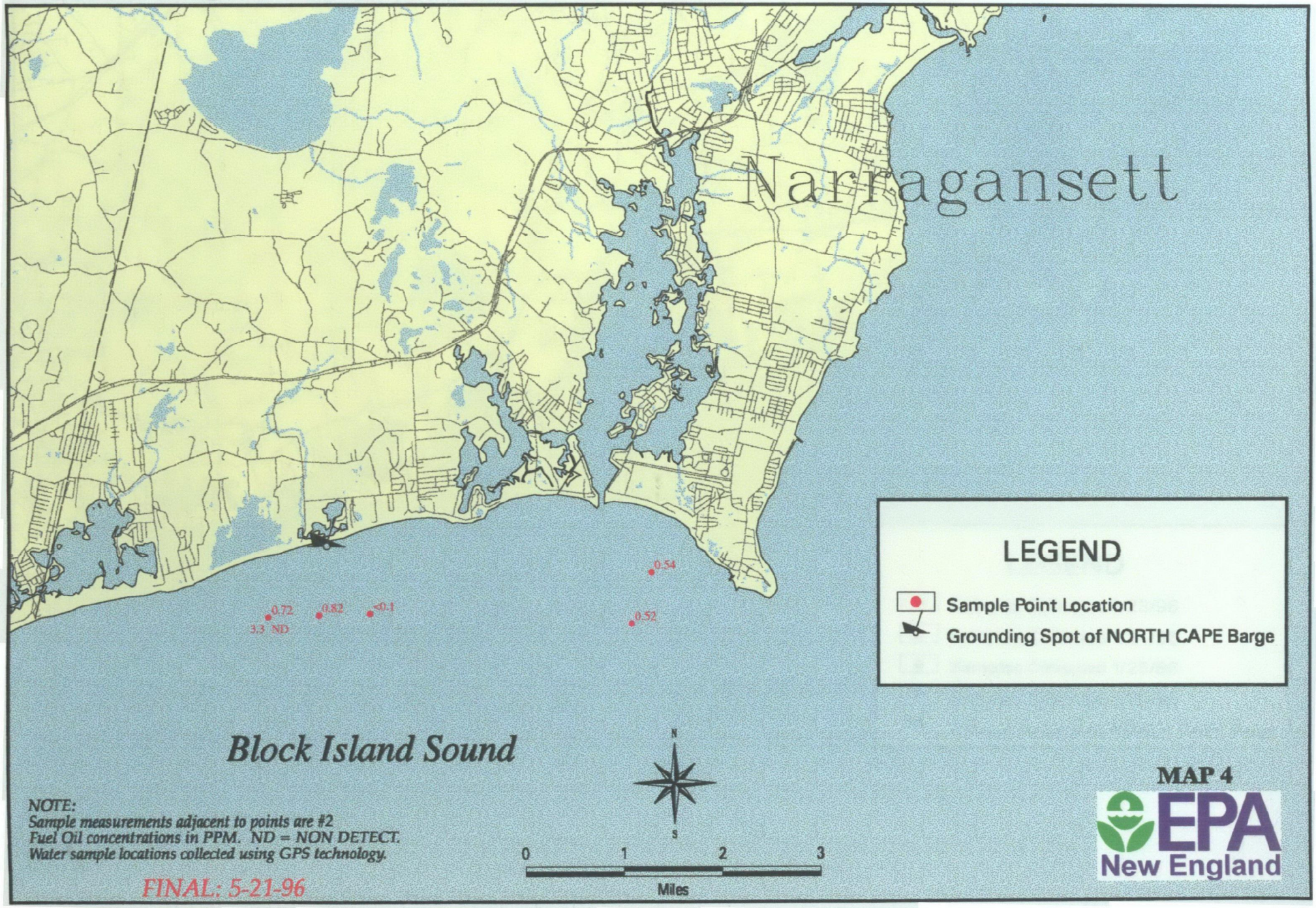
MAP 3

EPA New England

NOTE:
Sample measurements adjacent to points are #2 Fuel Oil concentrations in PPM. ND = NON DETECT.
Points were collected using LORAN.

FINAL: 5-21-96

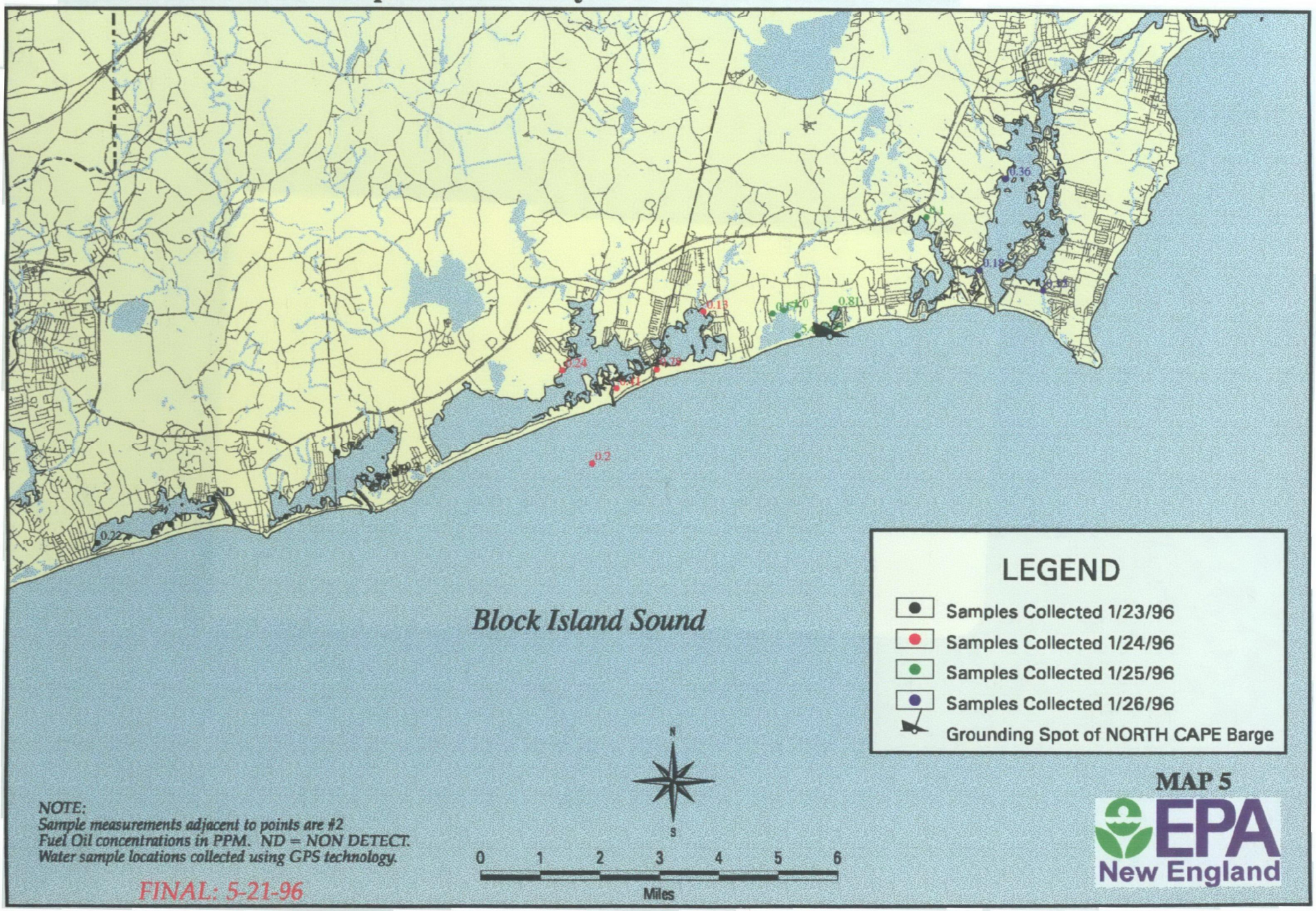
Concentrations of #2 Fuel Oil Samples (PPM)
Water Samples Collected at the Surface by EPA/ERT



NOTE:
Sample measurements adjacent to points are #2 Fuel Oil concentrations in PPM. ND = NON DETECT.
Water sample locations collected using GPS technology.

FINAL: 5-21-96

Concentrations of #2 Fuel Oil Samples (PPM)
Sub-Surface Water Samples Collected by U.S. Fish & Wildlife Service



MAP 5

EPA New England

NOTE:
Sample measurements adjacent to points are #2 Fuel Oil concentrations in PPM. ND = NON DETECT.
Water sample locations collected using GPS technology.

FINAL: 5-21-96

OCLC 44492590 Held by EHA - 1 other holding

Rec stat c	**Entered** 20000628		**Replaced** 20200302				
Type a	**ELvl** I	**Srce** d	**Audn**	**Ctr**		**Lang** eng	
BLvl m	**Form**	**Conf** 0	**Biog**	**MRec**		**Ctry** mau	
	Cont	**GPub**	**LitF** 0	**Indx** 0			
Desc a	**Ills** ab	**Fest** 0	**DtSt** s	**Dates** 1996			

040 RIN ǂb eng ǂc RIN ǂd OCLCQ ǂd OCLCO ǂd OCLCF ǂd OCLCA ǂd EHA
043 n-us-ri
050 4 GC1212.R4 ǂb S36 1996
088 EPA 901-R-96-007
099 EPA 901-R-96-007
049 EHAD
245 0 0 Sampling and analysis report, #2 fuel oil : ǂb "North Cape" barge oil spill, January 19-26, 1996 / ǂc prepared by: EPA, Region I, Office of Environmental Measurement and Evaluation.
246 3 0 "North Cape" barge oil spill
260 Lexington, MA : ǂb EPA, Region 1, ǂc 1996.
300 18 unnumbered leaves : ǂb tables, colored maps ; ǂc 28 cm
336 text ǂb txt ǂ2 rdacontent
337 unmediated ǂb n ǂ2 rdamedia
338 volume ǂb nc ǂ2 rdacarrier
500 Cover title.
610 2 0 Barge North Cape (Ship)
650 0 Oil spills ǂz Rhode Island.
651 0 Moonstone Beach (South Kingstown, R.I.)
650 7 Oil spills. ǂ2 fast ǂ0 (OCoLC)fst01044773
651 7 Rhode Island. ǂ2 fast ǂ0 (OCoLC)fst01204599
710 1 United States. ǂb Environmental Protection Agency. ǂb Region I. ǂb Office of Environmental Measurement and Evaluation, ǂe issuing body.

Delete Holdings- Export- Label- Submit- Replace-C Report Error- Update Holdings-C Validate-C
Workflow-In Process