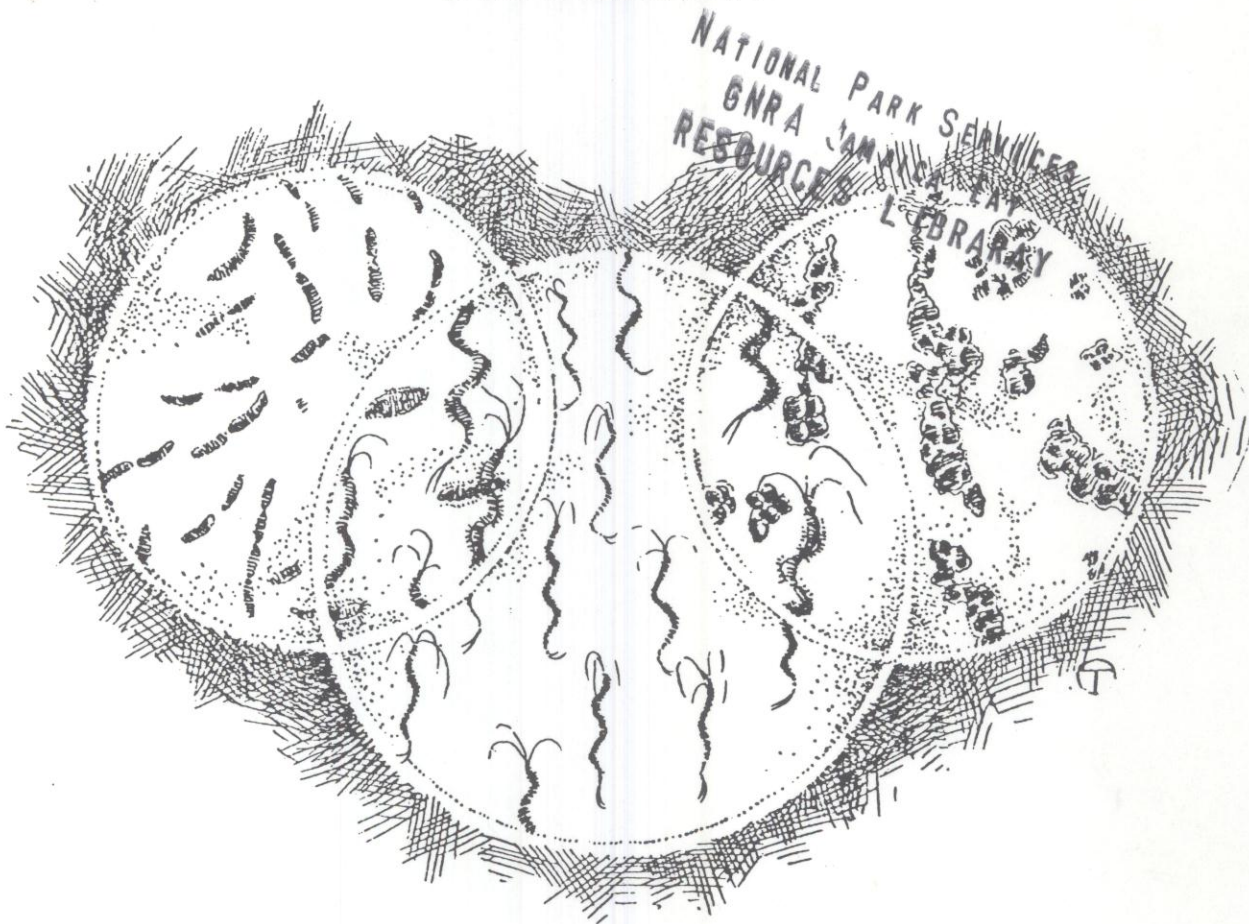




United States Department of the Interior
NATIONAL PARK SERVICE
GATEWAY NATIONAL RECREATION AREA

1993 WATER QUALITY SAMPLING
PROGRAM



DIVISION OF NATURAL RESOURCES
FLOYD BENNETT FIELD
BROOKLYN, NY 11234

W-1993-001

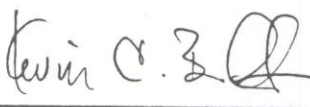
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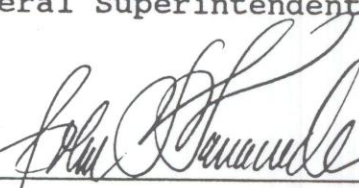
GATEWAY NATIONAL RECREATION AREA
DIVISION OF NATURAL RESOURCES

1993 WATER QUALITY SURVEY REPORT

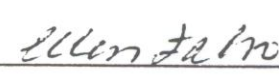
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I. BACKGROUND AND HISTORY

Gateway's Water Quality Program was initiated in 1977 to form a data base for the management of park waters for public health and ecological quality. Water quality data were collected for the following purposes:

1. To monitor bacterial levels at public beaches under Gateway jurisdiction for compliance with city, state and federal public health standards for contact-recreational beaches.
2. To monitor bacterial levels at other sites within the park to determine trends in water quality.
3. To identify potential long-term acceptable beach sites.
4. To provide data for the evaluation and review of Gateway's Natural Resources Management Plan regarding fish and wildlife management as well as visitor public health and safety.

The sampling program has been evolving since its inception in 1976. Identical sample sites and methods have been used from 1981 to the present. Two sites are sampled in Breezy Point, thirteen in Jamaica Bay and seven in Staten Island during the beach season (Memorial Day to Labor Day). In 1988 six new sites were added to include the beaches of Gateway National Recreation Area at the Sandy Hook Unit. The basis for water quality classification is total and fecal coliform enumeration. Coliform analysis of each site has been performed using the membrane filter technique.

Coliforms are a group of specific microorganisms whose densities can be related quantitatively to swimming related health hazards. The concern is with infectious, enteric diseases, such as cholera and typhoid fever, whose etiological agents are excreted in feces and are spread by water and food contaminated with fecal wastes (Cabelli et al., 1983).

Total coliform counts of 2400/100ml and fecal coliform counts of 200/100ml are the respective New York State and Federal bacterial standard limits and have the following advantages:

1. Relative simplicity and accuracy of measurement with the Membrane Filter Method (Approved in Standard Methods).
2. Speed of Results: Counts are available within 24 hours of filtration.
3. Ease of comparison with previous data.
4. Measurement of a broader spectrum of coliform bacteria insures the inclusion of most potential pathogens.

II. WATER QUALITY TRENDS

1. Breezy Point/Sandy Hook

The beaches of Breezy Point, the Rockaways (Riis Park), and Sandy Hook are usually Gateway's cleanest and have been consistently acceptable for bathing over the years tested. The average low counts of bacteria were found at these sites.

2. Jamaica Bay

The waters of Jamaica Bay are the most heavily impacted bacteriologically in Gateway National Recreation Area. The sewage treatment plants and CSOs emptying into Jamaica Bay combine with its poor flushing action (35 day residence time) to produce consistently high average total and fecal coliform counts in peripheral channels and in areas where circulation is poor such as Bergen Basin (Site 9). The bay's waters are classified as unacceptable for bathing and continue to express high coliform counts.

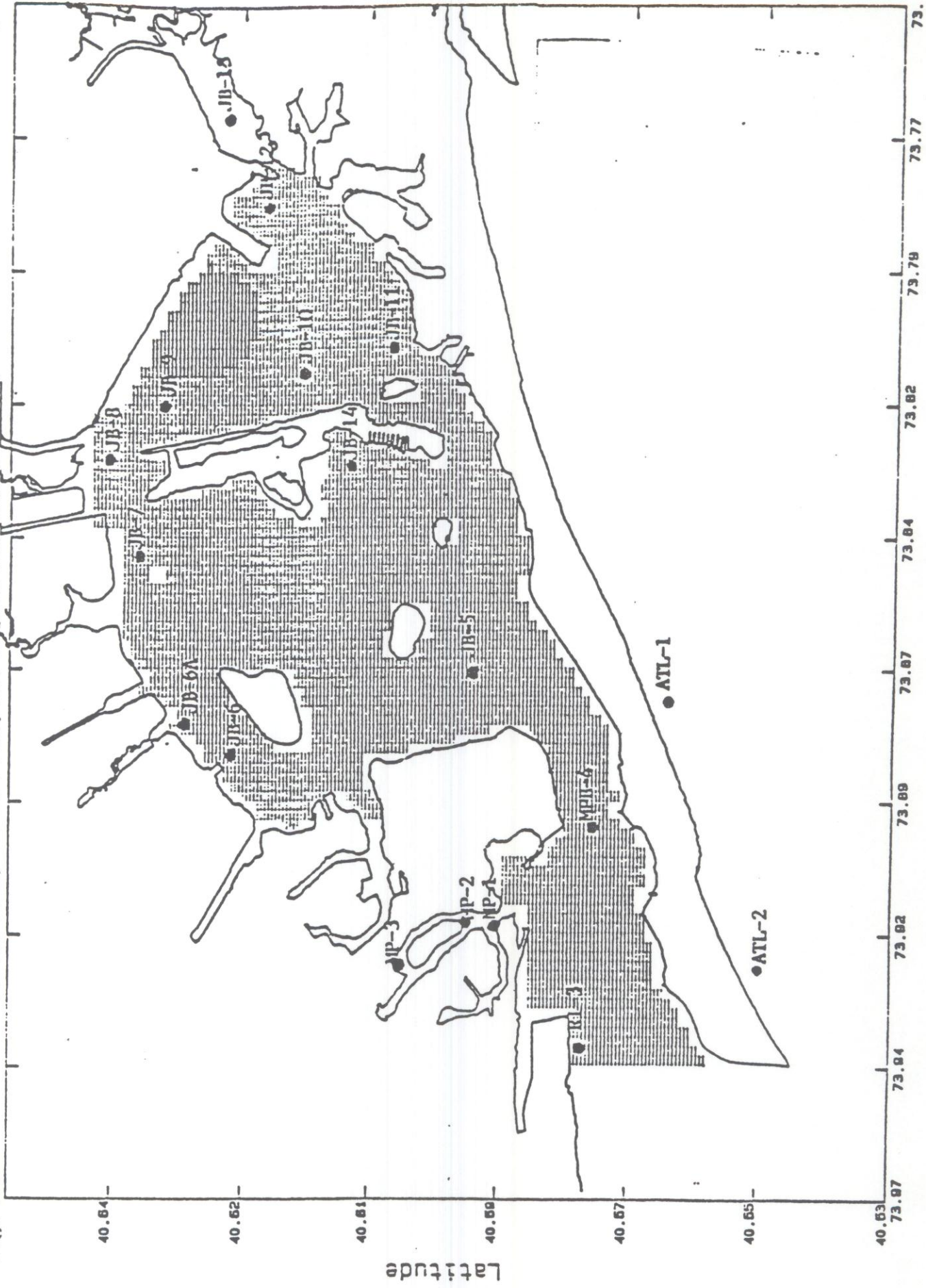
3. Staten Island

Water quality at sample sites in Staten Island have been "marginal" in past years, with South Beach (SB2) being officially closed to swimming by the New York City Department of Health. Other sites have seasonal averages below city and federal standards (2400/100ml Total, 200/100ml Fecal coliform) but show occasional unhealthy counts throughout the bathing season. Water Quality at Crookes Point (CP7) in the Staten Island Unit has been consistently acceptable over the years studied.

III. METHODS

SAMPLING AND COLIFORM TESTING

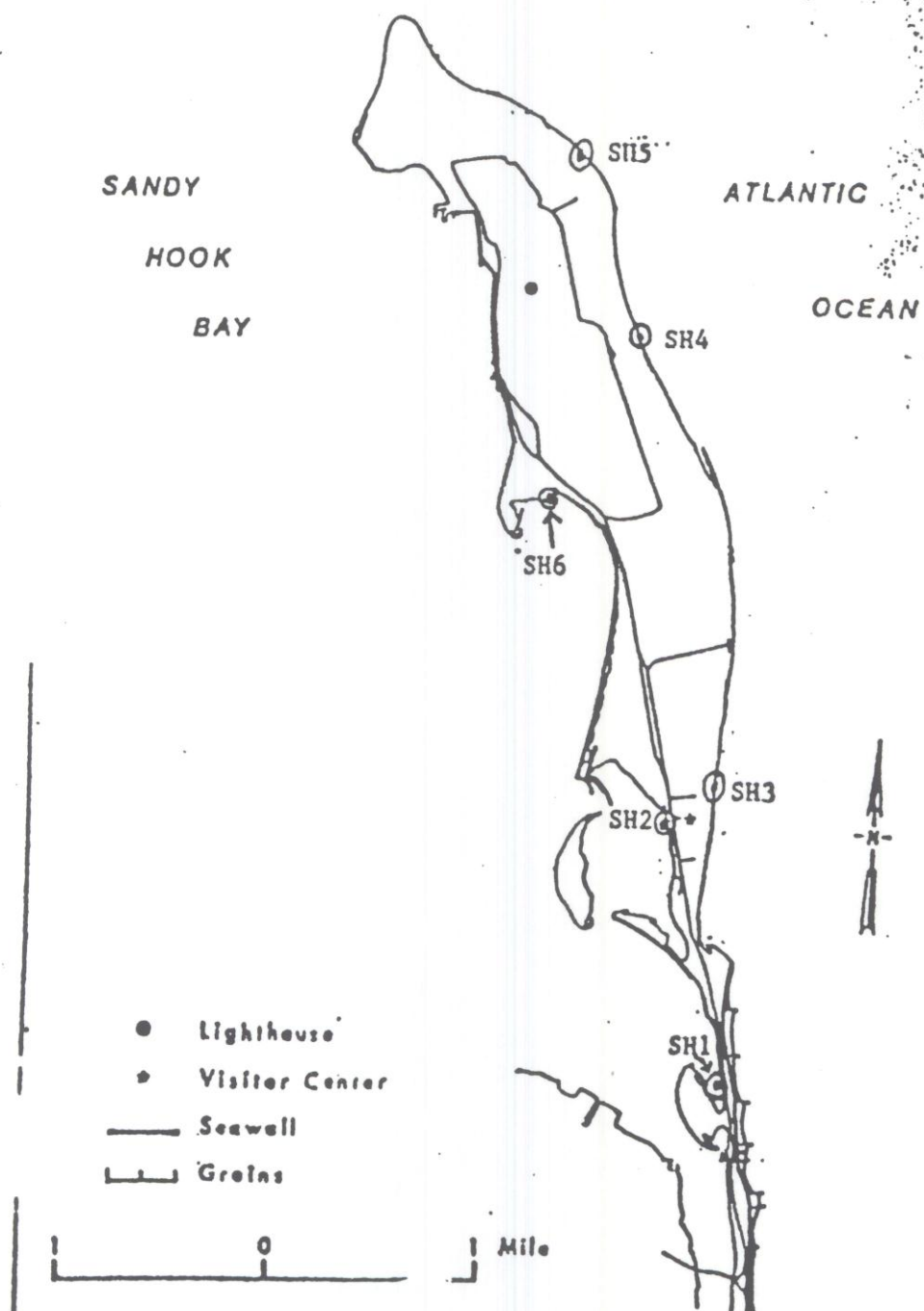
Sampling and Membrane Filter culture methods followed standard EPA procedures for wastewater analysis (Bordner and Winter, eds., 1978) with minor modifications. Gateway's Operations Manual for Bacteriological Analysis of Beach Water using the Membrane Filter Technique (Simon, 1984) provides a detailed description of methods used. Total and fecal coliform measurements were obtained for all sample sites on a weekly basis between Memorial Day and Labor Day. In Jamaica Bay, surface water samples were collected by boat (Map 1) while Staten Island (Map 2), Breezy Point and Sandy Hook (Map 3) samples were collected by wading into the surf zone. Samples were stored on ice and analyzed using the Membrane Filter Method (Bordner and Winter, 1978, Gateway 1981).



Longitude

SANDY HOOK WATER QUALITY PROGRAM

TESTING SITES



MAP 3

2. FACTORS EFFECTING WATER QUALITY

The quality of the waters surrounding Gateway is determined largely by pollutant inputs such as treated and untreated sewage, CSOs, industrial effluent, ocean dumping of sewage sludge and toxic waste leachates. The concentrations of these pollutants are controlled by chemical, physical, and biological processes in the marine environment (Dyer, 1973).

Total and fecal coliforms serve as nonconservative tracers of sewage related pollution (Dyer, 1973). They are nonconservative in the sense that they are rapidly removed from the marine environment by dieaway and incorporated into the sediments and decreases in their concentrations are not solely dependent on their physical transport and diffusion. Dieaway for total coliforms in Jamaica Bay was estimated to be 1.3 days and 1.5 days for fecal coliforms (Cardenas, 1983).

3. WATER QUALITY EMERGENCIES

In the past, Gateway's policy for the protection of public health at bathing beaches has been to officially close beaches by public notice when individual samples with total coliform values greater than 2400/100ml and fecal coliforms greater than 200/100ml are detected over a three consecutive day period at a given beach. Although this is an effective response to a persistent problem, it does leave a three day period during which bathers are potentially exposed to unhealthy concentrations of coliform organisms. Literature indicates that swimmers stand a much greater risk of contacting disease from polluted water than nonswimmers when swimmers are defined as those who undergo total immersion (Cabelli et al., 1983).

The following procedures are followed when a sample is determined to have greater than 200/100ml fecal coliform and greater than 2400/100ml total coliform count is collected at one of Gateway's beaches:

(1) Immediately contact the Water Quality Specialist in the Division of Natural Resources, who will notify the Superintendent of the unit effected by the potential problem and advise to alert lifeguards to look for unusual odors, fecal matter, algae, oil, or grease in water or on the beach and to pull swimmers from the water at their discretion.

(2) Check with New York City Health Department to determine if any overflow incident or accidental release of raw sewage has occurred at local sewage treatment plants. Advise park's Chief, Division of Resource Management and document all communication with New York City Health Department.

(3) Collect 5 samples at different locations (at least 50 yards apart) on the suspect beach and filter volumes of 10, 5 and 3ml for each sample.

Swimmers should be prevented from bathing by lifeguards if any of the following is observed:

(1) Elevated average total (greater than 2400/100ml) and fecal coliform (greater than 200/100ml) counts of replicate samples.

(2) Presence of oil, grease, or fecal matter in water or on the beach in large quantities.

(3) Accidental spillage of raw sewage or of any toxic substance in the waters adjacent to the beach which may adversely effect public health.

(4) Any other environmental incident which may be detrimental to the health and safety of the bathers.

Swimmers should be kept out of the water as long as replicate testing continues to show elevated coliform levels or other adverse environmental conditions persist. This will allow continued public access to the beach while still protecting the public health. If these conditions persist for three days or more, however, the beach should be closed officially by public notice and should remain closed until water quality has returned to normal levels. It is the responsibility of the park's Water Quality Specialist to carefully document water quality and environmental conditions when beach closure is considered. A looseleaf laboratory notebook is to be carefully maintained for each season's data. The notebook should contain all data and summary sheets and be used as a log for all laboratory and field operations.

4. DATA

Coliform data throughout the season at most sites showed high variability. This was probably due to error implicit in the method (Fleisher and McFadden, 1979) and various environmental factors. **TABLE III** exhibits the days during which standard water quality values were exceeded.

5. PRECIPITATION

Precipitation is a known cause of intermittent decreases in water quality. It produces shock loading of pollutants to local waters by storm waters and combined sewage overflows. (NYC DEP, 1987)

Total and fecal coliform counts have been consistently higher following rainfall in local waters (NYC Department of Health, 1983) (**TABLE IV**)

6. TIDES

Tidal currents and tidal flushing account for much of the transport and dilution in estuaries (Dyer, 1973). Sampling at Gateway sites is performed irrespective of the tidal state.

7. WATER QUALITY PARAMETERS

Water quality parameters include dissolved oxygen (DO), temperature, pH, salinity, and conductivity. These are taken at both the surface and bottom of twelve sites in Jamaica Bay in order to better assess the physical characteristics of these waters throughout the season.

8. DATA ANALYSIS

Weekly and average water quality parameter values for each sample site in Jamaica Bay were calculated and are listed on **TABLES V** through **XXXI**. Breezy Point coliform concentrations can be found on **TABLES XXXII** and **XXXIII**. **TABLES XXXIV** through **XLI** contain coliform concentrations for Staten Island and Sandy Hook results are on **TABLES XLII** and **XLIII**.

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VI. TABLES

- I - Dilutions (volumes) by Site for MF Analysis
- II - Gateway Total and Fecal Coliform Seasonal Averages
- III - June, July and August Precipitation for New York City Area
- IV - Sample Days Surpassing Water Quality Criteria
- V - Water Quality for Jamaica Bay Site RI-3
- VI - Physical Conditions for RI-3
- VII - Water Quality for Jamaica Bay Site MPB-4
- VIII - Physical Conditions for MPB-4
- IX - Water Quality for Jamaica Bay Site JB-5
- X - Physical Conditions for JB-5
- XI - Water Quality for Jamaica Bay Site JB-6
- XII - Physical Conditions for JB-6
- XIII - Water Quality for Jamaica Bay Site JB-6A
- XIV - Physical Conditions for JB-6A
- XV - Water Quality for Jamaica Bay Site JB-7
- XVI - Physical Conditions for JB-7
- XVII - Water Quality for Jamaica Bay Site JB-8
- XVIII - Physical Conditions for JB-8
- XIX - Water Quality for Jamaica Bay Site JB-9
- XX - Physical Conditions for JB-9
- XXI - Water Quality for Jamaica Bay Site JB-10
- XXII - Physical Conditions for JB-10
- XXIII - Water Quality for Jamaica Bay Site JB-11
- XXIV - Physical Conditions for JB-11
- XXV - Water Quality for Jamaica Bay Site JB-12
- XXVI - Physical Conditions for JB-12
- XXVII - Water Quality for Jamaica Bay Site JB-13

VI. TABLES (CONT'D)

- XXIX - Water Quality for Jamaica Bay Site JB-14
- XXX - Physical Conditions for JB-14
- XXXI - Chlorophyll a for Jamaica Bay
- XXXII - Total and Fecal Coliform Concentration for ATL-1
- XXXIII - Total and Fecal Coliform Concentration for ATL-2
- XXXIV - Water Quality for Staten Island Site SB-2
- XXXV - Water Quality for Staten Island Site MB-3
- XXXVI - Water Quality for Staten Island Site NDB-4
- XXXVII - Water Quality for Staten Island Site OB-5
- XXXVIII - Water Quality for Staten Island Site GK-6
- XXXIX - Water Quality for Staten Island Site GK-6A
- XL - Water Quality for Staten Island Site CP-7
- XLI - Water Quality for Staten Island Site GKM-8
- XLII - Total and Fecal Coliform Concentrations for Sandy Hook
- XLIII - Water Quality at Gunnison Beach
- XLIV - Water Quality at Intertidal Trough

MAPS

- 1 - Sampling Sites in Jamaica Bay
- 2 - Sampling Sites in Staten Island
- 3 - Sampling Sites in Sandy Hook

TABLE 1

DILUTIONS (VOLUMES) BY SITE FOR MF ANALYSIS

		<u>VOLUMES TO BE FILTERED</u>	
	<u>SITE</u>	<u>TOTAL</u>	<u>FECAL</u>
STATEN ISLAND	SB-2	10, 5, 3	10, 5, 3
	MB-3	10, 5, 3	10, 5, 3
	NDB-4	10, 5, 3	10, 5, 3
	OB-5	10, 5, 3	10, 5, 3
	GK-6	10, 5, 3	10, 5, 3
	CP-7	10, 5, 3	10, 5, 3
	GKM-8	10, 5, 3	10, 5, 3
BREEZY POINT	ATL-1	10, 5, 3	10, 5, 3
	ATL-2	10, 5, 3	10, 5, 3
JAMAICA BAY	RI-3	10, 5, 3	10, 5, 3
	MPB-4	10, 5, 3	10, 5, 3
	JB-5	10, 5, 3	10, 5, 3
	JB-6	10, 5, 3	10, 5, 3
	JB-6A	10, 5, 3	10, 5, 3
	JB-7	10, 5, 3	10, 5, 3
	JB-8	10, 5, 3	10, 5, 3
	JB-9	10, 5, 3	10, 5, 3
	JB-10	10, 5, 3	10, 5, 3
	JB-11	10, 5, 3	10, 5, 3
	JB-12	10, 5, 3	10, 5, 3
	JB-13	10, 5, 3	10, 5, 3
	JB-14	10, 5, 3	10, 5, 3
SANDY HOOK	SH-1	10, 5, 3	10, 5, 3
	SH-2	10, 5, 3	10, 5, 3
	SH-3	10, 5, 3	10, 5, 3
	SH-4	10, 5, 3	10, 5, 3
	SH-5	10, 5, 3	10, 5, 3
	SH-6	10, 5, 3	10, 5, 3

example: smallest volume filtered = 1ml
 $\frac{20 \text{ colonies}}{1 \text{ ml}} \times 100 = 2,000/100 \text{ ml}$
 The density would then be logged as 2,000/100ml

TABLE II
GATEWAY TOTAL AND FECAL COLIFORM SEASONAL AVERAGES
1982-1993

	BREEZY POINT		JAMAICA BAY		STATEN ISLAND		MARINE PARK		SANDY HOOK	
YEAR	T	F	T	F	T	F	T	F	T	F
1982	15	8	588	217	229	71				
1983	19	14	1631	1150	466	229				
1984	242	18	2955	500	1812	87				
1985	307	37	3513	429	3508	42				
1986	21	7	176	277	47	23	35	36		
1987	37	21	731	277	589	307	167	49		
1988	85	29	694	336	464	261	208	45	78	43
1989	401	77	3077	1324	401	77	1097	266	2450	29
1990	38	27	932	301	408	105	454	69	56	20
1991	16	19	580	900	92	88			48	38
1992	12	14	1832	1098	344	56			135	31
1993	42	24	1268	435	130	113			49	130

TABLE III
SAMPLE DAYS SURPASSING COLIFORM CRITERIA

SITE	TOTAL NO. OF SAMPLE DAYS	SAMPLE DAYS SURPASSING CRITERIA	%
ATL-1**	26	1	4
ATL-2**	21	0	0
AVERAGE	23.5 DAYS	0.5 DAYS	2 DAYS
RI-3	15	2	13
MPB-4	15	2	13
JB-5	15	3	20
JB-6	15	5	33
JB-6A	15	5	33
JB-7	15	4	27
JB-8	15	4	27
JB-9	15	*18	*120
JB-10	15	9	60
JB-11	15	2	13
JB-12	15	3	20
JB-13	15	5	33
JB-14	15	4	27
JAMAICA BAY AVERAGE	15 DAYS	5 DAYS	34 DAYS
SB-2	14	1	7
MB-3	14	0	0
NDB-4	14	1	7
OB-5	14	1	7
GK-6**	34	16	47
CP-7	14	0	0
GKM-8	14	1	7
STATEN ISLAND AVERAGE	17 DAYS	2.9 DAYS	10.7 DAYS
SH-1	16	1	6
SH-2	16	4	25
SH-3**	18	0	0
SH-4**	20	3	15
SH-5**	18	0	0
SH-6	16	1	6
SANDY HOOK AVERAGE	17 DAYS	1.5 DAYS	8.7 DAYS

* Although there were only 15 sampling days, sampling days surpassing criteria were based upon a combination of total and fecal coliform levels which totalled 30 samples

** Bathing beach sites

NOTE: No beaches were closed during 1993 due to bacterial contamination, even though standards may have been exceeded on initial count.

TABLE IV

JUNE, JULY AND AUGUST PRECIPITATION

	JUNE	JULY	AUGUST	TOTAL
LONGTERM AVERAGE	2.65	3.89	4.50	15.25
*1986	1.86	5.56	4.42	11.66
*1987	4.22	3.71	3.84	11.77
*1988	1.29	8.14	2.19	11.62
*1989	8.47	5.99	8.35	22.81
*1990	2.50	3.51	12.36	18.37
1991	N/D	N/D	N/D	N/D
**1992	.08	.24	.23	.55
**1993	.10	.08	.09	.27

* Precipitation for the New York Area

** Precipitation for Floyd Bennett Field taken from our weather station

TABLE V

WATER QUALITY DATA FOR JAMAICA BAY
MAY TO SEPTEMBER 1993
SITE RI-3 ROCKAWAY INLET

WK	DATE	COLIFORM		TEMPS.		SALINITY		PH		D.O.		COND		SECCHI
		TOTAL	FECAL	SUR	BOT	SUR	BOT	SUR	BOT	SUR	BOT	SUR	BOT	
1	5/24/93	0	0	12.7	12.9	26.8	17.0	7.97	8.06	12.0	12.0	325	205	84
2	6/1/93	87	58	12.5	12.6	27.7	27.1	8.35	8.14	10.0	11.5	326	322	96
3	6/7/93	0	0	11.8	11.8	27.1	28.3	8.09	8.14	7.5	2.5	331	335	108
4	6/14/93	58	0	16.6	17.3	24.8	25.5	8.50	8.41	3.5	4.5	350	345	90
5	6/21/93	145	0	17.3	18.1	25.1	25.8	7.41	7.57	6.0	5.0	360	362	78
6	6/28/93	0	0	19.8	19.5	26.9	27.0	7.83	7.95	*	*	373	379	72
7	7/8/93	0	0	22.9	23.2	26.5	26.0	8.10	8.21	7.5	7.0	398	390	115
8	7/12/93	0	0	22.9	22.3	25.1	24.9	8.56	8.53	8.5	8.0	401	409	78
9	7/19/93	232	58	20.0	20.0	24.9	24.5	7.80	*	7.0	6.0	402	399	78
10	7/26/93	0	1,044	21.0	21.0	26.9	26.8	*	*	1.5	*	401	400	132
11	8/2/93	0	0	22.1	21.2	27.2	26.9	*	*	2.0	2.5	391	391	96
12	8/9/93	200	0	22.0	22.2	24.9	25.7	*	*	4.0	3.0	370	375	132
13	8/16/93	400	0	24.0	24.0	25.8	26.1	*	*	5.5	1.5	391	401	72
14	8/23/93	800	1,000	22.4	22.1	23.5	25.8	7.90	7.90	6.0	7.5	360	385	CLEAR
15	8/30/93	*	50	23.0	23.0	22.1	22.1	8.00	8.30	5.0	4.5	359	362	78
<u>AVERAGE</u>		128	144	19.4	19.4	25.7	25.3	8.05	8.10	6.1	5.8	369	364	93.5

BOLD INDICATES A BACTERIAL LEVEL WHICH EXCEEDS THE LIMIT.

* = NO DATA

TABLE VI

PHYSICAL CONDITIONS
MAY TO SEPTEMBER 1993
SITE RI-3 ROCKAWAY INLET

<u>WK</u>	<u>DATE</u>	<u>TIME</u>	<u>WEATHER</u>	<u>AIR TEMP</u>	<u>PRECIP</u>	<u>TIDE</u>
1	5/24/93	9:15	CLOUDY, COOL	17.0	0.00	10:36 H 16.34 L
2	6/1/93	9:25	WINDY, COOL	15.0	1.52	5:41 H 11:51 L
3	6/7/93	9:45	PT CLOUDY, COOL	17.5	TRACE	10:41 H 4:41 L
4	6/14/93	15:00	SUNNY, BREEZY	26.0	0.00	3:47 H 10:08 L
5	6/21/93	12:20	FOGGY, COOL	23.0	0.35	9:33 H 3:39 L
6	6/28/93	9:20	HAZY, WARM	28.0	0.00	3:09 H 9:38 L
7	7/8/93	8:35	HAZY, HOT, HUMID	29.0	0.00	11:40 H 5:32 L
8	7/12/93	12:15	HAZY, HOT, HUMID	34.0	0.00	2:03 H 8:24 L
9	7/19/93	10:55	COOL, RAINING	21.0	0.44	8:26 H 2:30 L
10	7/26/93	13:40	FAIR	21.0	0.00	14:32 H 8:13 L
11	8/2/93	10:30	HAZY, HOT, HUMID	26.0	0.00	8:28 H 14:38 L
12	8/9/93	12:10	HAZY, HOT, HUMID	32.0	0.00	13:02 H 6:38 L
13	8/16/93	10:50	FOGGY, HUMID	28.0	0.00	7:16 H 1:13 L
14	8/23/93	8:50	HAZY	25.0	0.00	13:10 H 6:46 L
15	8/30/93	9:05	HAZY, HOT, HUMID	27.0	0.00	7:25 H 13:32 L

TABLE VII

WATER QUALITY DATA FOR JAMAICA BAY
MAY TO SEPTEMBER 1993
SITE MPB-4 MARINE PARK BRIDGE

WK	DATE	COLIFORM		TEMPS.		SALINITY		PH		D.O.		COND	
		TOTAL	FECAL	SUR	BOT	SUR	BOT	SUR	BOT	SUR	BOT	SUR	BOT
1	5/24/93	0	0	13.5	13.1	24.9	27.4	7.97	8.10	4.5	10.5	312	331
2	6/1/93	4,959	58	15.1	14.8	26.9	27.3	7.99	8.18	9.5	7.5	321	322
3	6/7/93	0	0	12.8	11.7	27.5	26.9	8.08	8.17	7.0	2.5	330	332
4	6/14/93	0	0	17.0	17.2	24.9	26.3	8.45	8.49	7.8	*	342	362
5	6/21/93	87	0	18.7	18.7	26.2	26.1	7.53	7.96	4.5	5.0	367	370
6	6/28/93	1,450	290	21.7	20.9	26.1	27.0	8.02	7.87	*	*	379	380
7	7/8/93	0	0	23.4	23.4	26.2	25.8	7.88	8.13	7.0	5.0	399	395
8	7/12/93	0	0	23.8	23.8	25.1	25.2	8.39	8.30	8.0	5.5	404	405
9	7/19/93	1,972	0	21.0	20.0	24.8	24.7	7.70	*	5.0	4.5	398	400
10	7/26/93	0	0	22.0	22.0	27.0	27.5	*	*	3.5	*	410	410
11	8/2/93	0	0	22.2	21.9	27.2	26.6	*	*	2.5	2.5	399	392
12	8/9/93	0	0	22.1	22.3	25.2	26.1	*	*	3.5	4.0	382	392
13	8/16/93	0	200	24.9	24.1	26.0	25.5	*	*	6.0	4.0	395	398
14	8/23/93	0	0	23.0	23.0	25.8	26.0	7.90	7.90	7.0	6.5	384	389
15	8/30/93	*	0	23.9	24.0	21.1	21.2	8.20	8.30	6.5	6.0	345	348
<u>AVERAGE</u>		599	37	20.3	20.3	25.7	26.0	8.01	8.14	5.9	5.3	371	375

BOLD INDICATES A BACTERIAL LEVEL WHICH EXCEEDS THE LIMIT.

* = NO DATA

TABLE VIII

PHYSICAL CONDITIONS
MAY TO SEPTEMBER 1993
SITE MPB-4 MARINE PARK BRIDGE

<u>WK</u>	<u>DATE</u>	<u>TIME</u>	<u>WEATHER</u>	<u>AIR TEMP</u>	<u>PRECIP</u>	<u>TIDE</u>
1	5/24/93	9:40	CLOUDY, COOL	16.0	0.00	10:36 H 16:34 L
2	6/1/93	10:00	WINDY, COOL	19.0	1.52	5:41 H 11:51 L
3	6/7/93	10:00	PT CLOUDY, COOL	16.0	TRACE	10:41 H 4:41 L
4	6/14/93	14:40	SUNNY, BREEZY	29.0	0.00	3:47 H 10:08 L
5	6/21/93	12:10	FOGGY, COOL	22.0	0.35	9:33 H 3:39 L
6	6/28/93	9:30	HAZY, WARM	25.0	0.00	3:09 H 9:38 L
7	7/8/93	8:45	HAZY, HOT, HUMID	28.0	0.00	11:40 H 5:32 L
8	7/12/93	12:25	HAZY, HOT, HUMID	43.0	0.00	2:03 H 8:24 L
9	7/19/93	11:00	COOL, RAINING	21.0	0.44	8:26 H 2:30 L
10	7/26/93	13:32	FAIR	21.0	0.00	14:32 H 8:13 L
11	8/2/93	8:28	HAZY, HOT, HUMID	27.0	0.00	8:28 H 14:38 L
12	8/9/93	12:20	HAZY, HOT, HUMID	30.0	0.00	13:02 H 6:38 L
13	8/16/93	11:10	FOGGY, HUMID	26.0	0.00	7:16 H 2:01 L
14	8/23/93	9:05	HAZY	25.0	0.00	13:10 H 6:46 L
15	8/30/93	9:25	HAZY, HOT, HUMID	26.5	0.00	7:25 H 13:32 L

TABLE IX

WATER QUALITY DATA FOR JAMAICA BAY
MAY TO SEPTEMBER 1993
SITE JB-5 RUFFLE BAR

WK	DATE	COLIFORM		TEMPS.		SALINITY		PH		D.O.		COND	
		TOTAL	FECAL	SUR	BOT	SUR	BOT	SUR	BOT	SUR	BOT	SUR	BOT
1	5/24/93	0	0	14.3	14.3	25.9	25.8	7.88	7.92	4.0	8.0	321	321
2	6/1/93	10,653	348	16.1	14.9	24.1	24.7	8.55	8.40	12.5	9.0	318	329
3	6/7/93	87	0	13.9	13.1	26.1	26.3	8.06	8.09	3.5	2.0	330	331
4	6/15/93	29	0	20.0	18.5	25.4	25.2	8.37	8.18	3.5	3.0	365	362
5	6/21/93	0	0	21.1	20.1	28.9	22.0	8.10	8.06	2.0	5.0	369	365
6	6/29/93	203	145	22.5	21.3	27.3	26.2	7.97	8.27	*	*	362	371
7	7/8/93	0	0	24.1	24.4	27.0	26.0	7.99	8.23	6.0	6.5	410	399
8	7/12/93	0	0	26.5	26.0	25.9	25.8	8.58	8.38	7.0	5.5	413	412
9	7/19/93	203	58	22.0	20.6	23.9	25.0	7.60	*	5.0	6.0	390	391
10	7/26/93	0	0	21.0	21.5	26.5	26.5	*	*	3.5	*	399	399
11	8/2/93	0	0	24.9	23.4	27.4	27.9	*	*	3.0	2.5	401	402
12	8/9/93	0	0	22.2	22.1	26.1	25.9	*	*	1.5	2.5	387	388
13	8/16/93	0	0	24.9	24.9	25.9	26.0	*	*	4.0	6.0	397	398
14	8/23/93	0	0	22.1	22.9	25.7	25.9	7.80	7.90	6.5	6.0	382	380
15	8/30/93	*	250	24.8	16.3	18.9	21.0	8.20	8.20	6.5	6.5	331	335
<u>AVERAGE</u>		798	53	21.4	20.3	25.7	25.3	8.10	8.20	4.9	5.3	372	372

BOLD INDICATES A BACTERIAL LEVEL WHICH EXCEEDS THE LIMIT.

* = NO DATA

PHYSICAL CONDITIONS
MAY TO SEPTEMBER 1993
SITE JB-5 RUFFLE BAR

<u>WK</u>	<u>DATE</u>	<u>TIME</u>	<u>WEATHER</u>	<u>AIR TEMP</u>	<u>PRECIP</u>	<u>TIDE</u>
1	5/24/93	9:55	CLOUDY, COOL	16.0	0.00	10:36 H
2	6/1/93	10:25	WINDY, COOL	18.0	1.52	16:34 L
3	6/7/93	10:15	PT CLOUDY, COOL	16.0	TRACE	5:41 H
4	6/15/93	8:25	PT CLOUDY, COOL	21.0	0.00	11:51 L
5	6/21/93	10:20	FOGGY, COOL	24.0	0.35	10:41 H
6	6/28/93	9:40	HAZY, WARM	26.0	0.00	4:41 L
7	7/8/93	9:00	HAZY, HOT, HUMID	29.0	0.00	4:45 H
8	7/12/93	10:20	HAZY, HOT, HUMID	32.0	0.00	10:56 L
9	7/19/93	8:50	COOL, RAINING	25.0	0.44	9:33 H
10	7/26/93	13:52	FAIR	23.0	0.00	3:39 L
11	8/2/93	10:55	HAZY, HOT, HUMID	28.0	0.00	3:09 H
12	8/9/93	12:27	HAZY, HOT, HUMID	30.0	0.00	9:38 L
13	8/16/93	11:25	FOGGY, HUMID	26.0	0.00	11:40 H
14	8/23/93	9:20	HAZY	28.0	0.00	5:32 L
15	8/30/93	9:35	HAZY, HOT, HUMID	26.0	0.00	2:03 H
						8:24 L
						8:26 H
						2:30 L
						14:32 H
						8:13 L
						8:28 H
						14:38 L
						13:02 H
						6:38 L
						7:16 H
						1:13 L
						13:10 H
						6:46 L
						7:25 H
						13:32 L

TABLE XII

PHYSICAL CONDITIONS
MAY TO SEPTEMBER 1993
SITE JB-6 CANARSIE PIER

<u>WK</u>	<u>DATE</u>	<u>TIME</u>	<u>WEATHER</u>	<u>AIR TEMP</u>	<u>PRECIP</u>	<u>TIDE</u>
1	5/24/93	10:10	CLOUDY, COOL	17.0	0.00	10:36 H
2	6/1/93	10:50	WINDY, COOL	20.0	1.52	16:34 L 5:41 H
3	6/7/93	10:30	PT CLOUDY, COOL	16.0	TRACE	11:51 L 10:41 H
4	6/15/93	8:35	PT CLOUDY, COOL	21.0	0.00	4:41 L 4:45 H
5	6/21/93	10:30	FOGGY, COOL	24.0	0.35	10:56 L 9:33 H
6	6/28/93	9:50	HAZY, WARM	27.0	0.00	3:39 L 3:09 H
7	7/8/93	9:10	HAZY, HOT, HUMID	31.0	0.00	9:38 L 11:40 H
8	7/12/93	10:30	HAZY, HOT, HUMID	30.0	0.00	5:32 L 2:03 H
9	7/19/93	9:00	COOL, RAINING	24.0	0.44	8:24 L 8:26 H
10	7/26/93	14:10	FAIR	24.0	0.00	2:30 L 14:32 H
11	8/2/93	11:05	HAZY, HOT, HUMID	27.0	0.00	8:13 L 8:28 H
12	8/9/93	12:37	HAZY, HOT, HUMID	29.0	0.00	14:38 L 13:02 H
13	8/16/93	11:35	FOGGY, HUMID	26.0	0.00	6:38 L 7:16 H
14	8/23/93	9:30	HAZY	25.5	0.00	1:13 L 13:10 H
15	8/30/93	9:50	HAZY, HOT, HUMID	26.0	0.00	6:46 L 7:25 H 13:32 L

TABLE XIII
WATER QUALITY DATA FOR JAMAICA BAY
MAY TO SEPTEMBER 1993
SITE JB-6A FRESH CREEK

WK	DATE	COLIFORM		TEMPS.		SALINITY		pH		D.O.		COND		SECCHI
		TOTAL	FECAL	SUR	BOT	SUR	BOT	SUR	BOT	SUR	BOT	SUR	BOT	
1	5/24/93	232	29	16.6	16.1	22.1	23.9	7.61	7.80	3.5	7.5	301	319	84
2	6/1/93	TNTC 2,030		18.0	17.2	17.2	20.1	8.16	8.44	8.5	8.5	239	281	42
3	6/7/93	1,276	29	16.3	15.1	21.3	24.3	8.10	8.23	2.5	3.0	284	322	54
4	6/15/93	145	29	21.0	20.3	18.5	22.8	8.14	8.24	3.5	3.0	270	330	36
5	6/21/93	783	87	22.9	22.0	11.9	25.9	7.57	8.24	3.0	4.0	179	365	42
6	6/28/93	116	0	23.4	22.8	14.4	26.2	7.51	7.80	*	*	211	370	36
7	7/8/93	0	58	25.4	25.1	14.0	25.1	7.98	8.51	7.0	6.5	230	393	42
8	7/12/93	754	0	26.7	26.6	24.5	24.2	8.58	8.40	7.0	5.5	396	392	42
9	7/19/93	174	58	23.7	23.4	20.7	24.2	7.70	*	5.0	4.0	341	391	48
10	7/26/93	58	0	23.0	23.0	26.5	25.5	*	*	5.5	*	398	399	54
11	8/2/93	400	0	26.1	25.4	15.5	25.9	*	*	3.5	2.5	232	382	42
12	8/9/93	800	200	24.1	23.9	25.7	25.8	*	*	2.5	1.5	383	389	36
13	8/16/93	4,000	3,400	25.0	25.0	25.1	25.1	*	5.50	3.0	3.0	385	387	36
14	8/23/93	800	0	23.0	23.0	17.2	24.8	7.60	7.70	4.0	*	265	370	60
15	8/30/93	*	1,350	24.5	25.0	16.4	21.9	8.00	8.20	6.5	*	265	341	48

AVERAGE 734 485 22.6 22.3 19.4 24.4 7.90 7.90 4.6 4.5 292 362 47
BOLD INDICATES A BACTERIAL LEVEL WHICH EXCEEDS THE LIMIT.
 * = NO DATA
 TNTC = TOO NUMEROUS TO COUNT.

TABLE XIV

PHYSICAL CONDITIONS
MAY TO SEPTEMBER 1993
SITE JB-6A FRESH CREEK

<u>WK</u>	<u>DATE</u>	<u>TIME</u>	<u>WEATHER</u>	<u>AIR TEMP</u>	<u>PRECIP</u>	<u>TIDE</u>
1	5/24/93	10:25	CLOUDY, COOL	20.0	0.00	10:36 H
2	6/1/93	11:05	WINDY, COOL	20.0	1.52	16:34 L 5:41 H
3	6/7/93	10:50	PT CLOUDY, COOL	18.0	TRACE	11:51 L 10:41 H
4	6/15/93	8:50	PT CLOUDY, COOL	22.0	0.00	4:41 L 4:45 H
5	6/21/93	10:40	FOGGY, COOL	24.0	0.35	10:56 L 9:33 H
6	6/28/93	10:00	HAZY, WARM	29.0	0.00	3:39 L 3:09 H
7	7/8/93	9:20	HAZY, HOT, HUMID	32.0	0.00	9:38 L 11:40 H
8	7/12/93	10:40	HAZY, HOT, HUMID	36.0	0.00	5:32 L 2:03 H
9	7/19/93	9:10	COOL, RAINING	25.0	0.44	8:24 L 8:26 H
10	7/26/93	14:15	FAIR	24.0	0.00	2:30 L 14:32 H
11	8/2/93	11:10	HAZY, HOT, HUMID	28.0	0.00	8:13 L 8:28 H
12	8/9/93	12:45	HAZY, HOT, HUMID	26.0	0.00	14:38 L 13:02 H
13	8/16/93	11:45	FOGGY, HUMID	26.0	0.00	6:38 L 7:16 H
14	8/23/93	9:40	HAZY	29.0	0.00	1:13 L 13:10 H
15	8/30/93	9:55	HAZY, HOT, HUMID	26.5	0.00	6:46 L 7:25 H 13:32 L

TABLE XV

WATER QUALITY DATA FOR JAMAICA BAY
MAY TO SEPTEMBER 1993
SITE JB-7 PUMPKIN PATCH CHANNEL

WK	DATE	COLIFORM		TEMPS.		SALINITY		PH		D.O.		COND	
		TOTAL	FECAL	SUR	BOT	SUR	BOT	SUR	BOT	SUR	BOT	SUR	BOT
1	5/24/93	29	0	16.5	16.5	23.2	23.8	8.06	7.82	3.5	6.0	319	319
2	6/1/93	20,400	1,595	17.4	17.5	23.2	22.1	8.65	8.54	10.5	9.5	310	309
3	6/7/93	870	29	15.7	15.6	24.5	24.1	8.21	8.21	3.0	2.5	322	322
4	6/15/93	522	87	21.2	20.5	23.2	24.1	8.34	8.21	3.0	2.5	338	349
5	6/21/93	667	290	22.3	22.2	26.2	26.1	8.32	8.32	2.0	4.0	372	370
6	6/28/93	87	0	23.5	23.1	26.7	26.4	7.75	7.88	*	*	372	371
7	7/8/93	290	0	26.0	25.4	25.0	25.1	8.54	8.48	10.5	6.0	395	395
8	7/12/93	464	58	26.7	26.4	24.1	25.2	8.48	8.20	5.5	3.5	392	401
9	7/19/93	319	0	23.9	23.4	24.1	24.2	7.60	*	4.0	4.0	392	393
10	7/26/93	0	0	23.0	23.0	26.3	26.5	*	*	4.0	*	397	395
11	8/2/93	200	0	25.2	25.2	27.1	26.9	*	*	2.5	2.5	391	397
12	8/9/93	400	0	23.2	23.1	25.3	25.1	*	*	3.5	3.5	381	381
13	8/16/93	400	400	23.0	22.0	23.5	23.5	*	*	5.5	5.0	365	365
14	8/23/93	200	0	23.0	23.0	24.1	24.9	7.80	7.70	*	*	362	372
15	8/30/93	*	200	25.0	25.0	22.5	22.8	8.20	8.20	1.5	*	349	352
<u>AVERAGE</u>		1,775	177	22.4	22.1	24.6	24.7	8.18	8.16	4.5	4.5	364	366

BOLD INDICATES A BACTERIAL LEVEL WHICH EXCEEDS THE LIMIT.

* = NO DATA

TABLE XVI

PHYSICAL CONDITIONS
MAY TO SEPTEMBER 1993
SITE JB-7 PUMPKIN PATCH CHANNEL

<u>WK</u>	<u>DATE</u>	<u>TIME</u>	<u>WEATHER</u>	<u>AIR TEMP</u>	<u>PRECIP</u>	<u>TIDE</u>
1	5/24/93	10:40	CLOUDY, COOL	24.0	0.00	10:36 H
2	6/1/93	11:25	WINDY, COOL	21.0	1.52	16:34 L
3	6/7/93	11:00	PT CLOUDY, COOL	17.0	TRACE	5:41 H
4	6/15/93	9:00	PT CLOUDY, COOL	24.0	0.00	11:51 L
5	6/21/93	10:50	FOGGY, COOL	24.0	0.35	10:41 H
6	6/28/93	10:10	HAZY, WARM	28.0	0.00	4:41 L
7	7/8/93	9:30	HAZY, HOT, HUMID	34.0	0.00	4:45 H
8	7/12/93	10:45	HAZY, HOT, HUMID	34.0	0.00	10:56 L
9	7/19/93	9:20	COOL, RAINING	24.0	0.44	9:33 H
10	7/26/93	14:21	FAIR	24.0	0.00	3:39 L
11	8/2/93	11:20	HAZY, HOT, HUMID	28.0	0.00	3:09 H
12	8/9/93	12:55	HAZY, HOT, HUMID	24.0	0.00	9:38 L
13	8/16/93	11:55	FOGGY, HUMID	26.0	0.00	11:40 H
14	8/23/93	9:50	HAZY	31.0	0.00	5:32 L
15	8/30/93	10:05	HAZY, HOT, HUMID	26.0	0.00	2:03 H
						8:24 L
						8:26 H
						2:30 L
						14:32 H
						8:13 L
						8:28 H
						14:38 L
						13:02 H
						6:38 L
						7:16 H
						1:13 L
						13:10 H
						6:46 L
						7:25 H
						13:32 L

TABLE XVII

WATER QUALITY DATA FOR JAMAICA BAY
MAY TO SEPTEMBER 1993
SITE JB-8 NORTH CHANNEL BRIDGE

WK	DATE	COLIFORM		TEMPS.		SALINITY		PH		D.O.		COND	
		TOTAL	FECAL	SUR	BOT	SUR	BOT	SUR	BOT	SUR	BOT	SUR	BOT
1	5/24/93	783	29	17.3	16.9	23.5	22.0	7.91	7.92	3.0	5.5	318	310
2	6/1/93	3,828	174	17.8	17.5	22.2	22.0	8.46	8.54	12.0	10.5	311	303
3	6/7/93	1,479	0	16.6	15.8	24.0	24.1	8.21	8.18	3.0	2.0	320	320
4	6/15/93	899	87	21.5	20.9	23.0	23.2	8.22	8.29	3.5	2.0	332	338
5	6/21/93	406	116	23.0	22.5	25.9	25.9	8.51	8.24	4.0	4.0	367	370
6	6/28/93	2,463	580	23.8	23.0	25.9	26.0	7.81	7.73	*	*	361	364
7	7/8/93	1,015	87	25.9	25.3	24.8	24.9	8.51	8.42	9.5	5.5	390	390
8	7/12/93	870	29	26.6	26.2	24.1	23.7	8.48	8.25	6.5	3.0	391	394
9	7/19/93	1,711	0	24.3	24.3	23.5	23.8	7.60	*	4.0	4.5	388	387
10	7/26/93	174	2,523	23.5	23.5	25.8	26.0	*	*	4.5	*	390	390
11	8/2/93	400	0	26.5	25.5	26.4	24.2	*	*	3.5	3.0	391	386
12	8/9/93	200	200	23.9	23.5	25.2	25.7	*	*	2.5	2.0	383	383
13	8/16/93	*	200	26.0	26.0	23.9	24.1	*	*	6.5	5.5	370	370
14	8/23/93	2,200	0	23.1	23.5	24.1	24.2	7.60	7.60	*	*	365	363
15	8/30/93	*	2,000	24.9	25.0	21.9	22.1	8.30	8.10	*	5.0	342	345
<u>AVERAGE</u>		1,264.	402	23.0	22.6	24.3	24.1	8.15	8.13	5.2	4.8	361	360

BOLD INDICATES A BACTERIAL LEVEL WHICH EXCEEDS THE LIMIT.

* = NO DATA

TABLE XVIII

PHYSICAL CONDITIONS
MAY TO SEPTEMBER 1993
SITE JB-8 NORTH CHANNEL BRIDGE

<u>WK</u>	<u>DATE</u>	<u>TIME</u>	<u>WEATHER</u>	<u>AIR TEMP</u>	<u>PRECIP</u>	<u>TIDE</u>
1	5/24/93	10:55	CLOUDY, COOL	22.0	0.00	10:36 H
2	6/1/93	11:40	WINDY, COOL	28.0	1.52	16:34 L
3	6/7/93	11:10	PT CLOUDY, COOL	18.0	TRACE	5:41 H
4	6/15/93	9:10	PT CLOUDY, COOL	23.5	0.00	11:51 L
5	6/21/93	10:55	FOGGY, COOL	23.0	0.35	10:41 H
6	6/28/93	10:15	HAZY, WARM	31.0	0.00	4:41 L
7	7/8/93	9:35	HAZY, HOT, HUMID	34.0	0.00	4:45 H
8	7/12/93	10:50	HAZY, HOT, HUMID	33.0	0.00	10:56 L
9	7/19/93	9:25	COOL, RAINING	24.0	0.44	9:33 H
10	7/26/93	14:29	FAIR	24.0	0.00	3:39 L
11	8/2/93	11:25	HAZY, HOT, HUMID	27.0	0.00	3:09 H
12	8/9/93	13:00	HAZY, HOT, HUMID	24.0	0.00	9:38 L
13	8/16/93	12:05	FOGGY, HUMID	26.0	0.00	11:40 H
14	8/23/93	10:00	HAZY	28.0	0.00	5:32 L
15	8/30/93	10:10	HAZY, HOT, HUMID	25.5	0.00	2:03 H
						8:24 L
						8:26 H
						2:30 L
						14:32 H
						8:13 L
						8:28 H
						14:38 L
						13:02 H
						6:38 L
						7:15 H
						1:13 L
						13:10 H
						6:46 L
						7:25 H
						13:32 L

TABLE XIX
WATER QUALITY DATA FOR JAMAICA BAY
MAY TO SEPTEMBER 1993
SITE JB-9 BERGEN BASIN

WK	DATE	COLIFORM		TEMPS.		SALINITY		PH		D.O.		COND	
		TOTAL	FECAL	SUR	BOT	SUR	BOT	SUR	BOT	SUR	BOT	SUR	BOT
1	5/24/93	3,219	3,045	17.5	17.0	23.0	23.1	8.27	8.12	3.0	5.5	312	318
2	6/1/93	23,400	2,900	18.6	17.7	19.9	22.3	8.61	8.48	9.0	8.5	279	279
3	6/7/93	TNTC	2,755	17.0	16.2	23.0	24.8	8.14	8.18	2.0	3.0	302	322
4	6/15/93	464	29	21.2	19.6	22.0	24.0	8.53	7.07	3.0	1.0	319	345
5	6/21/93	TNTC	TNTC	23.4	22.7	23.4	28.5	8.10	7.94	2.5	3.5	339	340
6	6/28/93	377	29	24.0	23.0	24.3	26.2	7.66	7.73	*	*	348	371
7	7/8/93	58	6,264	27.2	25.6	21.0	24.0	8.98	8.45	11.5	6.0	347	390
8	7/12/93	2,987	232	27.0	26.4	23.6	24.9	8.71	8.27	10.0	3.5	387	398
9	7/19/93	116	29	24.4	24.3	23.5	23.3	7.50	*	4.5	4.5	382	382
10	7/26/93	3,857	2,436	23.5	23.0	24.0	24.3	*	*	3.0	*	365	370
11	8/2/93	200	200	26.1	25.2	22.5	24.2	*	*	3.0	2.5	368	388
12	8/9/93	8,200	1,800	24.1	23.2	24.5	25.3	*	*	3.0	1.5	371	381
13	8/16/93	3,600	200	26.0	26.0	23.7	24.8	*	*	6.0	3.5	368	381
14	8/23/93	16,400	2,400	23.8	23.8	23.9	24.5	7.70	7.70	*	*	360	368
15	8/30/93	*	50	24.1	24.9	19.1	20.9	8.20	7.90	7.5	*	302	328
AVERAGE		3,578	1,598	23.2	22.6	22.8	24.3	8.22	7.98	5.2	3.9	343	357

BOLD INDICATES A BACTERIAL LEVEL WHICH EXCEEDS THE LIMIT.

* = NO DATA

TNTC = TOO NUMEROUS TO COUNT

TABLE XX

PHYSICAL CONDITIONS
MAY TO SEPTEMBER 1993
SITE JB-9 BERGEN BASIN

<u>WK</u>	<u>DATE</u>	<u>TIME</u>	<u>WEATHER</u>	<u>AIR TEMP</u>	<u>PRECIP</u>	<u>TIDE</u>
1	5/24/93	11:05	CLOUDY, COOL	21.0	0.00	10:36 H 16:34 L
2	6/1/93	12:00	WINDY, COOL	25.0	1.52	5:41 H 11:51 L
3	6/7/93	11:20	PT CLOUDY, COOL	19.5	TRACE	10:41 H 4:41 L
4	6/15/93	9:20	PT CLOUDY, COOL	22.5	0.00	4:45 H 10:56 L
5	6/21/93	11:05	FOGGY, COOL	23.0	0.35	9:33 H 3:39 L
6	6/28/93	10:25	HAZY, WARM	30.0	0.00	3:09 H 9:38 L
7	7/8/93	9:45	HAZY, HOT, HUMID	34 .0	0.00	11:40 H 5:32 L
8	7/12/93	11:00	HAZY, HOT, HUMID	36.0	0.00	2:03 H 8:24 L
9	7/19/93	9:35	COOL, RAINING	24.0	0.44	8:26 H 2:30 L
10	7/26/93	10:00	FAIR	22.0	0.00	14:32 H 8:13 L
11	8/2/93	11:30	HAZY, HOT, HUMID	27.0	0.00	8:28 H 14:38 L
12	8/9/93	13:05	HAZY, HOT, HUMID	24.0	0.00	13:02 H 6:38 L
13	8/16/93	12:15	FOGGY, HUMID	26.0	0.00	7:16 H 1:13 L
14	8/23/93	10:10	HAZY	29.0	0.00	13:10 H 6:46 L
15	8/30/93	10:15	HAZY, HOT, HUMID	25.0	0.00	7:25 H 13:32 L

TABLE XXI

WATER QUALITY DATA FOR JAMAICA BAY
MAY TO SEPTEMBER 1993
SITE JB-10 WINHOLE CHANNEL

WK	DATE	COLIFORM		TEMPS.		SALINITY		PH		D.O.		COND	
		TOTAL	FECAL	SUR	BOT	SUR	BOT	SUR	BOT	SUR	BOT	SUR	BOT
1	5/24/93	116	0	17.5	17.1	23.0	23.2	8.54	8.10	4.5	6.5	315	318
2	6/1/93	9,179	1,798	17.9	17.3	22.0	22.9	8.74	8.38	*	9.5	303	318
3	6/7/93	1,914	87	16.9	16.7	23.9	24.5	8.35	8.29	1.0	3.0	315	321
4	6/15/93	87	0	21.3	19.2	24.2	23.9	7.88	7.29	3.5	1.0	350	341
5	6/21/93	2,523	493	23.3	22.5	25.2	26.1	8.08	7.81	3.0	3.5	361	370
6	6/28/93	203	0	23.8	22.8	27.0	27.6	7.92	7.69	*	*	372	371
7	7/8/93	5,742	261	27.1	25.2	23.5	24.9	9.02	8.18	7.0	5.5	383	398
8	7/12/93	348	0	27.1	25.6	24.1	24.1	8.42	8.02	6.5	1.5	391	387
9	7/19/93	522	29	24.5	24.3	24.1	23.4	7.60	*	4.5	3.5	390	380
10	7/26/93	3,683	2,958	23.5	23.2	24.9	25.0	*	*	2.0	*	375	380
11	8/2/93	200	0	26.4	25.0	23.8	24.9	*	*	3.5	2.0	383	392
12	8/9/93	0	0	23.9	23.1	25.9	25.9	*	*	4.0	3.0	389	389
13	8/16/93	3,200	0	26.0	24.5	24.3	25.1	*	*	*	2.0	378	390
14	8/23/93	200	0	23.9	23.5	23.8	24.8	7.90	7.70	*	5.0	358	372
15	8/30/93	*	50	25.1	26.0	22.5	20.9	8.50	8.10	*	*	350	328
<u>AVERAGE</u>		1,994	378	23.2	22.4	24.1	24.5	8.27	8.00	4.0	3.8	361	364

BOLD INDICATES A BACTERIAL LEVEL WHICH EXCEEDS THE LIMIT.

* = NO DATA

TABLE XXII

PHYSICAL CONDITIONS
MAY TO SEPTEMBER 1993
SITE JB-10 WINHOLE CHANNEL

<u>WK</u>	<u>DATE</u>	<u>TIME</u>	<u>WEATHER</u>	<u>AIR TEMP</u>	<u>PRECIP</u>	<u>TIME</u>
1	5/24/93	11:20	CLOUDY, COOL	17.0	0.00	10:36 H
2	6/1/93	12:10	WINDY, COOL	26.0	1.52	16:34 L
3	6/7/93	11:30	PT CLOUDY, COOL	18.0	TRACE	5:41 H
4	6/15/93	9:30	PT CLOUDY, COOL	22.0	0.00	11:51 L
5	6/21/93	11:10	FOGGY, COOL	24.0	0.35	10:41 H
6	6/28/93	10:35	HAZY, WARM	29.0	0.00	4:41 L
7	7/8/93	9:50	HAZY, HOT, HUMID	33.0	0.00	4:45 H
8	7/12/93	11:05	HAZY, HOT, HUMID	38.0	0.00	10:56 L
9	7/19/93	9:40	COOL, RAINING	23.0	0.44	9:33 H
10	7/26/93	10:05	FAIR	22.0	0.00	3:39 L
11	8/2/93	11:40	HAZY, HOT, HUMID	27.0	0.00	3:09 H
12	8/9/93	13:12	HAZY, HOT, HUMID	24.0	0.00	9:38 L
13	8/16/93	12:20	FOGGY, HUMID	26.0	0.00	11:40 H
14	8/23/93	10:15	HAZY	29.0	0.00	5:32 L
15	8/30/93	10:25	HAZY, HOT, HUMID	24.0	0.00	2:03 H
						8:24 L
						8:26 H
						2:30 L
						14:32 H
						8:13 L
						8:28 H
						14:38 L
						13:02 H
						3:11 L
						7:15 H
						1:13 L
						13:10 H
						6:46 L
						7:25 H
						13:32 L

TABLE XXIII

WATER QUALITY DATA FOR JAMAICA BAY
MAY TO SEPTEMBER 1993
SITE JB-11 SUBWAY TRESSEL

WK	DATE	COLIFORM		TEMPS.		SALINITY		PH		D.O.		COND		SECCHI
		TOTAL	FECAL	SUR	BOT	SUR	BOT	SUR	BOT	SUR	BOT	SUR	BOT	
1	5/24/93	116	29	16.6	16.4	23.9	24.0	8.10	8.13	3.5	8.0	322	324	84
2	6/1/93	1,479	0	17.7	17.8	21.1	23.2	8.71	8.59	10.5	10.0	298	319	54
3	6/7/93	319	29	16.3	15.8	24.8	25.5	8.30	9.06	2.5	2.5	324	332	60
4	6/15/93	29	0	21.1	20.6	16.5	20.5	7.81	8.23	3.5	2.0	260	298	36
5	6/21/93	87	29	22.6	21.9	26.5	26.2	7.61	7.69	2.0	4.0	371	381	66
6	6/28/93	174	58	23.2	22.9	26.9	27.1	7.76	7.76	*	*	379	380	42
7	7/8/93	29	0	25.5	25.2	25.5	25.8	8.48	8.42	7.5	7.0	411	410	48
8	7/12/93	232	0	26.6	26.6	25.5	25.2	8.14	8.32	3.5	4.5	410	401	60
9	7/19/93	290	58	24.0	23.5	25.1	24.0	7.70	*	4.0	4.5	403	392	60
10	7/26/93	4,379	2,465	23.0	22.0	26.0	25.9	*	*	1.5	*	392	392	60
11	8/2/93	0	0	25.2	25.1	24.8	25.2	*	*	2.5	2.5	392	399	54
12	8/9/93	200	0	22.9	22.9	27.1	26.7	*	*	3.0	2.0	399	399	66
13	8/16/93	1,200	0	26.0	26.0	26.0	25.7	*	*	4.5	5.0	400	398	48
14	8/23/93	400	0	22.8	23.5	25.5	25.1	7.80	7.80	*	4.0	379	374	60
15	8/30/93	*	100	24.5	24.5	21.3	22.3	8.20	8.20	*	4.0	328	357	48
<u>AVERAGE</u>		639	185	22.5	22.3	24.4	24.8	8.06	8.22	4.0	4.6	365	370	56

BOLD INDICATES A BACTERIAL LEVEL WHICH EXCEEDS THE LIMIT.

* = NO DATA

TABLE XXIV

PHYSICAL CONDITIONS
MAY TO SEPTEMBER 1993
SITE JB-11 SUBWAY TRESSEL

<u>WK</u>	<u>DATE</u>	<u>TIME</u>	<u>WEATHER</u>	<u>AIR TEMP</u>	<u>PRECIP</u>	<u>TIDE</u>
1	5/24/93	11:40	CLOUDY, COOL	19.0	0.00	10.36 H 16.34 L
2	6/1/93	12:30	WINDY, COOL	25.0	1.52	5:41 H 11:51 L
3	6/7/93	11:45	PT CLOUDY, COOL	19.0	TRACE	10:41 H 4:41 L
4	6/15/93	9:40	PT CLOUDY, COOL	23.0	0.00	4:45 H 10:56 L
5	6/21/93	11:20	FOGGY, COOL	23.0	0.35	9:33 H 3:39 L
6	6/28/93	10:45	HAZY, WARM	27.0	0.00	3:09 H 9:38 L
7	7/8/93	10:05	HAZY, HOT, HUMID	32.0	0.00	11:40 H 5:32 L
8	7/12/93	11:15	HAZY, HOT, HUMID	35.0	0.00	2:03 H 3:55 L
9	7/19/93	9:50	COOL, RAINING	23.0	0.44	8:26 H 2:30 L
10	7/26/93	10:13	FAIR	23.0	0.00	14:32 H 8:13 L
11	8/2/93	11:45	HAZY, HOT, HUMID	27.0	0.00	8:28 H 14:38 L
12	8/9/93	13:20	HAZY, HOT, HUMID	24.0	0.00	13:02 H 6:38 L
13	8/16/93	12:35	FOGGY, HUMID	27.0	0.00	7:16 H 1:13 L
14	8/23/93	10:25	HAZY	26.5	0.00	13:10 H 6:46 L
15	8/30/93	10:35	HAZY, HOT, HUMID	25.0	0.00	7:25 H 13:32 L

TABLE XXV

WATER QUALITY DATA FOR JAMAICA BAY
MAY TO SEPTEMBER 1993
SITE JB-12 JOCO MARSH

WK	DATE	COLIFORM		TEMPS.		SALINITY		PH		D.O.		COND		SECCHI
		TOTAL	FECAL	SUR	BOT	SUR	BOT	SUR	BOT	SUR	BOT	SUR	BOT	
1	5/24/93	0	0	17.2	17.1	24.1	24.1	8.18	8.10	3.0	12.5	320	321	96
2	6/1/93	116	0	18.2	18.0	23.2	23.2	8.75	8.63	11.0	9.5	322	322	66
3	6/7/93	174	58	16.9	16.7	24.9	25.1	8.35	8.29	3.0	2.5	329	330	66
4	6/15/93	0	0	21.5	20.2	21.8	24.1	8.62	7.96	3.0	2.0	312	350	36
5	6/21/93	0	145	23.3	21.9	26.3	25.9	7.83	7.61	5.0	3.0	383	365	60
6	6/28/93	87	0	23.8	22.2	27.0	27.0	7.91	7.67	*	*	370	376	42
7	7/8/93	29	0	26.8	24.8	25.5	26.0	8.86	8.08	11.5	4.0	409	400	36
8	7/12/93	58	0	27.7	26.3	25.9	24.8	8.71	8.20	7.5	4.0	413	400	42
9	7/19/93	0	29	24.7	24.4	24.8	24.1	7.60	*	3.5	4.0	399	393	72
10	7/26/93	5,539	3,654	23.2	23.0	25.5	25.5	*	*	2.5	*	393	392	54
11	8/2/93	0	200	26.1	24.9	24.9	25.1	*	*	4.0	2.5	399	397	30
12	8/9/93	600	0	23.1	22.9	27.2	26.8	*	*	3.5	2.5	401	398	42
13	8/16/93	2,200	600	26.0	25.5	26.1	26.1	*	*	5.5	4.5	400	400	60
14	8/23/93	1,600	200	24.0	23.5	24.2	25.1	8.00	7.70	*	*	362	378	54
15	8/30/93	*	0	24.1	24.9	23.1	23.1	8.50	8.30	*	*	360	358	66
AVERAGE		743	326	23.1	22.4	25.0	25.1	8.30	8.05	5.3	4.6	371	372	55

BOLD INDICATES A BACTERIAL LEVEL WHICH EXCEEDS THE LIMIT.

* = NO DATA

TABLE XXVI

PHYSICAL CONDITIONS
MAY TO SEPTEMBER 1993
SITE JB-12 JO CO MARSH

<u>WK</u>	<u>DATE</u>	<u>TIME</u>	<u>WEATHER</u>	<u>AIR TEMP</u>	<u>PRECIP</u>	<u>TIDE</u>
1	5/24/93	12:00	CLOUDY, COOL	20.0	0.00	10:36 H 16:34 L
2	6/1/93	12:50	WINDY, COOL	25.0	1.52	5:41 H 11:51 L
3	6/7/93	12:00	PT CLOUDY, COOL	20.0	TRACE	10:41 H 4:41 L
4	6/15/93	9:55	PT CLOUDY, COOL	24.0	0.00	4:45 H 10:56 L
5	6/21/93	11:30	FOGGY, COOL	25.0	0.35	9:33 H 3:39 L
6	6/28/93	10:50	HAZY, WARM	27.0	0.00	3:09 H 9:38 L
7	7/8/93	10:15	HAZY, HOT, HUMID	31.0	0.00	11:40 H 5:32 L
8	7/12/93	11:30	HAZY, HOT, HUMID	41.0	0.00	2:03 H 8:24 L
9	7/19/93	10:00	COOL, RAINING	23.0	0.44	8:26 H 2:30 L
10	7/26/93	10:19	FAIR	23.0	0.00	14:32 H 8:13 L
11	8/2/93	12:00	HAZY, HOT, HUMID	28.0	0.00	8:28 H 14:38 L
12	8/9/93	13:30	HAZY, HOT, HUMID	24.0	0.00	13:02 H 6:38 L
13	8/16/93	12:45	FOG, HUMID	27.0	0.00	7:16 H 1:13 L
14	8/23/93	10:35	HAZY	24.0	0.00	13:10 H 6:46 L
15	8/30/93	10:45	HAZY, HOT, HUMID	25.0	0.00	7:25 H 13:32 L

TABLE XXVII

WATER QUALITY DATA FOR JAMAICA BAY
MAY TO SEPTEMBER 1993
SITE JB-13 HEAD OF THE BAY

WK	DATE	COLIFORM		TEMPS.		SALINITY		PH		D.O.		COND		SECCHI
		TOTAL	FECAL	SUR	BOT	SUR	BOT	SUR	BOT	SUR	BOT	SUR	BOT	
1	5/24/93	0	0	17.9	17.5	23.1	23.2	8.32	8.18	3.0	3.5	319	321	72
2	6/1/93	6,322	87	18.5	18.1	22.1	22.8	8.62	8.57	10.5	9.0	311	312	54
3	6/7/93	551	0	17.3	17.0	24.0	24.1	8.39	8.26	2.5	2.5	321	320	66
4	6/15/93	0	0	22.0	21.6	24.8	24.8	7.24	8.50	3.0	2.5	355	351	42
5	6/21/93	232	174	23.2	23.0	26.1	26.3	8.21	7.30	4.0	3.5	370	382	72
6	6/28/93	29	0	23.9	23.4	27.1	27.0	7.84	7.76	*	*	371	372	46
7	7/8/93	0	0	27.2	25.7	24.9	25.5	8.75	8.31	10.0	2.5	400	400	36
8	7/12/93	0	29	27.6	26.4	25.5	24.9	8.97	8.14	11.5	3.0	410	401	36
9	7/19/93	0	0	25.0	24.0	25.1	24.1	7.60	*	3.5	4.5	402	394	78
10	7/26/93	5,075	3,306	23.5	23.0	25.5	25.5	*	*	2.5	*	391	391	66
11	8/2/93	0	0	26.1	25.2	24.3	25.1	*	*	4.0	3.5	393	396	36
12	8/9/93	0	0	23.9	23.1	26.9	26.9	*	*	5.0	2.5	400	399	36
13	8/16/93	16	3,000	26.0	26.0	26.0	26.1	*	*	8.0	5.5	400	403	42
14	8/23/93	4,000	0	23.5	23.8	25.1	25.5	7.80	7.90	*	*	378	379	48
15	8/30/93	*	0	24.9	25.0	22.8	23.0	8.30	8.30	*	*	349	355	48
AVERAGE		1,159	440	23.4	22.9	24.9	25.0	8.19	8.12	5.6	3.9	371	372	52

BOLD INDICATES A BACTERIAL LEVEL WHICH EXCEEDS THE LIMIT.

* = NO DATA

TABLE XXVIII

PHYSICAL CONDITIONS
MAY TO SEPTEMBER 1993
SITE JB-13 HEAD OF THE BAY

<u>WK</u>	<u>DATE</u>	<u>TIME</u>	<u>WEATHER</u>	<u>AIR TEMP</u>	<u>PRECIP</u>	<u>TIDE</u>
1	5/24/93	12:10	CLOUDY, COOL	23.0	0.00	10:36 H 16:34 L
2	6/1/93	13:05	WINDY, COOL	24.0	1.52	5:41 H 11:51 L
3	6/7/93	12:10	PT CLOUDY, COOL	23.0	TRACE	10:41 H 4:41 L
4	6/15/93	10:10	PT CLOUDY, COOL	25.0	0.00	4:45 H 10:56 L
5	6/21/93	11:40	FOGGY, COOL	25.0	0.35	9:33 H 3:39 L
6	6/28/93	11:00	HAZY, WARM	30.0	0.00	3:09 H 9:38 L
7	7/8/93	10:30	HAZY, HOT, HUMID	34.0	0.00	11:40 H 5:32 L
8	7/12/93	11:35	HAZY, HOT, HUMID	38.0	0.00	2:03 H 8:24 L
9	7/19/93	10:30	COOL, RAINING	21.0	0.44	8:26 H 2:30 L
10	7/26/93	10:24	FAIR	22.0	0.00	14:32 H 8:13 L
11	8/2/93	12:05	HAZY, HOT, HUMID	30.0	0.00	8:28 H 14:38 L
12	8/9/93	13:35	HAZY, HOT, HUMID	24.0	0.00	13:02 H 6:38 L
13	8/16/93	12:50	FOGGY, HUMID	27.0	0.00	7:16 H 1:13 L
14	8/23/93	10:45	HAZY	29.0	0.00	13:10 H 6:46 L
15	8/30/93	10:55	HAZY, HOT, HUMID	24.0	0.00	7:25 H 13:32 L

TABLE XXIX

WATER QUALITY DATA FOR JAMAICA BAY
MAY TO SEPTEMBER 1993
SITE JB-14 BROAD CHANNEL

WK	DATE	COLIFORM		TEMPS.		SALINITY		pH		D.O.		COND	
		TOTAL	FECAL	SUR	BOT	SUR	BOT	SUR	BOT	SUR	BOT	SUR	BOT
1	5/26/93	58	29	19.1	N/A	24.1	N/A	7.84	N/A	7.5	N/A	340	N/A
2	6/3/93	145	29	20.2	N/A	24.3	N/A	8.40	N/A	*	N/A	349	N/A
3	6/8/93	58	0	19.5	N/A	24.9	N/A	8.37	N/A	*	N/A	355	N/A
4	6/16/93	116	29	24.3	N/A	25.5	N/A	9.10	N/A	3.0	N/A	391	N/A
5	6/21/93	29	29	24.8	N/A	25.5	N/A	8.84	N/A	*	N/A	400	N/A
6	6/28/93	0	0	25.2	N/A	26.8	N/A	8.76	N/A	*	N/A	412	N/A
7	7/6/93	29	29	26.4	N/A	26.0	N/A	8.78	N/A	4.0	N/A	412	N/A
8	7/14/93	58	145	28.2	N/A	26.1	N/A	8.64	N/A	*	N/A	430	N/A
9	7/21/93	0	493	24.0	N/A	25.0	N/A	*	N/A	6.0	N/A	402	N/A
10	7/28/93	1,044	174	26.0	N/A	27.5	N/A	*	N/A	2.5	N/A	410	N/A
11	8/5/93	0	0	26.0	N/A	25.5	N/A	*	N/A	2.5	N/A	412	N/A
12	8/12/93	17,800	13,200	24.1	N/A	25.5	N/A	*	N/A	3.0	N/A	390	N/A
13	8/17/93	1,600	600	25.6	N/A	25.7	N/A	*	N/A	4.1	N/A	389	N/A
14	8/25/93	200	0	26.2	N/A	24.9	N/A	8.54	N/A	*	N/A	401	N/A
15	8/31/93	*	200	26.0	N/A	25.9	N/A	8.20	N/A	*	N/A	395	N/A

AVERAGE 1,510 997 24.4 25.5 8.50 4.1 393

BOLD INDICATES A BACTERIAL LEVEL WHICH EXCEEDS THE LIMIT.

N/A = NOT APPLICABLE - SHORE SAMPLE SITE

* = NO DATA

TABLE XXX

PHYSICAL CONDITIONS
MAY TO SEPTEMBER 1993
SITE JB-14 BROAD CHANNEL

<u>WK</u>	<u>DATE</u>	<u>TIME</u>	<u>WEATHER</u>	<u>AIR TEMP</u>	<u>PRECIP</u>	<u>TIDE</u>
1	5/26/93	9:45	CLOUDY, COOL	24.0	0.00	12:21 H
2	6/3/93	14:10	WINDY, COOL	25.0	0.00	18:14 L
3	6/8/93	13:50	PT CLOUDY, COOL	27.0	0.00	5:41 H
4	6/16/93	10:50	PT CLOUDY, COOL	33.0	0.00	11:51 L
5	6/21/93	16:00	FOGGY, COOL	27.0	0.35	10:41 H
6	6/28/93	12:45	HAZY, WARM	31.0	0.00	4:41 L
7	7/6/93	14:55	HAZY, HOT, HUMID	29.0	0.00	4:45 H
8	7/14/93	13:30	HAZY, HOT, HUMID	34.0	0.00	10:56 L
9	7/21/93	10:30	HAZY, HOT, HUMID	26.0	0.00	9:33 H
10	7/28/93	11:50	FAIR	39.0	0.00	3:39 L
11	8/5/93	10:00	HAZY, HOT, HUMID	28.0	0.00	3:09 H
12	8/12/93	8:45	HAZY, HOT, HUMID	25.0	0.00	9:38 L
13	8/17/93	11:55	HUMID	30.0	0.00	10:15 H
14	8/25/93	14:30	HAZY	29.0	0.00	4:55 L
15	8/31/93	10:45	HAZY, HOT, HUMID	28.0	0.00	3:55 H

TABLE XXV

WATER QUALITY DATA FOR JAMAICA BAY
MAY TO SEPTEMBER 1993
SITE JB-12 JOCO MARSH

WK	DATE	COLIFORM		TEMPS.		SALINITY		PH		D.O.		COND	
		TOTAL	FECAL	SUR	BOT	SUR	BOT	SUR	BOT	SUR	BOT	SUR	BOT
1	5/24/93	0	0	17.2	17.1	24.1	24.1	8.18	8.10	3.0	12.5	320	321
2	6/1/93	116	0	18.2	18.0	23.2	23.2	8.75	8.63	11.0	9.5	322	322
3	6/7/93	174	58	16.9	16.7	24.9	25.1	8.35	8.29	3.0	2.5	329	330
4	6/15/93	0	0	21.5	20.2	21.8	24.1	8.62	7.96	3.0	2.0	312	350
5	6/21/93	0	145	23.3	21.9	26.3	25.9	7.83	7.61	5.0	3.0	383	365
6	6/28/93	87	0	23.8	22.2	27.0	27.0	7.91	7.67	*	*	370	376
7	7/8/93	29	0	26.8	24.8	25.5	26.0	8.86	8.08	11.5	4.0	409	400
8	7/12/93	58	0	27.7	26.3	25.9	24.8	8.71	8.20	7.5	4.0	413	400
9	7/19/93	0	29	24.7	24.4	24.8	24.1	7.60	*	3.5	4.0	399	393
10	7/26/93	5,539	3,654	23.2	23.0	25.5	25.5	*	*	2.5	*	393	392
11	8/2/93	0	200	26.1	24.9	24.9	25.1	*	*	4.0	2.5	399	397
12	8/9/93	600	0	23.1	22.9	27.2	26.8	*	*	3.5	2.5	401	398
13	8/16/93	2,200	600	26.0	25.5	26.1	26.1	*	*	5.5	4.5	400	400
14	8/23/93	1,600	200	24.0	23.5	24.2	25.1	8.00	7.70	*	*	362	378
15	8/30/93	*	0	24.1	24.9	23.1	23.1	8.50	8.30	*	*	360	358
AVERAGE		743	326	23.1	22.4	25.0	25.1	8.30	8.05	5.3	4.6	371	372

BOLD INDICATES A BACTERIAL LEVEL WHICH EXCEEDS THE LIMIT.

* = NO DATA

PHYSICAL CONDITIONS
MAY TO SEPTEMBER 1993
SITE JB-12 JO CO MARSH

<u>WK</u>	<u>DATE</u>	<u>TIME</u>	<u>WEATHER</u>	<u>AIR TEMP</u>	<u>PRECIP</u>	<u>TIDE</u>
1	5/24/93	12:00	CLOUDY, COOL	20.0	0.00	10:36 H
2	6/1/93	12:50	WINDY, COOL	25.0	1.52	16:34 L
3	6/7/93	12:00	PT CLOUDY, COOL	20.0	TRACE	5:41 H
4	6/15/93	9:55	PT CLOUDY, COOL	24.0	0.00	11:51 L
5	6/21/93	11:30	FOGGY, COOL	25.0	0.35	10:41 H
6	6/28/93	10:50	HAZY, WARM	27.0	0.00	4:41 L
7	7/8/93	10:15	HAZY, HOT, HUMID	31.0	0.00	4:45 H
8	7/12/93	11:30	HAZY, HOT, HUMID	41.0	0.00	10:56 L
9	7/19/93	10:00	COOL, RAINING	23.0	0.44	9:33 H
10	7/26/93	10:19	FAIR	23.0	0.00	3:39 L
11	8/2/93	12:00	HAZY, HOT, HUMID	28.0	0.00	3:09 H
12	8/9/93	13:30	HAZY, HOT, HUMID	24.0	0.00	9:38 L
13	8/16/93	12:45	FOG, HUMID	27.0	0.00	11:40 H
14	8/23/93	10:35	HAZY	24.0	0.00	5:32 L
15	8/30/93	10:45	HAZY, HOT, HUMID	25.0	0.00	2:03 H
						8:24 L
						8:26 H
						2:30 L
						14:32 H
						8:13 L
						8:28 H
						14:38 L
						13:02 H
						6:38 L
						7:16 H
						1:13 L
						13:10 H
						6:46 L
						7:25 H
						13:32 L

TABLE XXVII

WATER QUALITY DATA FOR JAMAICA BAY
MAY TO SEPTEMBER 1993
SITE JB-13 HEAD OF THE BAY

WK	DATE	COLIFORM		TEMPS.		SALINITY		PH		D.O.		COND	
		TOTAL	FECAL	SUR	BOT	SUR	BOT	SUR	BOT	SUR	BOT	SUR	BOT
1	5/24/93	0	0	17.9	17.5	23.1	23.2	8.32	8.18	3.0	3.5	319	321
2	6/1/93	6,322	87	18.5	18.1	22.1	22.8	8.62	8.57	10.5	9.0	311	312
3	6/7/93	551	0	17.3	17.0	24.0	24.1	8.39	8.26	2.5	2.5	321	320
4	6/15/93	0	0	22.0	21.6	24.8	24.8	7.24	8.50	3.0	2.5	355	351
5	6/21/93	232	174	23.2	23.0	26.1	26.3	8.21	7.30	4.0	3.5	370	382
6	6/28/93	29	0	23.9	23.4	27.1	27.0	7.84	7.76	*	*	371	372
7	7/8/93	0	0	27.2	25.7	24.9	25.5	8.75	8.31	10.0	2.5	400	400
8	7/12/93	0	29	27.6	26.4	25.5	24.9	8.97	8.14	11.5	3.0	410	401
9	7/19/93	0	0	25.0	24.0	25.1	24.1	7.60	*	3.5	4.5	402	394
10	7/26/93	5,075	3,306	23.5	23.0	25.5	25.5	*	*	2.5	*	391	391
11	8/2/93	0	0	26.1	25.2	24.3	25.1	*	*	4.0	3.5	393	396
12	8/9/93	0	0	23.9	23.1	26.9	26.9	*	*	5.0	2.5	400	399
13	8/16/93	16	3,000	26.0	26.0	26.0	26.1	*	*	8.0	5.5	400	403
14	8/23/93	4,000	0	23.5	23.8	25.1	25.5	7.80	7.90	*	*	378	379
15	8/30/93	*	0	24.9	25.0	22.8	23.0	8.30	8.30	*	*	349	355
AVERAGE		1,159	440	23.4	22.9	24.9	25.0	8.19	8.12	5.6	3.9	371	372

BOLD INDICATES A BACTERIAL LEVEL WHICH EXCEEDS THE LIMIT.

* = NO DATA

PHYSICAL CONDITIONS
MAY TO SEPTEMBER 1993
SITE JB-13 HEAD OF THE BAY

<u>WK</u>	<u>DATE</u>	<u>TIME</u>	<u>WEATHER</u>	<u>AIR TEMP</u>	<u>PRECIP</u>	<u>TIDE</u>
1	5/24/93	12:10	CLOUDY, COOL	23.0	0.00	10:36 H 16:34 L
2	6/1/93	13:05	WINDY, COOL	24.0	1.52	5:41 H 11:51 L
3	6/7/93	12:10	PT CLOUDY, COOL	23.0	TRACE	10:41 H 4:41 L
4	6/15/93	10:10	PT CLOUDY, COOL	25.0	0.00	4:45 H 10:56 L
5	6/21/93	11:40	FOGGY, COOL	25.0	0.35	9:33 H 3:39 L
6	6/28/93	11:00	HAZY, WARM	30.0	0.00	3:09 H 9:38 L
7	7/8/93	10:30	HAZY, HOT, HUMID	34.0	0.00	11:40 H 5:32 L
8	7/12/93	11:35	HAZY, HOT, HUMID	38.0	0.00	2:03 H 8:24 L
9	7/19/93	10:30	COOL, RAINING	21.0	0.44	8:26 H 2:30 L
10	7/26/93	10:24	FAIR	22.0	0.00	14:32 H 8:13 L
11	8/2/93	12:05	HAZY, HOT, HUMID	30.0	0.00	8:28 H 14:38 L
12	8/9/93	13:35	HAZY, HOT, HUMID	24.0	0.00	13:02 H 6:38 L
13	8/16/93	12:50	FOGGY, HUMID	27.0	0.00	7:16 H 1:13 L
14	8/23/93	10:45	HAZY	29.0	0.00	13:10 H 6:46 L
15	8/30/93	10:55	HAZY, HOT, HUMID	24.0	0.00	7:25 H 13:32 L

TABLE XXIX

WATER QUALITY DATA FOR JAMAICA BAY
MAY TO SEPTEMBER 1993
SITE JB-14 BROAD CHANNEL

WK	DATE	COLIFORM		TEMPS.		SALINITY		PH		D.O.		COND		SECCHI
		TOTAL	FECAL	SUR	BOT	SUR	BOT	SUR	BOT	SUR	BOT	SUR	BOT	
1	5/26/93	58	29	19.1	N/A	24.1	N/A	7.84	N/A	7.5	N/A	340	N/A	N/A
2	6/3/93	145	29	20.2	N/A	24.3	N/A	8.40	N/A	*	N/A	349	N/A	N/A
3	6/8/93	58	0	19.5	N/A	24.9	N/A	8.37	N/A	*	N/A	355	N/A	N/A
4	6/16/93	116	29	24.3	N/A	25.5	N/A	9.10	N/A	3.0	N/A	391	N/A	N/A
5	6/21/93	29	29	24.8	N/A	25.5	N/A	8.84	N/A	*	N/A	400	N/A	N/A
6	6/28/93	0	0	25.2	N/A	26.8	N/A	8.76	N/A	*	N/A	412	N/A	N/A
7	7/6/93	29	29	26.4	N/A	26.0	N/A	8.78	N/A	4.0	N/A	412	N/A	N/A
8	7/14/93	58	145	28.2	N/A	26.1	N/A	8.64	N/A	*	N/A	430	N/A	N/A
9	7/21/93	0	493	24.0	N/A	25.0	N/A	*	N/A	6.0	N/A	402	N/A	N/A
10	7/28/93	1,044	174	26.0	N/A	27.5	N/A	*	N/A	2.5	N/A	410	N/A	N/A
11	8/5/93	0	0	26.0	N/A	25.5	N/A	*	N/A	2.5	N/A	412	N/A	N/A
12	8/12/93	17,800	13,200	24.1	N/A	25.5	N/A	*	N/A	3.0	N/A	390	N/A	N/A
13	8/17/93	1,600	600	25.6	N/A	25.7	N/A	*	N/A	4.1	N/A	389	N/A	N/A
14	8/25/93	200	0	26.2	N/A	24.9	N/A	8.54	N/A	*	N/A	401	N/A	N/A
15	8/31/93	*	200	26.0	N/A	25.9	N/A	8.20	N/A	*	N/A	395	N/A	N/A
AVERAGE		1,510	997	24.4		25.5		8.50		4.1		393		

BOLD INDICATES A BACTERIAL LEVEL WHICH EXCEEDS THE LIMIT.

N/A = NOT APPLICABLE - SHORE SAMPLE SITE

* = NO DATA

PHYSICAL CONDITIONS
MAY TO SEPTEMBER 1993
SITE JB-14 BROAD CHANNEL

<u>WK</u>	<u>DATE</u>	<u>TIME</u>	<u>WEATHER</u>	<u>AIR TEMP</u>	<u>PRECIP</u>	<u>TIDE</u>
1	5/26/93	9:45	CLOUDY, COOL	24.0	0.00	12:21 H
2	6/3/93	14:10	WINDY, COOL	25.0	0.00	18:14 L
3	6/8/93	13:50	PT CLOUDY, COOL	27.0	0.00	5:41 H
4	6/16/93	10:50	PT CLOUDY, COOL	33.0	0.00	11:51 L
5	6/21/93	16:00	FOGGY, COOL	27.0	0.35	10:41 H
6	6/28/93	12:45	HAZY, WARM	31.0	0.00	4:41 L
7	7/6/93	14:55	HAZY, HOT, HUMID	29.0	0.00	4:45 H
8	7/14/93	13:30	HAZY, HOT, HUMID	34.0	0.00	10:56 L
9	7/21/93	10:30	HAZY, HOT, HUMID	26.0	0.00	9:33 H
10	7/28/93	11:50	FAIR	39.0	0.00	3:39 L
11	8/5/93	10:00	HAZY, HOT, HUMID	28.0	0.00	3:09 H
12	8/12/93	8:45	HAZY, HOT, HUMID	25.0	0.00	9:38 L
13	8/17/93	11:55	HUMID	30.0	0.00	10:15 H
14	8/25/93	14:30	HAZY	29.0	0.00	4:55 L
15	8/31/93	10:45	HAZY, HOT, HUMID	28.0	0.00	3:55 H
						10:13 L
						10:00 H
						4:00 L
						3:57 H
						10:18 L
						10:23 H
						16:38 L
						3:11 H
						9:29 L
						8:04 H
						2:01 L
						2:33 H
						7:11 L
						8:04 H
						1:59 L

TABLE XXXI

CHLOROPHYLL a FOR JAMAICA BAY
MAY TO SEPTEMBER 1993

	WEEK 1	WEEK 6	WEEK 10	WEEK 13
RI-3	*	15.098	10.791	8.056
MPB-4	2.078	4.159	2.203	4.594
JB-5	1.841	1.876	3.231	13.890
JB-6	3.744	1.792	15.312	30.864
JB-6A	2.082	.172	10.732	13.958
JB-7	0.585	.717	11.540	22.270
JB-8	0.104	4.282	17.644	24.002
JB-9	13.096	4.406	13.732	15.090
JB-10	10.056	1.629	16.416	15.156
JB-11	2.108	3.787	11.522	18.134
JB-12	1.995	.205	14.974	11.294
JB-13	22.938	1.968	10.084	8.870
JB-14	4.445	1.841	2.324	2.070

* = NO DATA

TABLE XXXII

TOTAL AND FECAL COLIFORM CONCENTRATIONS
BREEZY POINT - ALT-1
MAY TO SEPTEMBER 1993

WEEK	DATE	TIME	TOTAL	FECAL
1	5/25/93	12:15	0	0
2	6/1/93	9:25	0	0
BPSC1W 2	6/4/93	16:00	29	0
BPSC2W 2	6/4/93	16:15	0	0
BPSC3E 2	6/4/93	16:30	0	0
BPSC4E 2	6/4/93	16:45	29	0
BP1W FT. TILDEN	6/4/93	17:00	0	0
3	6/8/93	14:45	0	0
4	6/14/93	15:10	87	0
5	6/21/93	12:40	29	0
6	6/28/93	11:40	29	0
7	7/6/93	15:45	0	0
8	7/12/93	11:45	29	0
9	7/19/93	10:55	29	87
10	7/28/93	11:40	319	232
	7/29/93		203	0
	7/30/93		29	0
	7/31/93		0	0
11	8/1/93	11:30	87	58
12	*8/3/93		58	58
		ATL-1-1W	29	87
		ATL-1-2W	29	58

* = REPORT OF ODOR ON BEACH

TABLE XXXII (CONT.)

TOTAL AND FECAL COLIFORM CONCENTRATIONS
BREEZY POINT - ATL-1
MAY TO SEPTEMBER 1993

WEEK	DATE	TIME	TOTAL	FECAL
13	8/15/93	8:15	0	0
14	8/23/93	11:30	0	29
15	8/31/93	10:30	0	0
16	9/9/93	9:25	0	29
<u>AVERAGE</u>			39	25

BOLD = BACTERIAL LEVEL WHICH EXCEEDS THE LIMIT

TABLE XXXIII

TOTAL AND FECAL COLIFORM CONCENTRATIONS
BREEZY POINT - ALT-2
MAY TO SEPTEMBER 1993

WEEK	DATE	TIME	TOTAL	FECAL
1	5/25/93	11:45	0	0
2	6/1/93	13:15	0	0
BP2E RIIS 2	6/4/93	17:20	29	0
RIIS PARK 2	6/4/93	17:35	0	0
3	6/8/93	14:30	0	0
4	6/14/93	14:45	0	0
5	6/21/93	12:15	0	0
6	6/28/93	11:15	0	29
7	7/6/93	15:20	0	0
8	7/12/93	11:15	87	87
9	7/19/93	10:40	58	58
10	7/28/93	11:20	464	58
	7/29/93		115	58
	7/30/93		29	29
	7/31/93		58	87
11	8/1/93	11:10	29	0
12	8/9/93	11:56	29	0

TABLE XXXIII (CONT.)

TOTAL AND FECAL COLFORM CONCENTRATIONS
BREEZY POINT - ATL-2
MAY TO SEPTEMBER

WEEK	DATE	TIME	TOTAL	FECAL
13	8/15/93	11:10	0	0
14	8/23/93	11:10	29	0
15	8/31/93	10:00	0	58
16	9/9/93	9:00	0	0

AVERAGE

44

22

TABLE XXXIV

WATER QUALITY DATA FOR STATEN ISLAND
MAY THROUGH AUGUST 1993
SITE SB-2 SOUTH BEACH

WEEK	DATE	TIME	TOTAL	FECAL
1	5/24/93	11:45	58	0
2	6/1/93	10:35	232	58
3	6/8/93	12:25	87	29
4	6/14/93	10:35	0	0
5	6/21/93	10:30	377	232
6	6/28/93	10:40	580	87
7	7/6/93	12:30	116	0
8	7/12/93	10:15	0	0
9	7/19/93	9:50	0	58
10	7/28/93	10:05	754	87
11	8/1/93	10:25	0	0
12	8/9/93	11:00	58	58
13	8/15/93	10:25	200	0
14	8/23/93	10:26	0	0

BOLD INDICATES A BACTERIAL LEVEL WHICH EXCEEDS THE LIMIT.

AVERAGE 176 44

TABLE XXXV

WATER QUALITY DATA FOR STATEN ISLAND
MAY THROUGH AUGUST 1993
SITE MB-3 MIDLAND BEACH

WEEK	DATE	TIME	TOTAL	FECAL
1	5/25/93	9:30	0	0
2	6/1/93	10:25	87	0
3	6/8/93	12:15	0	0
4	6/14/93	10:25	0	0
5	6/21/93	10:25	377	29
6	6/28/93	10:30	58	58
7	7/6/93	12:25	435	58
8	7/12/93	10:05	58	0
9	7/19/93	9:40	58	145
10	7/28/93	9:55	696	87
11	8/1/93	10:15	116	116
12	8/9/93	10:52	435	0
13	8/15/93	10:15	0	0
14	8/23/93	10:18	0	0

AVERAGE 166 35

TABLE XXXVI

WATER QUALITY DATA FOR STATEN ISLAND
MAY THROUGH AUGUST 1993
SITE NDB-4 NEW DORP BEACH

WEEK	DATE	TIME	TOTAL	FECAL
1	5/25/93	10:45	0	0
2	6/1/93	10:10	174	58
3	6/8/93	12:00	145	0
4	6/14/93	10:10	0	0
5	6/21/93	10:10	145	87
6	6/28/93	10:15	290	116
7	7/6/93	12:05	435	29
8	7/12/93	9:45	0	58
9	7/19/93	9:30	406	174
10	7/28/93	9:30	638	116
11	8/1/93	9:50	29	0
12	8/9/93	10:35	1,334	435
13	8/15/93	9:50	0	0
14	8/23/93	10:00	0	0

BOLD INDICATES A BACTERIAL LEVEL WHICH EXCEEDS THE LIMIT.

AVERAGE	257	77
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TABLE XXXVII

WATER QUALITY DATA FOR STATEN ISLAND
MAY THROUGH AUGUST 1993
SITE OB-5 OAKWOOD BEACH

WEEK	DATE	TIME	TOTAL	FECAL
1	5/25/93	10:30	29	0
2	6/1/93	10:00	87	29
3	6/8/93	11:45	116	0
4	6/14/93	10:00	0	0
5	6/21/93	9:55	116	87
6	6/28/93	10:00	0	87
7	7/6/93	11:55	232	0
8	7/12/93	9:35	0	0
9	7/19/93	9:10	87	116
10	7/28/93	9:15	493	348
11	8/1/93	9:35	29	29
12	8/9/93	10:21	29	0
13	8/15/93	9:35	0	0
14	8/23/93	9:50	0	0

AVERAGE 87 50

BOLD INDICATES A BACTERIAL LEVEL WHICH EXCEEDS THE LIMIT.

TABLE XXXVIII

WATER QUALITY DATA FOR STATEN ISLAND
MAY THROUGH AUGUST 1993
SITE GK-6 GREAT KILLS BEACH

WEEK	DATE	TIME	TOTAL	FECAL
1	5/25/93	10:00	145	0
2	6/1/93	9:40	87	58
3	6/8/93	11:30	116	29
4	6/14/93	9:40	29	0
5	6/21/93	9:45	0	87
6	6/28/93	9:45	29	87
7	7/6/93	9:00	58	0
8	7/12/93	9:20	58	29
9	7/19/93	9:00	0	0
10	7/28/93	9:00	145	551
	7/29/93		0	290
	7/30/93		0	261
	7/31/93		0	0
11	8/1/93	9:20	58	145
	8/2/93		0	29
12	8/9/93	10:08	0	319
	8/10/93		0	2,117

TABLE XXXVIII (CONT.)

WATER QUALITY FOR STATEN ISLAND
MAY THROUGH AUGUST 1993
SITE GK-6 GREAT KILLS BEACH

WEEK	DATE	TIME	TOTAL	FECAL
	8/11/93		29	1,363
	8/12/93		928	290
	8/13/93		232	522
	8/14/93		0	290
13	8/15/93		200	0
	8/16/93		0	261
	8/17/93		0	116
	8/18/93		261	928
	8/19/93		145	435
	8/20/93		145	87
	8/21/93		0	232
	8/22/93		87	203
14	8/23/93	9:30	87	0
	8/24/93		145	116
	8/25/93		29	377
15	8/31/93	8:30	0	435
16	9/7/93	8:00	0	*

* = NO DATA

AVERAGE

89

293

BOLD = BACTERIAL LEVEL WHICH EXCEEDS THE LIMIT

TABLE XXXIX

WATER QUALITY DATA FOR STATEN ISLAND
GK-6A SUNBATHING BEACH

WEEK	DATE	TOTAL	FECAL
10	7/30/93	0	203
	7/31/93	0	87
11	8/1/93	0	87
	8/2/93	0	58
12	8/10/93	0	1,711
	8/11/93	0	435
	8/12/93	29	203
	8/13/93	58	348
	8/14/93	0	348
13	8/15/93	200	116
	8/16/93	0	174
	8/17/93	0	348
	8/18/93	174	667
	8/19/93	58	232
	8/20/93	58	58
	8/21/93	29	116
	8/22/93	59	261
14	8/23/93	87	145
	8/24/93	1,044	1,537
	8/25/93	0	0

AVERAGE

90

357

BOLD INDICATES A BACTERIAL LEVEL WHICH EXCEEDS THE LIMIT

TABLE XL

WATER QUALITY DATA FOR STATEN ISLAND
MAY THROUGH AUGUST 1993
SITE CP-7 CROOKES POINT

WEEK	DATE	TIME	TOTAL	FECAL
1	5/25/93	9:45	59	0
2	6/1/93	9:30	116	29
3	6/8/93	9:55	29	0
4	6/14/93	9:35	29	0
5	6/21/93	9:35	0	116
6	6/28/93	9:40	29	0
7	7/6/93	8:45	58	0
8	7/12/93	9:10	0	0
9	7/19/93	8:45	0	58
10	7/28/93	8:45	348	58
11	8/1/93	9:05	29	0
12	8/9/93	10:01	116	0
13	8/15/93	9:05	0	0
14	8/23/93	9:25	0	0

AVERAGE

58

19

TABLE XLI

WATER QUALITY DATA FOR STATEN ISLAND
MAY THROUGH AUGUST 1993
SITE GKM-8 GREAT KILLS MARINA

WEEK	DATE	TIME	TOTAL	FECAL
1	5/25/93	9:30	29	0
2	6/1/93	9:25	435	116
3	6/8/93	10:55	58	0
4	6/14/93	9:25	58	0
5	6/21/93	9:30	29	0
6	6/28/93	9:30	29	58
7	7/6/93	11:20	0	0
8	7/12/93	9:05	29	29
9	7/19/93	8:40	29	0
10	7/28/93	8:40	609	232
11	8/1/93	9:00	29	0
12	8/9/93	9:50	29	0
13	8/15/93	9:00	200	0
14	8/23/93	9:18	0	0

AVERAGE

117

31

BOLD INDICATES A BACTERIAL LEVEL WHICH EXCEEDS THE LIMIT.

TABLE XLII

TOTAL AND FECAL COLIFORM CONCENTRATIONS
SANDY HOOK
MAY TO SEPTEMBER 1993

WK	DATE	SH-1		SH-2		SH-3		SH-4		SH-5		SH-6	
		TOT	FEC	TOT	FEC	TOT	FEC	TOT	FEC	TOT	FEC	TOT	FEC
1	5/26/93	58	0	87	29	0	0	58	0	58	0	29	29
2	6/3/93	0	0	29	58	0	0	0	0	0	0	58	29
3	6/10/93	0	29	0	0	0	0	0	0	0	0	116	29
4	6/16/93	0	29	0	435	0	0	0	0	0	0	116	203
5	6/23/93	0	0	0	0	0	29	0	0	0	0	0	116
6	6/30/93	0	0	0	0	58	0	116	29	87	0	0	58
7	7/7/93	0	0	0	0	87	29	0	0	0	0	0	87
8	7/14/93	0	0	0	0	58	0	0	58	0	0	0	29
9	7/21/93	0	87	58	29	29	0	116	0	0	0	0	29
10	7/28/93	58	29	0	0	29	0	145	0	58	0	0	87
11	8/4/93	203	58	0	29	0	0	58	29	0	0	116	0
12	8/11/93	0	0	0	0	29	0	0	58	0	0	87	0
13	8/18/93	261	3,045	464	783	58	0	145	319	0	0	87	232
	8/19/93	*	*	*	*	*	*	1,093	551	*	*	*	0
	8/20/93	*	*	*	*	29	87	0	29	0	0	*	*
	8/21/93	*	*	*	*	0	0	29	29	0	0	*	*

TABLE XLII (CONT.)

TOTAL AND FECAL COLIFORM CONCENTRATIONS
SANDY HOOK
MAY TO SEPTEMBER 1993

WK	DATE	SH-1		SH-2		SH-3		SH-4		SH-5		SH-6	
		TOT	FEC	TOT	FEC	TOT	FEC	TOT	FEC	TOT	FEC	TOT	FEC
14	8/22/93	*	*	*	*	*	*	58	58	*	*	*	*
	8/25/93	0	0	58	725	0	0	29	0	0	0	58	0
15	9/1/93	*	58	*	29	*	0	*	29	*	0	*	0
16	9/8/93	*	0	*	754	*	0	*	203	*	0	*	58
	<u>AVERAGE</u>	41	208	50	178	24	8	103	70	13	0	44	60

* = NO DATA

SH-3, SH-4 AND SH-5 ARE THE BATHING BEACHES.

BOLD = BACTERIAL LEVEL WHICH EXCEEDS THE LIMIT.

TABLE XLIII
WATER QUALITY PROFILE
GUNNISON BEACH AUGUST 24, 1993

TIME	TEMP	SALINITY	COND	pH	TOTAL	FECAL
8 A.M.	21.6	21.1	316	8.15	87	0
9 A.M.	22.0	21.2	319	8.08	87	87
10 A.M.	23.7	22.8	339	8.16	0	0
11 A.M.	24.2	23.5	349	8.17	0	0
12 NOON	24.6	22.2	361	8.16	29	0
1 P.M.	24.5	24.2	389	7.98	29	0
2 P.M.	25.7	25.4	401	8.02	0	0
3 P.M.	25.7	25.9	402	8.15	0	0
4 P.M.	25.4	25.2	398	8.16	58	0
5 P.M.	24.9	24.4	382	8.13	29	0

AVERAGE

32

9

TABLE XLIV
WATER QUALITY PROFILE
INTERTIDAL TROUGH - AUGUST 24, 1993

TIME	TEMP	SALINITY	COND	pH	TOTAL	FECAL
8 A.M.	21.8	19.7	296	8.59	*1,533	*1,044
9 A.M.	22.3	22.2	331	8.26	29	0
10 A.M.	24.1	24.1	356	8.28	58	0
11 A.M.	25.0	21.1	312	8.27	116	0
12 NOON	25.8	22.7	362	8.26	116	0
1 P.M.	25.5	24.9	391	8.43	0	0
2 P.M.	27.1	25.9	409	7.92	174	58
3 P.M.	27.5	26.2	412	8.12	406	29
4 P.M.	27.6	26.1	411	8.29	29	29
5 P.M.	27.2	25.7	406	8.32	261	87

AVERAGE

132

23

*SAMPLE TAKEN AT WRONG SITE - SMALL POND AT END OF BOARDWALK
BOLD INDICATES A BACTERIAL LEVEL WHICH EXCEEDS THE LIMIT.