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NORTH COASTAL 1976



PART A - WATER QUALITY DATA

PART B - WASTEWATER DISCHARGE DATA

massachusetts department of environmental quality engineering

DIVISION OF WATER POLLUTION CONTROL

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NORTH COASTAL WATER QUALITY SURVEY

1976

PART A: DATA RECORD
PART B: WASTEWATER DISCHARGE SURVEY DATA

Water Quality and Research Section
Massachusetts Division of Water Pollution Control

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FOREWORD

The land-based stations were sampled by personnel from the Division's Westborough office. Stations in Salem-Beverly-Marblehead Harbors were sampled with the aid of personnel from the Cat Cove Marine Laboratory, Massachusetts, Division of Marine Fisheries. The laboratory provided a vessel to facilitate this Division's efforts. Chemical and bacterial analyses were conducted by personnel from the Lawrence Experiment Station, Department of Environmental Quality Engineering. Samples were iced and delivered to the laboratory either on the same day or next morning.

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INTRODUCTION

The North Coastal water quality survey was designed to provide a synoptic picture of water quality for the coastal area between Saugus and Essex. Sampling the freshwater streams composed most of the effort. Except for the Saugus-Pines, North, and Essex Rivers, all of the streams were very small and often unnamed. Station locations are depicted in Figures I and II. Flow in these smaller streams was approximately 3 cfs (cubic feet per second) or lower.

Water quality analyses were performed on grab samples collected on Tuesday and Thursday; thus each station was sampled twice. One additional dissolved oxygen-temperature data set was collected for stations NC1-NC20. The area between Saugus and Beverly was sampled on June 15 and June 17, 1976. In addition, nine stations were sampled in Salem-Beverly Harbor on June 15. Harbor sampling on June 17 was aborted because of adverse weather. The area between Beverly and Essex was sampled on July 27 and July 29, 1976. Because of laboratory commitments to other surveys, several of the analyses conducted on samples from stations NC21 through NC43 were not run on samples from stations NC1 through NC20. Analysis of total solids was done only on samples from stations NC1 through NC20 and SB1 through SB9.

Sampling Technique

For all stations with an "NC" code, surface samples were collected either directly or through means of a bucket. For stations coded "SB," dissolved oxygen and coliform bacteria samples were collected two feet below the surface and five feet above the bottom; chemical samples were collected at mid-depth. Sampling was done at high tide and low tide.

Discharges

Salem and Beverly Harbors receive the untreated discharge from the South Essex Sewerage District which serves Salem, Beverly, Danvers, and Peabody. A primary treatment plant is about to go on-line; this facility will also serve the Town of Marblehead. The North River receives overflows from sewers and industrial discharges. Many of these will be eliminated in conjunction with the sewerage associated with the SESD wastewater treatment facility.

The Saugus River receives intermittent discharges from a combined sewer overflow in Lynn. Since the weather was dry during the survey, this overflow was probably not operating. Lynn Harbor, which was not sampled, receives untreated wastewater from the City of Lynn.

Surcharging of the sewer system in Gloucester was occurring during the survey and the impact of one such overflow can be noticed at Station NC33. The fish processing plants, which operate seasonally, were unusually busy and the resulting hydraulic load surpassed the sewer system's capacity, causing the surcharging and overflow.

These, and the South Essex Sewerage District discharge, are the only known waste sources that were affecting the stations sampled. Present and anticipated water pollution control facilities are depicted in Figure III.

Non-Point Discharges

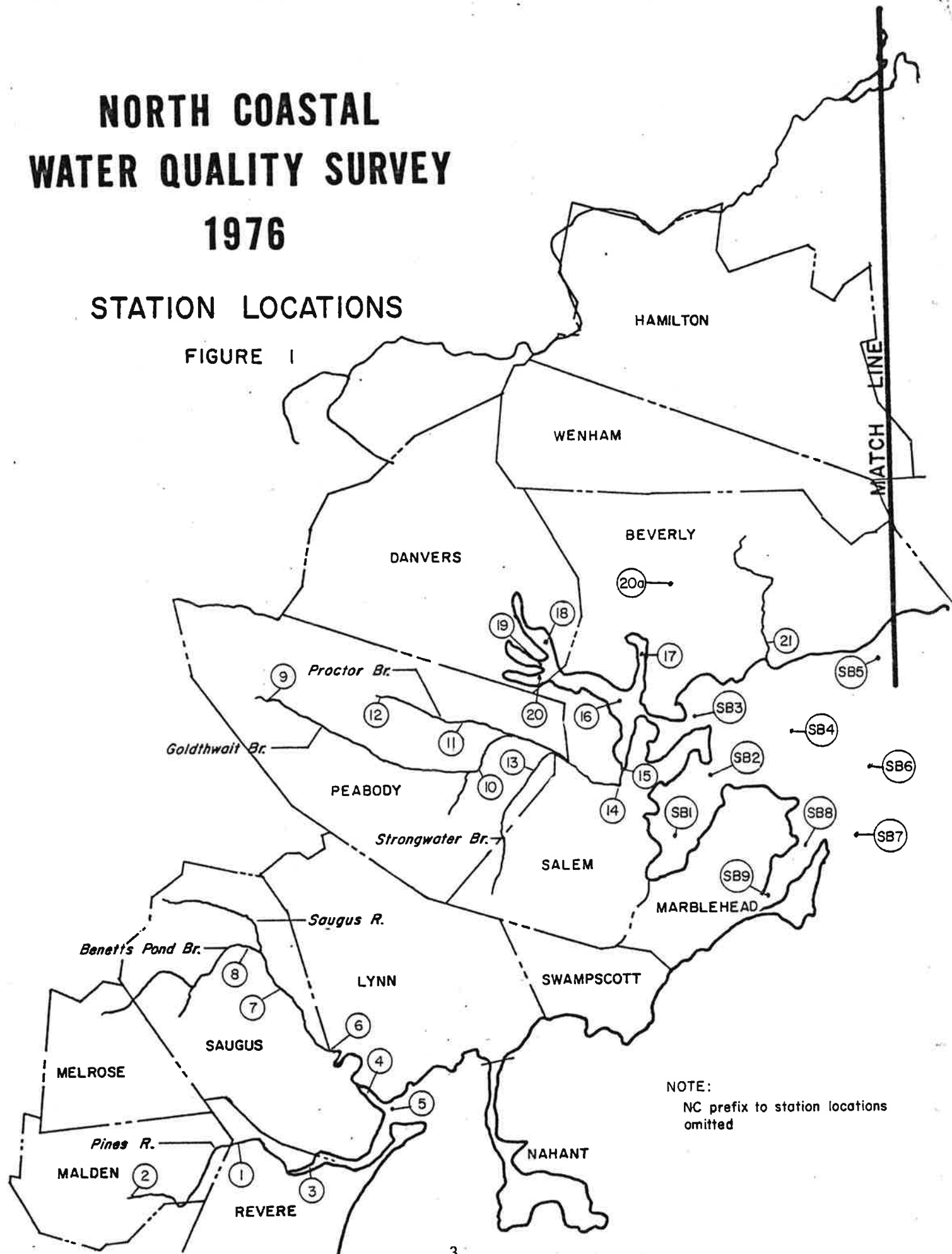
The weather during the survey was dry; therefore, there was no impact from urban runoff. Other sources such as seepage from subsurface disposal systems and/or illicit discharges are suspected, based on the water quality encountered at several stations.

NORTH COASTAL WATER QUALITY SURVEY

1976

STATION LOCATIONS

FIGURE 1



NORTH COASTAL WATER QUALITY SURVEY 1976

STATION LOCATIONS

FIGURE 2

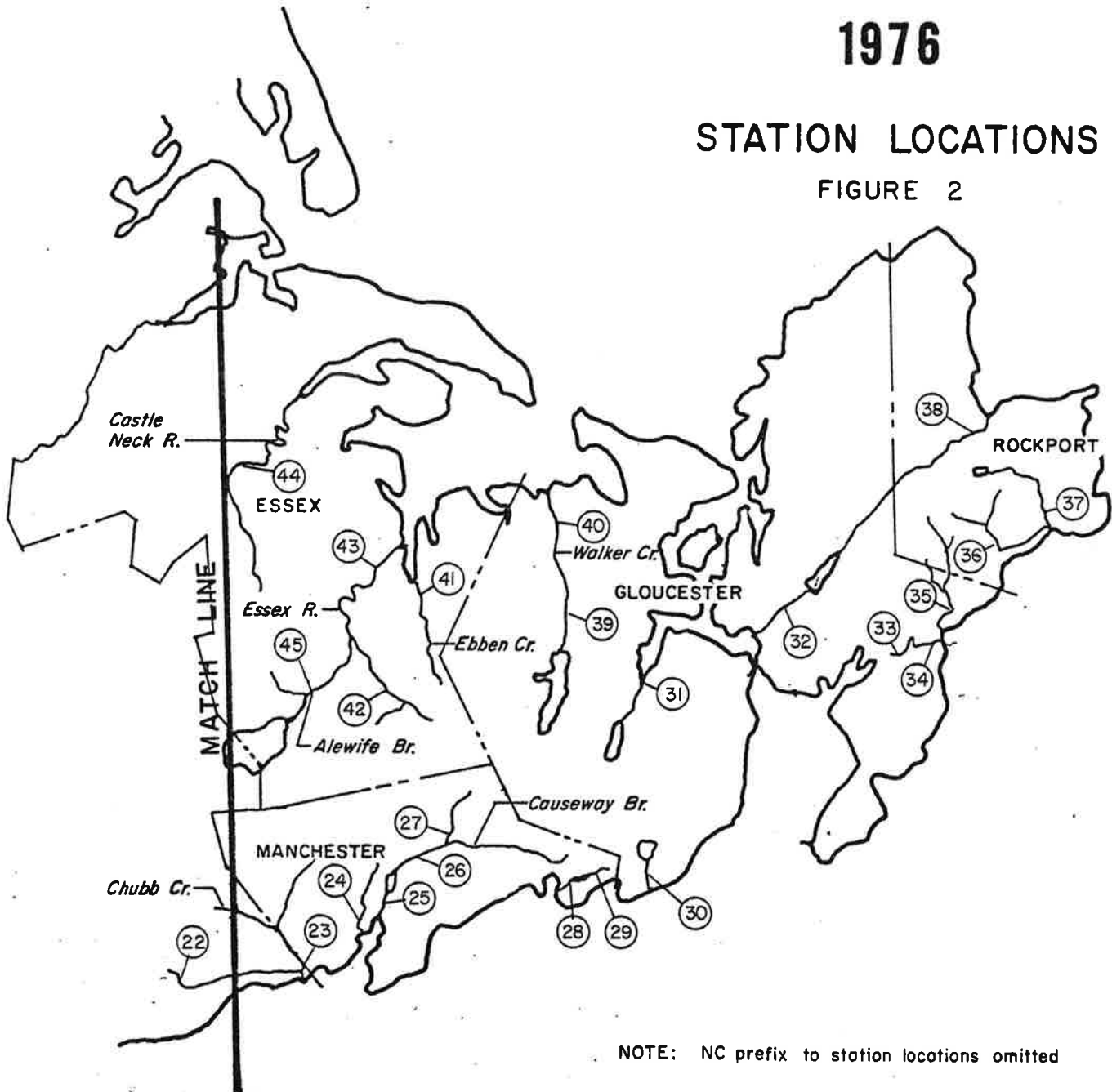


TABLE 1

NORTH COASTAL WATER QUALITY SURVEY

SALEM-BEVERLY-MARBLEHEAD HARBOR STATIONS

JUNE 15, 1976

<u>STATION NUMBER</u>	<u>DESCRIPTION</u>
SB1	Can 3 off Salem Harbor Power Plant, Salem Harbor
SB2	At Fl 4 sec "25" off Winter Island, Salem Harbor
SB3	At can 7 off Rams Horn Rock, Beverly Harbor
SB4	Boil from South Essex Sewerage District Discharge off Great Haste Island, Salem-Beverly Harbor
SB5	At Fl R4 sec in the vicinity of Misery Ledge and Bowditch Ledge, Salem-Beverly Harbor
SB6	Nun 8 in the vicinity of Midchannel Rock, Salem-Beverly Harbor
SB7	Red and Black Nun at Archer Rock, Salem Beverly Harbor
SB8	Vicinity of can 3, mouth of Marblehead Harbor
SB9	Off Boden Point in middle of Marblehead Harbor

TABLE 2

NORTH COASTAL WATER QUALITY SURVEY

LAND SAMPLING STATIONS

JUNE 15 and 17, 1976

<u>STATION NUMBER</u>	<u>DESCRIPTION</u>
NC1	Pines River at Squire Road, Revere
NC2	Pines River at Route 99 (Broadway), Malden
NC3	Pines River at Route 107 (Broadway), Revere-Saugus line
NC4	Saugus River at Route 107, Saugus-Lynn line
NC5	Confluence of Saugus and Pines Rivers at Route 1A, Revere-Saugus line
NC6	Saugus River at Lincoln Avenue, Saugus-Lynn line
NC7	Saugus River at Elm Street, Saugus
NC8A	Bennetts Pond Brook at Lynn Fells Parkway (above gasoline station), Saugus (coliform sample only)
NC8	Bennetts Pond Brook at Lynn Fells Parkway (below gasoline station), Saugus
NC9	Goldthwait Brook at Industrial Park (above General Electric), Peabody
NC10	Goldthwait Brook at Summit Street, Peabody
NC11	Proctor Brook at Endicott Street, Peabody
NC12	Proctor Brook at Lowell Street, Peabody
NC13	Strongwater Brook at Main Street, Peabody
NC14	Strongwater Brook at Bridge Street, Salem
NC15	North River at North Street, Salem
NC16	Danvers River at Liberty Hill Avenue-Kernwood Avenue, Salem-Beverly line
NC17	Bass River at Bridge Street, Beverly
NC18	Porter River at Liberty Street, Danvers
NC19	Crane River at Water Street, Danvers
NC20	Waters River at Water Street, Danvers

TABLE 2

NORTH COASTAL WATER QUALITY SURVEY

LAND SAMPLING STATIONS

JULY 27 and 29, 1976

<u>STATION NUMBER</u>	<u>DESCRIPTION</u>
NC20A	Essex Street, Beverly (Southeast of Hannah School) Drainage from Beverly Landfill
NC21	Hale Street (Route 127), Beverly ; Brook flows into Beverly Cove at Patch Beach
NC22	Oak Street (by Chubbs Brook Lane), Beverly tributary to Chubb Creek
NC23	Hale Street (Route 127), Beverly- Manchester Line Chubb Creek
NC24	Bridge Street (Route 127), Manchester tributary to Manchester Harbor
NC25	Bridge Street (Route 127), Manchester Causeway Brook (upstream side of bridge)
NC26	School Street, Manchester - Causeway Brook
NC27	Lincoln Street, Manchester - tributary to Causeway Brook
NC28	Off Summer Street (Route 127), Manchester - outlet of Clark Pond
NC29	Raymond Street, Manchester - inlet to Clark Pond
NC30	Hesperus Street, Gloucester (Magnolia) - outlet of West Pond
NC31	Essex Avenue (Route 133), Gloucester - stream from Lily Pond at top of fish ladder
NC32	Cherry Road (off Poplar), Gloucester - stream from Babson Reservoir
NC33	Hartz Street (Between Routes 127 & 127A), Gloucester - stream that passes behind Eastern School
NC34	Hache Road (Route 127A), Gloucester - stream that passes behind Eastern School
NC35	Hacke Road (Route 127A), Gloucester - stream that passes Calvary Cemetery
NC36	Thatcher Road (Route 127A), Rockport - stream that passes behind Long Beach
NC37	Thatcher Road (Route 127A), Rockport - stream that flows from Rum Rock Lake
NC38	Between Routes 127 & 127A, Rockport - Mill Brook as it enters Back Harbor

TABLE 2 (Continued)

<u>STATION NUMBER</u>	<u>DESCRIPTION</u>
NC39	Essex Avenue (Route 138), Gloucester - Walker Creek
NC40	Concord Street, Gloucester - Walker Creek
NC41	Eastern Avenue (Route 133), Essex - Ebben Creek
NC42	Grove Street near Apple Street, Essex - Essex River
NC43	Main Street (Route 133), Essex - Essex River
NC44	Wise Avenue (Route 133), Essex - Castle Neck River
NC45	Pond Street, Essex - Alewife Brook

TABLE 3

NORTH COASTAL 1976 WATER QUALITY SURVEY

DISSOLVED OXYGEN (mg/l) - TIME - TEMPERATURE (°F) DATA

STATION		6/15	6/16	6/17	STATION	6/15	6/16	6/17
NC1	*	1037	1015	1035	NC11	1400	1155	1225
	**	73	70	72		77	76	71
	***	8.7	3.5	3.2		9.6	8.9	8.4
NC2		1052	1005	1023	NC12	1410	1205	1234
		67	70	63		75	73	71
		5.9	5.6	4.4		9.0	8.6	7.5
NC3		1112	1025	1045	NC13	1430	1231	1320
		66	71	70		78	78	72
		6.7	5.8	6.3		5.9	5.7	5.7
NC4		1125	1032	1052	NC14	1440	1238	1329
		68	74	72		80	79	72
		6.6	5.4	5.0		6.1	4.3	3.7
NC5		1140	1043	1107	NC15	1445	1245	1355
		62	68	70		67	74	67
		7.7	6.4	5.8		7.4	6.7	6.7
NC6		1155	1057	1122	NC16	1500	1253	1405
		70	76	74		62	61	58
		6.4	12.5	9.4		8.5	8.1	8.2
NC7		1230	1104	1133	NC17	1505	1259	1414
		74	76	73		66	68	64
		9.7	9.1	7.8		7.7	7.9	7.9
NC8		1300	1117	1145	NC18	1520	1314	1424
		68	67	65		68	71	69
		7.3	6.7	6.5		8.1	7.3	7.3
NC9		1325	1138	1202	NC19	1530	1320	1429
		74	74	72		68	70	68
		5.5	5.0	4.7		7.6	7.1	7.1
NC10		1335	1140	1211	NC20	1535	1327	1436
		72	72	72		65	66	63
		7.3	6.9	6.6		8.0	7.8	6.5

* Time
 ** Temperature
 *** Dissolved Oxygen

TABLE 3 (CONTINUED)

NORTH COASTAL 1976 WATER QUALITY SURVEY
DISSOLVED OXYGEN (mg/l) - TIME - TEMPERATURE (°F) DATA

STATION	7/27	7/29	STATION	7/27	7/29
NC21	0955 64 7.5	0955 65 7.8	NC33	1145 69 0.0	1145 72 0.0
NC22	1005 62 5.4	1005 64 6.3	NC34	1150 60 8.8	1200 71 11.1
NC23	1015 63 8.0	1015 63 8.0	NC35	1200 64 8.1	1205 69 6.3
NC24	1025 68 9.1	1020 68 9.9	NC36	1218 68 5.5	1210 74 7.8
NC25	1030 72 9.0	1025 78 10.0	NC37	1225 66 8.0	1220 72 8.1
NC26	1035 67 8.3	1030 67 8.6	NC38	1235 69 5.3	1230 69 5.5
NC27	1045 68 7.0	1040 70 6.4	NC39	1300 72 4.7	1305 70 6.7
NC28	1055 76 5.0	1045 74 8.3	NC40	1310 69 6.9	1315 69 7.3
NC29	1100 70 10.3	1055 70 11.7	NC41	1320 69 6.4	1325 69 6.5
NC30	1110 66 5.4	1115 69 3.5	NC42	1335 69 7.2	1335 69 7.2
NC31	1120 70 9.1	1130 74 12.8	NC43	1342 70 5.8	1345 70 7.8
NC32	1130 68 8.6	1140 68 8.8	NC44	1350 74 10.2	1355 76 13.3

TABLE 4

NORTH COASTAL 1976 WATER QUALITY SURVEY

BOD₅ (mg/l)

STATION	6/15/76	6/17/76	STATION	7/27/76	7/29/76
NC1	3.0	0.6	NC21	3.4	2.0
NC2	2.8	13.	NC22	3.2	3.0
NC3	2.4	1.8	NC23	0.8	1.4
NC4	1.8	2.4	NC24	0.4	2.0
NC5	2.4	2.6	NC25	3.4	2.2
NC6	2.4	5.7	NC26	1.6	3.4
NC7	0.8	1.5	NC27	2.4	2.2
NC8	2.4	2.4	NC28	2.4	1.8
NC8A	---	---	NC29	1.6	2.0
NC9	3.6	1.8	NC30	2.6	2.8
NC10	4.0	3.6	NC31	1.2	4.4
NC11	3.4	3.6	NC32	1.4	3.4
NC12	3.8	2.1	NC33	300.	414.
NC13	6.0	8.7	NC34	1.8	8.6
NC14	15.	14.	NC35	2.4	3.4
NC15	2.2	4.0	NC36	4.0	4.2
NC16	1.0	2.0	NC37	3.0	3.6
NC17	1.6	3.2	NC38	6.0	3.6
NC18	2.4	2.8	NC39	2.8	2.4
NC19	2.4	0.8	NC40	2.6	3.0
NC20	1.6	3.0	NC41	2.0	1.6
			NC42	1.4	2.8
			NC43	2.4	3.0
			NC44	2.8	4.6

TABLE 5

NORTH COASTAL 1976 WATER QUALITY SURVEY

COD (mg/l)

STATION	7/27/76	7/29/76	STATION	7/27/76	7/29/76
NC21	13	21	NC33	--	--
NC22	21	25	NC34	--	--
NC23	20	39	NC35	--	--
NC24	--	--	NC36	--	--
NC25	--	--	NC37	--	--
NC26	34	37	NC38	38	21
NC27	38	25	NC39	30	29
NC28	--	--	NC40	--	--
NC29	30	29	NC41	--	--
NC30	47	33	NC42	13	8.3
NC31	17	37	NC43	--	--
NC32	21	25	NC44	--	--

TABLE 6
NORTH COASTAL 1976 WATER QUALITY SURVEY
pH (std. units)

STATION	6/15/76	6/17/76	STATION	7/27/76	7/29/76
NC1	7.6	7.1	NC21	7.2	7.3
NC2	7.2	6.9	NC22	7.2	7.2
NC3	7.9	7.7	NC23	7.1	7.3
NC4	7.9	7.6	NC24	7.1	7.2
NC5	8.1	7.7	NC25	7.2	7.4
NC6	7.6	7.6	NC26	7.1	7.2
NC7	7.7	7.4	NC27	7.0	7.1
NC8	7.7	6.9	NC28	7.6	7.9
NC8A	---	---	NC29	7.3	7.3
NC9	7.2	6.8	NC30	7.1	7.3
NC10	7.1	6.8	NC31	6.9	7.0
NC11	7.5	7.3	NC32	7.3	7.5
NC12	7.4	7.1	NC33	6.8	6.9
NC13	7.6	7.3	NC34	7.9	7.7
NC14	7.4	7.0	NC35	7.8	7.5
NC15	8.1	7.0	NC36	7.3	7.5
NC16	8.2	7.8	NC37	8.0	7.7
NC17	8.1	7.9	NC38	7.0	7.5
NC18	8.1	7.8	NC39	6.7	7.2
NC19	8.1	7.7	NC40	7.7	7.9
NC20	7.9	7.8	NC41	7.7	7.6
			NC42	7.3	7.5
			NC43	7.6	7.6
			NC44	7.7	7.6

TABLE 7
NORTH COASTAL 1976 WATER QUALITY SURVEY
TOTAL ALKALINITY (mg/l)

STATION	6/15/76	6/17/76	STATION	7/27/76	7/29/76
NC1	97	109	NC21	27	27
NC2	112	120	NC22	29	29
NC3	112	110	NC23	25	28
NC4	110	108	NC24	57	55
NC5	110	112	NC25	34	78
NC6	87	88	NC26	20	20
NC7	88	52	NC27	16	24
NC8	52	47	NC28	77	63
NC8A	---	---	NC29	25	25
NC9	35	37	NC30	40	37
NC10	35	38	NC31	7.0	7.0
NC11	66	72	NC32	24	24
NC12	67	68	NC33	148	141
NC13	101	115	NC34	110	115
NC14	103	111	NC35	114	112
NC15	111	94	NC36	103	89
NC16	113	108	NC37	111	109
NC17	112	109	NC38	27	28
NC18	110	108	NC39	11	12
NC19	110	116	NC40	106	106
NC20	107	113	NC41	107	112
			NC42	22	19
			NC43	108	111
			NC44	92	78

TABLE 8
NORTH COASTAL 1976 WATER QUALITY SURVEY
SUSPENDED SOLIDS (mg/l)

STATION	6/15/76	6/17/76	STATION	7/27/76	7/29/76
NC1	7.5	16	NC21	3.5	2.0
NC2	11	26	NC22	6.0	3.5
NC3	10	17	NC23	5.0	7.0
NC4	10	7.5	NC24	3.0	2.0
NC5	11	10	NC25	6.0	9.5
NC6	16	17	NC26	6.0	23
NC7	4.5	5.5	NC27	5.5	12
NC8	2.0	7.5	NC28	5.5	5.0
NC8A	--	--	NC29	10	9.0
NC9	3.0	5.0	NC30	24	14
NC10	10	10	NC31	5.0	37
NC11	6.0	36	NC32	7.5	1.0
NC12	24	16	NC33	366	33
NC13	7.0	9.0	NC34	10	21
NC14	7.0	6.5	NC35	6.5	6.0
NC15	2.5	6.0	NC36	4.0	5.5
NC16	1.5	3.5	NC37	3.0	5.0
NC17	2.0	4.0	NC38	6.0	2.0
NC18	6.5	3.5	NC39	6.0	32
NC19	6.0	2.5	NC40	7.5	9.0
NC20	5.0	4.5	NC41	4.5	5.5
			NC42	16	17
			NC43	4.5	4.5
			NC44	5.5	4.5

TABLE 9

NORTH COASTAL 1976 WATER QUALITY SURVEY

TOTAL KJELDAHL-N (mg/l)

STATION	7/27/76	7/29/76	STATION	7/27/76	7/29/76
NC21	0.56	0.00	NC33	40.	17.
NC22	0.56	0.56	NC34	0.36	0.78
NC23	0.56	0.45	NC35	0.42	0.56
NC24	0.56	0.56	NC36	0.10	0.22
NC25	0.70	0.67	NC37	0.06	0.08
NC26	0.42	0.56	NC38	0.56	1.1
NC27	0.56	0.45	NC39	0.56	0.45
NC28	0.84	0.67	NC40	0.56	0.20
NC29	0.56	0.45	NC41	0.42	0.45
NC30	2.1	2.4	NC42	0.56	0.22
NC31	0.00	0.67	NC43	0.56	0.56
NC32	0.42	0.45	NC44	0.84	0.09

TABLE 10
NORTH COASTAL 1976 WATER QUALITY SURVEY
AMMONIA-N (mg/l)

STATION	6/15/76	6/17/76	STATION	7/27/76	7/29/76
NC1	0.29	0.43	NC21	0.00	0.00
NC2	1.0	1.3	NC22	0.04	0.8
NC3	0.23	0.25	NC23	0.10	0.13
NC4	0.20	0.33	NC24	0.06	0.07
NC5	0.14	0.24	NC25	0.02	0.05
NC6	0.16	0.08	NC26	0.01	0.00
NC7	0.02	0.03	NC27	0.00	0.04
NC8	0.09	0.10	NC28	0.11	0.10
NC8A	---	---	NC29	0.09	0.07
NC9	1.0	0.45	NC30	1.5	1.3
NC10	0.13	0.10	NC31	0.00	0.01
NC11	0.00	0.03	NC32	0.08	0.06
NC12	0.14	0.14	NC33	13.	12.
NC13	4.5	4.8	NC34	0.36	0.36
NC14	0.86	0.70	NC35	0.09	0.09
NC15	0.65	0.35	NC36	0.10	0.22
NC16	0.27	0.15	NC37	0.06	0.08
NC17	0.24	0.13	NC38	0.12	0.08
NC18	0.21	0.38	NC39	0.18	0.23
NC19	0.23	0.38	NC40	0.08	0.20
NC20	0.20	0.38	NC41	0.06	0.09
			NC42	0.02	0.00
			NC43	0.06	0.11
			NC44	0.04	0.09

TABLE 11
NORTH COASTAL 1976 WATER QUALITY SURVEY
NITRITE-N (mg/l)

STATION	7/27/76	7/29/76	STATION	7/27/76	7/29/76
NC21	0.004	0.005	NC33	0.009	0.000
NC22	0.028	0.023	NC34	0.001	0.017
NC23	0.030	0.033	NC35	0.002	0.006
NC24	0.006	0.006	NC36	0.006	0.004
NC25	0.003	0.006	NC37	0.001	0.000
NC26	0.011	0.014	NC38	0.042	0.032
NC27	0.011	0.019	NC39	0.005	0.008
NC28	0.001	0.007	NC40	0.001	0.000
NC29	0.034	0.031	NC41	0.001	0.002
NC30	0.036	0.045	NC42	0.002	0.004
NC31	0.003	0.004	NC43	0.002	0.002
NC32	0.004	0.003	NC44	0.005	0.000

TABLE 12
NORTH COASTAL 1976 WATER QUALITY SURVEY
NITRATE-N (mg/l)

STATION	6/15/76	6/17/76	STATION	7/27/76	7/29/76
NC1	0.0	0.0	NC21	0.6	0.9
NC2	0.5	0.1	NC22	1.3	1.6
NC3	0.0	0.0	NC23	1.8	2.6
NC4	0.0	0.0	NC24	0.0	0.0
NC5	0.0	0.0	NC25	0.0	0.0
NC6	0.0	0.0	NC26	0.8	1.4
NC7	0.3	0.3	NC27	0.7	1.0
NC8	1.0	1.3	NC28	0.0	0.1
NC8A	---	---	NC29	1.4	1.9
NC9	1.0	0.7	NC30	1.0	1.2
NC10	1.6	1.3	NC31	0.0	0.0
NC11	1.3	1.4	NC32	0.5	0.5
NC12	1.1	1.0	NC33	0.2	0.1
NC13	0.9	0.5	NC34	0.0	0.0
NC14	0.4	0.7	NC35	0.0	0.0
NC15	0.0	0.0	NC36	0.0	0.0
NC16	0.0	0.0	NC37	0.0	0.0
NC17	0.0	0.0	NC38	0.4	0.6
NC18	0.0	0.0	NC39	0.1	0.2
NC19	0.0	0.0	NC40	0.0	0.0
NC20	0.0	0.0	NC41	0.0	0.0
			NC42	0.2	0.2
			NC43	0.0	0.0
			NC44	0.0	0.0

TABLE 13
NORTH COASTAL 1976 WATER QUALITY SURVEY
TOTAL PHOSPHORUS as P (mg/l)

STATION	6/15/76	6/17/76	STATION	7/27/76	7/29/76
NC1	0.08	0.07	NC21	0.03	0.03
NC2	0.08	0.14	NC22	0.05	0.06
NC3	0.17	0.05	NC23	0.04	0.03
NC4	0.09	0.15	NC24	0.04	0.07
NC5	0.07	0.07	NC25	0.06	0.04
NC6	0.11	0.15	NC26	0.05	0.12
NC7	0.05	0.04	NC27	0.06	0.06
NC8	0.10	0.10	NC28	0.05	0.03
NC8A	---	---	NC29	0.03	0.02
NC9	0.04	0.02	NC30	0.07	0.04
NC10	0.08	0.05	NC31	0.04	0.06
NC11	0.08	0.07	NC32	0.03	0.01
NC12	0.14	0.09	NC33	13.	9.0
NC13	0.52	0.70	NC34	0.04	0.20
NC14	0.41	0.35	NC35	0.06	0.08
NC15	0.03	0.08	NC36	0.06	0.05
NC16	0.04	0.02	NC37	0.03	0.06
NC17	0.06	0.05	NC38	0.06	0.04
NC18	0.06	0.06	NC39	0.05	0.05
NC19	0.07	0.04	NC40	0.05	0.05
NC20	0.05	0.04	NC41	0.06	0.05
			NC42	0.08	0.06
			NC43	0.08	0.05
			NC44	0.11	0.12

TABLE 14

NORTH COASTAL 1976 WATER QUALITY SURVEY

ORTHO-P (mg/l)

STATION	7/27/76	7/29/76	STATION	7/27/76	7/29/76
NC21	0.03	0.01	NC33	13.0	7.5
NC22	0.05	0.02	NC34	0.04	0.08
NC23	0.04	0.02	NC35	0.06	0.05
NC24	0.04	0.04	NC36	0.06	0.02
NC25	0.06	0.02	NC37	0.03	0.03
NC26	0.05	0.02	NC38	0.02	0.02
NC27	0.06	0.01	NC39	0.03	0.04
NC28	0.05	0.01	NC40	0.03	0.03
NC29	0.03	0.01	NC41	0.03	0.03
NC30	0.07	0.02	NC42	0.02	0.03
NC31	0.04	0.03	NC43	0.04	0.03
NC32	0.03	0.01	NC44	0.06	0.07

TABLE 15

NORTH COASTAL 1976 WATER QUALITY SURVEY

TOTAL COLIFORM (/100 ml.)

STATION	6/15/76	6/17/76	STATION	7/27/76	7/29/76
NC1	930	1,500	NC21	1,500	500
NC2	24,000	43,000	NC22	430	750
NC3	91	430	NC23	1,500	1,000
NC4	4,300	43,000	NC24	3,900	12,000
NC5	<36	24,000	NC25	2,400	1,000
NC6	9,300	4,300	NC26	4,600	750
NC7	930	230	NC27	4,600	3,000
NC8	24,000	930	NC28	36	2,000
NC8A	2,400	24,000	NC29	2,400	1,000
NC9	930	430	NC30	36	100
NC10	7,500	230	NC31	430	800
NC11	2,400	24,000	NC32	930	200
NC12	4,300	930	NC33	2.4×10^6	2.4×10^6
NC13	93,000	43,000	NC34	930	20,000
NC14	240,000	930,000	NC35	390	2,600
NC15	230	24,000	NC36	230	1,000
NC16	36	230	NC37	91	100
NC17	150	230	NC38	2,400	400
NC18	<36	91	NC39	46,000	30,000
NC19	91	150	NC40	91	<10
NC20	230	230	NC41	36	100
			NC42	2,400	1,100
			NC43	91	1,000
			NC44	430	2,000

TABLE 16

NORTH COASTAL 1976 WATER QUALITY SURVEY

FECAL COLIFORM (/100 ml.)

STATION	6/15/76	6/17/76	STATION	7/27/76	7/29/76
NC1	91	150	NC21	150	30
NC2	430	4,300	NC22	150	40
NC3	<36	91	NC23	230	60
NC4	750	15,000	NC24	430	500
NC5	<36	230	NC25	930	200
NC6	930	2,400	NC26	150	90
NC7	91	36	NC27	150	450
NC8	2,400	430	NC28	<36	250
NC8A	2,400	4,300	NC29	430	200
NC9	930	430	NC30	<36	20
NC10	230	230	NC31	230	40
NC11	2,400	4,300	NC32	91	<10
NC12	930	930	NC33	2.4×10^6	1.1×10^6
NC13	24,000	24,000	NC34	430	2,000
NC14	93,000	240,000	NC35	230	200
NC15	91	2,400	NC36	91	60
NC16	<36	91	NC37	36	20
NC17	<36	36	NC38	36	20
NC18	<36	91	NC39	7,500	2,000
NC19	36	36	NC40	<36	<5
NC20	<36	<36	NC41	36	20
			NC42	91	<5
			NC43	91	20
			NC44	150	20

TABLE 17
NORTH COASTAL 1976 WATER QUALITY SURVEY
TURBIDITY (JTU)

STATION	6/15/76	6/17/76	STATION	7/27/76	7/29/76
NC1	10	10	NC21	2	2
NC2	24	32	NC22	3	4
NC3	2	3	NC23	2	3
NC4	2	3	NC24	3	3
NC5	1	2	NC25	4	3
NC6	4	5	NC26	6	4
NC7	3	2	NC27	7	8
NC8	4	4	NC28	2	2
NC8A	--	--	NC29	3	4
NC9	1	1	NC30	7	6
NC10	2	2	NC31	6	6
NC11	4	4	NC32	5	3
NC12	5	4	NC33	175	64
NC13	5	10	NC34	1	4
NC14	10	8	NC35	1	2
NC15	1	2	NC36	1	1
NC16	1	1	NC37	0	1
NC17	1	2	NC38	4	5
NC18	1	2	NC39	2	3
NC19	2	2	NC40	2	2
NC20	1	2	NC41	1	2
			NC42	1	2
			NC43	1	2
			NC44	3	3

TABLE 18
NORTH COASTAL 1976 WATER QUALITY SURVEY
COLOR (std. units)

STATION	6/15/76	6/17/76	STATION	7/27/76	7/29/76
NC1	25	25	NC21	35	45
NC2	15	30	NC22	30	40
NC3	15	20	NC23	25	45
NC4	15	15	NC24	20	30
NC5	10	10	NC25	25	35
NC6	25	25	NC26	35	30
NC7	35	30	NC27	50	50
NC8	40	35	NC28	45	60
NC8A	--	--	NC29	25	30
NC9	40	35	NC30	45	35
NC10	35	30	NC31	10	25
NC11	30	20	NC32	10	15
NC12	25	20	NC33	*	**
NC13	40	25	NC34	0	40
NC14	20	20	NC35	0	30
NC15	10	5	NC36	50	30
NC16	5	0	NC37	0	15
NC17	5	5	NC38	30	50
NC18	10	5	NC39	25	25
NC19	10	5	NC40	0	5
NC20	10	0	NC41	10	10
			NC42	20	20
			NC43	20	10
			NC44	45	50

*Dark gray.

**Light gray.

TABLE 19
NORTH COASTAL 1976 WATER QUALITY SURVEY
CHLORIDES (mg/l)

STATION	6/15/76	6/17/76	STATION	7/27/76	7/29/76
NC1	3,250	8,500	NC21	22	22
NC2	102	97	NC22	48	46
NC3	17,000	15,250	NC23	430	750
NC4	16,250	14,250	NC24	4,500	4,750
NC5	16,500	16,500	NC25	1,750	7,750
NC6	9,000	3,250	NC26	57	57
NC7	74	54	NC27	64	33
NC8	57	54	NC28	8,750	6,500
NC8A	---	---	NC29	46	47
NC9	73	56	NC30	38	40
NC10	80	73	NC31	14	12
NC11	57	120	NC32	30	19
NC12	112	110	NC33	8,550	4,000
NC13	68	70	NC34	16,000	14,250
NC14	3,000	1,270	NC35	15,500	14,250
NC15	17,000	12,500	NC36	15,750	15,250
NC16	16,250	13,500	NC37	15,250	15,750
NC17	16,500	16,000	NC38	61	40
NC18	17,250	16,250	NC39	32	30
NC19	16,000	15,750	NC40	15,750	16,500
NC20	15,750	16,250	NC41	15,250	16,250
			NC42	27	24
			NC43	15,250	14,500
			NC44	15,500	13,500

TABLE 20
NORTH COASTAL 1976 WATER QUALITY SURVEY
TOTAL SOLIDS (mg/l)

STATION	6/15/76	6/17/76	STATION	6/15/76	6/17/76
NC1	9,950	33,170	NC11	214	414
NC2	206	400	NC12	214	366
NC3	31,600	33,250	NC13	178	210
NC4	29,380	30,280	NC14	6,510	2,550
NC5	32,020	33,580	NC15	31,450	32,320
NC6	16,590	12,500	NC16	31,920	35,050
NC7	140	280	NC17	31,370	33,950
NC8	186	220	NC18	31,010	31,620
NC9	204	192	NC19	30,690	40,260
NC10	110	192	NC20	29,920	31,840

TABLE 21
NORTH COASTAL 1976 WATER QUALITY SURVEY
IRON (mg/l)

STATION	7/27/76	7/29/76	STATION	7/27/76	7/29/76
NC21	0.60	0.65	NC33	1.5	1.6
NC22	1.0	1.0	NC34	0.20	0.55
NC23	0.36	0.40	NC35	0.25	0.50
NC24	0.62	0.60	NC36	0.30	0.40
NC25	0.34	0.30	NC37	0.18	0.25
NC26	0.87	0.75	NC38	1.0	1.0
NC27	1.0	1.2	NC39	0.60	0.75
NC28	0.20	0.30	NC40	0.25	0.25
NC29	0.35	0.25	NC41	0.25	0.25
NC30	2.4	1.0	NC42	0.60	0.27
NC31	0.50	0.75	NC43	0.25	0.25
NC32	0.70	0.34	NC44	0.45	0.45

TABLE 22

NORTH COASTAL 1976 WATER QUALITY SURVEY

DISSOLVED OXYGEN (mg/l) - TIME - TEMPERATURE (°F) - DEPTH (ft.)

June 15, 1976

STATION	Low Tide			High Tide		
	SAMPLE DEPTH	VALUES	SECCHI DEPTH	SAMPLE DEPTH	VALUES	SECCHI DEPTH
SB01	Surface	* 0815	--	Surface	1300	11.5
		** 59			64	
		*** 8.7			8.3	
SB02	Surface	0835	--	Surface	1310	--
		60			62	
		8.9			8.5	
SB02	20'	0835	--	25'	1310	--
		58			60	
		8.7			8.5	
SB03	Surface	0845	6.5	Surface	1330	20
		62			60	
		7.6			8.7	
	20'	0845	--	20'	1330	--
		60			56	
		7.7			8.9	
SB04	Surface	--	2	Surface	1500	1.5
		57			58	
		6.1			5.3	
	20'	--	--	25'	1500	--
		54			57	
		9.1			9.0	
SB05	Surface	0905	--	Surface	1350	11
		56			60	
		8.9			8.8	
SB05	30'	0905	--	30'	1350	--
		54			52	
		8.9			8.9	
SB06	Surface	0925	--	Surface	1405	12
		58			60	
		9.0			8.8	
	40'	0925	13	50'	1405	--
		52			52	
		9.1			8.2	

* Time

** Temperature

*** Dissolved Oxygen

TABLE 22 (Continued)

STATION	SAMPLE DEPTH	VALUES	SECCHI DEPTH	SAMPLE DEPTH	VALUES	SECCHI DEPTH
SB07	Surface	0935	--	Surface	1415	14
		56			60	
		8.7			8.9	
	20'	0935	--	25'	1415	--
		54			53	
		8.9			9.2	
SB08	Surface	0950	16	Surface	1425	15
		56			58	
		5.3			9.1	
	27'	0950	--	35'	1425	--
		52			54	
		8.9			8.6	
SB09	Surface	1005	15	Surface	1440	16
		56			58	
		9.0			9.2	
	20'	1005	--	16'	1440	--
		--			54	
		9.1			9.7	

TABLE 23
NORTH COASTAL 1976 WATER QUALITY SURVEY

BOD₅ (mg/l)

<u>STATION</u>	<u>LOW TIDE</u>	<u>HIGH TIDE</u>
SB1	1.6	1.5
SB2	1.3	1.1
SB3	1.2	1.2
SB4*	68.0	---
SB4**	1.1	---
SB5	1.2	0.8
SB6	0.5	0.3
SB7	0.7	0.2
SB8	0.4	0.6
SB9	0.5	---

pH (std. units)

<u>STATION</u>	<u>LOW TIDE</u>	<u>HIGH TIDE</u>
SB1	8.0	7.9
SB2	7.9	8.0
SB3	7.9	7.9
SB4*	8.0	---
SB4**	8.0	---
SB5	8.0	7.9
SB6	8.0	7.9
SB7	8.0	7.9
SB8	7.9	8.0
SB9	7.9	---

SB4* - Low tide, surface sample

SB4** - Low tide, mid-depth sample

TABLE 24
NORTH COASTAL 1976 WATER QUALITY SURVEY
CHLORIDES (mg/l)

<u>STATION</u>	<u>LOW TIDE</u>	<u>HIGH TIDE</u>
SB1	14,250	17,000
SB2	15,750	16,000
SB3	16,000	10,500
SB4*	16,250	---
SB4**	13,750	---
SB5	15,250	15,000
SB6	15,000	16,000
SB7	16,750	16,750
SB8	17,000	16,250
SB9	17,000	---

SB4* - Low tide, surface sample

SB4** - Low tide, mid-depth sample

TABLE 25
NORTH COASTAL 1976 WATER QUALITY SURVEY
TOTAL SOLIDS (mg/l)

<u>STATION</u>	<u>LOW TIDE</u>	<u>HIGH TIDE</u>
SB1	32,040	31,150
SB2	31,450	31,410
SB3	31,230	30,730
SB4*	28,240	---
SB4**	31,650	---
SB5	31,160	32,260
SB6	31,370	31,630
SB7	31,480	30,950
SB8	32,070	31,460
SB9	30,640	---

SUSPENDED SOLIDS (mg/l)

<u>STATION</u>	<u>LOW TIDE</u>	<u>HIGH TIDE</u>
SB1	4.5	2.5
SB2	1.5	3.5
SB3	9.0	1.5
SB4*	79.	---
SB4**	3.0	---
SB5	0.5	2.0
SB6	0.5	1.0
SB7	2.0	0.5
SB8	2.5	4.0
SB9	4.5	---

SB4* - Low tide, surface sample

SB4** - Low tide, mid-depth sample

TABLE 26
NORTH COASTAL 1976 WATER QUALITY SURVEY
TOTAL ALKALINITY (mg/l)

<u>STATION</u>	<u>LOW TIDE</u>	<u>HIGH TIDE</u>
SB1	110	109
SB2	110	110
SB3	108	111
SB4*	137	---
SB4**	109	---
SB5	114	107
SB6	110	111
SB7	107	109
SB8	107	110
SB9	106	---

TOTAL PHOSPHORUS as P (mg/l)

<u>STATION</u>	<u>LOW TIDE</u>	<u>HIGH TIDE</u>
SB1	0.04	0.03
SB2	0.05	0.02
SB3	0.05	0.01
SB4*	0.30	---
SB4**	0.03	---
SB5	0.03	0.05
SB6	0.02	0.02
SB7	0.03	0.02
SB8	0.02	0.03
SB9	0.01	---

SB4* - Low tide, surface sample

SB4** - Low tide, mid-depth sample

TABLE 27
NORTH COASTAL 1976 WATER QUALITY SURVEY
AMMONIA-N (mg/l)

<u>STATION</u>	<u>LOW TIDE</u>	<u>HIGH TIDE</u>
SB1	0.18	0.11
SB2	0.16	0.10
SB3	0.18	0.10
SB4*	1.7	---
SB4**	0.14	---
SB5	0.18	0.11
SB6	0.09	0.12
SB7	0.11	0.14
SB8	0.07	0.07
SB9	0.07	---

NITRATE-N (mg/l)

<u>STATION</u>	<u>LOW TIDE</u>	<u>HIGH TIDE</u>
SB1	0.0	0.0
SB2	0.0	0.0
SB3	0.0	0.0
SB4*	0.1	---
SB4**	0.0	---
SB5	0.0	0.0
SB6	0.0	0.0
SB7	0.0	0.0
SB8	0.0	0.0
SB9	0.0	---

SB4* - Low tide, surface sample

SB4** - Low tide, mid-depth sample

TABLE 28
NORTH COASTAL 1976 WATER QUALITY SURVEY
TURBIDITY (JTU)

<u>STATION</u>	<u>LOW TIDE</u>	<u>HIGH TIDE</u>
SB1	1	1
SB2	1	1
SB3	1	0
SB4*	9	--
SB4**	1	--
SB5	1	1
SB6	1	0
SB7	0	0
SB8	0	0
SB9	0	--

COLOR (std. units)

<u>STATION</u>	<u>LOW TIDE</u>	<u>HIGH TIDE</u>
SB1	10	0
SB2	5	0
SB3	5	0
SB4*	25	--
SB4**	0	--
SB5	0	0
SB6	0	0
SB7	0	0
SB8	0	0
SB9	0	--

SB4* - Low tide, surface sample

SB4** - Low tide, mid-depth sample

TABLE 29
NORTH COASTAL 1976 WATER QUALITY SURVEY
TOTAL COLIFORM (per 100 ml.)

<u>STATION</u>	<u>DEPTH</u>	<u>LOW TIDE</u>	<u>DEPTH</u>	<u>HIGH TIDE</u>
SB1	Surface	91	Surface	36
SB2	Surface	230	Surface	<36
	20'	2,400	25'	36
SB3*	Surface	930	Surface	36
	--	---	20'	230
SB4	Surface	2.4×10^7	Surface	93,000
	20'	230	25'	430
SB5	Surface	2,400	Surface	430
	30'	230	30'	<36
SB6	Surface	230	Surface	91
	40'	<36	50'	<36
SB7	Surface	36	Surface	<36
	20'	<36	Bottom	<36
SB8	Surface	<36	Surface	<36
	27'	<36	35'	<36
SB9	Surface	<36	Surface	<36
	20'	<36	30'	<36

*SB3 - High tide, 35' depth - 91/100 ml

TABLE 30
NORTH COASTAL 1976 WATER QUALITY SURVEY
FECAL COLIFORM (per 100 ml.)

<u>STATION</u>	<u>DEPTH</u>	<u>LOW TIDE</u>	<u>DEPTH</u>	<u>HIGH TIDE</u>
SB1	Surface	<36	Surface	<36
SB2	Surface	<36	Surface	<36
	20'	36	25'	<36
SB3*	Surface	230	Surface	<36
	--	--	20'	91
SB4	Surface	9.3×10^6	Surface	24,000
	20'	230	25'	91
SB5	Surface	230	Surface	36
	30'	36	30'	<36
SB6	Surface	36	Surface	<36
	40'	<36	50'	<36
SB7	Surface	<36	Surface	<36
	20'	<36	Bottom	<36
SB8	Surface	<36	Surface	<36
	27'	<36	35'	<36
SB9	Surface	<36	Surface	<36
	20'	<36	30'	<36

*SB3 - High tide 35' depth. - 36/100 ml

TABLE 31
NORTH COASTAL 1976 WATER QUALITY SURVEY

FLOW DATA

<u>STATION</u>	<u>DATE</u>	<u>FLOW (cfs)</u>
NC7	June 15	3.5
NC7	June 17	3.2
NC8	June 15	0.5
NC9	June 14	0.9
NC9	June 17	1.1
NC10	June 14	1.6
NC10	June 17	2.5
NC11	June 14	1.3
NC11	June 17	1.3
NC12	June 14	0.7
NC12	June 17	0.9
NC13	June 14	2.8
NC13	June 17	2.4

ANALYSIS OF WASTEWATER DISCHARGES

1975 - 1977

Wastewater discharges were sampled during the periods of March 15-17, 1976 and January 26-29, 1977. Samples were collected from both inland discharges as well as outfalls to harbors and coastal areas. Techniques for sampling alternated between the use of automatic equipment during 24-hour periods and grab sampling.

All samples were conveyed to the Lawrence Experiment Station of the Massachusetts Department of Environmental Quality Engineering for chemical analysis, except for dissolved oxygen determinations, which were performed by Division personnel using the Azide-Iodometric modification of the Winkler titration method. All analyses were performed in accordance with the A.P.H.A.'s Standard Methods for the Examination of Water and Wastewater (Thirteenth Edition 1971, New York).

The major discharges from municipalities in the North Coastal Basin are in Rockport, Marblehead, Nahant, Southern Essex Sewerage District, Beverly, Lynn, Gloucester, Salem, Manchester, Danvers, Swampscott, and Revere. Industrial discharges occur at the General Electric Company, Lynn; New England Power Company; Salem Harbor Station; and other smaller industries. Figure III indicates the nature of known discharges in the region.

The North Coastal 1975-1977 discharge survey data were compiled and tabulated by personnel of the Division of Water Pollution Control.

NON-POINT SOURCE POLLUTION

Non-point discharges of pollution also contribute to pollution of North Coastal waters. While most of these are not yet quantified for formal analysis, investigations have revealed many sources of non-point source pollution. (See North Coastal Water Quality Management Plan, DWPC 1975). They are summarized in Table 33.

Sanitary wastes from watercraft will be controlled on a nationwide basis by laws promulgated by the federal government.

There is currently one location (Salem Power Station) where oil shipments enter the North Coastal region. This single facility helps focus controls on oil spillage and thereby increases the likelihood that pollution from oil will be held to a minimum.

CAUSES OF WATER POLLUTION

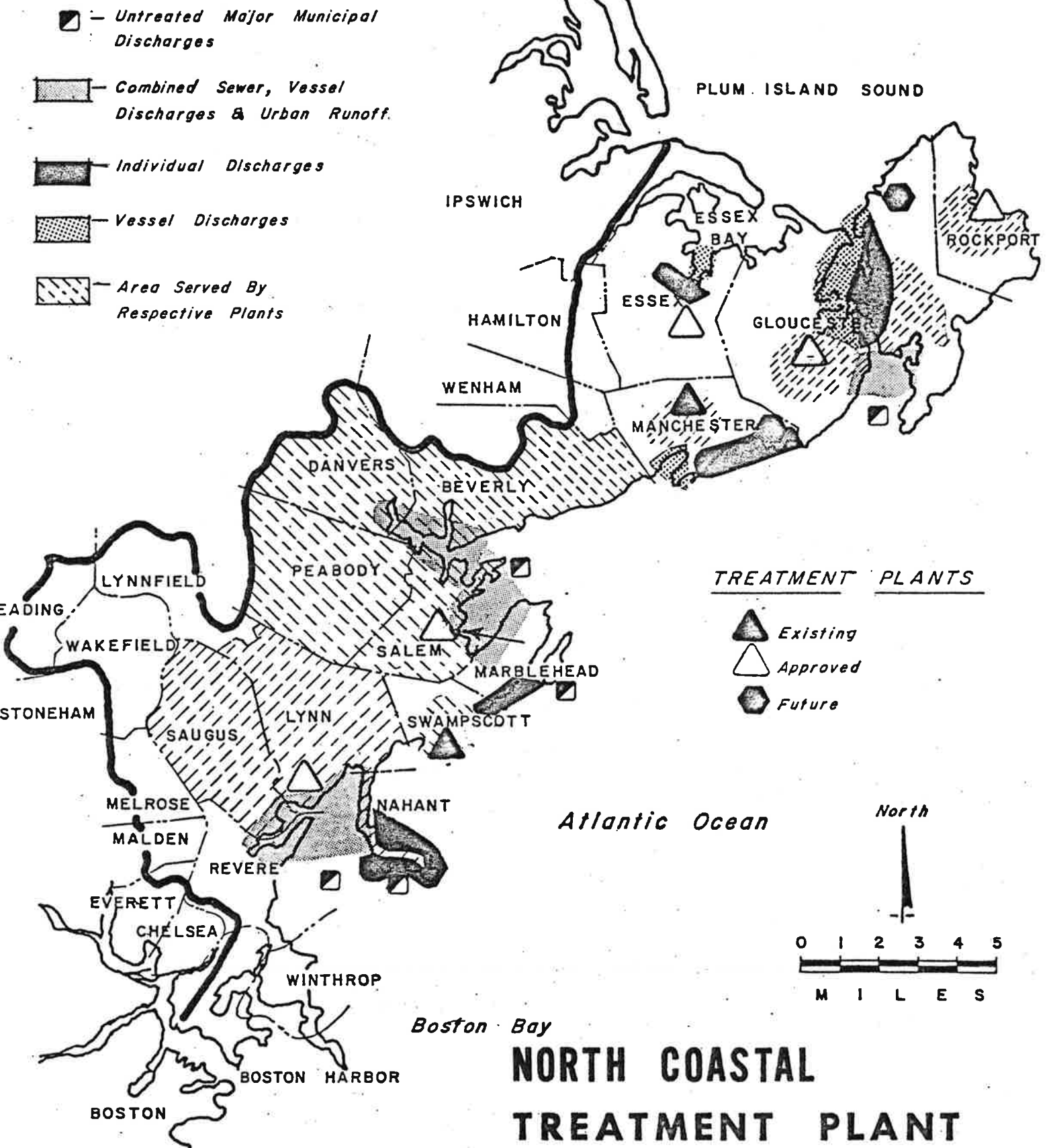


FIGURE 3

TABLE 32
NORTH COASTAL
MAJOR WASTEWATER DISCHARGES

Eastern Tool & Die Company, Saugus
Eastman Gelatin, Peabody
General Electric-Riverworks, Lynn
Le Page's, Gloucester
Manchester WWTP
Municipal Light (Peabody)
Rockport WWTP
Salem Harbor Power
Salem Oil & Grease
South Essex Sewerage District
Swampscott WWTP
USM Corporation, Beverly
Verian Associates, Beverly
Vertron Corporation, Beverly

DISCHARGE PERMITS APPLIED FOR:

GTE Sylvania, Salem
General Tire & Rubber, Salem
Spir-it, Inc., Wakefield

DISCHARGES FROM MAJOR MUNICIPAL
TREATMENT WORKS

GLOUCESTER WWTP

Presently discharging untreated wastewater and stormwater to the Annisquam River and Gloucester Harbor. Plans have been approved for the construction of a secondary treatment plant (design flow of 7.24 MGD) but construction has been delayed.

ROCKPORT WWTP

Presently discharging untreated wastewater to Rockport Harbor at North and Doyle's Cove Road (Bearskin Harbor). Plans have been approved for the construction of a secondary treatment plant (design flow 0.8 MGD) but completion of construction has been delayed.

SALEM WWTP

Newly constructed treatment plant, will provide primary treatment and chlorination to some SESD wastewater (Beverly, Danvers, Peabody, and Marblehead). This plant is presently experiencing start-up problems.

MANCHESTER WWTP

The wastewater treatment plant is located at Manchester Harbor in Manchester. The plant provides secondary treatment to an average of 0.67 MGD. The effluent discharges in Manchester Harbor.

Date	<u>EFFLUENT</u>		<u>INFLUENT</u>	
	3/17/76	7/26-27/77	9/19-20/77	9/19-20/77
Type of Sample	5-hr. comp.	24-hr. comp.	24-hr. comp.	24-hr. comp.
Flow (MGD)	0.8	--	0.3	--
BOD ₅ (mg/l)	140	132	14	320
COD (mg/l)	--	--	210	580
pH (Standard Units)	7.2	6.5	7.1	7.2
Suspended Solids (mg/l)	92	24	30	180
Settleable Solids (mg/l)	3.0	6	1.5	7.0
NH ₃ -N (mg/l)	3.5	0.08	0.66	24
NO ₃ -N (mg/l)	0.7	15	11	0.6
Total Phosphorus (mg/l)	4.4	7.6	7.2	16
Total Coliform/100 ml	36	930	800	--
Fecal Coliform/100 ml	36	36	20	--
Chloride	550	--	--	--
Chlorine Residual	--	1.9	1.0	--

SWAMSCOTT WWTP

The treatment plant is located on Humphrey Street in Swamscott. The plant provides primary treatment to an average of 2.17 million gallons of wastewater per day. The effluent discharges into Nahant Bay.

Date	<u>EFFLUENT</u>		
	7/26-27/76	7/27-28/76	7/28-29/76
Type of Sample	24-hr. comp.	24-hr. comp.	24-hr. comp.
Flow (MGD)	2.005	2.09	1.84
BOD ₅ (mg/l)	138	132	78
COD	--	--	--
pH (Standard Units)	7.0	6.9	7.0
Suspended Solids (mg/l)	18	58	52
Settleable Solids (mg/l)	1.0	0.4	1.0
NH ₃ -N (mg/l)	--	19	16
NO ₃ -N (mg/l)	--	0.4	0.1
Total Phosphorus (mg/l)	8.5	--	--
Total Coliform/100 ml	12.4x10 ⁶	--	--
Fecal Coliform/100 ml	12.4x10 ⁶	--	--
Chloride (mg/l)	60	92	50
Chlorine Residual	--	--	--

SWAMSCOTT WWTP

	<u>EFFLUENT</u>	<u>INFLUENT</u>
Date	9/20-21/77	9/20-21/77
Type of Sample	24-hr. comp.	24-hr. comp.
Flow (MGD)	3.5	--
BOD ₅ (mg/l)	57	72
COD	200	130
pH (Standard Units)	7.5	7.5
Suspended Solids (mg/l)	50	124
Settleable Solids (mg/l)	0.4	4.5
NH ₃ -N (mg/l)	8.6	8.6
NO ₃ -N (mg/l)	0.0	0.1
Total Phosphorus (mg/l)	3.0	4.8
Total Coliform/100 ml	110,000	--
Fecal Coliform/100 ml	2,400	--
Chloride (mg/l)	--	--
Chlorine Residual	1.5	--

SOUTH ESSEX SEWERAGE DISTRICT

(UNTREATED SEWAGE)

Date	6/17/76
Type of Sample	Grab
Flow (MGD)	2.15
BOD ₅ (mg/l)	350
pH (Standard Units)	8.1
Suspended Solids (mg/l)	646
NH ₃ -N (mg/l)	31
NO ₃ -N (mg/l)	0.2
Total Phosphorus (mg/l)	2.5

INDUSTRIAL WASTE DISCHARGES¹

EASTMAN GELATINE - PEABODY

(COOLING WATER)

Date	3/17/76
Type of Sample	Grab
Flow (MGD)	.028
Temperature	66°F
pH (Standard Units)	8.0

¹All parameters in (mg/l) except total and fecal coliform (per ml).

EASTERN TOOL & DIE COMPANY - SAUGUS

(INDUSTRIAL PROCESS)

Date - 3/15/76

Type of Sample - Grab

Location	001	002
BOD ₅	--	2.1
pH (Standard Units)	8.3	--
Suspended Solids	95	1.5
Oil & Grease	4.9	10
MBA's	1.3	--
Iron	5.0	--
Zinc	1.4	--

LE PAGE'S - GLOUCESTER

Date - 3/17/65

Type of Sample*

* Plant personnel could not locate their discharge which was alleged to be submerged in Banjo Pond.

MUNICIPAL LIGHT COMPANY - PEABODY

No discharge reported by plant personnel.

GENERAL ELECTRIC-RIVERWORKS - LYNN

This industry is permitted for 27 discharges, all from small cooling water processes. The total discharge is 100 MGD.

Date of all Samples - 3/15/76

Type of Sample - Grab

Location	007	013	019	028	031
pH (Standard Units)	7.0	7.1	7.4	7.1	7.2
Suspended Solids	8.0	45	14	31	5.5
Oil & Grease	1.2	1.4	3.2	3.0	2.1

SALEM HARBOR POWER COMPANY - SALEM

Permitted discharges #001 - 004 are cooling water discharges associated with the generation of electricity. The maximum flow from these four discharges is 636 MGD. The maximum permitted temperature is 90°F.

Discharge #005 is the backwash discharge from the intake screen.

Discharge #006 is the discharge from the flyash transport and cleaning system. Maximum discharge of 1.71 MGD enters Salem Harbor.

Date	3/17/76	3/17/76	3/17/76
Time of Sample	10:30	11:00	10:30
Location of Discharge	001-004	005 Unit 2 Screen Backwash	006
pH (Standard Units)	8.3	--	--
Suspended Solids	--	--	52
Settleable Solids (ml/l)	--	0.1	--
Manganese	--	--	0.15
Vanadium	--	--	3.2
Turbidity	--	--	27
Oil & Grease	--	--	1.2
Nickel	--	--	0.15
Zinc	0.02	--	0.02
Chromium	0.05	--	--
Copper	--	--	0.05
Aluminum	--	--	0.29
Iron	--	--	0.4

SALEM OIL & GREASE

SALEM

Date - 3/16/76

Type of Sample*

* No discharge to date

U.S.M. CORPORATION

BEVERLY

Date 3/17/76

Type of Sample Grab

Suspended Solids 15

Total P 17

Iron 0.60

VARIAN ASSOCIATES

BEVERLY

Date 3/15/76

Type of Sample Grab

Flow Intermittent (Permit requirement .05 MGD)

Temperature 46-55°F

pH (Standard Units) 6.5

VENTRON CORPORATION

BEVERLY

Date 3/16/76

Type of Sample*

*Cooling water discharges; must be sampled at low tide. Discharge submerged at time of visit.

TABLE 33

NORTH COASTAL WATER QUALITY SURVEY

INVESTIGATIONS OF SOME NON-POINT SOURCES OF WATER POLLUTION

Landfills	Danvers - Cranes Brook Saugus ¹ - Pines River Beverly (with M.D.P.H.) - affects water supply Gloucester (Magnolia)	
Septic Tank Failures	Investigations mainly by Massachusetts Division of Environmental Health and Local Boards of Health	
Oil Spills	Salem Harbor	
Sewage, Cesspool, and Sewer Overflow Pipes ²	Beverly	7
	Salem	14
	Peabody	0
	Danvers	17
	Marblehead	50
	Swampscott	11
	Nahant	33
	Lynn	<u>9</u>
	TOTAL	144 ³

¹Court action was initiated in this case; the defendant was found not guilty.

²Special report of the Massachusetts Division of Environmental Health relative to investigation and study of sanitary conditions of the waters of Manchester, Beverly, Salem, Lynn, and Marblehead under Chapter 96 of the Resolves of 1964-1965.

³Represents discharge from over 200 houses.

OTHER DISCHARGES

<u>LOCATION</u>	<u>DATE</u>	<u>TOTAL COLIFORM/100ml</u>	<u>FECAL COLIFORM/100ml</u>
Lonwater Brook Tributary, Hanover, Massachusetts	3/12/76	430	36
Country Road culvert Upstream brook easement to Single Hill Brook	3/12/76	<36	<36
Country Road culvert Downstream brook easement to Single Hill Brook	3/12/76	230	36
Lanesville area, James Cove, driveway runoff	3/22/76	230	91