NEW BEDFORD HARBOR

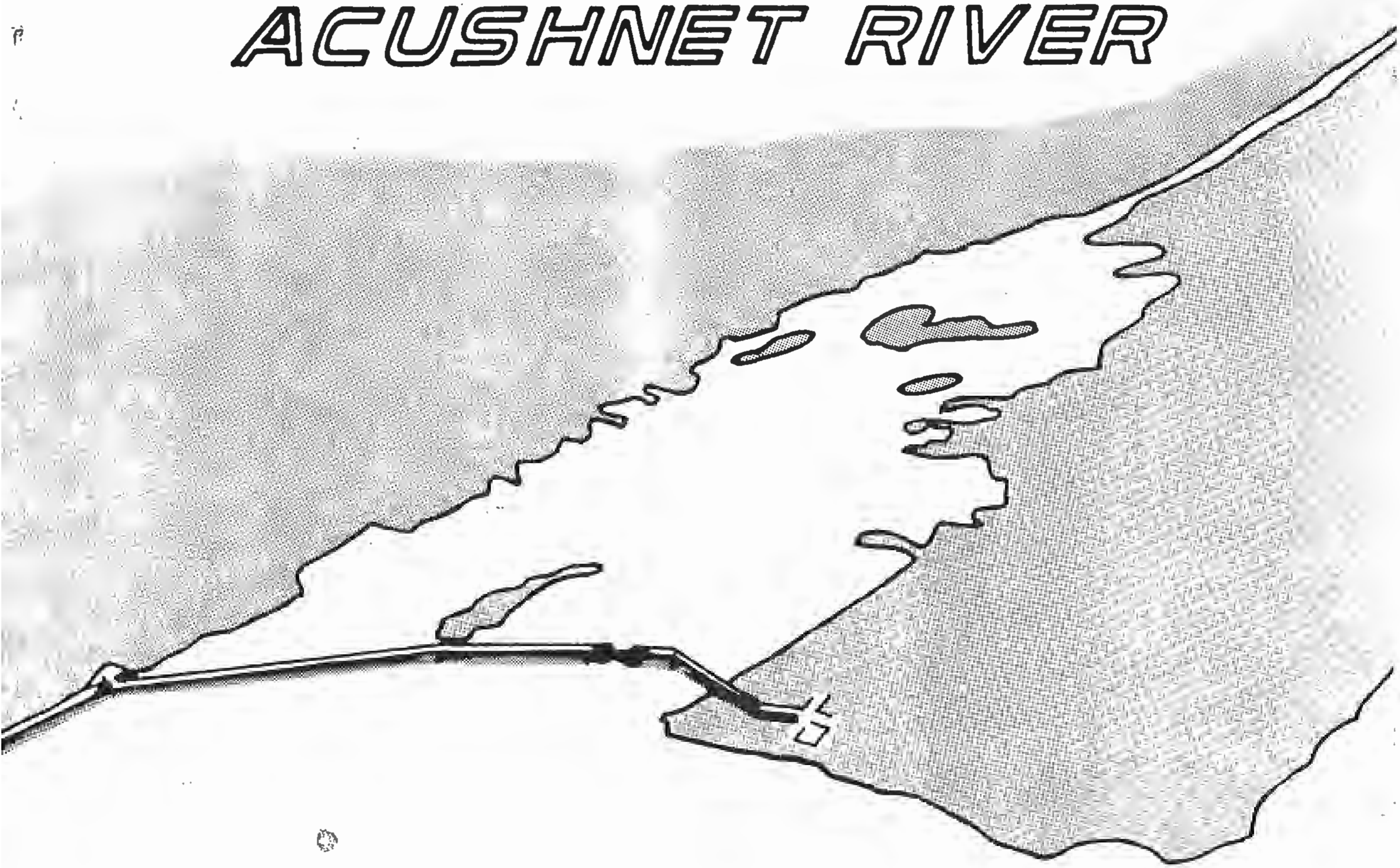
BBP Database
Project # 11

BBP

SCI # 4.1

AND

ACUSHNET RIVER



WATER QUALITY STUDY 1971

Water Resources Commission

Division Of Water Pollution Control

Thomas C. McMahon Director

ACUSHNET RIVER - NEW BEDFORD HARBOR

WATER QUALITY STUDY 1971

PREPARED BY

WATER QUALITY MANAGEMENT SECTION

DIVISION OF WATER POLLUTION CONTROL

MASSACHUSETTS WATER RESOURCES COMMISSION

BOSTON

JANUARY, 1972

Publication Number: 6046

Approved By: Alfred C. Holland
Purchasing Agent

DEDICATION

This report is dedicated to the memory of Manuel Brown, Fairhaven Shellfish Warden, who passed away last Fall. Manny will be remembered fondly by all of us who knew him and worked with him during the survey. His willingness to help in any way he could as well as his good humor were a great help to the survey.

FOREWORD

Water Pollution problems in the Acushnet River and New Bedford Harbor were studied extensively in the summer of 1971 by the Southeast Regional Office and the Water Quality Management Section of the Division of Water Pollution Control. Increasing awareness of these problems by the local citizenry brought about a great deal of interest and cooperation, particularly from the Town of Fairhaven and the City of New Bedford.

Following a series of meetings and preliminary investigations, the survey crew arrived in New Bedford on July 12. Field lab facilities were set up at the new Fairhaven Sewage Treatment Plant. Five photosynthesis stations were established employing the light and dark bottle technique. Assistance was provided by Romeo Mosakowski, Shellfish Warden for the City of New Bedford. Sampling began early the following morning as six locations on the Acushnet River and five on the outer harbor (beyond the Hurricane Barrier) were sampled four times over a 24-hour period. The outer harbor stations were sampled at two depths, one foot below the surface and one foot above the bottom. Dissolved oxygen was measured for each sample at the field lab. The four samples from each location were composited into one and conveyed to the Lawrence Experiment Station of the Massachusetts Department of Public Health for analysis. Procedures set forth in Standard Methods for the Examination of Water and Wastewater (13th edition, 1971, American Public Health Association, New York) were followed in all tests. The sampling was repeated on July 15. 89? ?

During the first week of sampling, most of the industries which discharge wastes to the harbor were closed. They reopened on July 19. The sampling that week therefore concentrated on the inner harbor. Two new photosynthesis stations were established in the area of the industries and the two original stations in the harbor behind the Hurricane Barrier were continued. Fairhaven Shellfish Warden Manuel Brown assisted Division personnel in this study. Three locations in the inner harbor were sampled. East, west and middle points at each location, top and bottom were sampled four times daily on July 20 and 22. Testing procedures were the same as the first week. Samples of bottom sediment were collected from all stations on July 21. Results of the survey were verified and placed in tabular form by engineers of the Water Quality Management Section.

Later in the summer, personnel from the Southeast Regional Office, assisted by U.S. Coast Guard Reserves, conducted a shoreline survey of the harbor in which all discharges were located and identified. Details and results of that survey were prepared for this report by the regional office.

ACUSHNET RIVER - NEW BEDFORD HARBOR

WATER QUALITY STUDY

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

COMMONWEALTH OF MASSACHUSETTS

WATER POLLUTION CONTROL

HISTORICAL BACKGROUND

The need for governmental control to safeguard the waters of the Commonwealth was first recognized by the Massachusetts General Court in 1886. In that year, a State Division of Sanitary Engineering was established and given the responsibility to examine and advise on public health problems relating to water. In 1945, the control of water pollution was strengthened with the enactment of legislation which authorized the Massachusetts Department of Public Health to adopt water pollution regulations.

The Federal Government became deeply committed to the abatement of water pollution in 1956 when Congress passed the Federal Water Pollution Control Act. This Act provided for limited financial aid by the Federal Government to municipalities constructing pollution abatement facilities. Amendments to the Act increased the amount of aid available to 50 percent of the construction cost, provided that the State agreed to pay not less than 25 percent and had established Water Quality Standards for all its waterbodies and an enforcement program for reaching and maintaining these standards. The standards were subject to the approval of the Secretary of the Interior, who was given the authority to adopt standards for any State which failed to do so. An additional 5 percent grant was made available to any project which was consistent with the master plan of a regional planning agency for pollution control.

MASSACHUSETTS CLEAN WATERS ACT

In order to establish a strong water pollution control program in the Commonwealth in coordination with the provisions of the Federal Act, the General Court passed the Massachusetts Clean Waters Act in 1966. This Act provided for the establishment of a Division of Water Pollution Control under the Water Resources Commission. The Division was given comprehensive duties and responsibilities including the establishment of Water Quality Standards, the classification of all waters in the Commonwealth, and the establishment of a schedule for the implementation of the standards. To effect compliance with this schedule, the Division was authorized to issue orders to violators or to institute criminal proceedings. The Act further made it unlawful for any person to discharge into the waters of the Commonwealth any substances which would cause or contribute to a condition in contravention of the water quality standards, or to make or permit an outlet for the discharge of wastes without obtaining a permit from the Division. The Act has been strengthened each year through legislative amendments.

WATER QUALITY STANDARDS

After public hearings in the Spring of 1967, the Division of Water Pollution Control established water quality standards for all interstate, intrastate, and coastal waters in the Commonwealth. Included in the standards were present and proposed use classifications for each waterbody, critical limits of the amounts of various pollutants allowable in the waters for each use classification, and a plan for the implementation and enforcement of the standards. In August, 1967, the standards were approved by the Secretary of the Interior, making Massachusetts the third state in the union to have such standards approved.

ORGANIZATION OF THE DIVISION OF WATER POLLUTION CONTROL

The main office of the Division of Water Pollution Control is located in the Leverett Saltonstall Building in Boston. This office consists of an administrative staff, a legal counsel, and operational sections to administrate the broad functions of the program. These sections reflect the major areas of concern in the area of water pollution control. Their duties are as follows:

CONSTRUCTION GRANTS - In an era of rapidly rising construction costs, financial assistance is imperative for municipalities planning pollution abatement facilities. Legislation enacted concurrently with the Massachusetts Clean Waters Act provided a 150 million dollar bond issue to provide such aid. This amount was increased by 250 million dollars by legislative action in 1970. In order to be eligible for aid, a project must be approved by the Division. The Construction Grants Section reviews engineering reports, final plans and specifications for municipal treatment facilities and applications for grants for the following purposes:

1) Comprehensive planning of wastewater treatment facilities.

2) Preparation of final plans and specifications for wastewater treatment facilities.

3) Construction of wastewater treatment facilities.

4) Prefinancing of Federal grants for wastewater treatment facilities.

ENFORCEMENT - The schedule for implementation of the Water Quality Standards established dates for reaching the several steps of a pollution abatement program for each of some 550 known municipal and industrial polluters. The Enforcement Section is responsible for effecting compliance with this schedule through cooperative action where possible and legal measures when necessary.

INDUSTRIAL WASTES - The large number as well as the diversity of the industries discharging wastes to the waters of the Commonwealth requires critical review of reports and plans for industrial treatment facilities. In reviewing proposed designs, engineers of the Industrial Wastes Section meet with the industries and their consulting engineers to insure installation of the most efficient pollution abatement facilities. Additional activities of this section include inspection of newly-operating industrial treatment plants, processing of application for certification of treatment facilities as eligible for tax benefits provided under the General Laws, assisting in locating new sources of pollution and establishing implementation schedules, evaluation of monthly operating reports from existing industrial waste treatment plants, and directing pilot plant studies on the treatment of industrial wastes.

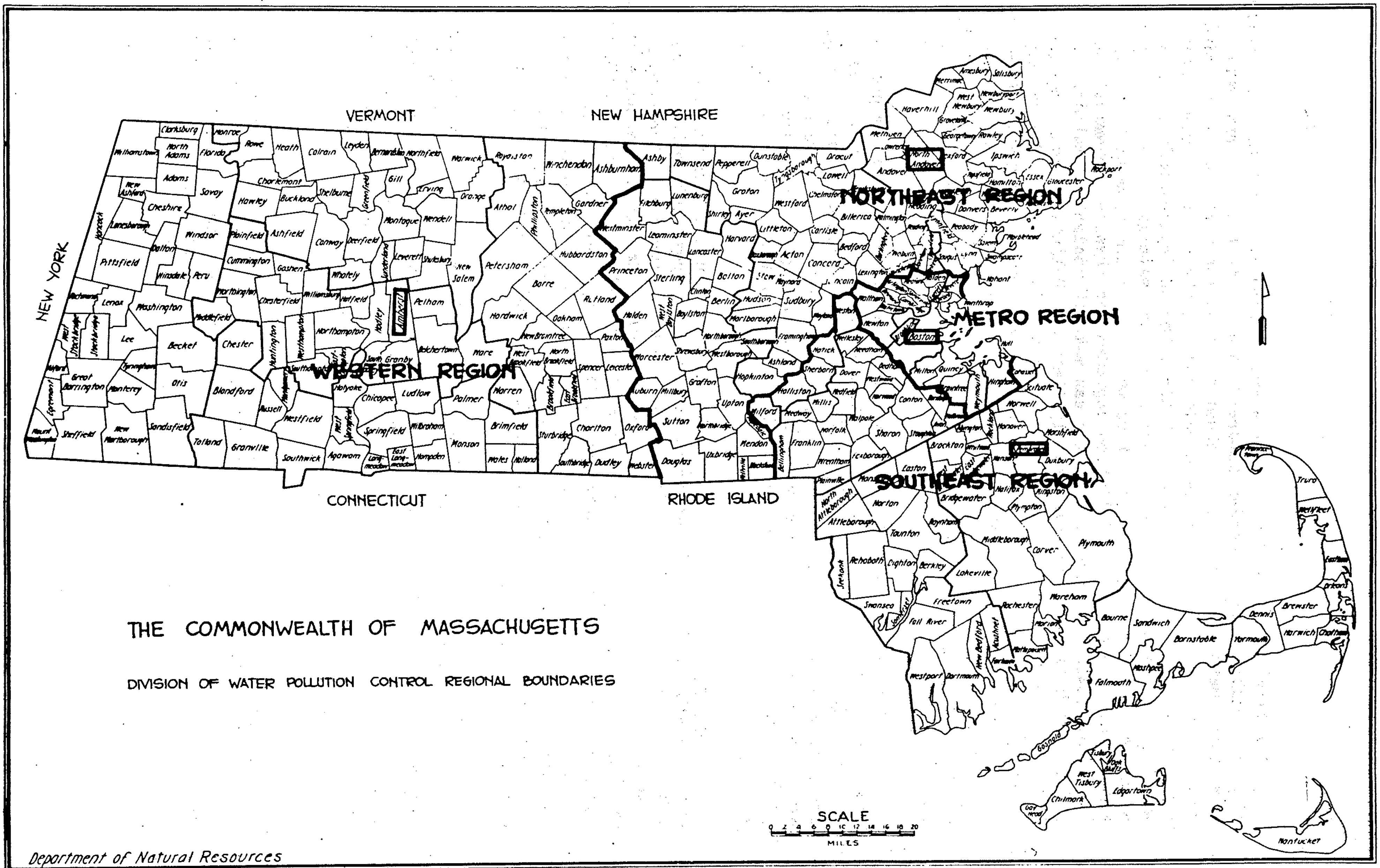
OIL POLLUTION - Increased concern with the detrimental effects of oil pollution led to the passage of the Massachusetts Oil Pollution Act of 1968, which was further strengthened in 1970. This Act provided for the immediate clean-up of all oil spills and the licensing by the Division of all marine oil terminals and waste oil collectors. The Oil Pollution Section initiates the clean-up of oil spills when required to protect water quality, finances the operation, then recovers funds from the source of the spill. The section also maintains a continuing program of research to develop and evaluate new methods for oil pollution abatement.

OPERATION AND MAINTENANCE - In order to effectively abate water pollution, a treatment plant must be operated properly. The Operations and Maintenance Section attempts to insure proper operation through plant inspections, review of monthly operating records, plant personnel training programs, and, in extreme cases, direct orders from the Division and refusal to approve applications for permits for new sewers. The mandatory certification of plant operators should upgrade the quality of plant operation throughout the Commonwealth.

RESEARCH AND TRAINING - The Massachusetts Clean Waters Act authorized 10 million dollars over a 10-year period for a research and demonstration program. This program is designed to provide increased knowledge in the areas of analysis and abatement of water pollution. Research grants are made to consulting engineers, universities, and research institutions to conduct particular projects. Training activities of this section include treatment plant operator training, in-service training of Division personnel, and a scholarship intern program for engineering students.

WATER QUALITY MANAGEMENT - In order to properly solve water pollution problems, it is necessary to consider entire river basins rather than particular waste discharges. The waters of the Commonwealth are divided into 17 major river and coastal basins. The Water Quality Management Section conducts surveys of these basins and analyzes and publishes the results. Where sufficient data is available, a river is analyzed by a computer model. Such models simulate the level of dissolved oxygen and other parameters along the entire length of a stream, enabling section personnel to determine the degree of treatment required at each discharge to maintain the desired level. This section also develops basin plans which present alternative solutions to pollution problems in a particular basin.

REGIONAL OFFICES - The Division maintains four regional offices which have responsibility for particular river basins. The Regional Office locations and regional boundaries are indicated on the attached map. Besides assisting the seven sections of the central office in their functions, the regional offices investigate complaints of water pollution, conduct field investigations of discharges, visit construction sites to supervise progress on pollution abatement projects, inspect and sample wastewater treatment plants to provide precise data on their efficiency of operation, conduct local operator training courses, and provide liason between local groups and the Division. Regional personnel acquire an intimate knowledge of local problems which is invaluable to the Division's planning.



THE COMMONWEALTH OF MASSACHUSETTS
DIVISION OF WATER POLLUTION CONTROL REGIONAL BOUNDARIES
WESTERN REGION
NORTHEAST REGION
METRO REGION
SOUTHEAST REGION
VERMONT
NEW HAMPSHIRE
NEW YORK
CONNECTICUT
RHODE ISLAND
SCALE
MILES
Department of Natural Resources

MEASURES OF WATER POLLUTION

The term "water pollution" has acquired many connotations. Literally, the word pollute means "render impure;" thus, in this sense, any water containing matter other than its chemical constituent of two parts hydrogen to one part oxygen would be considered polluted. Such "pure" water, however, is never found in natural bodies; the ecological balance in a waterbody is dependent on the presence of other material. In this report, water pollution refers to a condition which is in contravention of the Water Quality Standards. Pollution degrades the physical, chemical, and bacterial quality of a waterbody and can make it unsightly, malodorous, and a health hazard, its uses sharply limited. Pollution occurs mainly through the discharge of wastes from homes and industries. The various types of pollution are: (1) oxygen-demanding, such as originates from domestic sewage and certain industrial wastes, (2) toxic materials as in some industrial wastes, (3) radioactive, (4) thermal, (5) bacterial, (6) oil, and (7) physical. Stormwater runoff from both urban and rural areas can also add pollutants to a waterbody.

The extent of pollution in a particular waterbody is determined by measuring certain chemical and biological constituents and properties. Chemical constituents, such as dissolved oxygen, phosphates, and metals, are generally measured in milligrams per liter (mg/l); since the unit weight of water is 1.0 grams per milliliter, milligrams per liter are roughly equivalent to parts per million for a solution which is mostly water.

Dissolved Oxygen (D.O.) refers to the uncombined oxygen in water which is available to aquatic life. Since this oxygen is consumed more rapidly in the decomposition of wastes, the D.O. gives an instantaneous picture of the condition of a waterbody. Time of day and temperature of the water are important in interpreting D.O. Levels. Temperature affects the amount of oxygen which water can contain. Time of day is related to the effects of algae. Algae consume oxygen through respiration throughout the day and night. During daylight hours, they add oxygen through photosynthesis. D.O. levels are therefore generally highest during the afternoon and lowest just before sunrise.

Biochemical Oxygen Demand (B.O.D.) measures the amount of oxygen required by bacteria to decompose organic matter. The B.O.D. is gradually exerted, consisting of two stages. In the first stage, carbonaceous matter is stabilized while nitrogenous substances are broken down in the second stage. The second stage (nitrification) usually begins after seven days. The ultimate, or total, B.O.D. from both stages may require an incubation period of 30 days or more. Through recurrent use, the 5 day B.O.D. has become the standard test used in water quality analysis.

Chemical Oxygen Demand (C.O.D.) refers to the amount of oxygen required to chemically oxidize waste material. Since some of the organic matter in a waste cannot be decomposed by microorganisms but can be broken down by chemical oxidation, the C.O.D. is generally greater than the B.O.D.

The C.O.D. is especially useful in analyzing a waste that contains a great deal of non-biodegradable matter.

Total Solids measures all solids in water including suspended and dissolved, organic and inorganic. They are measured by evaporating the water from a sample of known volume and weighing the residue remaining. The residue then can be ignited in a laboratory furnace to determine the organic portion. The loss on ignition is considered organic and the remaining residue, known as fixed solids, is considered to be inorganic.

Suspended Solids are those which can be removed by passing the water through a filter. The remaining solids are called dissolved solids. Suspended solids provide a good measure of the efficiency of a sewage treatment plant; primary treatment should remove about 50 percent of the suspended solids while secondary treatment should remove about 90 percent.

Coliform Bacteria are found in abundance in the intestinal tract of warm-blooded animals. They are not harmful in themselves, but their presence indicates that pathogenic bacteria also may be present. Since they can be detected by relatively simple test procedures, coliforms are used to indicate the extent of bacterial pollution from sewage. Bacterial tests usually measure the fecal coli and the total coli. Fecal coli make up about 90 percent of the coliforms discharged in fecal matter. Non-fecal coli may originate in soil, grain, or decaying vegetation.

pH measures the hydrogen ion concentration on an inverse logarithmic scale ranging from 0 to 14. pH values under 7 indicate more hydrogen ions and therefore more acidic solutions; pH values over 7 indicate less hydrogen ions and therefore more alkaline solutions. A pH of 7 indicates a neutral solution. Alkalinity is a quantitative measure of the alkaline materials present while acidity is a quantitative measure of acidic materials.

Nutrients are compounds which act as fertilizers for aquatic organisms. Small amounts are necessary to the ecological balance of a waterbody, but excessive amounts can upset the balance by causing excessive growths of algae and other aquatic plants. Sewage discharged to a waterbody usually contains large amounts of carbon, nitrogen, and phosphorus. The concentration of carbonaceous matter is reflected in the B.O.D. test. Additional tests are run to determine the concentrations of nitrogen and phosphorus.

Phosphorus appears in waterbodies in combined forms known as ortho- and poly- phosphates and organic phosphorus. The majority of the phosphorus contained in domestic sewage and industrial wastes comes from detergents. Additional phosphorus may enter a waterbody in agricultural runoff where fertilizers are used.

Nitrogen in the form of organic nitrogen decomposes into ammonia nitrogen, nitrite nitrogen and nitrate nitrogen. Since each decomposition reaction is dependent on the preceding one, the progress of decomposition can be determined in terms of the relative amounts of these four forms of nitrogen.

Ammonia Nitrogen is present in sewage and is also generated from the decomposition of organic nitrogen. It can also be formed when nitrites and nitrates are reduced. Ammonia is particularly important since it has high oxygen and chemical demands and is also toxic to fish.

Nitrite Nitrogen is the oxidation product of ammonia. It has a fairly low oxygen demand and is rapidly converted to nitrate. The presence of nitrite nitrogen usually indicates that active decomposition is taking place.

Nitrate Nitrogen is important since it is the end product in the aerobic decomposition of nitrogenous matter. Nitrogen in this form is readily available to plants.

Turbidity is the measure of the clarity of a water sample. It is expressed in Jackson Standard Units which are related to the scattering and absorption of light by the water sample.

Color is determined by visual comparison of a sample with known concentrations of colored solutions and is expressed in standard units of color. Certain waste discharges may turn water to colors which cannot be defined by this method; in such cases, the color is expressed qualitatively rather than numerically.

Specific Conductance yeilds a measure of a water sample's capacity to convey an electric current. It is dependent on temperature and the concentration of ionized substances in the water. Distilled water exhibits specific conductance of 0.5 to 2.0 micromhos per centimeter while natural waters show values from 50 to 500 micromhos per centimeter.

The above parameters are measured in most water quality surveys. Other constituents such as metals or radioactivity are measured in areas where particular problems are known to exist. Microscopic examinations are conducted on most surveys to measure the amount of algae and other microorganisms present. Additional samples of the river bottom are usually collected in order to determine the types of deposits present. Decomposition of organic suspended matter which settles to the bottom will exert an oxygen demand on the water.

Two types of samples are collected for analysis: grab and composite. A grab sample is an instantaneous sample collected to show conditions at a particular time. Composite samples are collected over a period of time at specific intervals, giving a better picture of the overall water quality situation for the time covered.

Certain levels of the above parameters occur naturally in waterbodies. Since these levels vary among the different ponds, streams, and coastal waters, the following tables are presented for the sake of reference. Table A summarizes the numerical limits for certain parameters as specified by the Massachusetts Water Quality Standards. Table B lists levels found in unpolluted reaches of various Massachusetts waters.

TABLE A: SPECIFIED LEVELS OF CERTAIN PARAMETERS

MASSACHUSETTS WATER QUALITY STANDARDS

	Dissolved Oxygen	pH	Coliform Bacteria	Total Phosphate	Ammonia Nitrogen
Class A	Not less than 75% of saturation for 16 hours of any 24 hour period and never less than 5 mg/1.	As naturally occurs.	Not to exceed an average of 50 per 100 ml. for any monthly period.	No Standard (As naturally occurs)	No Standard (As naturally occurs)
Class B	Same as above	6.5-8.0	Not to exceed an average value of 1000 for any mo th nor 2400 in more than 20% of samples collected.	Not to exceed an average of 0.05 mg/1 during any month.	Not to exceed an average of 0.5 mg/1 as N during any month.
Class C	Not less than 5 mg/1 during at least 16 hours of any 24 hour period and never less than 3.0.	6.0-8.5	None in concentrations that would impair usages assigned to this class.	Same as above.	Not to exceed an average of 1.0 mg/1 as N during any month.
Class D	Not less than 2.0 mg/1	6.0-9.0	Same as above.	No standard.	No standard.
Class SA	Not less than 6.5 mg/1	6.8-8.5	Not to exceed a median value of 70 and not more than 10% of samples over 230.	Not to exceed an average of 0.07 mg/1 as P during any month.	Not to exceed an average of 0.2 mg/1 as N during any month.
Class SB	Not less than 5.0 mg/1	6.8-8.5	Not to exceed a median value of 700 and not more than 10% of samples over 2300.	Same as above.	Same as above.
Class SC	Not less than 5 mg/1 during at least 16 hours of any 24 hour period and never less than 3 mg/1.	6.5-8.5	None in concentrations that would impair any uses assigned to this class.	Same as above.	Not to exceed an average of 1.0 mg/1 during any month.

TABLE B: SELECTED ANALYSES OF UNPOLLUTED WATERS

	Lake Quinsigamond Worcester	Swift River **below Quabbin** Reservoir	Parker River Byfield	Charles River Hopkinton
Dissolved Oxygen, mg/l	11.2-12.5	7.4-9.2	7.2-8.4	6.2-7.4
5-Day B.O.D., mg/l	0.8	1.8	1.9	0.7
Suspended Solids, mg/l	1.5	5	4	0
pH	6.7	6.5	7.6	6.4
Alkalinity, mg/l	18	8	37	8
Total Coliform per 100ml.	28	1300	300	170
Fecal Coliform per 100ml.	5	14	-	-
Color, Std. Units.	28	25	68	35
Turbidity, Std. Units	2	4	2	2
Ammonia as N., mg/l	.04	0.10	0.04	0.0
Nitrite as N, mg/l	-	0.000	0.006	0.0
Nitrate as N, mg/l	-	0.0	0.1	0.0
Total Phosphate as P, mg/l	.04	.07	0.16	0.03

BASIN DESCRIPTION

Probably no other city in Massachusetts is more involved with the ocean than New Bedford. Long the center of the whaling trade, the City's leading industry remains fishing. New Bedford Harbor is busy with fishing and lobster boats as well as pleasure craft. Fish processing plants line the shores. Many reminders of the City's seafaring heritage can be seen at the Whaling Museum and other sites along the Moby Dick Trail.

New Bedford Harbor is essentially the tidal portion of the Acushnet River. The river begins in northern Acushnet at the outfall from New Bedford Reservoir and flows generally south to the New Bedford City Line. Here, at the dam by Acushnet Sawmill, the river turns tidal and continues south to Popes Island and the Route 6 bridge. This point is considered to be the boundary between the river and the harbor. Approximately 1.3 miles below the bridge, the entrance to the harbor is marked by a stone dyke. Erected by the Corps of Engineers, this 4000 foot wide barrier provides flood protection for the City. During severe storms, the 157 foot wide navigational opening can be closed. This barrier has been a center of controversy as local residents feel that it inhibits the tidal action in the harbor, thereby preventing pollutants from being dispersed into the open sea.

Beyond the barrier, the harbor broadens out into Buzzards Bay. To the east is Sconticut Neck in Fairhaven. To the west is a penninsula which is part of New Bedford. Fort Rodman lies at the tip of this penninsula. This will be the site of the New Bedford Sewage Treatment Plant. At the present time, sewage is pumped from here to a point half a mile off shore. On the west side of the penninsula is Clark Cove. A pumping station on shore frequently discharges sewage into this cove.

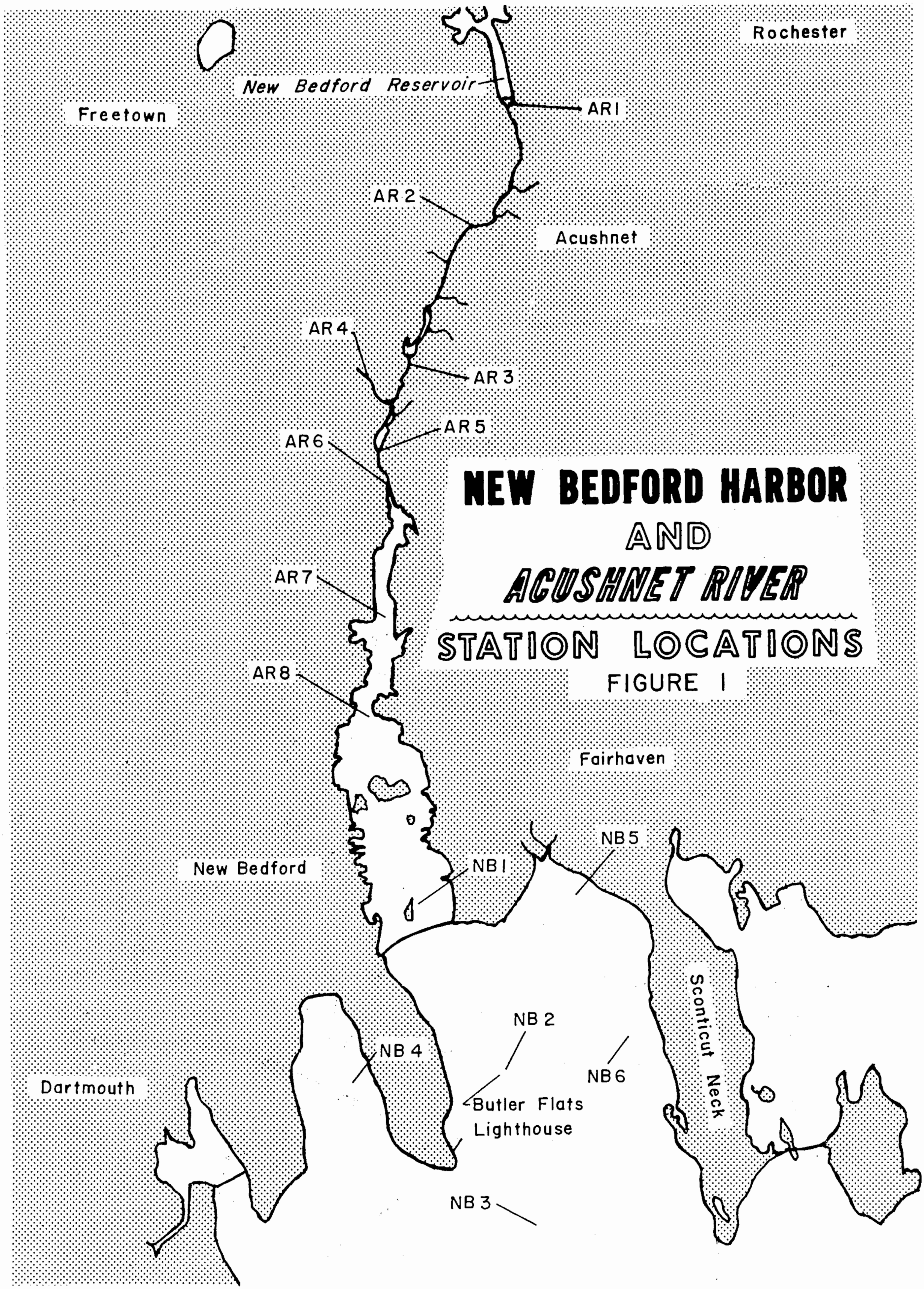
A dairy farm and several industries discharge wastes to the Acushnet River in Acushnet. Several industries in New Bedford and Fairhaven discharge wastes to the river and the harbor without treatment. These include several fish processing plants as well as textile mills. New Bedford also has the combined sewer problems which are so common in the older cities in the State. These sewers carry both wastes from homes and industries and storm water. During storms, they overflow to the river and the harbor. Fairhaven, meanwhile, has recently completed an extended aeration sewage treatment plant. The effluent from this plant is discharged inside the barrier.

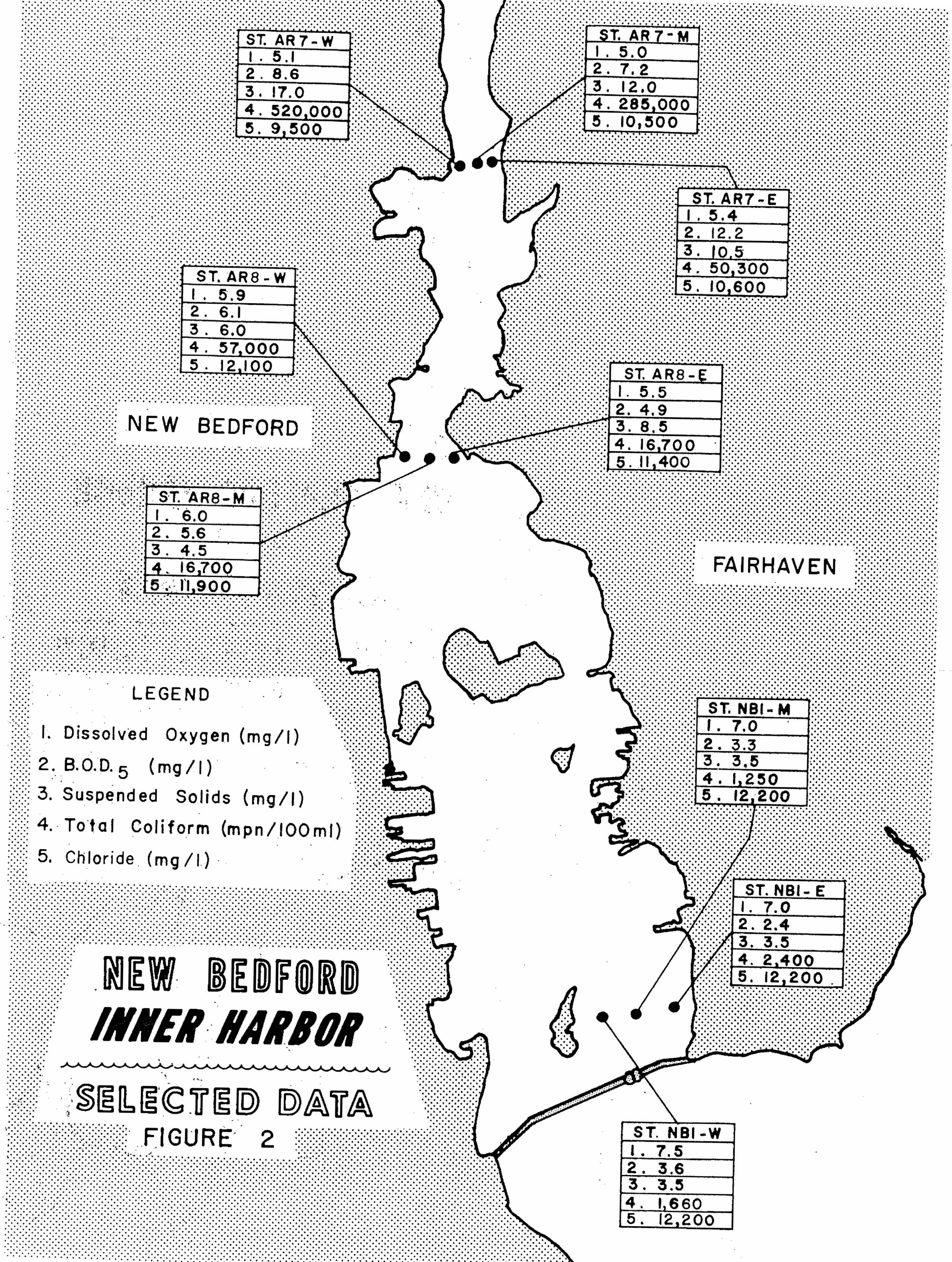
TABLE 1

DEFINITION OF SAMPLING STATIONS
ACUSHNET RIVER - NEW BEDFORD HARBOR

STATION NUMBER	LOCATION	RIVER MILE
AR1	New Bedford Reservoir at dam, Achushnet	8.2
AR2	Achusnet River at dirt road bridge off Middle Road, Acushnet	6.8
*AR3	Acushnet River at Hamlin Road, Acushnet	5.5
AR4	Achusnet River Tributary at Middle Road, Coury Heights, Acushnet	5.0 + .4
AR5	Acushnet River at Pond Outlet above Acushnet Sawmill, Acushnet	4.6
AR6	Acushnet River at Main Street bridge, Acushnet-New Bedford City Line	4.5
AR7	Acushnet River, opposite Coffin Avenue, Fairhaven-Acushnet-New Bedford City Line	3.1
AR8	Acushnet River, opposite radio station WBSM Tower, Fairhaven-New Bedford City Line	2.1
NB1	New Bedford Harbor - Inside Hurricane Barrier, Fair-haven-New Bedford City Line	.2
NB2	New Bedford Harbor at Butler Flats Lightship, New Bedford	
NB3	New Bedford Harbor at New Bedford Sewer Outfall, New Bedford	
NB4	Clark Cove opposite sewage pumping station, New Bedford	
NB5	Nasketucket Bay opposite Pope Beach, Fairhaven	
NB6	New Bedford Harbor off Silver Shell Beach, Fairhaven	

* East and West Channels were both sampled

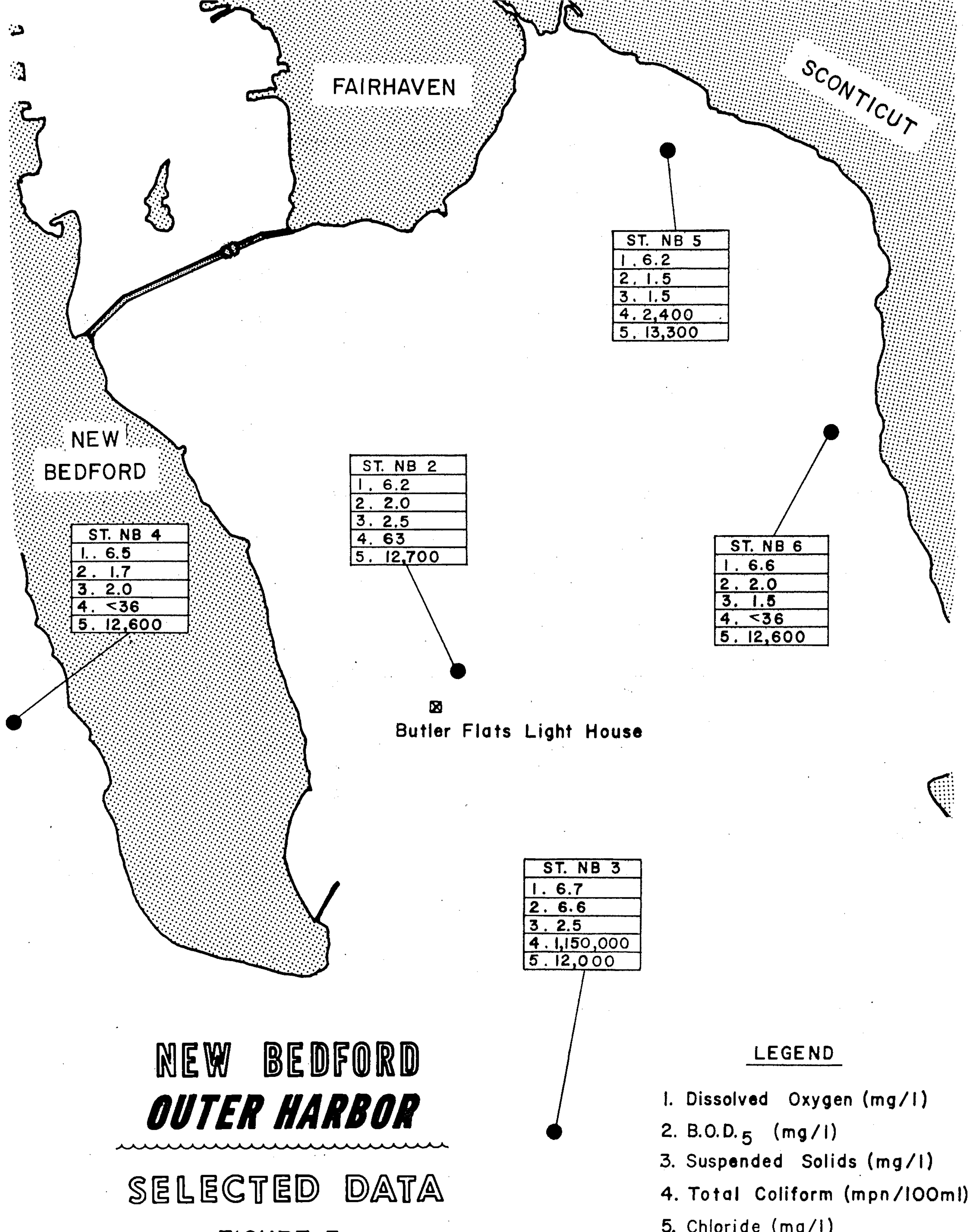

NEW BEDFORD HARBOR
AND
ACUSHNET RIVER
STATION LOCATIONS
FIGURE 1
Rochester
New Bedford Reservoir
AR1
Freetown
AR 2
Acushnet
AR 4
AR 3
AR 5
AR 6
AR 7
AR 8
Fairhaven
NB 5
NB 1
New Bedford
NB 2
NB 4
NB 6
Sconticut Neck
Dartmouth
Butler Flats
Lighthouse
NB 3



NEW BEDFORD INNER HARBOR

SELECTED DATA

FIGURE 2



NEW BEDFORD
OUTER HARBOR

SELECTED DATA

FIGURE 3

TABLE 2

TIME, TEMPERATURE, DISSOLVED OXYGEN

ACUSHNET RIVER 1971

		JULY 13			JULY 15			
STATION	RUN 1	RUN 2	RUN 3	RUN 4	RUN 5	RUN 6	RUN 7	RUN 8
AR1	* 03:55	10:05	20:35	-	04:00	10:00	19:45	23:00
	** 66	72	75	-	68	72	71	69
	*** -	7.2	7.5		7.5	7.3	7.4	7.2
AR2	04:05	10:15	20:45	-	04:10	10:10	20:00	23:05
	64	64	71	-	-	68	68	-
	2.8	3.1	4.3		3.2	4.1	5.0	4.3
AR3-East	04:20	10:30	21:00	-	04:15	10:25	-	-
	65	70	73	-	66	70	-	-
	2.1	5.5	5.9	-	2.7	3.9	-	-
AR3-West	04:20	10:30	21:00	-	04:20	10:25	20:15	23:10
	65	70	73	-	66	70	71	68
	0.7	3.6	6.5	-	0.3	4.5	6.3	5.0
AR4	04:30	10:45	21:10	-	04:25	10:30	20:30	23:20
	60	68	70	-	62	62	66	64
	2.4	2.1	1.2	-	0.4	0.5	0.0	0.0
AR5	04:40	10:50	21:25	-	04:35	10:35	20:40	23:25
	66	68	72	-	66	68	-	68
	1.4	1.9	1.6	-	1.2	1.2	3.3	2.5
AR6	04:45	10:55	21:30	-	04:45	10:40	20:55	23:30
	64	70	68	-	65	67	68	68
	4.1	6.7	4.2	-	3.8	6.5	5.4	5.7

* Time
** Temperature, degrees Fahrenheit
*** Dissolved Oxygen, milligrams per liter

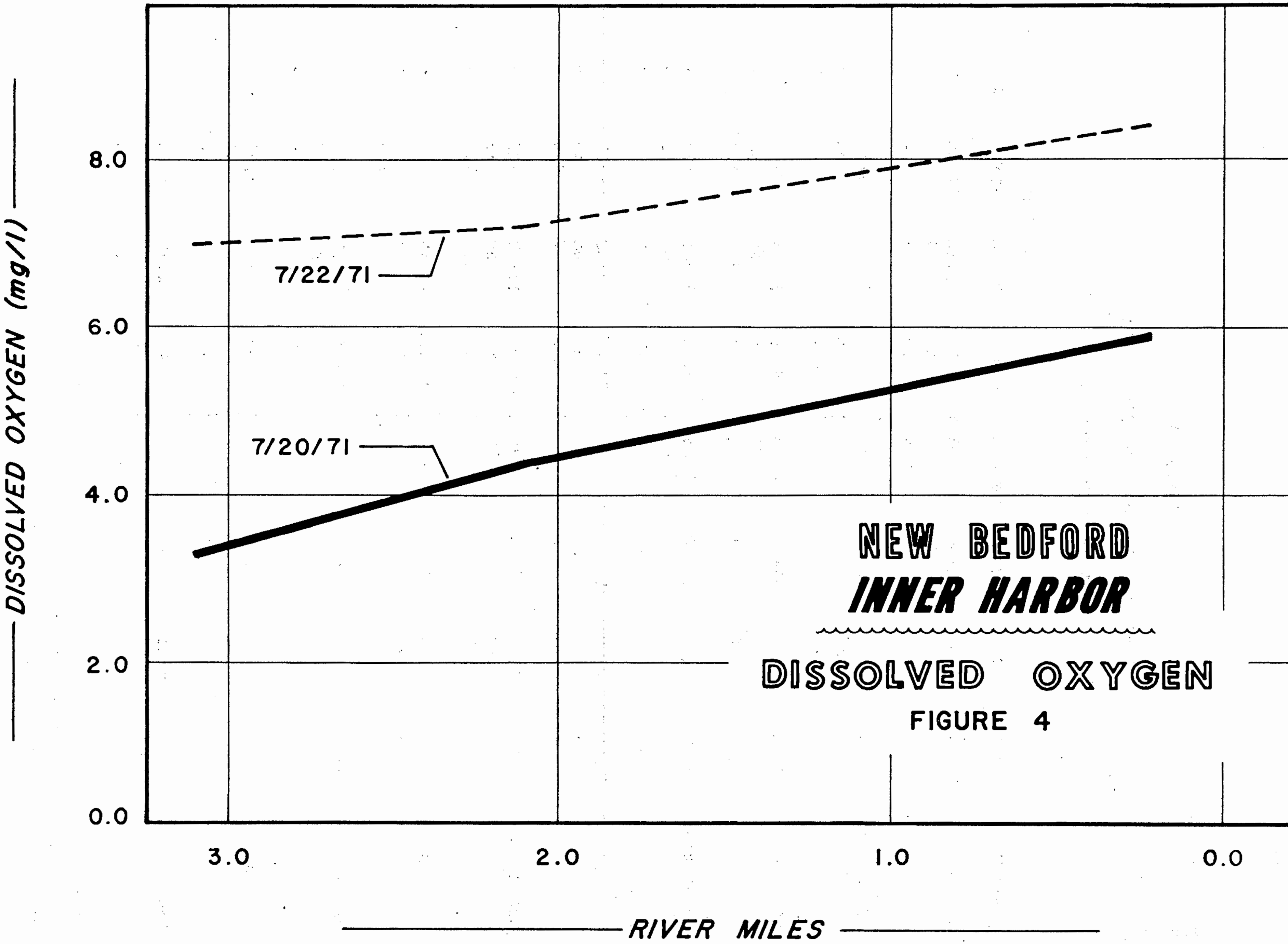
TABLE 3

TIME, TEMPERATURE, DISSOLVED OXYGEN

NEW BEDFORD OUTER HARBOR

	JULY 13				JULY 15			
STATION	RUN 1	RUN 2	RUN 3	RUN 4	RUN 5	RUN 6	RUN 7	RUN 8
NB2-Top	*05:35	11:30	16:30	23:05	8:00	11:30	16:40	-
	** -	67	72	70	65	67	67	-
	*** 1.4	7.2	7.4	6.6	6.8	6.9	7.4	-
NB2-Bottom	05:40	11:30	16:30	23:10	8:00	11:30	16:45	-
	64	67	70	71	66	67	66	-
	1.4	6.4	5.8	7.0	6.5	6 8	7.4	-
NB3-Top	05:50	11:40	16:40	0:00	08:10	11:45	17:00	-
	66	66	71	70	65	66	68	-
	5.9	6.9	7.1	7.3	6.7	6.5	6.3	-
NB3-Bottom	05:50	11:45	16:50	0:05	08:15	11:45	17:05	-
	64	65	70	68	65	66	66	-
	7.0	1.9	5.9	7.0	7.0	6.9	7.4	-
NB4-Top	06:10	11:55	17:05	-	08:20	12:00	17:25	-
	66	67	71	-	66	68	68	-
	7.2	7.4	4.0	-	6.2	6.7	7.6	-
NB4-Bottom	06:10	11:55	17:05	0:30	08:20	12:00	17:25	-
	64	67	70	70	66	68	66	-
	6.1	6.6	7.8	7.3	6.1	6.1	7.2	-
NB5-Top	06:45	12:10	17:30	-	08:35	12:15	17:55	-
	66	67	72	-	66	68	-	-
	6.8	7.4	7.2	-	7.1	7.3	7.6	-
NB5-Bottom	06:45	12:10	17:40	-	08:35	12:15	18:00	-
	66	66	71	-	66	66	68	-
	3.0	7.8	8.5	-	6.9	7.3	7.6	-
NB6-Top	06:30	12:20	17:50	-	08:45	12:25	18:05	-
	-	66	70	-	66	68	68	-
	2.4	7.2	8.2	-	7.0	7.1	8.0	-
NB6-Bottom	06:30	12:25	17:50	-	08:45	12:25	18:10	-
	65	67	70	-	66	69	68	-
	3.4	7.3	8.1	-	7.1	7.2	8.0	-

*Time
** Temperature, degrees fahrenheit
*** Dissolved oxygen, milligrams per liter



NEW BEDFORD
INNER HARBOR
DISSOLVED OXYGEN
FIGURE 4

TABLE 4

TIME, TEMPERATURE, DISSOLVED OXYGEN

NEW BEDFORD INNER HARBOR

	JULY 20				JULY 22			
STATION	RUN	RUN 2	RUN 3	RUN 4	RUN 5	RUN 6	RUN 7	RUN 8
AR7-East Top	*05:20	10:55	17:00	22:35	05:00	10:30	18:15	23:30
	** 68	70	74	72	68	72	75	75
EAST	*** 2.2	3.6	4.1	3.4	7.1	6.9	7.6	8.1
AR7-~~West~~ Bottom	05:25	10:55	17:00	22:35	05:05	10:30	18:15	23:30
	69	70	74	72	70	69	75	72
	1.1	3.6	3.9	3.8	3.3	3.8	7.3	5.8
AR7-Middle Top	05:15	10:45	17:05	22:35	04:55	10:25	18:05	0:00
	70	70	73	-	69	73	75	75
	2.3	2.3	4.9	3.3	6.6	4.3	8.8	7.7
AR7-Middle Bottom	05:20	10:55	17:05	22:35	04:55	10:30	18:05	0:05
	69	70	73	72	70	72	75	75
	2.0	2.2	4.6	2.2	3.2	2.7	9.3	6.1
AR7-West Top	05:10	10:40	17:15	22:30	04:50	10:25	-	23:45
	68	70	74	72	69	72	-	74
	3.8	2.9	4.3	2.8	6.8	4.4	9.4	6.2
AR7-West Bottom	05:15	10:45	17:15	22:30	04:30	10:25	18:00	23:45
	69	70	74	72	72	72	75	72
	1.7	1.1	3.8	2.3	2.7	4.3	9.4	5.5
AR8-East Top	05:00	10:35	16:45	22:20	04:45	10:15	17:55	23:10
	69	70	74	72	70	70	75	72
	2.9	2.4	5.9	4.0	6.7	4.5	10.9	6.7
AR8-East Bottom	05:05	10:35	16:45	22:20	04:45	10:20	17:55	23:10
	70	69	73	72	71	71	75	72
	2.1	2.7	5.8	2.9	4.2	4.0	10.7	6.7
AR8-Middle Top	04:55	10:30	16:50	22:15	04:40	10:15	17:50	23:40
	68	70	74	72	70	70	75	72
	7.1	2.6	6.5	3.9	4.8	5.3	10.8	6.6
AR8-Middle Bottom	05:00	10:30	10:50	22:15	04:40	10:15	17:50	23:40
	70	70	73	72	70	70	75	74
	3.0	2.3	3.4	3.1	3.5	4.8	10.0	5.6
AR8-West Top	04:50	10:25	16:55	22:10	04:35	10:10	17:35	23:35
	70	69	74	72	69	71	75	72
	4.1	2.4	7.0	3.7	4.6	6.4	10.7	8.1
AR8-West Bottom	04:55	10:25	16:55	22:10	04:35	10:15	17:40	23:35
	70	69	74	72	70	72	75	74
	2.4	2.3	4.5	2.5	4.7	4.8	10.8	6.8
NB1-East Top	04:45	10:15	16:20	22:00	04:10	10:05	17:30	23:20
	68	69	74	72	70	72	74	72
	5.2	5.8	6.8	5.1	7.3	7.7	10.5	7.2
NB1-East Bottom	04:45	10:15	16:15	22:00	04:15	10:05	17:30	23:20
	69	69	74	72	70	72	73	72
	5.1	5.8	5.2	5.8	5.3	7.4	7.4	7.4
NB1 Middle Top	04:30	10:10	16:30	22:00	04:05	10:00	17:20	23:15
	68	70	73	72	70	72	73	72
	5.4	5.1	7.2	5.7	6.8	7.6	9.5	9.0
NB1 Middle Bottom	04:35	10:10	16:30	22:00	04:05	10:00	17:20	23:15
	69	69	73	72	70	70	73	72
	5.4	5.0	7.1	5.7	6.8	6.0	8.3	9.0
NB1 West Top	04:25	10:10	16:30	21:50	03:55	09:55	17:15	23:25
	68	69	72	72	70	71	76	72
	5.7	5.4	7.8	5.6	6.9	8.4	11.0	9.2
NB1-West Bottom	04:25	10:05	16:30	21:50	04:00	09:55	17:15	23:25
	69	68	72	72	70	70	73	71
	4.0	5.0	4.6	5.0	6.6	5.2	6.4	5.5

* Time
** Temperature, degrees fahrenheit
*** Dissolved oxygen, milligrams per liter

TABLE 5

TEMPERATURE, DISSOLVED OXYGEN SUMMARY

ACUSHNET RIVER, NEW BEDFORD OUTER HARBOR

STATION	WATER TEMPERATURE, °F MAX	MIN	AVG	DISSOLVED OXYGEN, mg/l MAX	MIN	AVG
AR1	75	66	70	7.5	7.2	7.4
AR2	71	64	67	5.0	2.8	3.8
AR3-East	73	65	69	5.9	2.1	4.0
AR3-West	73	65	69	6.5	0.3	3.8
AR4	70	60	65	2.4	0.0	0.9
AR-5	72	66	68	3.3	1.2	1.9
AR6	70	64	67	6.7	3.8	6.0
NB2 Top	72	65	68	7.4	1.4	6.2
NB2 Bottom	71	64	67	7.4	1.4	5.9
NB3 Top	71	65	67	7.3	5.9	6.7
NB3 Bottom	70	64	66	7.4	1.9	6.2
NB4 Top	71	66	68	7.6	4.0	6.5
NB4 Bottom	70	64	67	7.8	6.1	6.7
NB5 Top	72	66	68	7.6	6.8	6.2
NB5 Bottom	71	66	67	8.5	3.0	7.0
NB6 Top	70	66	68	8.2	2.4	6.6
NB6 Bottom	70	65	68	8.1	3.4	6.8

TABLE 6

TEMPERATURE, DISSOLVED OXYGEN SUMMARY

NEW BEDFORD INNER HARBOR

	EAST			MIDDLE			WEST		
STATION	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG
AR7 Top	* 75	68	72	75	69	72	74	66	71
	** 8.1	2.2	5.4	8.8	2.3	5.0	9.4	2.8	5.1
Bottom	75	69	71	75	69	72	75	69	72
	7.3	1.1	3.6	9.3	2.0	4.0	9.4	1.1	3.8
AR8 Top	75	69	72	75	68	73	75	69	72
	10.9	2.4	5.5	10.8	2.6	6.0	10.7	2.4	5.9
Bottom	75	69	72	75	70	72	75	69	72
	10.7	2.1	4.9	10.0	2.3	4.5	10.8	2.3	4.8
NB1 Top	74	68	71	73	68	71	76	68	71
	10.5	5.1	7.0	9.5	5.1	7.0	11.0	5.4	7.5
Bottom	74	69	71	73	69	71	73	68	71
	7.4	5.1	6.2	9.0	5.0	6.7	6.6	4.0	5.3

* Temperature, degrees fahrenheit
** Dissolved Oxygen, milligrams per liter

TABLE 7

5 DAY BIOCHEMICAL OXYGEN DEMAND

ACUSHNET RIVER, NEW BEDFORD OUTER HARBOR

STATION	JULY 13	JULY 15	AVERAGE
AR1	2.0	1.4	1.7
AR2	1.6	1.0	1.3
AR3	2.8	2.8	2.8
AR4	16.0	152.0	84.0
AR5	2.2	3.6	2.9
AR6	2.8	4.6	3.7
NB2 Top	2.4	1.6	2.0
NB2 Bottom	1.6	3.4	2.5
NB3 Top	6.0	7.2	6.6
NB3 Bottom	2.6	0.6	1.6
NB4 Top	1.8	1.6	1.7
NB4 Bottom	1.4	1.2	1.3
NB5 Top	1.4	1.6	1.5
NB5 Bottom	1.6	2.0	1.8
NB6 Top	2.0	2.0	2.0
NB6 Bottom	2.0	1.8	1.9

RESULTS IN MILLIGRAMS PER LITER

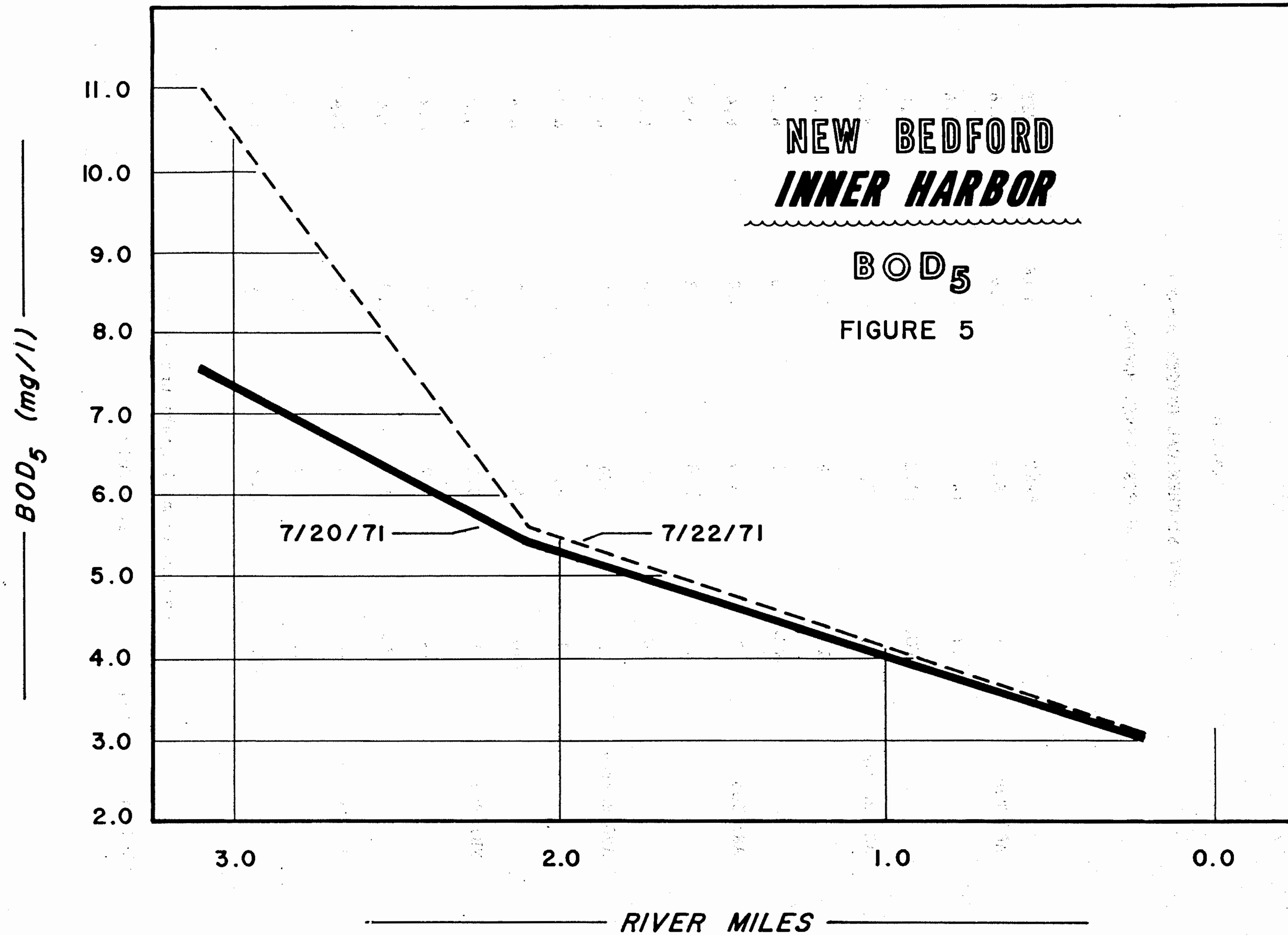

NEW BEDFORD
INNER HARBOR
BOD5
FIGURE 5
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
BOD5 (mg/l)
7/20/71
7/22/71
3.0
2.0
1.0
0.0
RIVER MILES

TABLE 8

5 DAY BIOCHEMICAL OXYGEN DEMAND

NEW BEDFORD INNER HARBOR

		EAST	MIDDLE	WEST
AR7 Top	I	8.4	5.6	8.8
	II	16.0	8.7	8.4
	AVG.	12.2	7.2	8.6
AR7 Bottom	I	7.2	6.4	5.6
	II	7.8	7.2	7.2
	AVG.	7.5	6.8	6.4
AR8 Top	I	4.0	6.0	6.4
	II	5.8	5.2	5.8
	AVG.	4.9	5.6	6.1
AR8 Bottom	I	5.6	3.2	4.8
	II	6.2	2.6	4.0
	AVG.	5.9	2.9	4.4
NB1 Top	I	3.2	3.0	3.0
	II	1.6	3.6	4.2
	AVG.	2.4	3.3	3.6
NB1 Bottom	I	2.6	3.2	2.4
	II	1.0	1.0	2.5
	AVG.	1.8	2.1	2.4

Results in milligrams per liter

DATES: I - July 20 II - July 22

TABLE 9

LONG TERM B.O.D. STUDY

ACUSHNET RIVER - NEW BEDFORD HARBOR

E = east
M = mid
W = west
T = top
B = bottom

STATION		2 DAY	5 DAY	7 DAY	14 DAY	21 DAY
AR1		0.6	2.0	2.4	2.8	4.2
AR2		0.4	1.6	2.0	3.2	3.8
AR3		0.6	2.8	3.2	6.8	8.4
AR4		14.0	16.0	26.0	108.0	126.0
AR5		1.2	2.2	2.8	3.8	4.8
AR6		1.8	2.8	3.4	5.4	6.0
AR7	ET	3.6	8.8	9.6	10.0	11.0
	EB	1.6	5.6	6.4	8.4	9.6
	MT	2.8	5.6	6.0	7.6	9.2
	MB	3.2	6.4	6.6	6.8	8.8
	WT	5.2	8.4	9.2	10.0	13.0
	WB	3.6	7.2	7.2	8.8	10.0
AR8	ET	2.4	6.4	8.0	10.0	11.0
	EB	2.4	4.8	6.4	6.8	8.0
	MT	2.8	6.0	6.4	8.8	9.2
	MB	1.6	3.2	4.0	5.2	6.4
	WT	1.2	4.0	5.6	6.0	6.0
	WB	3.2	5.6	5.6	6.4	8.4
NB1	ET	1.6	3.0	3.4	3.8	5.2
	EB	1.4	2.4	2.6	3.8	4.8
	MT	1.6	3.0	3.0	3.4	4.4
	MB	1.0	3.2	3.2	3.8	4.0
	WT	2.0	3.2	3.2	3.4	4.6
	WB	1.2	2.6	3.8	4.2	5.0
NB2	T	0.7	1.2	1.2	1.7	1.8
	B	0.8	1.6	1.8	2.0	2.2
NB3	T	2.4	6.0	7.0	7.8	8.4
	B	0.4	1.3	1.6	2.4	2.6
NB4	T	0.8	1.8	2.2	2.8	3.0
	B	0.4	1.4	1.4	2.6	2.8
NB5	T	0.6	1.4	2.0	2.4	2.8
	B	0.6	1.6	2.0	2.6	2.8
NB6	T	0.8	2.0	2.4	3.0	3.0
	B	0.6	2.0	2.0	2.8	3.0

Results in milligrams per liter

TABLE 10

SUSPENDED SOLIDS, pH, ALKALINITY

ACUSHNET RIVER - NEW BEDFORD OUTER HARBOR

STATION	JULY 13 SUSP. SOL. mg/l	JULY 13 pH	JULY 13 ALK. mg/l	JULY 15 SUSP. SOL. mg/l	JULY 15 pH	JULY 15 ALK. mg/l	AVERAGE SUSP. SOL. mg/l	AVERAGE ALK. mg/l
AR1	2.0	6.9	12	6.0	6.9	8	4.0	10
AR2	3.0	6.5	15	1.0	6.5	11	2.0	13
AR3	6.0	6.6	19	19.0	6.5	12	12.5	16
AR4	26.0	7.8	255	33.0	7.2	160	29.5	208
AR5	2.0	6.5	21	2.0	6.5	20	2.0	20
AR6	1.0	6.7	25	6.0	6.7	14	3.5	20
NB2 T	4.0	8.1	116	1.0	8.2	110	2.5	113
NB2 B	10.0	8.1	114	1.0	8.2	115	5.5	114
NB3 T	2.0	7.9	115	3.0	7.8	105	2.5	110
NB3 B	49.0	8.0	115	1.0	8.3	110	25.0	112
NB4 T	1.0	8.2	110	3.0	8.1	110	2.0	110
NB4 B	2.0	8.1	115	7.0	8.2	110	4.5	112
NB5 T	2.0	8.1	100	1.0	8.2	105	1.5	102
NB5 B	8.0	8.1	110	2.0	8.1	110	5.0	110
NB6 T	1.0	8.1	90	2.0	8.2	105	1.5	98
NB6 B	16.0	8.2	90	6.0	8.2	115	11.0	102

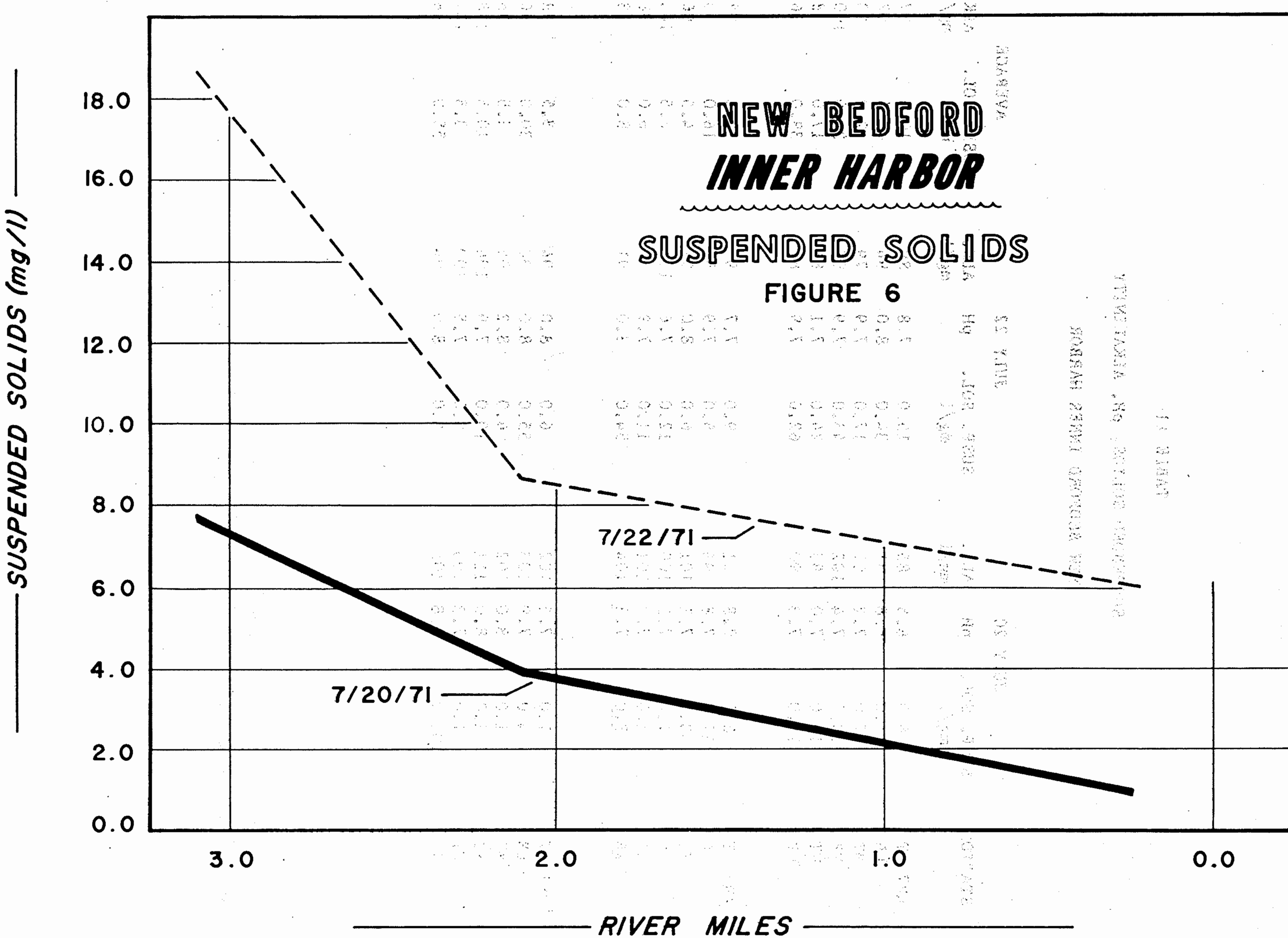

NEW BEDFORD
INNER HARBOR
SUSPENDED SOLIDS
FIGURE 6
SUSPENDED SOLIDS (mg/l)
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
7/22/71
7/20/71
3.0
2.0
1.0
0.0
RIVER MILES

TABLE 11

SUSPENDED SOLIDS, pH, ALKALINITY

NEW BEDFORD INNER HARBOR

STATION		JULY 20 SUSP. SOL. mg/l	JULY 20 pH	JULY 20 ALK. mg/l	JULY 22 SUSP. SOL. mg/l	JULY 22 pH	JULY 22 ALK. mg/l	AVERAGE SUSP. SOL. mg/l	AVERAGE ALK. mg/l
AR7	ET	6.0	6.5	85	15.0	7.8	89	10.5	87
	EB	47.0	6.8	91	34.0	8.0	94	40.5	92
	MT	7.0	7.2	107	17.0	7.9	79	12.0	93
	MB	10.0	7.4	102	43.0	7.9	97	26.0	100
	WT	10.0	7.0	95	24.0	7.1	81	17.0	88
	WB	16.0	7.3	90	62.0	7.9	82	39.0	86
AR8	ET	8.0	7.8	101	9.0	7.7	95	8.5	98
	EB	27.0	7.8	96	5.0	7.9	90	16.0	93
	MT	3.0	7.1	101	6.0	8.0	91	4.5	96
	MB	1.0	7.5	100	12.0	7.6	106	6.5	103
	WT	1.0	7.7	101	11.0	7.9	95	6.0	98
	WB	8.0	7.8	104	54.0	8.0	91	8.0	98
NB1	ET	1.0	7.3	102	6.0	8.0	94	3.5	98
	EB	4.0	7.9	103	55.0	8.0	90	30.0	96
	MT	1.0	8.0	102	6.0	8.2	95	3.5	98
	MB	2.0	8.0	111	19.0	7.9	106	10.5	108
	WT	1.0	7.3	105	6.0	7.5	109	3.5	107
	WB	102.0	7.8	105	6.0	8.0	94	55.0	98

TABLE 12

COLIFORM BACTERIA, MPN PER 100 ML

ACUSHNET RIVER, NEW BEDFORD OUTER HARBOR

STATION	JULY 13 TOTAL	JULY 13 FECAL	JULY 15 TOTAL	JULY 15 FECAL
AR1	<36	<36	150	91
AR2	210	210	91	36
AR3 EAST	4600	430	9300	2400
AR3 WEST	240,000	9300	240,000	24,000
AR4	2,400,000	1,100,000	4,600,000	430,000
AR5	<36	< 36	430	36
AR6	240,000	9300	75,000	24,000
NB2T	<36	<36	91	36
NB2B	<36	<36	73	36
NB3T	1,100,000	1,100,000	1,200,000	1,200,000
NB3B	1,100,000	1,100,000	2300	2300
NB4T	<36	<36	<36	<36
NB4B	<36	<36	<36	<36
NB5T	4600	4600	230	<36
NB5B	15,000	4300	<36	<36
NB6T	36	<36	<36	<36
NB6B	<36	<36	<36	<36

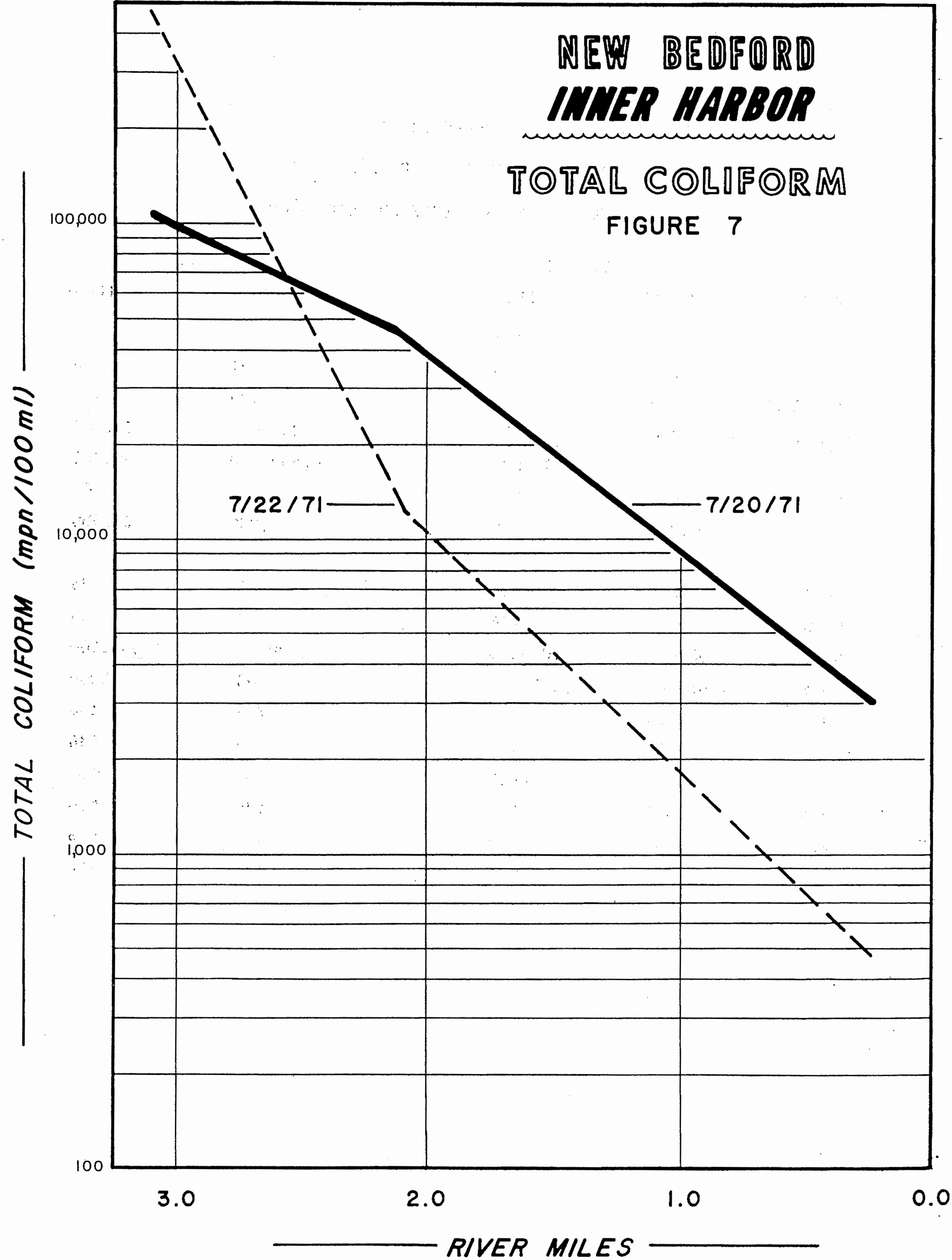

NEW BEDFORD
INNER HARBOR
TOTAL COLIFORM
FIGURE 7
100,000
10,000
1,000
100
7/22/71
7/20/71
TOTAL COLIFORM (mpn/100ml)
3.0
2.0
1.0
0.0
RIVER MILES

TABLE 13

COLIFORM BACTERIA, MPN PER 100 ML

NEW BEDFORD INNER HARBOR

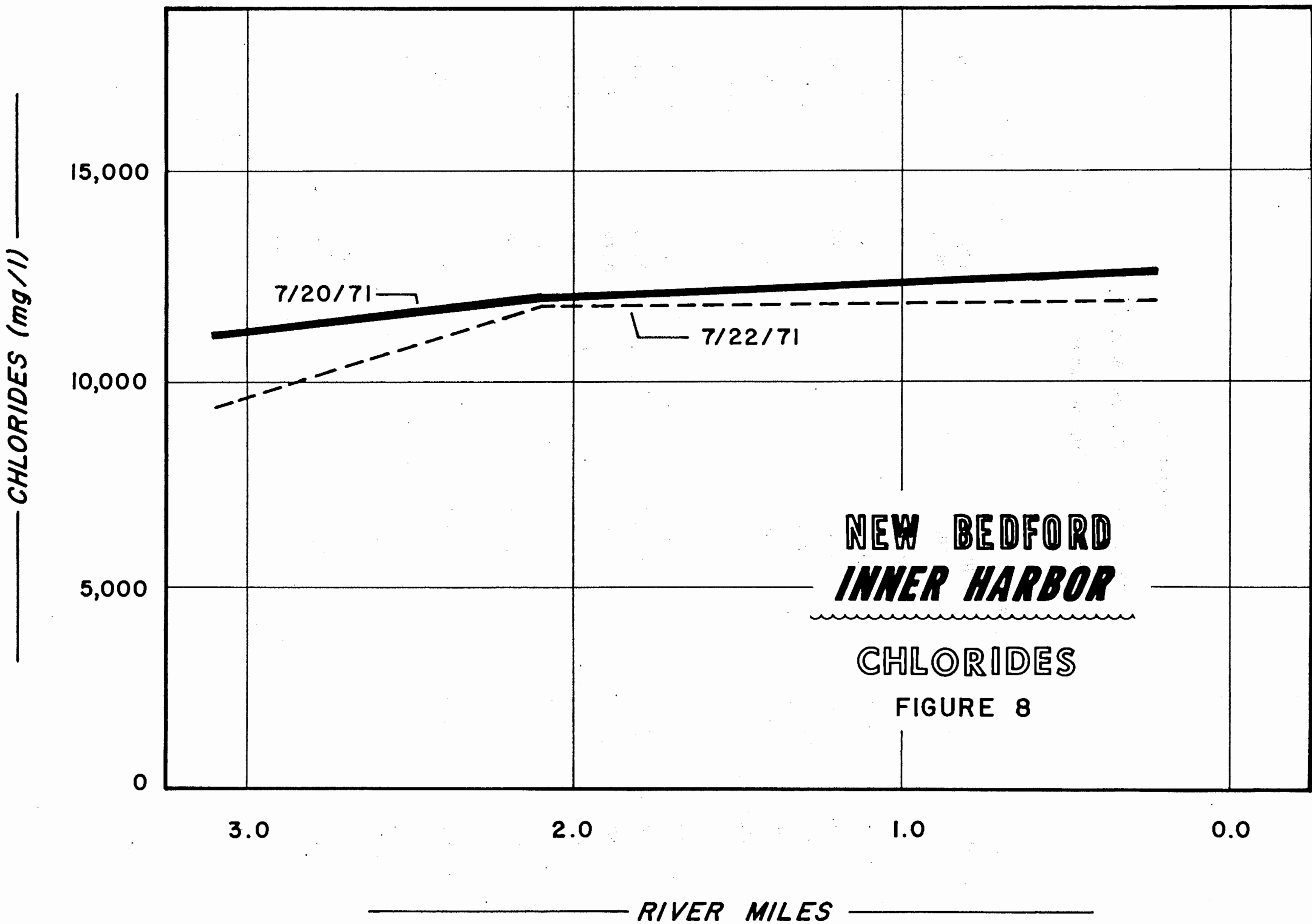
STATION		JULY 20 TOTAL	JULY 20 FECAL	JULY 22 TOTAL	JULY 22 FECAL
AR7	ET	93,000	4300	7500	4300
	EB	24,000	4300	4300	2300
	MT	110,000	15,000	460,000	240,000
	MB	9300	2300	9300	2300
	WT	110,000	46,000	930,000	430,000
	WB	46,000	9300	4300	4300
AR8	ET	24,000	4300	9300	4300
	EB	4300	1500	430	<36
	MT	9300	2300	24,000	9300
	MB	24,000	2300	230	36
	WT	110,000	4300	4300	2300
	WB	7500	4300	2300	930
NB1	ET	4300	1500	430	<36
	EB	430	230	91	<36
	MT	2400	230	91	<36
	MB	230	91	4300	430
	WT	2400	930	930	930
	WB	930	230	430	<36

TABLE 14

TOTAL PHOSPHATE, CHLORIDES, CHLOROPHYLL A

ACUSHNET RIVER, NEW BEDFORD OUTER HARBOR

STATION	PO_4 mg/l	CHLORIDES mg/l	PO_4 mg/l	CHLORIDES mg/l	CHLOROPHYLL A mg/l
AR1	0.05	20	0.05	7	0.010
AR2	0.07	17	0.06	17	0.005
AR3	0.22	34	0.15	19	0.013
AR4	17.00	61	30.90	31	0.013
AR5	0.40	20	0.83	21	0.013
AR6	0.20	150	0.25	800	0.005
NB2 T	0.10	13,000	0.06	12,400	0.007
NB2 B	0.11	12,800	0.06	12,400	0.013
NB3 T	0.27	12,000	0.26	12,000	0.001
NB3 B	0.21	13,000	0.06	12,600	0.002
NB4 T	0.08	12,600	0.08	12,600	0.002
NB4 B	0.09	12,800	0.08	12,600	0.002
NB5 T	0.09	14,000	0.09	12,600	0.005
NB5 B	0.09	13,400	0.09	12,400	0.004
NB6 T	0.09	12,800	0.09	12,400	0.005
NB6 B	0.09	13,400	0.08	12,600	0.005



15,000
10,000
5,000
0
CHLORIDES (mg/l)
7/20/71
7/22/71
NEW BEDFORD
INNER HARBOR
CHLORIDES
FIGURE 8
3.0
2.0
1.0
0.0
RIVER MILES

TABLE 15

TOTAL PHOSPHATE, CHLORIDES

NEW BEDFORD INNER HARBOR

STATION		JULY 20 PO_4 mg/l	JULY 20 CHLORIDES mg/l	JULY 22 PO_4 mg/l	JULY 22 CHLORIDES mg/l
AR7	ET	0.27	11,000	0.23	10,200
	EB	0.25	11,800	0.14	11,800
	MT	0.25	11,200	0.20	9800
	MB	0.24	11,200	0.10	10,600
	WT	0.29	11,000	0.53	8000
	WB	0.29	11,400	0.29	11,400
AR8	ET	0.23	11,200	0.24	11,600
	EB	0.23	11,600	0.25	12,400
	MT	0.15	11,800	0.22	12,000
	MB	0.22	12,200	0.21	12,000
	WT	0.22	12,600	0.17	11,600
	WB	0.22	12,400	0.16	12,200
NB	ET	0.15	12,400	0.13	12,000
	EB	0.12	12,200	0.12	12,400
	MT	0.11	12,400	0.14	12,000
	MB	0.13	12,400	0.13	12,000
	WT	0.13	12,600	0.15	11,800
	WB	0.07	12,800	0.12	12,000

TABLE 16

COLOR, TURBIDITY, SPECIFIC CONDUCTANCE

ACUSHNET RIVER, NEW BEDFORD OUTER HARBOR

	JULY 13			JULY 15		
STATION	COLOR Std. Units	TURBIDITY Std. Units	SPEC. COND. Micromhos/cm	COLOR Std. Units	TURBIDITY Std. Units	SPEC. COND. Micromhos/cm
AR1	120	1	90	120	1	170
AR2	110	2	100	100	1	110
AR3	100	2	110	90	1	100
AR4	110	7	660	-	-	140
AR5	110	1	120	110	1	110
AR6	100	1	720	100	1	1450
NB2 T	13	1	44,000	5	1	47,000
NB2 B	15	3	43,000	10	1	48,000
NB3 T	15	2	43,000	20	1	45,000
NB3 B	15	6	40,000	5	1	44,000
NB4 T	10	0	45,000	10	1	47,000
NB4 B	5	0	40,000	15	1	47,000
NB5 T	15	1	42,000	15	1	46,000
NB5 B	10	1	2800	10	1	47,000
NB6 T	10	1	43,000	15	1	44,000
NB6 B	15	2	46,000	15	1	46,000

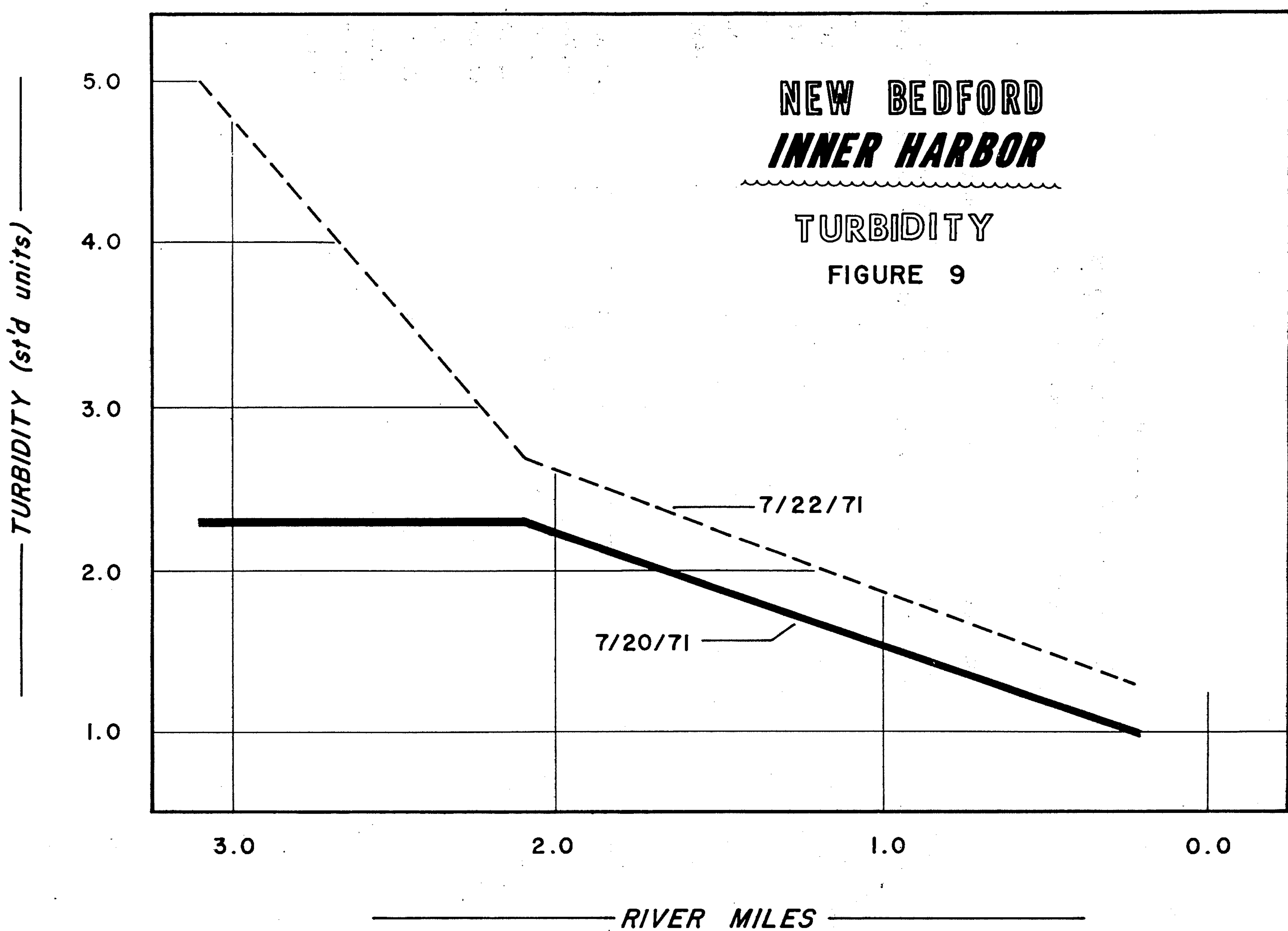

NEW BEDFORD
INNER HARBOR
TURBIDITY
FIGURE 9
TURBIDITY (st'd units)
5.0
4.0
3.0
2.0
1.0
7/22/71
7/20/71
3.0
2.0
1.0
0.0
RIVER MILES

TABLE 17

COLOR, TURBIDITY, SPECIFIC CONDUCTANCE

NEW BEDFORD INNER HARBOR

STATION		JULY 20 COLOR Std. Units	JULY 20 TURBIDITY Std. Units	JULY 20 SPEC. COND. Micromhos/cm	JULY 15 COLOR Std. Units	JULY 15 TURBIDITY Std. Units	JULY 15 SPEC. COND. Micromhos/cm
AR7	ET	45	2	44,000	50	2	37,000
	EB	50	2	40,000	50	4	41,000
	MT	40	2	44,000	50	3	33,000
	MB	35	3	46,000	50	4	41,000
	WT	30	3	37,000	45	10	29,000
	WB	35	3	40,000	50	6	41,000
AR8	ET	70	3	40,000	30	3	41,000
	EB	35	5	46,000	25	2	43,000
	MT	40	2	46,000	35	2	37,000
	MB	25	2	43,000	30	3	37,000
	WT	35	2	40,000	40	3	40,000
	WB	35	2	46,000	40	3	37,000
NB1	ET	15	1	42,000	20	1	40,000
	EB	15	2	45,000	30	7	42,000
	MT	12	1	46,000	15	2	42,000
	MB	15	1	48,000	20	3	41,000
	WT	12	1	43,000	20	1	39,000
	WB	20	11	47,000	20	1	41,000

TABLE 18

NITROGEN CONCENTRATIONS

ACUSHNET RIVER, NEW BEDFORD OUTER HARBOR

	JULY 13			JULY 15	
STATION	Kj-N	NH_3-N	NO_3-N	NH_3-N	NO_3-N
AR1	1.2	0.01	0.0	0.00	0.2
AR2	0.7	0.07	0.2	0.05	0.0
AR3	1.4	0.20	0.0	0.10	0.0
AR4	25.7	22.00	0.0	12.00	0.0
AR5	1.3	0.10	0.0	0.24	0.1
AR6	1.2	0.10	0.1	0.07	0.1
NB2 T	0.1	0.20	0.0	0.30	0.0
NB2 B	0.4	0.30	0.0	0.25	0.0
NB3 T	0.1	0.38	0.0	0.50	0.0
NB3 B	0.1	0.30	0.0	0.20	0.0
NB4' T	0.1	0.14	0.0	0.20	0.0
NB4 B	0.1	0.20	0.0	0.15	0.0
NB5 T	0.1	0.10	0.0	0.20	0.0
NB5 B	0.1	0.12	0.0	0.18	0.0
NB6 T	0.1	0.07	0.0	0.10	0.0
NB6 B	0.1	0.10	0.0	0.10	0.0

Results in milligrams per liter

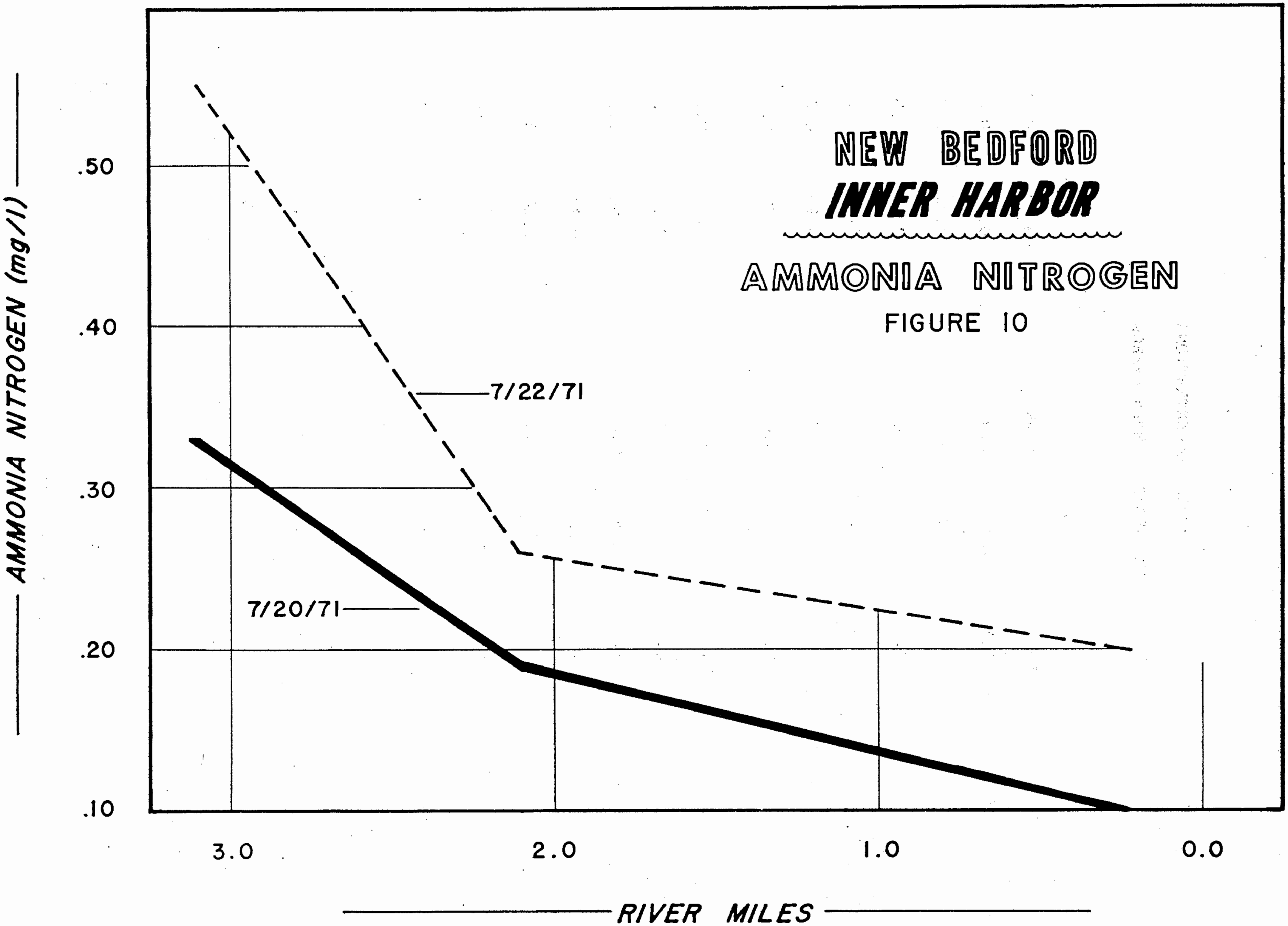

NEW BEDFORD
INNER HARBOR
AMMONIA NITROGEN
FIGURE 10
7/22/71
7/20/71
.50
.40
.30
.20
.10
AMMONIA NITROGEN (mg/l)
3.0
2.0
1.0
0.0
RIVER MILES

TABLE 19

NITROGEN CONCENTRATIONS

NEW BEDFORD INNER HARBOR

STATION		JULY 20			JULY 22	
		Kj-N	NH_3-N	NO_3-N	NH_3-N	NO_3-N
AR7	ET	2.5	0.30	0.0	0.35	0.0
	EB	1.9	0.40	0.0	0.30	0.0
	MT	1.8	0.30	0.0	0.50	0.0
	MB	0.9	0.30	0.0	0.30	0.0
	WT	3.1	0.40	0.0	0.80	0.0
	WB	0.7	0.30	0.0	0.30	0.0
AR8	ET	1.3	0.20	0.0	0.29	0.0
	EB	1.9	0.15	0.0	0.24	0.0
	MT	1.1	0.18	0.0	0.30	0.0
	MB	1.4	0.20	0.0	0.22	0.0
	WT	1.8	0.20	0.0	0.20	0.0
	WB	0.3	0.20	0.0	0.20	0.0
NB1	ET	0.4	0.10	-	0.18	0.0
	EB	0.3	0.10	-	0.17	0.0
	MT	0.5	0.10	-	0.17	0.0
	MB	0.7	0.10	-	0.23	0.0
	WT	0.5	0.10	-	0.25	0.0
	WB	0.8	0.10	-	0.30	0.0

Results in milligrams per liter

TABLE 20

MICROSCOPICAL EXAMINATION

ACUSHNET RIVER, NEW BEDFORD OUTER HARBOR

STATION	ALGAE BLUE-GREEN	GREEN	FLAGELLATES	DIATOMS	CRUSTACEA	ROTIFER	AMORPHOUS MATTER
AR1	0	175	100	40	0	0	400
AR2	0	20	20	150	0	0	1000
AR3 E	50	40	0	175	2	0	800
AR3 W	30	115	0	50	0	0	900
AR4	0	0	0	0	0	200	1500
AR5	30	70	0	800	0	0	500
AR6	30	20	0	400	0	0	500
NB2 T	0	0	0	0	2	0	400
NB2 B	0	0	0	0	0	0	300
NB3 T	0	0	0	0	0	0	500
NB3 B	0	0	0	25	0	0	500
NB4 T	0	0	0	0	2	0	400
NB4 B	0	0	0	0	0	0	500
NB5 T	0	0	0	50	0	0	400
NB5 B	0	0	0	0	0	0	400
NB6 T	0	0	0	0	1	0	300
NB6 B	0	0	0	0	3	0	400

Samples collected July 13-15, 1971
Results in Aerial Standard Units per Cubic Centimeter

TABLE 21

MICROSCOPICAL EXAMINATION

NEW BEDFORD INNER HARBOR

STATION		BLUE GREEN	ALGAE GREEN	DIATOMS	CRUSTACEA	NEMATODES	AMORPHOUS MATTER
AR 7	ET	0	0	0	0	0	4100
	EB	0	0	0	0	0	4500
	MT	0	0	0	0	0	6000
	MB	0	0	0	0	0	5000
	WT	0	0	0	6	0	7000
	WB	40	75	0	5	0	1800
AR 8	ET	0	0	0	0	0	2000
	EB	0	0	10	1	0	3500
	MT	10	0	0	1	0	2200
	MB	0	0	0	1	1	1250
	WT	0	0	0	1	0	2000
	WB	0	0	4	2	0	1400
NB 1	ET	0	0	10	0	0	1500
	EB	0	0	0	0	0	500
	MT	0	0	0	0	0	500
	MB	0	0	0	0	0	700
	WT	0	0	0	0	0	600
	WB	0	0	0	0	0	500

Samples collected July 20-22, 1971

Results in Aerial Standard Units per Cubic Centimeter

TABLE 22

BIOLOGICAL EXAMINATION OF SEDIMENT

ACUSHNET RIVER, NEW BEDFORD HARBOR

Station	Sampled	Physical Character	Macroorganisms #30 Sieve	% Organic Debris (volume)	% Inorganic Debris (volume)
AR1	7/14	Gravel	None Living	19.0	56.0
AR2	7/14	Muck	1 Arthropod	8.0	2.0
AR3	7/14	Muck	5 Arthropods	19.0	9.0
AR4	7/14	Sand	None Living	1.0	30.0
AR5	7/14	Muck	None Living	36.0	22.0
AR6	7/14	Muck	None Living	42.0	6.0
AR7E	7/21	Muck	5 Littorina	18.0	2.0
AR7M	7/21	Muck	1 Annelid	18.0	2.0
AR7W	7/21	Muck	3 Littorina 3 Annelids	9.0	1.0
AR8E	7/21	Muck	2 Annelids 2 Littorina	4.0	1.0
AR8M	7/21	Muck and Stones	1 Littorina	16.0	2.0
AR8W	7/21	Muck	3 Annelids	2.0	8.0
NB1E	7/21	Muck	1 Annelid 1 Littorina	15.0	2.0
NB1M	7/21	Muck	None Living	13.0	1.0
NB1W	7/21	Muck	None Living	<1.0	0.0
NB2	7/21	Gravel and Shell	1 Anomiidae 2 Limpets 1 Littorina	<1.0	63.0
NB3	7/21	Muck	None Living	20.0	1.0
NB4	7/21	Muck and Shell	1 Limpet 1 Littorina 1 Annelid	<1.0	23.0
NB5	7/21	Sand	None Living	0.0	28.0
NB6	7/21	Muck	1 Annelid	<1.0	15.0

TABLE 23

SPECIAL ANALYSIS OF SEDIMENT

NEW BEDFORD HARBOR

Heavy Metal Concentrations in Milligrams Per Killigram

Passing Number 30 Sieve

STATION	MERCURY	CADMIUM	LEAD	ZINC	NICKEL	COPPER	CHROMIUM	ARSENIC
AR7E	1.90	76.0	320.0	1700.0	100.0	1920.0	960.0	5.2
AR7M	3.10	53.0	310.0	1040.0	72.0	1620.0	920.0	5.2
AR7W	3.30	0.9	560.0	2300.0	180.0	2540.0	1380.0	5.2
AR8E	1.70	40.0	320.0	1070.0	110.0	2520.0	1280.0	3.2
AR8M	3.80	40.0	290.0	600.0	81.0	1680.0	1210.0	9.2
AR8W	2.70	24.0	310.0	1200.0	550.0	7250.0	3200.0	14.0
NB1E	0.90	1.9	410.0	95.0	6.8	1930.0	110.0	0.8
NB1M	1.70	0.7	11.0	35.0	3.6	36.0	21.0	0.0
NB1W	1.70	18.0	150.0	430.0	39.0	610.0	310.0	5.2
NB2	0.75	0.4	31.0	410.0	37.0	32.0	18.0	0.6
NB3	7.70	43.0	510.0	1170.0	36.0	760.0	250.0	8.2
NB4	1.80	0.8	38.0	59.0	6.9	40.0	27.0	1.6
NB5	0.85	0.1	3.4	5.5	1.5	5.0	5.1	0.0
NB6	0.21	0.9	20.0	50.0	4.5	59.0	27.0	0.6

TABLE 24

PHOTOSYTHESIS SUMMARY

ACUSHNET RIVER - NEW BEDFORD HARBOR

STATION NUMBER	LOCATION	DEPTH	NUMBER OF OBSERVATIONS	AVERAGE PHOTOSYNTHESIS	AVERAGE RESPIRATION
1	Outer Harbor off Butler Flats Lights	1.0	8	1.0	0.4
		8.0	8	0.3	0.5
		18.0	8	0.2	0.4
2	Inner Harbor opposite power plant	1.0	14	1.1	0.2
		5.0	14	0.5	1.3
		30.0	10	0.4	1.0
3	Acushnet River above Popes Island	1.0	14	2.3	1.1
		4.0	13	1.2	1.5
		17.0	14	0.3	1.6
3A	Acushnet River above Coggeshall St. Bridge	1.0	6	4.9	2.8
		3.0	6	1.6	2.6
		9.0	6	1.4	2.8
3B	Acushnet River below Wood St. Bridge	1.0	6	2.5	2.1
		2.0	6	0.6	2.1
4	Acushnet River at Hamlin Pond	1.0	8	2.1	3.2
		4.0	8	0.4	2.8
5	New Bedford Reservoir Below Lake Street	1.0	8	0.3	0.1
		7.0	8	0.6	0.8

TABLE 25

PHOTOSYNTHESIS DATA JULY 12 - 13

NEW BEDFORD HARBOR

STATION	DEPTH (FEET)	TEMPERATURE (°F)	INITIAL D.O. (mg/1)	LIGHT D.O. (mg/1)	DARK D.O. (mg/1)	LIGHT - DARK (PHOTOSYNTHESIS)	INITIAL - DARK (RESPIRATICN)
1	1.0	70	5.2	5.7	4.7	1.0	0.5
				5.7	4.6	1.1	0.6
	8.0	70	5.0	3.5	4.3	-0.8	0.7
				3.6	4.0	-0.4	1.0
	18.0	70	5.1	4.3	4.2	0.1	0.9
				4.3	4.7	-0.4	0.4
2	1.0	72	3.7	3.3	3.6	-0.3	0.1
				2.7	--	-0.9	--
	5.0	72	5.5	4.2	2.9	-1.3	2.6
				3.0	--	0.1	--
	30.0	72	3.5	--	--	--	--
				--	--	--	--
3	1.0	75	3.5	5.0	2.2	2.8	1.3
				4.3	--	2.1	--
	4.0	75	3.1	2.4	1.9	0.5	1.2
				2.3	--	0.4	--
	17.0	75	3.2	2.6	2.2	0.4	1.0
				1.9	--	-0.3	--

TABLE 26

PHOTOSYNTHESIS DATA JULY 12 - 13

ACUSHNET RIVER

STATION	DEPTH (FEET)	TEMPERATURE (^{o}F)	INITIAL D.O. (mg/1)	LIGHT D.O. (mg/1)	DARK D.O. (mg/1)	LIGHT - DARK (PHOTOSYNTHESIS)	INITIAL - DARK (RESPIRATION)
4	1.0	75	8.1	5.7	4.9	0.8	3.2
				7.0	4.5	2.5	3.6
	4.0	75	4.6	3.5	2.2	1.3	2.4
				1.7	2.3	-0.6	2.3
5	1.0	79	6.9	6.9	6.6	0.3	0.3
				7.3	7.2	0.1	-0.3
	7.0	79	4.3	4.8	4.6	0.2	-0.3
				4.5	4.5	0.0	-0.2

TABLE 27

PHOTOSYNTHESIS DATA JULY 13 - 14

NEW BEDFORD HARBOR

STATION	DEPTH (FEET)	TEMPERATURE (°F)	INITIAL D.O. (mg/1)	LIGHT D.O. (mg/1)	DARK D.O. (mg/1)	LIGHT - DARK (PHOTOSYNTHESIS)	INITIAL - DARK (RESPIRATION)
1	1.0	70	6.0	6.3	5.9	0.4	0.1
				--	5.7	0.6	0.3
	8.0	70	5.4	5.7	5.1	0.6	0.3
				5.7	5.0	0.7	0.4
	18.0	70	5.2	5.6	5.6	0.0	-0.4
				5.4	5.1	0.3	0.1
2	1.0	74	4.1	4.5	3.0	1.5	1.1
				4.3	3.2	1.1	0.9
	5.0	74	4.3	3.5	5.4	-1.9	-1.1
				3.5	1.3	2.2	3.0
	30.0	74	4.3	3.7	2.6	1.1	1.7
				3.9	2.6	1.3	1.7
3	1.0	75	3.0	3.9	2.7	1.2	1.8
				--	2.9	1.0	2.0
	4.0	75	3.6	3.3	0.0	3.3	3.6
				4.7	2.3	2.4	1.3
	17.0	74	3.1	2.6	1.0	1.5	2.1
				--	0.0	1.6	3.1

TABLE 28

PHOTOSYNTHESIS DATA JULY 13 - 14

ACUSHNET RIVER

STATION	DEPTH (FEET)	TEMPERATURE (°F)	INITIAL D.O. (mg/1)	LIGHT D.O. (mg/1)	DARK D.O. (mg/1)	LIGHT - DARK (PHOTOSYNTHESIS)	INITIAL - DARK (RESPIRATION)
4	1.0	74	4.6	2.2	0.3	1.9	4.3
				1.5	0.0	1.5	4.6
	4.0	73	4.4	2.1	1.2	0.9	3.2
				1.4	1.3	0.1	3.1
5	1.0	80	7.2	7.5	7.4	0.1	-0.2
				8.0	7.1	0.9	0.1
	7.0	78	7.2	7.7	7.0	-0.7	0.2
				6.9	7.0	-0.1	0.2

TABLE 29

PHOTOSYNTHESIS DATA JULY 14 - 15

NEW BEDFORD HARBOR

STATION	DEPTH (FEET)	TEMPERATURE (^{o}F)	INITIAL D.O. (mg/1)	LIGHT D.O. (mg/1)	DARK D.O. (mg/1)	LIGHT - DARK (PHOTOSYNTHESIS)	INITIAL - DARK (RESPIRATION)
1	1.0	71	--	7.1	6.1	1.0	--
				7.0	--	0.9	--
	8.0	71	6.7	6.7	6.5	0.2	0.2
				6.6	6.1	0.5	0.6
	18.0	71	6.6	6.2	6.0	0.2	0.6
				6.4	6.3	0.1	0.3
2	1.0	72	4.8	4.2	4.2	0.0	0.6
				4.1	3.9	0.2	0.9
	5.0	72	4.8	4.2	3.8	0.4	1.0
				--	4.0	0.2	0.8
	30.0	72	5.3	5.3	3.6	1.7	1.7
				5.3	3.8	1.5	1.5
3	1.0	73	3.1	5.1	2.5	2.6	0.6
				5.8	2.3	3.5	0.8
	4.0	73	4.4	2.9	2.2	0.7	3.7
				--	--	--	--
	17.0	73	4.3	3.0	2.4	0.6	3.7
				3.2	3.2	0.0	4.3

TABLE 30

PHOTOSYNTHESIS DATA JULY 14 - 15

ACUSHNET RIVER

STATION	DEPTH (FEET)	TEMPERATURE (°F)	INITIAL D.O. (mg/1)	LIGHT D.O. (mg/1)	DARK D.O. (mg/1)	LIGHT - DARK (PHOTOSYNTHESIS)	INITIAL - DARK (RESPIRATION)
4	1.0	--	4.4	5.5	1.2	4.3	3.2
				6.6	1.4	5.2	3.0
	4.0	--	4.4	1.5	1.5	0.0	2.9
				1.6	1.6	0.0	2.8
5	1.0	80	7.4	7.2	6.7	0.5	0.7
				7.2	6.7	0.5	0.7
	7.0	78	7.1	6.9	4.8	2.1	2.3
				6.6	2.0	4.6	5.1

TABLE 31

PHOTOSYNTHESIS DATA JULY 15 - 16

NEW BEDFORD HARBOR

STATION	DEPTH (FEET)	TEMPERATURE (°F)	INITIAL D.O. (mg/l)	LIGHT D.O. (mg/l)	DARK D.O. (mg/l)	LIGHT - DARK (PHOTOSYNTHESIS)	INITIAL - DARK (RESPIRATION)
1	1.0	71	6.5	7.4	6.0	1.4	0.5
				7.3	--	1.3	--
	8.0	71	6.7	7.5	6.0	1.5	0.7
				6.8	6.5	0.3	0.2
	18.0	71	6.6	7.0	6.0	1.0	0.6
				6.5	5.9	0.6	0.7
2	1.0	72	4.7	4.7	3.9	0.8	0.8
				5.0	4.3	0.7	0.4
	5.0	72	4.6	4.4	3.6	0.8	1.0
				4.4	3.9	0.5	0.7
	30.0	72	4.9	4.0	3.8	0.2	1.1
				3.8	--	0.0	--
3	1.0	73	4.2	6.8	3.5	3.3	0.7
				6.4	3.3	3.1	0.9
	4.0	73	4.2	4.4	2.2	2.2	2.0
				4.2	3.0	1.2	1.2
	17.0	73	3.9	3.1	3.0	0.1	0.9
				3.3	3.1	0.2	0.8

TABLE 32

PHOTOSYNTHESIS DATA JULY 15 - 16

ACUSHNET RIVER

STATION	DEPTH (FEET)	TEMPERATURE (°F)	INITIAL D.O. (mg/l)	LIGHT D.O. (mg/l)	DARK D.O. (mg/l)	LIGHT - DARK (PHOTOSYNTHESIS)	INITIAL - DARK (RESPIRATION)
4	1.0	74	4.8	2.9	2.5	0.4	2.3
				3.0	3.0	0.0	1.8
	4.0	74	2.0	0.0	0.0	0.0	2.0
				1.3	0.0	1.3	2.0
5	1.0	80	6.8	6.8	7.0	-0.2	-0.2
				7.6	7.5	0.1	-0.7
	7.0	78	6.9	6.7	7.3	-0.6	-0.4
				6.4	7.1	-0.7	-0.2

TABLE 33

PHOTOSYNTHESIS DATA JULY 19 - 20

NEW BEDFORD INNER HARBOR

STATION	DEPTH (FEET)	TEMPERATURE (°F)	INITIAL D.O. (mg/l)	LIGHT D.O. (mg/l)	DARK D.O. (mg/l)	LIGHT - DARK (PHOTOSYNTHESIS)	INITIAL - DARK (RESPIRATION)
2	1.0	70	5.6	5.8	5.2	0.6	0.4
				6.2	4.7	1.5	0.9
	5.0	70	6.0	5.2	4.6	0.6	1.4
				--	5.0	0.2	1.0
	30.0	70	5.5	5.7	5.7	0.0	-0.2
				5.5	5.7	-0.2	-0.2
3	1.0	72	3.0	3.9	2.7	1.2	0.3
				2.4	3.5	-1.1	-0.5
	4.0	72	4.0	5.0	2.1	2.9	1.9
				2.7	2.6	0.1	1.4
	17.0	72	4.5	2.7	2.9	-0.2	1.6
				2.6	2.4	0.2	2.1
3A	1.0	70	3.8	1.7	1.3	0.4	2.5
				4.7	1.1	3.6	2.7
	3.0	70	3.2	1.9	0.6	1.3	2.6
				1.7	0.8	0.9	2.4
	9.0	70	3.7	1.5	0.8	0.7	2.9
				1.0	0.3	0.7	3.4
3B	1.0	70	4.0	1.0	0.0	1.0	4.0
				1.8	0.0	1.8	4.0
	2.0	70	3.6	0.3	0.0	0.3	3.6
				0.3	0.0	0.3	3.6

TABLE 34

PHOTOSYNTHESIS DATA JULY 20 - 21

NEW BEDFORD INNER HARBOR

STATION	DEPTH (FEET)	TEMPERATURE (°F)	INITIAL D.O. (mg/1)	LIGHT D.O. (mg/1)	DARK D.O. (mg/1)	LIGHT - DARK (PHOTOSYNTHESIS)	INITIAL - DARK (RESPIRATION)
2	1.0	70	5.0	7.0	4.1	2.9	0.9
				7.4	4.1	3.3	0.9
	5.0	70	4.8	4.4	4.4	0.0	0.4
				4.0	4.3	-0.3	0.5
	30.0	70	5.1	3.2	4.3	-1.1	0.8
				4.1	4.7	-0.6	0.4
3	1.0	70	3.6	5.8	2.3	3.5	1.3
				6.1	3.4	2.7	0.2
	4.0	70	4.0	3.4	2.8	0.6	1.2
				3.0	3.2	-0.2	0.8
	17.0	70	3.4	1.9	2.2	-0.3	1.2
				2.3	2.5	-0.2	0.9
3A	1.0	70	2.0	4.0	0.0	4.0	2.0
				7.3	0.0	7.3	2.0
	3.0	70	1.6	0.1	0.0	0.1	1.6
				0.0	0.0	0.0	1.6
	9.0	70	1.6	0.0	0.0	0.0	1.6
				0.0	0.0	0.0	1.6
3B	1.0	70	1.2	3.1	1.2	1.9	0.0
				5.0	0.0	5.0	1.2
	2.0	70	0.9	0.0	0.0	0.0	0.9
				0.8	0.0	0.8	0.9

TABLE 35

PHOTOSYNTHESIS DATA JULY 21 - 22

NEW BEDFORD INNER HARBOR

STATION	DEPTH (FEET)	TEMPERATURE (^{o}F)	INITIAL D.O. (mg/l)	LIGHT D.O. (mg/l)	DARK D.O. (mg/l)	LIGHT - DARK (PHOTOSYNTHESIS)	INITIAL - DARK (RESPIRATION)
2	1.0	74	2.5	6.3	6.0	0.3	-3.5
				8.7	5.0	3.7	-2.5
	5.0	74	5.6	5.4	2.7	2.7	2.9
				--	2.8	2.6	3.2
	30.0	74	4.6	8.0	--	--	--
				0.0	--	--	--
3	1.0	74	3.6	4.6	1.6	3.0	2.0
				5.2	1.6	3.6	2.0
	4.0	74	3.7	3.2	3.0	0.2	0.7
				3.2	3.0	0.2	0.7
	17.0	74	3.4	3.1	3.0	0.1	0.4
				3.4	3.2	0.2	0.2
3A	1.0	74	3.8	8.7	0.0	8.7	3.8
				5.6	0.0	5.6	3.8
	3.0	74	3.8	3.0	0.0	3.0	3.7
				4.2	0.0	4.2	3.7
	9.0	74	3.7	4.7	0.0	4.7	3.7
				2.6	0.0	2.6	3.7
3B	1.0	74	1.8	2.6	0.0	2.6	1.8
				2.8	0.0	2.8	1.8
	2.0	74	1.7	0.0	0.0	0.0	1.7
				2.1	0.0	2.1	1.7

TABLE 36

WEEKLY PHOTOSYNTHESIS SUMMARIES

STATIONS 2 AND 3

		WEEK OF JULY 12, 1971			WEEK OF JULY 19, 1971		
STATION	DEPTH	NO. OBSERVATIONS	AVG. PHOTO.	AVG. RESP.	NO. OBSERVATIONS	AVG. PHOTO.	AVG. RESP.
2	1.0	8	0.4	0.7	6	2.0	-0.5
	5.0	8	0.1	1.1	6	1.0	1.6
	30.0	6	1.0	1.5	4	-0.5	0.2
3	1.0	8	2.3	1.2	6	2.2	0.9
	4.0	7	1.5	2.0	6	0.6	1.1
	17.0	8	0.5	1.9	6	0.0	1.1

SHORELINE SURVEY

Following the sampling program on the Acushnet River and New Bedford Harbor it was determined that a shoreline survey to locate all pertinent source discharges was necessary. Engineers of the Southeast Regional Office of the Division of Water Pollution Control, in cooperation with the Water Quality Section and the United States Coast Guard Reserves, conducted the survey August 24 through September 1, 1971. Through the efforts of Lt. Comm. John J. Fitzgerald, Commanding Officer ORTUPS 01-82045, the United States Coast Guard allowed the training ship Courier to be assigned to the New Bedford Area. An orientation period was held Tuesday morning August 24, aboard the Courier, following which, group assignments were made. Shoreline and boat patrols were utilized to locate the outfalls.

The survey revealed 130 pipe and waste source locations. Discharges varied from no flow from some sources to an average of 3 million gallons per day from sanitary sources and 1 million gallons per day from industrial sources. The combined results of the river sampling program and the shoreline survey established that the inner New Bedford Harbor is receiving pollution loads which render the waters unsuitable for all water usage.

Members of the Southeast Regional Office are starting an effective program of pollution abatement in this area by conducting inplant investigations of all industrial discharges. The data obtained from these investigations will be used to evaluate the need for pretreatment prior to connection to the municipal sewage system or for full treatment with discharge. In addition, the data will assist Division personnel in the evaluation and review of plans for private industry and the plans being formulated by a number of consulting firms in the updating of the sewerage system for the City of New Bedford and Towns of Acushnet and Fairhaven. The present status of the pollution abatement program by these municipalities is as follows:

1. Fairhaven - The town has recently completed a new secondary sewage treatment plant, pumping stations, and interceptors to convey all wastes to the treatment plant providing secondary treatment with chlorination prior to discharge to the Inner New Bedford Harbor. One outfall has not been connected; however, the town has been directed by this Division to proceed with this connection prior to releasing funds for final payment.

2. Acushnet - The Town of Acushnet is not meeting their implementation dates. Funds have not been appropriated for the construction of sewers to tie into the City of new Bedford. Private corporations and the town storm drain are discharging inadequately treated wastes to the Acushnet River and Inner New Bedford Harbor causing contravention of the water quality standards. Robert Childs Associates, consultants, have recommended to the Town to appropriate funds and proceed with final planning for connection to New Bedford.

3. New Bedford - The City of New Bedford, located on the westerly bank of the Acushnet River and Inner Harbor, is presently constructing a 130 MGD primary sewage treatment plant with discharge into the Outer New

Bedford Harbor through an outfall located of Ft. Rodman. The western bank of the Acushnet River is heavily industrialized and a major problem exists in this area because of separated industrial waste discharges and approximately 46 combined sewage overflow points. Urban renewal projects under construction or in planning stages in the heavy populated shoreline areas include a program of sewer separation which will assist in eliminating some sanitary wastes now combined with storm drainage entering the Harbor. Two major problem areas are located at the Sawyer Street Pumping Station and Coffin Avenue Pumping Station. The City has engaged the engineering firm of Tibbets Engineering, New Bedford, to prepare an engineering plan to correct major overflows into the harbor. The engineers have been limited to a ceiling of $15,000,000 in overall construction costs for planning, whereas complete separation is estimated to cost $90,000,000. The Sawyer Street Station presently in dry weather has a constant sewage overflow. Stop logs are being installed at the present time in an effort to divert this overflow into an 18-inch sanitary sewer. Under consideration for correcting the Sawyer Street problem is the construction of a pumping station and interceptor designed for a dry weather flow of 30 million gallons per day. Flows in excess of this, which is estimated to be in the vicinity of 70 million gallons a day, will be diverted to a micro filter, then chlorinated prior to discharge into the Inner Harbor. Sludge from the micro filter would be backwashed into the sanitary sewer.

There would be stations similar to Sawyer Street located at Coffin Avenue, State Pier, and upstream from Route 6.

Other major problems, are industrial wastes discharges (presently being investigated), oil discharges by vessels and town storm drainage systems and the organic bottom deposits existing within the Inner Harbor. Appended are listings of pipe discharges, complaints, industries, and status of field investigations to date.

The City of New Bedford has been requested by the Division on advice by the Southeast Regional Office to formulate an industrial waste survey of waste discharged to the City of New Bedford sewerage system. The City will then enforce its sewer use ordinance requiring pretreatment of industrial wastes. The Southeast Regional Office will cooperate with the City in the programming of this industrial waste survey.

It is the opinion the the Regional Office that a permanent local authority - namely, the New Bedford Harbor Commission - be given funding and enforcement authority to coordinate local supervision of a water pollution abatement program within the harbor. This Commission would oversee complaints and delegate authority to the various conservation and pollution abatement groups in the vicinity, such as the Special Committee on Pollution, Counselor David R. Nelson, Chairman, for follow-up to the individual complaints and problems. Investigation would be conducted by the Division personnel on the fish processing plants and of sanitary and oil discharges from the New Bedford and Fairhaven fishing fleet should be coordinated through the Commission due to the political-economic situation existing in the fishing industry in Massachusetts today.

Two major fish kills involving menhaden and striped bass occurred in New Bedford during 1970, an indication of the degree of pollution existing in the Inner Harbor. Observations by Division personnel noted oil slicks existing within the inner harbor in the vicinity of the New Bedford and Fairhaven fishing fleet dock areas. Debris and floating solids including fish gurrey is visible each and every day. Oil spills from New England Petroleum have been reported in the past. Thermal pollution does not seem to be a problem in respect to New Bedford Gas and Electric's generating station. However, the overall affect of thermal pollution from industrial wastes discharges to the inner harbor will have to be evaluated. Past fish kills have been attributed to the combination of the sanitary sewerage and industrial waste pollution depleting the available dissolved oxygen.

SOUTH DARTMOUTH

Clark's Cove

1. 2-3" CI and 1-4" A- Land drains behind white house at end of William St. - No Flow
2. 1-36" RC - North of Mohel residence - Slight Flow
3. 1-12" RC - 100 yards south of oil yard - Possible Sewage -Low flow
4. 1-6" CI - yard drain from oil yard at foot of Rodgers Street - No flow - Appears abandoned

NEW BEDFORD

Clark's Cove

5. 2-24" CI - 25 yards North of end of Rodgers Street - Clear flow
6. 5-4" CI - Traver's Seafood - Padnaram St. - One (1) minor flow
7. 1-60" RC - End of dike - 50 yards north of Traver's Seafood - No flow
8. 1-18" CI - 10 feet to South of jetty - Opposite Woodlawn St. - Small Clear Flow
9. 1-18" CI - 5 feet to north of jetty opposite Dudley St. - No flow
10. 1-18" CI - Located in retaining wall - 200 ft. north of Hazelwood Park Entrance - End of pipe visible - No flow
11. 1-18" CI - 100 yards north of Lucas Street -- End of pipe not visible - No Flow
12. 1-18" CI - Opposite Oaklawn Street - End of pipe not visible - No flow
13. 1-8" VC - Opposite Cattle St. - No flow
14. 1-60" CI - Located at foot of Coral St. - North of pumping station - No flow
15. 1-18" CI - 100 yards North of Bonito St. - No flow
16. 1-18" VC - South of Seymour St. - No flow

NEW BEDFORD

Outer Harbor

17. New Bedford Outfall Sewer - Point of discharge not visible

17\. a. Storm drainage to hidden box - 200 yards from first large pier extension - No flow

18. Storm drainage to hidden box - Just inside Ft. Rodman Gate - No flow

19. 1-18" CI - Located beneath Rip-Rap and below water at end of jetty South of Seymour St. - Cloudy Discharge.

20. 1-24" CI - 100 ft. north of Portland St. - No Flow

21. 1-12" CI - Storm drain opposite first street north of Portland St. - No flow

22. 1-36" CI - Storm drain at end of jetty opposite Ricketson St. - No flow

23. 1-12" VC - and 1-24" VC - Opposite Aquidneck St. - No flow but possible combined overflow

24. 1-24" CI - Storm drain - 400 feet north of Aquidneck St.

25. 1-12" CI - Located 5 feet to the South of #26 - No flow

26. 1-18" and 4-12" - 100 ft. north of pump house - 18" Water Temperature 100° - The 12" lines appeared abandoned

27. 1-12" VC - 300 ft. South of #28 - Flow approximately 30 -40 gpm Temperature 95°

28. 1-24" CI - At end of small jetty across from Butler St. - Submerged - Slight discoloration in vicinity of pipe

29. 1-48" VC - Located outside of dike opposite chimney stack of Cornel Dubilier - Cloudy discharge - Floating Solids

30. 1-8" RC and 48" concrete culvert - Corner of Rodney French Blvd. and Cove Street - No flow but known to be sewer overflow

Inner Harbor

31. Gifford St. - Sewer outfall - small flow - Discolored

32. 1-24" CS - Blackmer St. outfall

Inner Harbor

33. Ell. Vee Dee Filet House - Noted entrails- Oil - Suds - and cloudy discharge under dock

34. South of New Bedford Gas & Electric by Ell Vee Dee Filet House

35. 2-4 ft. RC - Culverts - New Bedford Gas & Electric - No Discharges noted

36. 4" to 12" multiple pipes - Inlet North of Culverted discharge - New Bedford Power and Light - Light green suspended solids noted

37. Gem Filet House - Small Operation appears shut down

38. 1-60" RC - North of Gem Filet near Campanella Construction Trailer - Oil rainbows - Sewage & fish entrails noted

39. Seaview Filet Company - Homer's Wharf - wash down into harbor

40. New Bedford Fish Products - South of State Pier - Wash down into Harbor

41. Multiple 6" and 8" CI - Located at head wall of inlet to Pier 2 - No discharge but oil noted in water

42. 1-8" CI - Pier 3 area - Minor flow - Oil films noted in water

43. Cast Iron Pipe - New Bedford Ice Co. - Clean Water Flow

44. 1-18" CI - Crystal Ice Co. - Clear Water Flow

45. 1-12" VC - located 150 ft. from West end of Fish Island (South Side)- Appeared abandoned

46. 2-6" CI - West end of Fish Island (North Side) Yard drain adjacent to Route #6 Bridge - No flow

47. Yard drains from Glen Oil Co. - No flow

48. Fish Island - Unloading of fish wash down - Discharge into Harbor

49. 1-18" RC - Street drain at foot of Route #6 Bridge

50. 1-18" RC - Street drain for Route 6 Bridge (North Side)

51. 1-18" CI - Discharge from Quaker Oats flowing 1/3 full

52. 2 ft. wide runoff trough and two 2" P - No flow

53. 1-48" RC - North of Quaker Oats - Herman Melville Blvd.-No Flow

Inner Harbor

54. 1-36" RC - 1500 ft. North of #53 - Herman Melville Blvd. Flowing Sewage

55. 1-6 ft. box culvert - 200 yds. South of Revere Copper & Brass - Herman Melville Blvd. - Large volume of sewage

56. 1-12" and 1-24" CI and 2-36" RC - Opposite Wamsutta St.- small clear flow

57. 2-12" RC - and one storm culvert - South side of Revere Copper & Brass - Pipes not flowing but culvert was - Rainbow films noted

58. a. Revere Copper & Brass - 6" VC - 3 feet below platform

    b. 1-18" VC - 150 ft. South of North end of pier

    c. 1-24" RC - 3 feet below platform- All were submerged outfalls

59. 1-10" VC and 1-8" VC - No flow in 10 inch - Sewage and cooling water in 8" - Both outfalls submerged

60. 1-10" CS - To rear of Alpine Co. - No flow

61. 1-12" RC - Coggeshall St. - Bridge drainage - No Flow

62. 1-12" CI - Coggeshall St. - Bridge Drainage- No Flow

63. 1-60" RC - Sawyer St. - Outfall - Oil - Sewage and industiral waste noted - Heavy Flow

64. Storm drain with hidden box - Behind North end of Fairhaven Corp - No flow

65. 1-6"P - Industrial - Not flowing

66. Multiple 1" and 4" CI - Isotronics, Inc. - Flowing from back wall of building into river

67. 1-5 ft. open culvert - End of Coffin Ave. - High volume of raw sewage

68. 1-10" CI - Located 5 ft. North of #67 - No flow

69. 1-4" CI - 50 ft. North of Coffin Ave. - American Press Co. - No Flow

Inner Harbor

70. Multiple 4" P - Behind Cameo Curtain & Draperies Co. - Riverside Ave.

71. 1-72" Culvert - Manomet St. Outfall - Raw Sewage

72. 1-36" CI - 200 ft. north Manomet St. - No Flow

73. 3-12" CI - Behind New Bedford Rayon Co - 100 yds. North of Manomet St. - Minimal flow - Oil noted in discharge channel

74. 1-24" CI - Behind Acushnet Process Plant D - No flow

75. 1-60" RC - Box Culvert - Sewage and oil noted - North of Acushnet Process Plant D

76. 1-48" RC - Box culvert behind Tibbets Engineering Co - Directly behind large white stack - No flow

77. Multiple 6" and 12" VC - Behind Fiber Leather Corp. - Intermittent discharge - Oil and much debris and settled matter noted in vicinity of discharge.

78. 3-24" CI - South end of Acushnet Building C - Slight Flow

79. 1-10" VC - Behind Acushnet Building C - 20 yds... south of #80 - No flow

80. 1-6" VC - Behind Acushnet Building C - 20 yds. South of 81 - No flow

81. 1-4 ft. X 4 ft. concrete duct - South end of Aerovox Corp. - Steady sewage flow

82. 2-10" VC - Directly behind Aerovox - 25yds. South of #83 - Slight Sewage Flow

83. 2 ft. Concrete Duct - North end of Aerovox - 40 yds. South of #84 - Steady Flow of clear water

84. 4 ft. box culvert - concrete - 15 ft. to the south of #85 - Steady water flow - Some oil

85. 1-18" VC - Beyond Fence at end of Acushnet Drive - Steady flow - some oil

NEW BEDFORD

Inner Harbor

86. 1-18" RC - Drain from Wood St. Bridge - North Side

87. 1-12" VC - Drainage from Wood St. Bridge - North Side

88. 1-60" RC - 150 yds. North of Wood St. Bridge - Raw Sewage

ACUSHNET

Inner Harbor

89. 1-2" and 2-6" CI - Foundation wall of Bear Wheel & Brake Co. - No Flow in 6" pipes - 2" pipe appears to be oil discharge

90. Storm drain to hidden box - Slight Flow across river from Reliable Homes

91. 1-12" RC - Drainage from Wood St. Bridge - Acushnet side

92. Unknown pipe buried under debris - North edge of Wood St. Bridge

93. Acushnet Processing - Golf Ball Division

   a. Oil seeping out of Rip-Rap Acushnet Process Co. - Golf ball Division - 20 ft. South of Red Building

   b. 1-10" VC - Acushnet Golf Ball Division - Located at foot of first brick building south of bridge

   c. 1-8" VC - Acushnet Golf Ball Division - 100 yds. South of Bridge - Pipe Flowing half full - Temp. 100°

   d. 1-4" CI - 10 yds. South of #93c- No flow

   e. 3-12" VC - All Pipes flowing - Black oil noted in two of them

   f. 1-24" VC - Slight flow of cloudy grayish solutions

   g. Oil draining into marsh grass at edge of dumping pit

94. Septic tank discharge - Acushnet Rest Home - North Main St.

95. Drainage ditch from Warren Bros.

FAIRHAVEN

Inner Harbor

96. 1-3 ft. x 8 ft. storm culvert - located opposite Magnolia Ave. - Storm drainage

Inner Harbor

ditch - Low flow - Trace of oil

97. 1-18" CS - foot of Veranda Ave. - 1-24" RC - drainage from Coggshall Bridge

98. 1-12" RC - 100 yds. from East End of Coggshall Bridge - South side - No Flow

99. 1-12" RC - Storm drain behind sea wall end of street south of radio towers - No flow

100. 1-4" VC - Land drain adjacent to white house at end of Pilgrim St. - No flow

101. 1-36" RC - 20 ft. North of Route 6 Bridge - No flow

102. 1-12" RC - Between Stop & Shop and Eugene's Steak House Pope's Island - Half submerged

103. Oil visible on embankment - Possibly waste crank case oil behind John Dugan Auto Service Center

104. 3-4" VC - only 1 pipe flowing --- Sewage

105. 1-10" VC - Yard drain - in sea wall South of WBSM TV and Radio Station - No Flow

106. 2-6" CI - Storm drains at end of Skipper Motor Inn - No Flow

107. Storm water pumping Station across from Park Motors on Middle St.

108. 1-10" VC - Storm drain adjacent to West End Corp. corner of Washington & Water Sts. - No Flow

109. 2-4" CI - Rear of Texaco Marine Products (Green building) No Flow

110. 9-4" CI - Located under wharf - McClean's Seafood Inc - 6 flowing - 3 dry - Clear Flow

111. 1-4" CI - Behind New Bedford Seafood Corp - Clear flow

112. 1-10" VC - Located at North side between first and second piers - No Flow

113. 1-24" RC - Storm drain - 100 yds. North of Hathaway Machine Co. - South Side - No Flow

114. 1-18" RC - Storm drain at foot of Church St. - No Flow

115. Fairhaven outfall - Could only see the boil - No flowing matter noted.

FAIRHAVEN

Inner Harbor

116. 1-24" CI - Located at end of pier on Fairhaven Marine Inc. - No Flow

117. Outer Harbor - 48" Culvert through dike east of Ft. Phoenix- Waste discharge from Atlas Tack Co.

118. 1-12" RC - 100 yds. South of Mack's Soda Bar - Clear Flow

119. 1-4" CI - South of 15 Bayview Rd. - Appears to be house drain - minimal flow

120. 1-8" CI - South of #119 - Minimal Flow

121. 1-18" CS - Redrock Beach - abandoned

122. 1-12" RC - Foot Bonney Street - No Flow