

Report on
POLLUTION OF THE NAVIGABLE WATERS
of
EASTERN NEW JERSEY
SHARK RIVER TO CAPE MAY



U. S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
NORTHEAST REGION
NORTH ATLANTIC WATER QUALITY MANAGEMENT CENTER
METUCHEN, NEW JERSEY

SEPTEMBER 1967



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September 1967

"..... an impressive body of evidence points to the lowlands bordering the sea coasts as an area where pollution problems merge and concentrate. In this area contamination which is deleterious to fish and wildlife resources is rarely if ever a purely local problem;....."

The President's Science Advisory Committee

November, 1955

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CONCLUSIONS AND RECOMMENDATIONS

1. This report covers the estuaries and tributaries of Eastern New Jersey, from Shark River on the north to Cape May on the south. These waters receive the discharge of wastes from municipal waste treatment plants, individual septic tanks and cesspools, recreational boats and land drainage. As a result, these waters are polluted by bacteria, suspended solids and nutrients.

2. Because of the existing or potential pollution of these waters, the State of New Jersey, under the cooperative arrangements governing the National Shellfish Sanitation Program, has closed more than 33,000 acres of water to the direct harvesting of shellfish. These closures have caused substantial economic injury resulting from the inability to market shellfish or shellfish products in interstate commerce. The estimated economic loss to the region is at least \$1.5 million annually.

3. Accordingly, the pollution of these navigable waters is subject to abatement under the provisions of Section 10 of the Federal Water Pollution Control Act, as amended.

4. In addition to constituting a health hazard via shellfish, the bacterial contamination of these waters constitutes a hazard to the health and welfare of persons utilizing these waters for recreation.

5. The pollution of these waters by suspended solids and nutrients has resulted in an unsightly appearance, the production of objectionable odors, and excessive growths of algae and other aquatic plants. These conditions limit the use of these waters for recreational bathing, boating, and esthetic enjoyment.

6. Municipal and institutional waste discharges constitute the major sources of pollution of these waters. Although all significant sources of such waste provide some form of treatment, many of the existing treatment facilities do not provide effective removal or control of pollutants due to inadequate design or operation. The 100 known municipal and institutional discharges impose a loading of 125,000 pounds per day of BOD (Biochemical Oxygen Demand) on the waters of the area.

7. Other sources of pollution to these waters include overflow or seepage from cesspools and septic tanks, the discharge of waste from recreational boats, and surface or groundwater runoff of agricultural chemicals. At the present time, due to the limited number of industries, industrial waste does not represent a significant source of pollution in this area.

8. Pollution of these waters is complicated further by natural hydrographic conditions. Many of the bays have very restricted connections with the ocean. As a result of this lack of available circulation, pollutants are not readily flushed from these waters, which further increases the degradation of water quality.

9. The New Jersey State Department of Health has adopted water quality standards for the waters covered by this report, and has submitted the standards to the Secretary of the Interior for approval as Federal water quality standards under the provisions of Section 10 of the Federal Water Pollution Control Act, as amended. These standards require that all wastes discharged to the Atlantic Ocean receive, as a minimum, treatment that will provide at all times 85 percent removal of BOD, and that all wastes discharged to the estuaries or tributary streams receive a minimum treatment at all times of 95 percent removal of BOD. Abatement orders issued under these standards further require effective year round disinfection, with construction to be undertaken in accordance with the following schedule:

- a. Preliminary plans for treatment or for upgrading of facilities to be submitted on or before October 30, 1968;
- b. Final construction plans to be submitted on or before and approved by June 1, 1969;
- c. Construction to be initiated on or before October 1, 1969 and to be completed on or before November 30, 1970.

10. The treatment requirements and time schedule established by these standards and orders represent a significant step in pollution abatement. However, to permit reopening of those areas presently closed to the harvesting of shellfish under the National Shellfish Sanitation Program, it will be necessary for all waste discharges to be eliminated, since some danger of contamination exists even when adequate treatment is provided. Construction of waste treatment systems which provide adequate treatment prior to discharge through a limited number of outfalls into the estuaries or through outfall lines extended into the Atlantic Ocean should be considered an approach that may permit opening areas now closed to the harvesting of shellfish. As an alternate, construction of advanced waste treatment facilities with groundwater recharge of the effluent would have the additional benefit of preserving or enhancing the groundwater supply.

11. Since the existence of individual septic tanks and cesspools also requires closure of adjacent shellfish harvest areas under the National Shellfish Sanitation Program, the elimination of such individual facilities would enable more utilization of these harvest areas. Steps should be taken to restrict proliferation of individual sub-surface disposal systems by more stringent control of sub-division construction.

12. Control measures aimed at abating pollution from recreational boats operating in the tidal waters of the area should be adopted by the State of New Jersey. Such control measures should require either adequate treatment facilities aboard vessels equipped with toilets, or holding tanks capable of holding waste material for subsequent discharge to on-shore treatment facilities. Such regulations should be adopted so that pollution from this source will be controlled no later than January 1, 1970.

I. INTRODUCTION

Description of Area

The area covered by this report extends from Shark River on the north to Cape May on the south, and embraces the navigable estuaries and tributaries of the Atlantic Coastal Area of New Jersey. It includes Shark River and inlet, Manasquan River and inlet, the Intracoastal Waterway, and the various bays, harbors, and streams tributary to the waterway. These waters have a surface area of more than 126,000 acres.

With the exception of Shark River and a portion of Manasquan River, which are in Monmouth County, and a portion of Mullica River in Burlington County, the waters of the area lie within three counties: Ocean, Atlantic and Cape May. As only a very limited portion of Monmouth and Burlington Counties is included in this area, discussions of population, economics and similar factors are restricted to Ocean, Atlantic and Cape May Counties.

Geology

On the basis of ground water occurrence, New Jersey can be divided into two major geological provinces: The highland Appalachian Valley and the Atlantic Coastal Plain. ^{1/} A "fall line", stretching from Trenton to Perth Amboy, separates the Atlantic Coastal Plain from the northern ground water province. The area under discussion is entirely underlain by the Atlantic Coastal Plain Province.

The Atlantic Coastal Plain Province is a southeastward-thickening wedge made up of deposits of unconsolidated clay, silt, sand, gravel and marl of Cretaceous and Tertiary age. The wedge has a southeastward dip of about 100 feet per mile. The coarser beds in these deposits are very favorable for the storage and movement of ground water. A band six to ten miles wide along the coast identifies the area susceptible to salt-water contamination. ^{2/}

The topography of the Coastal Plain has relatively low relief. Most of the Plain lies between sea level and the 200 foot contour.

Population and Economy

The resident population in the three county area numbered 317,676 persons in 1960, and is estimated to have increased to 382,850 by 1966, a growth of approximately 3.4 percent each year, compared with a statewide annual rate of 2.5 percent. ^{3/} Atlantic County is the most populous, with slightly less than half of the area's residents. Ocean County registered the swiftest population rise, approximately 39 percent in the six-year period, 1960-1966. More than three-quarters of the inhabitants in the study area live in the cities and other municipalities fronting the Atlantic or located along the coastal bays and inlets.

An internationally famous resort area, the "Jersey Shore" attracts millions of tourists and vacationers throughout the year. During the summer season the population swells to more than triple its winter size. The following data illustrate the enormous influx of summer visitors to several large and small resort centers. This seasonal variation requires that all forms of public facilities be sufficiently flexible to provide increased services during the summer, yet operate efficiently during off-peak periods.

SEASONAL POPULATION CHANGES AT SELECTED COASTAL COMMUNITIES 1964

<u>Resort</u>	<u>Normal Population</u>	<u>Summer Population</u>	<u>Population Increase</u>	
			<u>Net Gain</u>	<u>Percent</u>
Atlantic City	60,400	210,000	149,000	248
Ocean City	7,730	150,000	142,270	1,840
Wildwood City	4,680	125,000	120,320	2,571
Ship Bottom	750	16,000	15,250	2,033
Surf City	<u>450</u>	<u>13,000</u>	<u>12,550</u>	<u>2,789</u>
TOTALS	74,010	514,000	439,990	595

Source: New Jersey State Navigation Bureau. 4/

It should be noted that the summer population gain of 439,990 for the five resorts listed above is larger than the total resident population for the three-county area, 382,850. There are many other resort communities in the area which experience equally dramatic increases in summer population.

An analysis of the employment pattern (wage and salary employment covered by Social Security) in the three-county coastal area also characterizes it as a leading resort region. 5/ More than half of those employed are engaged in trade and service activities. Even in mid-March, the data of Census enumeration, these counties provided 43 percent of the State's total employment in hotels, motels and other lodging places. Summer employment at these facilities rises significantly to accommodate the needs of thousands of guests visiting the "Jersey Shore".

Employment in the area is growing faster than in the state as a whole. Although total employment in New Jersey advanced 23 percent between 1956 and 1966, employment in the three-county area grew at almost twice the state rate, with an increase of 44 percent. The area accounted for only four percent of the state's total covered employment, but in several major employment sectors it had a relatively high ratio of the state total. Such sectors include: agricultural services, forestry and fisheries, 15 percent of the state total; contract construction, 9 percent; services, 6.3 percent and retail trade, 6 percent.

Another economic measure demonstrating the attraction of this area as a vacation and recreation area is the proportion of seasonally vacant housing units within its outline, which is one of the best qualitative measures of an area's recreational development. With only nine percent of the state's total housing units, the three-county area monopolized 61 percent of New Jersey's total seasonally vacant housing units.

On the basis of employment, the area includes the majority of the New Jersey fin and shellfish industry. According to the Fish and Wildlife Service of the U. S. Department of the Interior, New Jersey had 3,789 fin and shellfishermen in 1965, two-thirds of whom worked in the three-county area. 6 Of this total, approximately 1,000 fishermen were classified as casual (fishermen who earn less than half of their income in the fishing industry).

II. HYDROGRAPHY

New Jersey has a very uniform long-term average monthly precipitation with about 8 percent of the annual average occurring each month. Average annual precipitation in southern New Jersey is about 45 inches.

Although precipitation during drought conditions may be only a third or half of the maximum rainfall month, the stabilizing effect of ground water storage in the Coastal Plain results in a noticeably greater sustained dry season runoff in the headwaters region of the Batsto and Toms Rivers. ^{7/}

The New Jersey coastal estuaries are characterized by very restricted connections with the ocean. The average depth over their barrier bars is from three to five feet (except for Cape May and Little Egg Inlets), and the bars are made impassable by breakers on many occasions. The greatest tidal current velocities are found in the inlets and may reach three knots. ^{8/}

The northern estuaries, inside the inlets, are relatively broad and shallow, and their normal tidal current pattern and range may be greatly modified by the wind. In Barnegat Bay, for example, normal tidal range is about half a foot away from the inlets, and four feet on the ocean side, but during strong winds of long duration may vary by as much as three feet above and below normal maximum levels. The southern estuaries are characterized by relatively narrow, twisting channels connecting shallow, sedgy sounds. Their circulation is quite restricted.

A dye study in Barnegat Bay by Carpenter (1965) indicated a residence time of roughly five days, a tidal excursion of about one mile, and typical bay water velocities of several tenths of a knot. ^{9/} Federal Water Pollution Control Administration drogue studies made in 1966 indicated elliptical particle trajectories over a tidal cycle and appeared to confirm Carpenter's conservative speed and excursion values. The tide provides most of the energy for circulation, although water from Toms River contributes to a general southerly drift.

New Jersey State Department of Health studies conducted south of Atlantic City from 1960 to 1967 show tidal excursions of about 2.5 miles near the inlets on the larger bays and sounds and about 1.5 miles in the more restricted sounds and channels well away from the inlets. Immediately outside the inlets, the major sand transport is northward along the coastline. Recent Federal Water Pollution Control Administration studies served to confirm New Jersey's work in the area. Drift bottle studies by Bumpus and Lauzier in 1965 showed that a combination of eddies, tidal currents and net drift exerts a shoreward component of current during the summer bathing season. ^{10/} Sea bed drifter returns suggest bottom currents with a shoreward component of several tenths of a mile per day. ^{11/}

As a result of this limited circulation, residence time of pollutants in many of the bays and inlets is increased, which results in further degradation of water quality.

III. WATER USES

Water Supply

An inventory of municipal and institutional water supplies in the three-county study area was conducted in 1966. The results, shown in Table 1, indicate significant seasonal variation in demand. There are 51 systems supplying 29 MGD (million gallons per day) in the winter. Demand in the summer increases to 77 MGD. The majority of the systems are small in size. Only nine systems supply 1.0 MGD or more during the winter months.

All of these systems rely on ground water sources, although Atlantic City utilizes a supplemental surface water source during period of peak demand.

Industry is generally supplied by the systems described above, and according to one estimate, utilizes about 5 MGD of the total municipal supply.^{12/} The only major self-supplied industry in the area is Toms River Chemical Co., which utilizes 3 to 4 MGD of ground water for process purposes, and an additional 13 MGD of Toms River water for cooling.

Recreational Bathing

Recreational bathing, most of which is along the Ocean, represents an important water use and economic factor in the New Jersey Coastal Area. Table 2 presents data on the number of visitors at each of the 31 public bathing areas in the three counties for 1964. Use amounted to 45,300,000 visitor-days, evenly distributed throughout the three counties. These figures are for public beaches only, and do not include the extensive use of private beaches where no records are maintained.

The Federal Ad Hoc Water Resources Council has suggested that a minimum value of \$.50 per visitor-day provides a conservative estimate of the economic value of this industry.^{13/} Using this guideline, recreational bathing has a minimum value of nearly \$22,700,000 annually in the three-county area. This figure, however, is a minimum and does not represent the full economic benefit associated with recreational bathing in this region. As a resort area, much of the region's economy derives from activities associated with forms of recreation, such as bathing. In 1962, for example, it is estimated that wages paid to employees of hotels, motels, eating and drinking establishments in the three-county area amounted to nearly \$24,000,000.

Recreational Boating

Boating is another important factor in the economy of the New Jersey Coastal Area. From Manasquan River to Cape May there are 260 known marinas or dock facilities for recreational boating.^{14/} Two-thirds of these are located north of Great Bay.

One of the attractions of the Atlantic Coastal counties to the boating enthusiast is the New Jersey Intracoastal Waterway. Small craft (draft four feet or less) can cruise protected waters from Manasquan Inlet to Cape May Inlet and then proceed by canal to Delaware Bay and the National Intracoastal Waterway.

In 1966, New Jersey issued 130,000 motor boat licenses. In addition, there are 200,000 boats in the New York City-Long Island area, many of which cruise the New Jersey Intracoastal Waterway. ^{15/}

Commercial Finfishing

Commercial finfishing is an important industry in New Jersey, although the catch value has declined over the past decades. The 1966 catch, with a value of \$3.0 million, was only one-third of the 1956 catch. ^{16/} The relative importance of finfishing to the total New Jersey fish catch (finfish plus shellfish) has also sustained a similar downward trend, from 62 percent of the total take in 1956 to 31 percent in 1966. In comparison, the United States total harvest of finfish has remained relatively unchanged for the last eleven years, with an annual value of \$200 million.

Although the finfishing industry in New Jersey as a whole has slumped sharply, the three-county area reported an advance of 15 percent, during the same period, from \$2 million in 1956 to \$2.3 million in 1966. In terms of relative share of the state's total catch, the area now accounts for slightly more than one-third of the total finfish harvest as compared with one-fifth eleven years earlier.

Commercial Shellfishing

The New Jersey shellfish industry services a significant portion of the Northeast market. In 1956, the area accounted for 40 percent of the New Jersey shellfish output, which had a total landing value of \$5.7 million. ^{17/} In 1966, this same area contributed 82 percent of the state's total shellfish catch valued at \$6.7 million. This increased contribution by the area to the state's total shellfish take is due to the increasing harvest of the surf clam, a mollusk found in the moderately deep ocean waters. The value of the surf clam harvest in the three counties rose by 208 percent in ten years, from \$1.2 million in 1956 to \$3.7 million in 1966, with all of the gain taking place off Ocean County.

In contrast to the accelerated harvest of the surf clam, the landing value of hard clams, soft clams and oysters in New Jersey declined from \$3.6 million in 1956 to \$2.0 million in 1966. Expressed in relative shares of the industry, the value of the hard clam, soft clam and oyster harvest fell from 63 percent of the total shellfish output in 1956 to 30 percent of the total in 1966.

TABLE 1

MUNICIPAL & INSTITUTIONAL WATER SUPPLY SYSTEMS
WATER CONSUMPTION - N. J. COASTAL BASIN

Water Facility by County		Consumption - mgd	
		Winter	Summer
A. OCEAN COUNTY			
1.	Barnegat Light Municipality	0.08	0.35
2.	Bay Head Municipality	0.40	1.65
3.	Beachwood Municipality	0.10	0.18
4.	Beach Haven Municipality	0.20	1.00
5.	Arlington Beach Water Company	0.04	1.12
6.	Bayville Water Company	0.03	0.03
7.	Shore Water Company	0.06	0.16
8.	Toms River Water Company	1.90	1.90
9.	Harvey Cedars Municipality	0.06	0.31
10.	Island Heights Municipality	0.18	0.30
11.	Jackson Township Municipality	0.60	0.70
12.	Lakehurst Municipality	0.12	0.30
13.	Lakewood Water Company	1.00	1.20
14.	South Lakewood Water Company	0.03	0.14
15.	Lavallette Municipality	0.15	0.80
16.	Mystic Isles Water Company	0.08	0.45
17.	Long Beach Water Company	0.25	1.50
18.	Long Beach Township Municipality	0.05	0.15
19.	Cedar Glen City	0.10	0.10
20.	Ocean Gate Municipality	0.09	0.30
21.	Pine Beach Municipality	0.10	0.10
22.	Point Pleasant Municipality	1.50	2.50
23.	Point Pleasant Beach Municipality	0.60	2.00
24.	Seaside Heights Municipality	0.30	2.89
25.	Seaside Park Municipality	0.10	1.62
26.	Ship Bottom Municipality	0.20	0.79
27.	Stafford Water Company	0.10	0.28
28.	Surf City Municipality	0.10	0.67
29.	Tuckerton Water Company	0.04	0.50
Total Ocean County		8.56	22.99
B. ATLANTIC COUNTY			
1.	Atlantic City Municipality	10.00	20.00
2.	Atlantic County Water Company	1.80	5.60
3.	Brigantine Municipality	0.51	1.13
4.	Egg Harbor City Municipality	0.35	0.50
5.	Hamilton Township Municipality	0.25	0.25
6.	Hammonton Municipality	0.90	2.00
7.	Longport Municipality	0.25	0.80
8.	Margate Municipality	1.00	2.00
9.	Atlantic County Hospital	0.04	0.09
10.	Ventnor Municipality	1.07	2.35
Total Atlantic County		16.17	34.72
C. CAPE MAY COUNTY			
1.	Avalon Municipality	0.15	1.20
2.	Cape May Municipality	0.70	2.10
3.	Lower Township Water Company	-	-
4.	Crest Haven Home	0.01	0.01
5.	Neptunnus Water Company	0.18	0.18
6.	Ocean City Water Company	1.00	5.20
7.	Sea Isle City Municipality	0.25	1.00
8.	Stone Harbor Municipality	0.45	0.85
9.	Corson's Inlet Water Company	0.08	0.12
10.	Wildwood Municipality	1.00	7.40
11.	N. J. Colony @ Woodbine	0.20	0.20
12.	Woodbine Water Company	0.30	0.90
Total Cape May County		4.32	19.16
TOTAL THREE COUNTIES		29.05	76.87

TABLE 2
ESTIMATED BEACH USE, 1964 FOR
SELECTED RESORT CENTERS IN THE STUDY AREA

Resort Centers and Municipalities by County	Estimated Population		Beach Use		Total ^{a/} Beach Use
	Normal (Resident)	Summer	Weekdays	Weekends	
<u>Atlantic County</u>					
Atlantic City	60,400	210,000	110,000	150,000	14,860,000 ^{b/}
Brigantine city	4,590	15,000	1,500	3,000	165,000
Long Port borough	1,060	8,000	600	1,500	73,500
Margate city	10,000	30,000	5,000	12,000	600,000
Ventnor city	8,900	20,000	7,000	20,000	920,000
Total	84,950	283,000	124,100	186,500	16,618,500
<u>Cape May County</u>					
Avalon borough	810	16,000	8,000	12,000	780,000
Cape May City	4,600	25,000	15,000	28,000	1,600,000
Cape May Point borough	280	2,300	750	1,800	90,000
Lower Township	7,110	20,000	318	650	35,330
North Wildwood city	3,670	48,000	35,000	40,000	3,100,000
Ocean City	7,730	150,000	25,000	40,000	2,500,000
Stone Harbor borough	860	25,000	10,000	15,000	975,000
Sea Isle City	1,380	22,000	10,000	18,000	1,050,000
Upper Township	2,690	4,000	1,500	3,500	177,500
Wildwood city	4,680	125,000	45,000	75,000	4,575,000
Wildwood Crest borough	3,270	20,000	17,600	23,100	1,633,500
Total	37,080	457,300	168,168	257,050	16,516,330
<u>Ocean County</u>					
Barnegat Light borough	320	10,000	4,000	7,000	415,000
Bay Head borough	820	5,000	2,500	4,000	250,000
Beach Haven borough	1,060	22,000	2,000	5,000	245,000
Berkeley Township	5,240	10,000	100	500	18,500
Brick Township	20,830	65,000	1,000	2,500	122,500
Dover Township	22,070	35,000	1,500	3,000	165,000
Harvey Cedars	140	5,500	2,750	3,500	252,500
Lavallette borough	840	25,000	9,000	12,000	840,000
Long Beach Township (all four parts)	1,770	35,000	20,000	25,000	1,825,000
Mantoloking borough	180	1,600	400	500	36,500
Pt. Pleasant Beach borough	4,140	35,000 ^{c/}	20,000	25,000	1,825,000 ^{c/}
Seaside Heights borough	970	33,000	12,800	27,500	1,455,500
Seaside Park borough	1,060	25,000	18,591	37,182	2,045,010
Ship Bottom borough	750	16,000	22,800	32,600	2,183,000
Surf City borough	450	13,000	5,000	8,000	500,000
Total	60,640	336,100	122,441	193,282	12,178,510
Grand Total	182,670	1,076,400	414,709	636,832	45,313,340

^{a/} Total beach use was arrived at by multiplying the "Beach Use Weekdays" figure by 60 and the "Beach Use Weekend days" by 25, a period encompassing 85 days from June 15 to September 7, 1964. An estimation method developed by the New Jersey State Navigation Bureau.

^{b/} Total beach use for Atlantic City was compiled for the period from June 1 through September 30.

^{c/} No Beach Use Report - Estimate based on Long Beach Center, with like summer population.

Source: New Jersey State Navigation Bureau

Hence, although the New Jersey shellfish industry has shown a moderate gain of 17 percent in value of output in the period selected for analysis, (1956-1966), the direct market harvest of hard and soft clams and oysters has declined, due primarily to pollution in the case of clams and to natural disease in the case of oysters.

IV. SOURCES OF POLLUTION

The New Jersey coastal waters serve as a receiving body for the discharge of wastes from municipalities, institutions, industry, individual cesspools and septic tanks, recreational boating and, to a lesser degree, surface runoff and agricultural land drainage.

Municipal and Institutional Wastes

Municipal and institutional waste discharges constitute the greatest source of pollution within the New Jersey Coastal Basin. Many of these sewage systems are subjected to large seasonal load variations, which are due to an increase in the resident and transient population during the summer recreational period. As a result, a number of water pollution control plants are overloaded or operate at capacity during the summer.

A recent Federal Water Pollution Control Administration survey of municipal and institutional wastes discharged into the New Jersey Coastal Basin between the vicinity of Shark River and Cape May found that: 17 sources discharge directly into the Atlantic Ocean; 37 discharge directly into the estuary (shellfish waters); 46, including three Federal installations, discharge to tributary streams. These figures include small "package plants" which are defined as prefabricated units with design flows less than 150,000 gallons per day.

Information for these waste sources is summarized in Table 3. The locations of the sources listed are shown by county in Figures 1, 2 and 3. Of the 100 facilities listed: 37 serving 836,000 persons provide primary treatment or less, 36 serving 69,000 persons provide intermediate treatment and 27 serving 121,000 persons provide secondary treatment. Chlorination facilities are provided for all of the systems shown in Table 3.

The BOD (biochemical oxygen demand) loadings discharged by these systems are summarized below. Of the total load of 125,000 pounds of BOD per day, over 65 percent is discharged to the shellfish waters. Less than three percent of the load is imposed upon the tributary waters.

MUNICIPAL AND INSTITUTIONAL WASTE LOADINGS TC STUDY AREA

<u>Receiving Water</u>	<u>No. of Plants</u>	<u>Est. Summer Pop. Served</u>	<u>Est. Pounds BOD/day</u>
Atlantic Ocean	17	290,000	40,000
Estuary (Shellfish Waters)	37	658,000	81,000
Tributaries	46	78,000	3,700
Totals	100	1,026,000	124,700

TABLE 3

MUNICIPAL AND INSTITUTIONAL WASTE DISCHARGES
NEW JERSEY COASTAL BASIN
(SHARK RIVER TO CAPE MAY)

Map Ident. No.	Municipality by County and Major Discharge Water	Receiving Waters	Est. Pop. (Summer)	Degree of Treatment	FLOW - MGD		ESTIMATED BOD LOADINGS ^{a/} (lbs/day)			Orders Issued
					Design	Actual Summer	Influent	Percent Removal	Effluent	
MONMOUTH COUNTY (See Figure 1)										
I. <u>Systems Discharging Directly to Atlantic Ocean</u>										
1.	Belmar and S. Belmar	Atlantic Ocean	30,000	Primary	2.5	1.2	6,000	35	3,900	Yes
2.	Spring Lake Heights	Atlantic Ocean	8,000	Primary	3.5	0.2	1,600	35	1,000	Yes
3.	Spring Lake Boro #1	Atlantic Ocean	12,000	Primary	1.5	0.7	2,400	35	1,600	Yes
4.	Spring Lake Boro #2	Atlantic Ocean	700	Primary	0.1	Unk	200	35	100	Yes
5.	Sea Girt	Atlantic Ocean	3,000	Primary	0.5	0.2	600	35	400	Yes
6.	Manasquan	Atlantic Ocean	18,000	Primary	1.0	0.3	3,600	35	2,400	Yes
II. <u>Systems Discharging Directly to Shellfishing Waters</u>										
7.	Brisbane Child Center (Allaire)	Brisbane Lake								
		Manasquan River	200	Primary	Unk	0.02	40	35	30	No
8.	Wall Twp. N.J. Highway Auth.	Shark River	2,000	Second.	0.03	0.02	400	85	60	Yes
9.	Wall Twp. Allenwood Hospital	Manasquan River	200	Inter.	0.04	0.02	40	70	10	No
III. <u>Systems Discharging Indirectly to Shellfishing Waters</u>										
10.	Camp Evans (Federal)	Shark River	300	Primary ^{c/}	0.6	0.03	100 ^{d/}	85	15 ^{d/}	No
11.	Freehold Boro	Tributary to Manasquan River	10,000	Second.	0.8	0.7	2,000 ^{d/}	85	300 ^{d/}	Yes
12.	Freehold Twp. (Freehold Sewer Company)	Tributary to Manasquan River	1,100	Inter.	0.3	0.2	200	70	100	Yes
13.	Freehold Twp. (Wynnewood Sewer Company)	Tributary to Manasquan River	1,000	Second.	0.2	0.1	325 ^{d/}	70	95 ^{d/}	Yes
14.	South Freehold Regional H.S.	Manasquan River	300	Inter.	0.06	0.01	60	70	20	Yes
15.	Howell Twp. (Maxim Sewer Co.)	Tributary to N. Branch Metedeconk	4,000	Inter.	0.4	0.2	670 ^{d/}	88	85 ^{d/}	Yes
16.	Freehold Twp. Silvertrailers	Tributary to Manasquan River	Na	Second.	0.03	Na	Na	85	Na	Yes
17.	Freehold Twp. Stonehurst	Br. to Manasquan	Na	Second.	0.3	Na	Na	85	Na	Yes
18.	Howell Twp. Cricket Rest.	N.Br. Metedeconk	Na	Second.	0.006	Na	Na	85	Na	Yes

OCEAN COUNTY (See Figure 1)

I. Systems Discharging Directly to Atlantic Ocean

19.	Point Pleasant Beach	Atlantic Ocean	15,000	Primary	1.5	0.8	3,000	35	2,000	Yes
20.	Bay Head	Atlantic Ocean	6,000	Primary	0.5	0.4	1,200	35	800	Yes
21.	Lavallette	Atlantic Ocean	5,000	Primary	0.9	0.8	1,000	35	700	Yes
22.	Dover Twp. Ortley Beach	Atlantic Ocean	7,000	Primary	2.6	1.1	2,500 ^{d/}	54	1,150 ^{d/}	Yes

TABLE 3

MUNICIPAL AND INSTITUTIONAL WASTE DISCHARGES
NEW JERSEY COASTAL BASIN
(SHARK RIVER TO CAPE MAY) (Cont'd)

Map Ident. No.	Municipality by County and Major Discharge Water	Receiving Waters	Est. Pop. (Summer)	Degree of Treatment	FLOW-MGD		ESTIMATED BOD LOADINGS ^{a/} (lbs/day)			Orders Issued ^{b/}
					Design	Actual Summer	Influent	Percent Removal	Effluent	
OCEAN COUNTY (Cont'd)										
23.	Seaside Heights	Atlantic Ocean	50,000	Primary	1.7	1.5	10,000	35	6,500	Yes
24.	Seaside Park	Atlantic Ocean	35,000	Primary	1.0	1.3	7,000	20	5,600	Yes
25.	Berkeley Twp. Sewerage Auth. (S. Seaside Park)	Atlantic Ocean	500	Inter.	0.4	0.1	100	70	30	Yes
26.	Surf City	Atlantic Ocean	15,000	Primary	0.7	0.4	8,000	35	2,000	Yes
27.	Ship Bottom	Atlantic Ocean	20,000	Primary	1.2	0.4	4,000	35	2,600	Yes
28.	Long Beach Twp.	Atlantic Ocean	50,000	Primary	2.0	1.3	10,000	35	6,500	Yes
29.	Beach Haven	Atlantic Ocean	15,000	Primary	0.6	0.9	3,000	20	2,400	Yes
II. <u>Systems Discharging Directly to Shellfishing Waters</u>										
30.	Dover Sewerage Auth. (Toms River Plant)	Toms River	4,000	Primary	0.4	0.5	800	35	500	Yes
31.	Island Heights Boro	Tributary to Toms River	3,700	Second.	0.4	0.1	700	85	100	Yes
32.	Berkeley Twp. Municipal (Clamming Creek)	Clamming Cr. Barnegat Bay	500	Inter.	0.3	0.1	100	70	30	Yes
33.	Tuckerton Municipal	Tuckerton Creek (Little Egg H.)	7,000	Inter.	0.5	0.2	1,400	70	400	Yes
34.	Little Egg Harbor Twp. (Mystic I. Sewer Co.)	Big Creek Great Bay	7,000	Inter.	0.5	0.2	1,400	70	400	Yes
35.	Dover Twp.-Bd. of Ed.	Barnegat Bay	Na	Inter.	0.04	Na	Na	70	Na	Yes
36.	Lacey Twp. N.J. Highway Auth.	Forked River	200	Inter.	0.04	0.02	40	70	10	Yes
37.	Lacey Twp. Forked R. Marina	Forked River	Na	Primary	0.01	Na	Na	35	Na	Yes
38.	Point Pleasant Boro. Bd. of Ed.	Bay Hd.-Manasqn Can.	Na	Inter.	0.02	0.01	Na	70	Na	Yes
39.	Berkeley Twp.-Berkeley Shores	Barnegat Bay	250	Inter.	0.3	Na	Na	70	Na	Yes
40.	Berkeley Twp.-Bd. of Ed.	Barnegat Bay	Na	Inter.	0.01	Na	Na	70	Na	Yes
41.	Dover Twp.-Toms R. Bd. of Ed.	Applegate Cove Barnegat Bay	Na	Inter.	0.04	Na	Na	70	Na	Yes
III. <u>Systems Discharging Indirectly to Shellfishing Waters</u>										
42.	Jackson Twp. Municipal (Brookwood #3)	North Branch Metedeconk	1,200	Inter.	0.3	0.1	375 ^{d/}	87	50 ^{d/}	Yes
43.	Jackson Twp. Municipal (Brookwood #1)	North Branch Metedeconk	2,000	Inter.	0.1	0.2	670 ^{d/}	75	165 ^{d/}	Yes
44.	Lakewood Boro (Lakewood Water Co.)	South Branch Metedeconk	12,500	Second.	1.9	2.0	13,000 ^{d/e/}	90	1,300 ^{d/}	Yes
45.	Jackson Twp. Municipal (Brookwood #2)	South Branch Metedeconk	1,000	Inter.	0.1	0.1	290 ^{d/}	86	42 ^{d/}	Yes
46.	Jackson Twp. (Harmony Sewer Co.)	South Branch Metedeconk	700	Inter.	0.1	0.5	210 ^{d/}	95	10 ^{d/}	Yes

TABLE 3
MUNICIPAL AND INSTITUTIONAL WASTE DISCHARGES
NEW JERSEY COASTAL BASIN
(SHARK RIVER TO CAPE MAY) (Cont'd)

Map Ident. No.	Municipality by County and Major Discharge Water	Receiving Waters	Est. Pop. (Summer)	Degree of Treatment	FLOW-MGD		ESTIMATED BOD LOADINGS ^{a/} (lbs/day)			Orders Issued ^{b/}
					Design	Actual Summer	Influent	Percent Removal	Effluent	
OCEAN COUNTY (Cont'd)										
47.	Lakewood (Leisure Village)	Kettle Creek								
48.	Lakehurst Municipal	Barnegat Bay	700	Inter.	0.3	0.03	390 ^{d/}	86	54 ^{d/}	Yes
49.	Lakehurst Naval Air Sta.(Fed.)	Tributary to S. Br. Toms R.	1,500	Second.	0.5	0.1	300	85	50	Yes
50.	Lakehurst Naval Air Sta.(Fed.)	Ridgeway Br. Toms River	3,000	Primary	0.5	0.2	600	35	400	No
51.	Stafford Twp. Municipal	Tributary to Manahawkin Bay	7,000	Second.	0.5	0.3	1,400	85	200	Yes
52.	Brick Twp. - Brick Plaza Inc.	Metedeconk R.	Na	Inter.	0.03	0.02	Na	70	Na	Yes
53.	Brick Twp. - Milza Realty	Tributary to Metedeconk R.	Na	Second.	0.015	0.002	Na	85	Na	Yes
54.	Brick Twp. - Riviera Corp.	Kettle Cr. Barnegat Bay	800	Second.	0.03	0.01	160	85	20	Yes
55.	Jackson Twp. Bd. of Ed.	N. Br. Toms R.	Na	Second.	0.02	0.01	Na	85	Na	Yes
56.	Ocean Twp.									
56.	Mid Jersey Sewer Co.	Barnegat Bay	1,000	Inter.	0.1	0.02	Na	70	Na	Yes
56.	Union Twp.-Indianola	Big Horse Neck Barnegat Bay	500	Inter.	0.1	Na	Na	70	Na	Yes
57.	Lakewood-Mary Knoll School	S.Br. Metedeconk	2,000	Inter.	Na	Na	Na	70	Na	No
58.	Lakewood-St. Gabriels Jr.Col.	T. to S.Br Meted.	80	Inter.	0.01	0.01	20	70	Negligible	Yes
59.	Dover S. A. - Holiday City	Kettle Creek	2,600	Second.	0.3	0.1	520	85	80	Yes
60.	Dover S. A. - Bellcrest	Br. to Apple- gate Cove to Barnegat Bay	400	Inter.	0.03	0.07	80	50	40	Yes

ATLANTIC COUNTY (See Figure 2)

I. Systems Discharging Directly to Atlantic Ocean

None

II. Systems Discharging Directly to Shellfishing Waters

61.	Atlantic City (City Island Plant)	Beach Thoro.	250,000	Primary	18.0	16.0	50,000	35	32,000	Yes
62.	Atlantic City (Texas Ave. Plant)	Beach Thoro.	12,000	+ Cl ₂ Screening	Unk	0.8	2,400	10	2,200	Yes
63.	Pleasantville	Lakes Bay	25,000	Second.	2.0	1.3	5,000	85	800	Yes
64.	Ventnor-Margate	Beach Thoro.	55,000	Primary	3.5	8.0	11,000	20	8,800	Yes
65.	Longport	Beach Thoro.	6,500	Primary	0.5	0.6	1,300	30	900	Yes
66.	Somers Point	Patcong Creek	7,000	Second.	1.0	0.5	1,400	85	200	Yes
67.	Longport 14 th St.	Risley Channel	Na	Primary	0.04	Na	Na	35	Na	No

TABLE 3

MUNICIPAL AND INSTITUTIONAL WASTE DISCHARGES
NEW JERSEY COASTAL BASIN
(SHARK RIVER TO CAPE MAY) (Cont'd)

Map Ident. No.	Municipality by County and Major Discharge Water	Receiving Waters	Est. Pop. (Summer)	Degree of Treatment	FLOW-MGD		ESTIMATED BOD LOADINGS ^{a/} (lbs/day)			Orders Issued ^{b/}
					Design	Actual Summer	Influent	Percent Removal	Effluent	
ATLANTIC COUNTY (Cont'd)										
68.	USN Reserve Center Atlantic City, (Federal)	Clam Thoro.	Na	Primary	Na	Na	Na	35	Na	No
69.	Brigantine	Absecon Inlet	25,000	Inter.	1.0	3.5	4,800	50	2,400	Yes
III. <u>Systems Discharging Indirectly to Shellfishing Waters</u>										
70.	Winslow Twp.	Tributary to Mullica R.	2,500	Second.	1.2	0.2	500	85	80	No
71.	State Hosp. @ Ancora Hammonton Municipal	Tributary to Mullica R.	6,000	Second.	1.2	0.7	2,400 ^{d/}	94	140 ^{d/}	Yes
72.	Egg Harbor City	Tributary to Mullica R.	4,500	Second.	1.0	0.3	690 ^{d/}	93	50 ^{d/}	Yes
73.	Monroe Mun. Util. Auth. (Williamstown)	Tributary to Gr. Egg H. R.	4,600	Second.	0.4	0.3	900	85	100	No
74.	Weymouth Twp. Municipal (Belcoville Section)	S. Br. Great Egg Harbor R.	400	Primary	0.6	0.03	70	35	50	Yes
75.	Mays Landing (Oakcrest School)	Tributary to Gr. Egg H. R.	1,800	Second.	0.03	0.011 ^{f/}	400	85	60	No
76.	Pomona (FAA Federal)	Gr. Egg H. R.	2,000	Second.	0.2	0.1	400	85	60	No
77.	Galloway Twp. N.J. Highway Auth.	Tributary to Mullica R.	Na	Inter.	0.03	Na	Na	70	Na	Yes
78.	Hamilton Twp. Atlantic City Expressway	Tributary to Gr. Egg H. R.	Na	Inter.	0.05	Na	Na	70	Na	Yes
79.	Hammonton Atlantic City Expressway	Tributary to Gr. Egg H. R.	Na	Inter.	0.01	Na	Na	70	Na	Yes
80.	Linwood-Bd. of Ed. (Mainland Reg. H. S.)	Patcong Creek	Na	Inter.	0.02	Na	Na	70	Na	Yes
81.	Galloway Twp. Seaview C. C.	Tributary to Reeds Bay	Na	Primary	0.03	Na	Na	35	Na	Yes
82.	Hamilton Twp. Bd. of Chosen Freeholders	Gr. Egg H. R.	Na	Inter.	0.04	Na	Na	70	Na	Yes
83.	Hamilton Twp. Atlantic City Raceway	Gr. Egg H. R.	Na	Inter.	0.03	Na	Na	70	Na	Yes
84.	Hamilton Twp. Mun. Util. Auth.	Gr. Egg H. R.	Na	Second.	0.6	Na	Na	85	Na	No
CAPE MAY COUNTY (See Figure 3)										
I. <u>Systems Discharging Directly to Atlantic Ocean</u>										
None										
II. <u>Systems Discharging Directly to Shellfishing Waters</u>										
85.	Ocean City - 3rd Ave Plant	Gr. Egg H.	100,000	Primary	3.6	3.4	20,000	30	14,000	Yes

TABLE 3

CAPE MAY COUNTY (Cont'd)

III. Systems Discharging Indirectly to Shellfishing Waters

98.	Lower Twp. - Bd. of Ed.	Mill Creek to									
	Lower Mainland Reg. H.S.	Cape May H.	Na	Second.	0.02	Na	Na	85	Na	Yes	

CAMDEN COUNTY (See Figure 2)

I. Systems Discharging Directly to the Atlantic Ocean

None

II. Systems Discharging Directly to Shellfishing Waters

None

III. Systems Discharging Indirectly to Shellfishing Waters

99.	Berlin Boro Mun.	Tributary to Gr. Egg H.R.	3,000	Inter.	0.7	0.3	720 ^{d/}	85	110 ^{d/}	Yes
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BURLINGTON COUNTY (See Figure 2)

I. Systems Discharging Directly to the Atlantic Ocean

None

TABLE 3

MUNICIPAL AND INSTITUTIONAL WASTE DISCHARGES
NEW JERSEY COASTAL BASIN
(SHARK RIVER TO CAPE MAY) (Cont'd)

Map Ident. No.	Municipality by County and Major Discharge Water	Receiving Waters	Est. Pop. (Summer)	Degree of Treatment	FLOW-MGD		ESTIMATED BOD LOADINGS ^{a/} (lbs/day)			Orders ^{b/} Issued
					Design	Actual Summer	Influent	Percent Removal	Effluent	

BURLINGTON COUNTY (Cont'd)

II. Systems Discharging Directly to Shellfishing Waters

None

III. Systems Discharging Indirectly to Shellfishing Waters

100.	Washington Twp. Leeks	Mullica R.	Na	Inter.	0.01	Na	Na	70	Na	Yes
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^{a/} Where plant data were not available waste loads were estimated using 5-day 20° Centigrade biochemical oxygen demand (BOD) in pounds per day, based upon summer population, a factor of 0.2 pounds of BOD per capita, and a percentage of BOD removal for each sewage treatment plant. Waste facilities were credited with 35 percent BOD removal for primary treatment, 70 percent for intermediate treatment and 85 percent for secondary treatment. The percentage of BOD removal was adjusted for those cases where plants were found to be overloaded. For purposes of this study, type of treatment provided is defined as: primary, primary settling; intermediate, any treatment in excess of primary settling but less than full scale biological secondary treatment; and secondary treatment, primary settling, biological treatment and secondary settling.

^{b/} Formal pollution abatement orders issued by the New Jersey State Department of Health.

^{c/} Plant has secondary treatment facilities - due to low flows, only primary units are in use.

^{d/} Treatment plant data.

^{e/} Includes some industrial waste.

^{f/} Day school - flow figure represents school period.

Na Information not available.

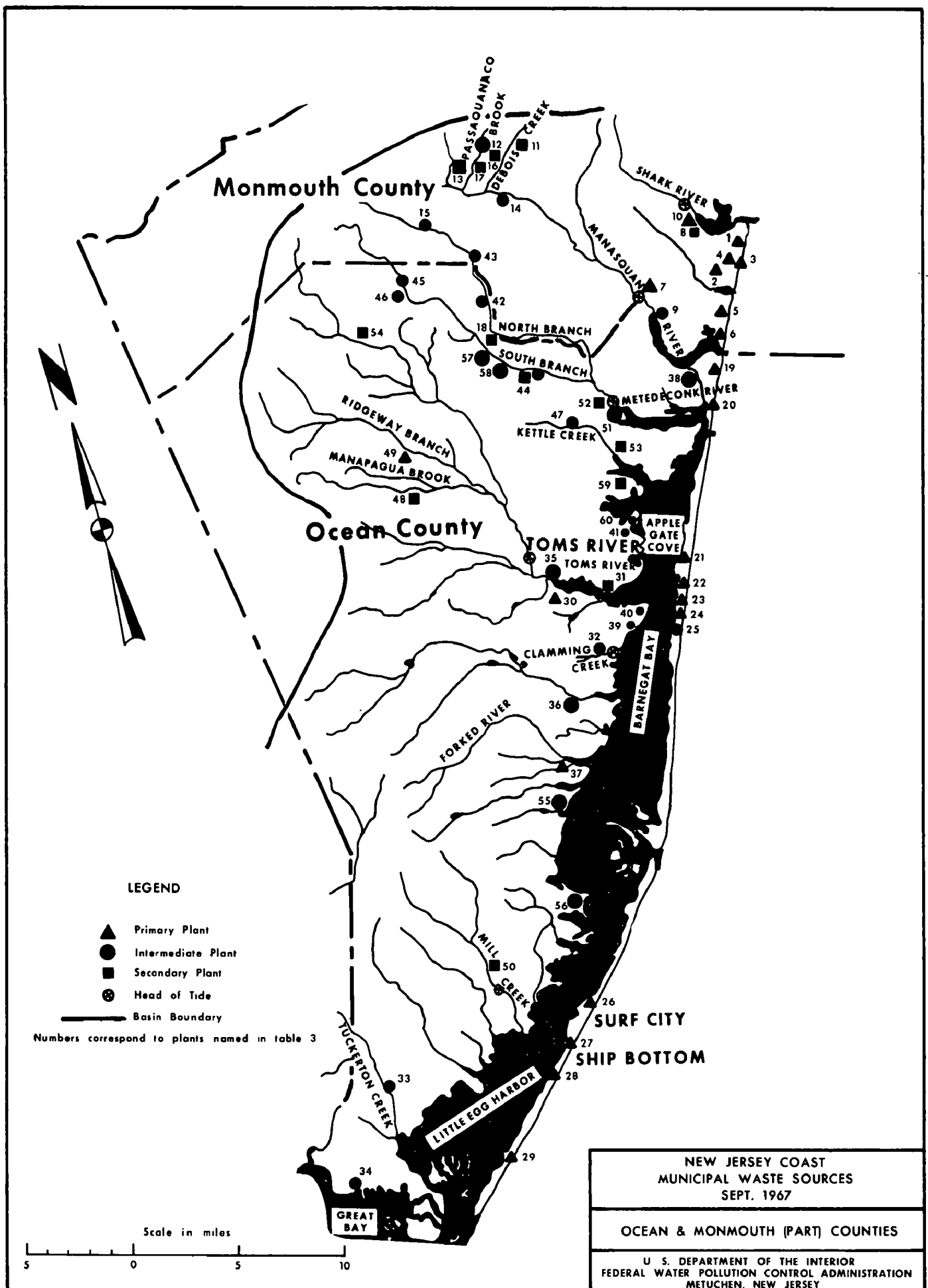
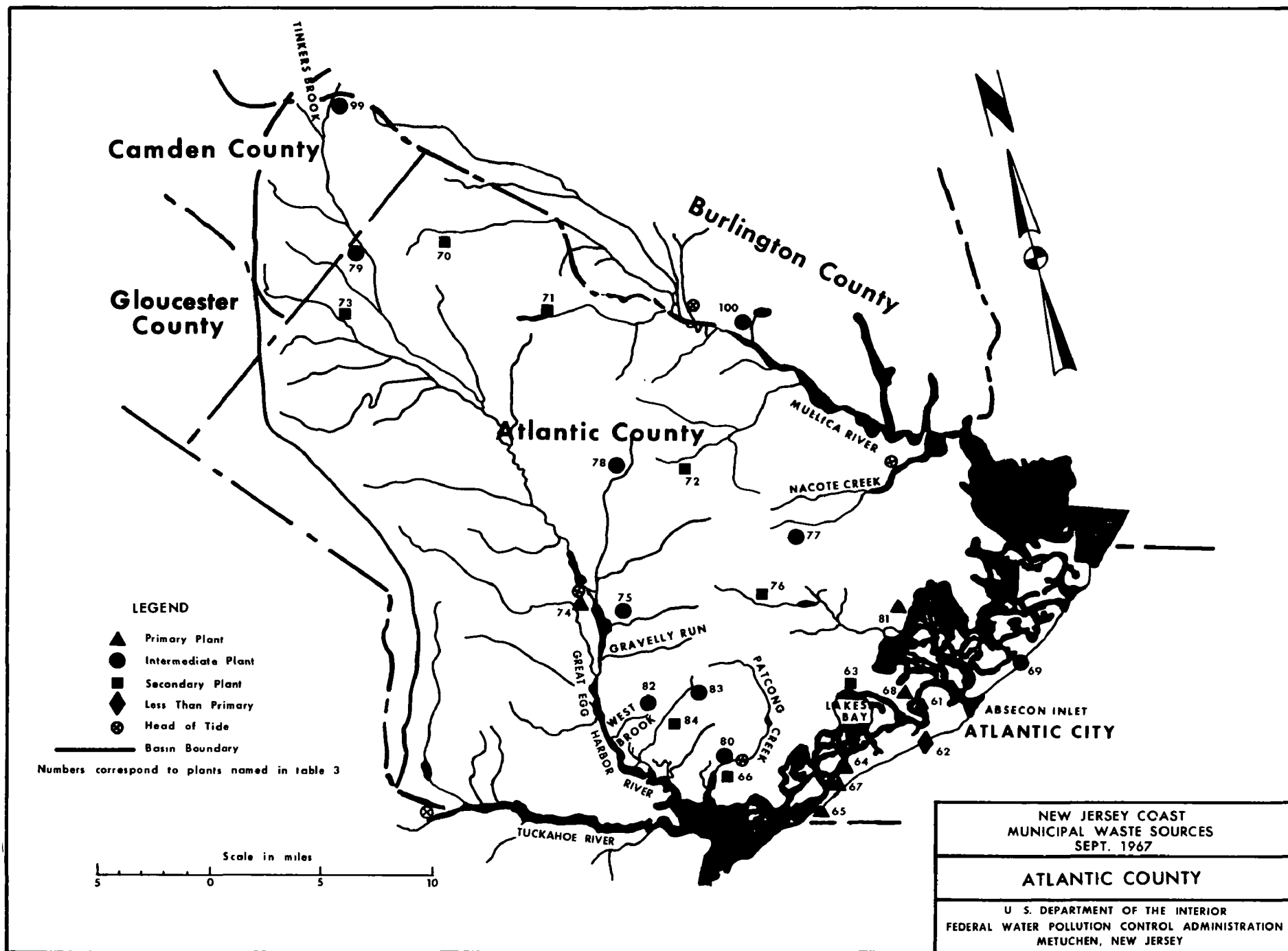
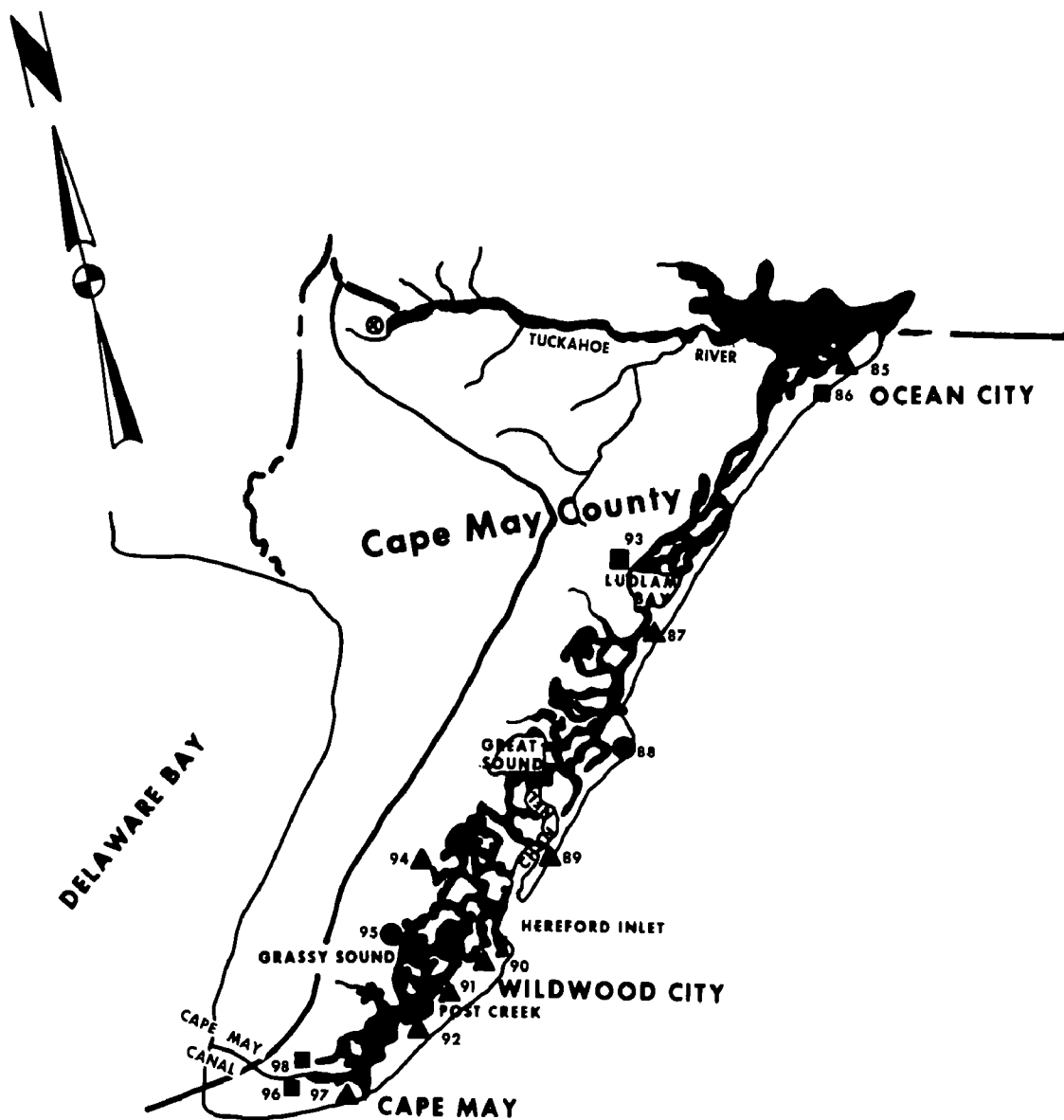


FIGURE 1

FIGURE 2





LEGEND

- ▲ Primary Plant
- Intermediate Plant
- Secondary Plant
- ⊙ Head of Tide
- Basin Boundary

Numbers correspond to plants named in table 3

NEW JERSEY COAST
MUNICIPAL WASTE SOURCES
SEPT. 1967

CAPE MAY COUNTY

U. S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
METUCHEN, NEW JERSEY

FIGURE 3

Nearly three-quarters of the waste load to the estuarine shellfish waters is concentrated in the Atlantic City and Wildwood-Cape May areas. Both these areas contain a large concentration of recreational facilities. Near Atlantic City four plants operate near or beyond design capacity. In the Wildwood-Cape May area, three municipal primary sewage treatment plants which discharge about 8 mgd directly into the intracoastal waterway are either outdated or overloaded.

The 17 municipal plants which discharge directly into the Atlantic Ocean utilize outfall pipes extending from 1,000 to 1,200 feet offshore. For the most part, the effluent from plants discharging municipal waste directly into the ocean is chlorinated only from May to October each year.

Industrial Wastes

At present, industrial waste is not a major pollution problem in the New Jersey Coastal Basin. The economy of the region is primarily recreational and agricultural, with only light industrial activity. The major industrial plant is the Toms River Chemical Corporation, Toms River, which employs about 1,200 persons, and produces dyes, resins and plastics. Treatment is provided the combined industrial waste and sanitary sewage, and the effluent discharged through a 3,500-foot-long outfall into the Atlantic Ocean.

Wastes from three firms: Nescafe Coffee, Freehold; Glidden Co., Jackson Township; and New Jersey Menhaden Products, Wildwood, appear to cause occasional local pollution problems. Thirteen industrial plants discharge wastes to municipal sewage treatment facilities, and the remaining ten industries in the basin either utilize dry processes or provide subsurface waste disposal.

Cesspools and Septic Tanks

Based upon Bureau of Census data for 1960, within the Atlantic Coastal watershed of New Jersey there are more than 300,000 persons in 100,000 homes who dispose of domestic sanitary waste waters by individual cesspools or septic tanks. Leaching of pollutants, in particular nutrients, from cesspools and septic tanks may constitute a significant source of pollution of these waters.

Recreational Boating

Recreational boating can represent a significant source of pollution, particularly from the standpoint of pathogenic bacteria. Over 300,000 boats are registered within a few hours drive of the area, indicating that wastes from this source may be highly significant. The State of New Jersey does not at present have any regulations governing the discharge of human waste from boats in tidal waters.

The development of marinas and associated facilities (presently 110 launch ramps and 18,000 marina berths) to meet present and future recreational boating needs will result in greater pollution unless closer regulatory and surveillance activity is provided.

Other Sources of Pollution

Water quality may be adversely affected by a variety of other land and water uses. Agricultural activities within the area result in agricultural chemicals spread over the land surface being washed into surface waters or percolated into the ground water aquifers. This transport of nutrient fertilizers and toxic herbicides and pesticides, across and through the land into adjacent bodies of water, should be recognized as a possible contributing factor to the problems in these waters.

The disturbance of bottom muds by dredging operations can result in a re-suspension of accumulated organic sludges and silt. In addition, uncontrolled dredging may result in the formulation of significant potholes in the bottom of bays, thereby increasing the detention time and reducing the circulation, the result being inadequate mixing of pollutants with the receiving water and inadequate flushing of the system.

V. EFFECTS OF WASTE ON WATER QUALITY AND USES

One of the problems of waste contamination of the water of the bays and inlets in the New Jersey Coastal Area can be illustrated by a statement issued by the President's Science Advisory Committee on Barnegat Bay, an area typical of the New Jersey coast. This report states in part:

"1. Barnegat Bay, N. J.: Sewage - Proliferation of a sudden Red-Tide in Barnegat Bay during August, 1964 generated considerable controversy which centered on the role of a small chemical company whose effluents enter the Bay via a tidal estuary. Barnegat Bay.....is shallow, highly productive, and its northern shores are densely populated with many miles of small summer cottages in rows of 10-20 perpendicular to the Bay.

"...Most Bay residents assumed that the bloom water discoloration and fish kill were due to the chemical company's dye effluent, although actually the bloom species does not utilize this kind of molecule. Organic nitrate and phosphate sources and bacteria...which most probably caused their massive proliferation are the result of sewage and septic tank wastes--wastes from cottages of persons who populated Barnegat's shores to enjoy their recreational resources...

"...Thus, knowledge of the nutritional requirements of the bloom species gives circumstantial evidence that the source of pollution which supported the red tide was primarily sewage that has leached into the Bay. A repetition of this occurrence in coming summers will undoubtedly damage the shore resort economy of several towns along Barnegat's banks."^{12/}

Bacteria

Bacteria from human wastes constitute a major water pollution problem in the basin. These bacteria originate from the discharge of inadequately treated municipal wastes, from the discharges of septic tanks and cesspools on or near the shore, and from recreational boats using these waters.

The chain of disease transmission by pathogenic bacteria from human waste, through shellfish which are eaten raw or improperly cooked, has been well established. The National Shellfish Sanitation Program was established to control such disease transmission. This program is an excellent teaming of State, Federal and industry resources aimed at preserving and managing the shellfish industry. The National Program, of which New Jersey is a member, has set guidelines for the determination of proper sanitary quality and classification for the designation of waters approved for shellfish harvesting.^{18/} Approval or condemnation of a shellfish area is based on the following factors:

1. Amount of dilution water available;
2. Hydrographic conditions;
3. Survey of actual and potential sources of pollution, including fecal material, radionuclides, and chemical wastes;

4. Possible fresh pollution sources, such as that from toilet discharges from boats directly over shellfish beds;
5. Lack of knowledge of above factors pending a sanitary survey; and
6. Bacteriological data, with samples collected under the worst hydrographic conditions.

In accordance with this program the New Jersey State Department of Health has closed valuable shellfish harvest areas throughout the area. The shellfish areas which have been closed are shown in Figure 4 and listed in Table 4. A copy of the closure orders is included in Appendix I. The harvest of shellfish is prohibited year round in more than 33,000 of the 126,000 acres of water within the study area.

The compilation of actual and potential harvest of hard and soft clams in the coastal areas indicates that a minimum of 2½ bushels per acre could be harvested in the acreage (33,000) closed year-round to shellfishing if existing and suspected pollution sources were abated and the harvest (catch) is left to purely natural propagation. Based on the 1966 dockside price of \$5.04 per bushel for the study area, the potential natural harvest from the closed areas would have an annual value of roughly \$400,000.

Clammers could double the natural harvest to five bushels per acre by carrying out only the simplest of controlled fish farm practices. Accordingly, output could double yielding clammers in the Jersey Coastal Area, a harvest valued at \$800,000 per year. Marine biologists engaged in the study of mollusk reproduction have shown that an annual harvest of 50 bushels per acre can be obtained using scientific mollusk farm practices. ^{19/}

A recent study of the Florida shellfish industry and the price structure of the shellfish industry indicated that the final retail value of shellfish products is roughly four times the dockside value. The economic loss due to the closure of shellfish harvest areas may be summarized as follows:

<u>Harvest Method</u>	<u>Output/acre Bushels</u>	<u>Annual Loss</u>	
		<u>Dockside Value</u>	<u>Retail Value</u>
Present (natural)	2½	\$400,000	\$1,600,000
Using Simple Farm Practices	5	\$800,000	\$3,200,000

The economic loss in shellfish production is not the sole damage caused by the discharge of bacteria to the study waters. The discharge of inadequately treated human wastes creates a hazard to the health of those coming in contact with the receiving waters.

Dissolved Oxygen

Dissolved oxygen is one of the most significant parameters of water quality. When an organic load, such as that measured by the BOD test, is imposed upon a water, dissolved oxygen is utilized in the stabilization process. Oxygen is transferred and dissolved from the atmosphere, or from

TABLE 4

ACTIVE SHELLFISH AREAS
CLOSED TO HARVESTING OF SHELLFISH*

Areas Closed Full Year

<u>AREA</u>	<u>ACREAGE</u>
Shark River	810
Manasquan River	1,350
Barnegat Bay (Part) & Metedeconk River	2,010
Barnegat Bay (Part - Kettle Creek to Mathis Bridge)	2,490
Toms River	1,920
Barnegat Bay (Part - Mathis Bridge to Forked River)	1,180
Barnegat Bay (Part - Forked River to Main Point)	1,800
Manahawkin Bay (Main Point to Long Point)	1,340
Little Egg Harbor (Long Point to Beach Haven Inlet)	140
Mullica River	220
Great Bay	150
Brigantine Area (Great Bay to Absecon Inlet)	700
Reed Bay & Absecon Bay	3,570
Lakes Bay Area	3,960
Scull Bay	1,050
Great Egg Harbor River	1,160
Great Egg Harbor Bay	2,190
Peck Bay to Corson Inlet	350
Ludlam Bay	160
Sea Isle City Blvd. to Great Sound	640
Great Sound to Jenkins Sound	1,300
Hereford Inlet to Wildwood Blvd.	2,440
Wildwood Blvd. to Cape May	<u>2,000</u>
Total, Full Year Closure	32,930

Seasonal Closures

Manahawkin Bay (Main Point to Long Point)	170
Little Egg Harbor (Long Point to Beach Haven Inlet)	140
Scull Bay	80
Great Egg Harbor River	430
Great Egg Harbor Bay	420
Peck Bay to Corson Inlet	640
Great Sound to Jenkins Sound	<u>170</u>
Total, Seasonal Closure	2,050

* Data from the Water Supply and Sea Resource Program, Region 2, Public Health Service, U. S. Department of Health, Education, and Welfare (1967).

photosynthetic production by aquatic plants. Adequate levels of dissolved oxygen are necessary to support fish and other aquatic life. When total depletion of oxygen occurs, the waters become septic and further decomposition produces hydrogen sulfide gas, creating obnoxious environmental conditions.

The shellfish waters in the study area receive directly an estimated 81,000 lbs. per day of BOD from municipal wastes. As a result of the discharge of this waste into waters with limited dilution or restricted circulation, such as found in the various bays and lagoons of the study area, dissolved oxygen may be depressed to less than desirable values. The FWPCA sampling program conducted during the summers of 1966-67 showed that 20 percent of the samples taken in the waters from Absecon Inlet to Great Egg Harbor Inlet (restricted intracoastal waters) contained dissolved oxygen levels equal to or less than four milligrams per liter (mg/l).

Nutrients

Human and animal feces contain phosphorus and nitrogen that serve as nutrients, or fertilizer, for both land and water plant life. Although other elements are necessary as nutrients for plant growth, deficiencies in phosphorus and nitrogen are believed to be the most common restraining factors on aquatic plant growth. Municipal waste is a significant source of phosphorus and nitrogen in these waters. Other sources may include the direct discharge from recreational boats, runoff from adjoining agricultural areas, and percolation from cesspools and septic tanks.

New Jersey Coastal waters are rich in both phosphorus and nitrogen which support prolific growths of both suspended and attached algae. Open coastal waters commonly contain 0.02 to 0.05 mg/l of phosphorus (as P). Study area waters have been found to contain as much as 0.5 mg/l of phosphorus.

Although minimum concentrations of nitrogen required for algae blooms have not been determined for sea water, the generally accepted value for fresh water is 0.3 mg/l (as N). Results of the FWPCA sampling program (summer 1967) showed that of 160 stations sampled, 152 contained total available nitrogen (N) concentrations greater than 0.3 mg/l.

With the adequate supply of nitrogen and phosphorus, the waters of the study area support luxurious growths of suspended algae, attached filamentous algae and rooted aquatic plants. The suspended algae generally reduce aesthetic enjoyment of the waters by reducing their clarity, sometimes to the extent that objects in more than two feet of water are not visible from the surface. With changes in environmental conditions, the sudden death and subsequent decomposition of a dense algae population can deplete dissolved oxygen to the extent that fish and other aquatic life are not able to survive.

These plants become detached from their moorings, especially during periods of turbulent water, accumulate as slimy masses in the surf and wash up on the shore. It is not uncommon to see masses of detached plants covering

long reaches of the shore several inches deep and many feet from the water's edge. They not only present an unsightly appearance but also decay and produce extremely offensive odors. Such shoreline conditions prevent full development of the recreational potential of the area.

Suspended Solids

Suspended solids in sewage include large proportions of decomposable organic solids. Within this area, the major source of such suspended solids is the discharge of inadequately treated municipal waste. Adequate treatment facilities are capable of removing 90 to 95 percent of such material from municipal wastewaters. Upon discharge to the receiving waters, the suspended solids immediately impart a grey turbidity to the waters and diminish their esthetic appeal. The heavier solids settle to the stream bottom in the vicinity of the points of discharge and form objectionable and harmful sludge deposits. These sludge blankets cover and destroy the bottom aquatic life that serve as food for fish. A survey of the study waters by the Federal Water Pollution Control Administration in 1966 found sludge deposits at 34 sampling stations along the Intracoastal Waterway and its adjoining bays and tributaries. These deposits, in the form of strips of black odorous ooze, were found on the bottom as well as along the shore line, in some cases covered by shallow layers of sand that have been washed over them by wave action.

The organic material in the sludge undergoes a decomposition process which lowers the dissolved oxygen level in the overlying waters, at times to below that needed for fish and other aquatic life to survive. When complete depletion of oxygen occurs, the further decomposition of organic matter produces obnoxious hydrogen sulfide gas which appears as bubbles on the surface. This gas breaks loose masses of the deposited sludge and lifts them to the surface where they appear as unsightly grey or black odorous clumps and rafts.

The lighter suspended solids are carried downstream by the velocity of the flowing water to settle and form similar sludge banks in eddy areas distant from the points of discharge. In coastal streams, the salt content of the sea water precipitates the fine colloidal portions of the suspended solids to form additional sludge deposits where fresh and salt waters meet.

Thus, these suspended solids may produce harmful effects throughout the entire length of the receiving streams from the points of discharge to their mouths.

VI., STATUS OF POLLUTION CONTROL PROGRAMS

Water Quality Standards

The Water Quality Act of 1965 amended the Federal Water Pollution Control Act to provide for establishment of water quality standards for interstate waters. It is the position and purpose of the Federal Water Pollution Control Administration to encourage and support the States in establishing their own standards. Standards adopted by a State may be accepted by the Secretary of the Interior if he determines that the State criteria and plan are consistent with the purposes of the Act, i.e. "...to enhance the quality and value of our water resources and to establish a national policy for the prevention, control, and abatement of water pollution." In the absence of State action, such standards will be adopted by the Secretary of the Interior under procedures set forth in the Act.

In 1964, the New Jersey State Department of Health established a program of stream classification. The Department adopted water quality criteria for various uses of water and after public hearings issues formal rules and regulations classifying the waters and establishing minimum waste treatment requirements. Following a series of public hearings the State adopted in May 1967 standards for the waters of the Atlantic Coastal Basin and subsequently submitted these standards to the Secretary of the Interior under the Water Quality Act of 1965. Appendix II presents the classifications for these waters as submitted to the Secretary, rules and regulations for treatment requirements for all wastes discharged to these waters, and a copy of a typical pollution abatement order issued by the Department to achieve compliance with these standards. Similar orders were issued to a number of municipalities and institutions, as shown in Table 3.

State Abatement Programs

There has been increasing emphasis on water pollution control by the State of New Jersey, and a number of new programs initiated. To carry out the State's water quality management programs the Commissioner of the New Jersey State Department of Health in 1967 created the Division of Clean Air and Water.

The State Public Sanitary Sewerage Facilities Act of 1965 authorizes the Commissioner of Health to make grants and loans to local governmental units for the preparation of feasibility studies on the engineering design of public sanitary sewerage facilities. The law declares that it is the Public policy of the State, "to encourage and support, as hereinafter provided, the promotion, planning, development and construction of public sanitary sewerage facilities, including collection, transmission, treatment and disposal works on a regional or multi-unit basis."

Grants are authorized for the purpose of preparing feasibility studies and reports on projects for the collection, treatment and disposal of sewage involving two or more local governmental units, acting together on a joint basis. Loans are authorized for the preparation of preliminary engineering plans, detail design, engineering drawings and specifications, and contract documents for the construction of a new, or expansion of an existing, sewerage facility provided a feasibility study or a report upon the facility has been filed with and approved by the Commissioner. This Act became effective July 1, 1965 with \$1,000,000 appropriated for carrying out the grant and loan provisions. Additional funds have been appropriated for subsequent years.

The County Sewerage Financing Law (Chapter 205) passed in 1966, permits counties, separately or jointly with municipalities located within the county: (1) to construct or acquire sewage disposal facilities or sanitary sewers, (2) to operate such facilities, and (3) to furnish the services of these facilities to any municipality within the county. The Law also authorizes a county (1) to issue general obligation bonds to finance the construction or acquisition of such facilities, (2) to fix and collect fees for the facilities and services furnished, (3) to accept grants and gifts, and (4) to enter into contracts and carry out other business necessary to the operation of these facilities. This law is designed to supplement the "Sewerage Authorities Law." It specifically restricts a county from establishing any sewage disposal system, however, that would be competitive with a county sewerage or municipal utilities authority previously established under existing legislation, without the consent of such existing authority.

In 1967, the State of New Jersey enacted additional pollution abatement legislation encouraging the broad and active participation of representative leaders of industry, labor, government and selected professional societies in the clean waters program of the State. It created a Clean Water Council, within the State Department of Health, to advise the Commissioner on matters relevant to the management of the State's water pollution control program, to conduct studies and hearings pertinent to the program, and to make enlightened recommendations to the Commissioner. It authorized the Commissioner of Health (subject to the availability of funds) to make grants to any county or municipality, or any combination or agency thereof or any State or interstate agency to assist such governmental units in the construction of those water pollution control projects as qualify for Federal Aid. The State's contribution toward the construction of such projects shall not exceed 30 percent of the cost of that portion of said projects that shall qualify for Federal Assistance. Under the provision of the Federal Water Pollution Control Act, as amended, this grant program makes possible increased Federal construction grants participation. In addition, the legislature broadened the program of loans and grants for feasibility studies and engineering reports and established educational scholarship programs at the graduate and undergraduate level to help further the purposes of administering the State's clean waters program by attracting qualified students to those fields of engineering essential to the progress of pollution abatement and water resource development.

Federal Grants

In the Jersey Coastal Area to date the Federal Water Pollution Control Administration has spent or allocated \$2.7 million of the Area's total waste facilities construction cost of \$10.8 million. This amounts to a Federal participation ratio in the Jersey Coastal Area of one Federal dollar to every three State-and-local dollars and contrasts well with the national average of one Federal dollar to four State-and-local.

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APPENDIX I

SHELLFISH CLOSURE ORDERS

NEW JERSEY STATE DEPARTMENT OF HEALTH

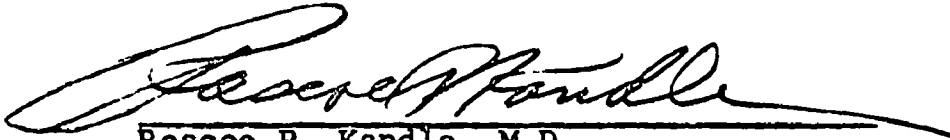
RULES AND REGULATIONS

* * *

The State Department of Health of the State of New Jersey pursuant to the authority vested in it by Chapter 177, Laws of 1947 hereby establishes the following Rules and Regulations for the administration of Revised Statutes 24:2-1 and 24:14-2. All prior Rules and Regulations in these matters adopted on various dates by the Department of Health of the State of New Jersey are hereby rescinded.

NEW JERSEY STATE DEPARTMENT OF HEALTH

By:



Roscoe P. Kandle, M.D.
State Commissioner of Health

Effective Date: January 1, 1967

Filed with the Secretary of State: December 15, 1966

* * *

The State Department of Health hereby condemns all oyster, clam and mussel growing areas or other places from which oysters, clams or other shellfish are or may be taken, at all times of the year except when otherwise noted, in:

1. General

- (a) all lagoons dredged for the purpose of providing access to property and/or the dockage of boats.
- (b) all marinas, boat yards, boat basins, harbors or other places where docking facilities are provided for boats.

2. Northern New Jersey Area

- (a) all the waters lying west and north of Raritan Bay including: Raritan River, Arthur Kill, Kill Van Kull, Newark Bay, Passaic River, Hackensack River, Upper Bay, Hudson River and tributaries of the above bodies of water.

3. Raritan Bay Area

- (a) all the waters of Raritan Bay and tributaries thereof.
- (b) all the waters of Lower Bay and tributaries thereof.
- (c) all the waters of Sandy Hook Bay lying west and north of a straight line beginning at Conover Light at Leonardo, N.J. and bearing approximately 46°T to Sandy Hook Lighthouse and; all the waters of Sandy Hook Bay south of a straight line beginning at the flashing green light at the end of the first spur of the Naval Ammunition Pier at Leonardo, N.J. bearing approximately 133°T to the flashing light at the eastern end of the Atlantic Highlands breakwater, then bearing 094°T across the southeast tip of the island at the mouth of Spermaceti Cove and terminating on Sandy Hook peninsula.

4. Shrewsbury River Area

- (a) all of the Shrewsbury River and tributaries thereof (not including the Navesink River) lying south from the above described line in Sandy Hook Bay running from the Naval Ammunition Pier to Sandy Hook peninsula. At the confluence of the Navesink and Shrewsbury Rivers, the condemned waters shall be only on the east side of a line beginning at the most southerly tip of Lower Rocky Point and connecting the most easterly edge of the marshy islands in the mouth of the Navesink River then terminating on the mainland of Rumson Neck on the south side of the most southerly entrance to the Navesink River.

5. Navesink River

- (a) all that portion of the Navesink River and tributaries west from a straight line beginning on shore at the pier at the Fairhaven Yacht Works bearing approximately 001°T to the mouth of the small creek on the opposite shore of the Navesink River.
- (b) all that portion of the Navesink River contained within a line beginning at the southern terminus of

the Oceanic Bridge then running along the bridge to the main channel, then following the south side of the channel westward to flashing light #15, then bearing approximately 181°T to the point of land on the south bank of the Navesink River.

- (c) all that portion of the Navesink River and tributaries contained within a line beginning at the southern terminus of the Oceanic Bridge and bearing approximately 65°T to the northwest tip of the small island southeast of flashing light #9 marking the Navesink River Channel, then bearing approximately 93°T to northernmost tip of Barley Point, then following the eastern shore of Barley Point to its southeastern point at the mouth of Black Point Creek, then bearing approximately 180°T and terminating on the mainland shore of Black Point Creek.

6. Shark River Area

- (a) all of Shark River and tributaries.

7. Sea Girt Area

- (a) all of Sea Girt Inlet.
- (b) all of Wreck Pond and tributaries.

8. Manasquan River Area

- (a) all of Manasquan River and tributaries including Stockton Lake, Watson Creek, Glimmer Glass, and Lake Louise.
- (b) all of Bay Head - Manasquan Canal.

9. Bay Head Area & Metedeconk River

- (a) all of Beaverdam Creek and tributaries and all of Metedeconk River west from a straight line beginning at Flashing Red light #10 off Perch Hole Point at the southern end of Bay Head - Manasquan Canal and bearing approximately 226°T to Flashing Red light #2 south of Wardell Neck, then bearing approximately 172°T through Flashing Green light #1 and terminating on the south shore of the Metedeconk River.

10. Island Beach Area - Bay Head to Seaside Park

- (a) all that portion of Barnegat Bay and tributaries north and east of a line beginning at Flashing Red light #10 off Perch Hole Point at the southern end of Bay Head - Manasquan Canal, then running in a southerly direction to Flashing Red light #12, then to Flashing Red light #14, then to the northwest

tip of Herring Island, continuing along the shore of Herring Island to its southernmost tip, then bearing approximately 185°T to inland waterway marker 23, then following the east side of the inland waterway channel to can buoy "27", then bearing approximately 202°T to the most westerly point of land in "Curtis Point", then bearing approximately 189°T to the most westerly point of land just south of "Mantaloking Shores", then bearing approximately 213°T to Flashing Red light #2 off "Normandy Beach", then bearing approximately 169°T to the nearest island to the south, then along the shore of that island to its southeastern point, then bearing approximately 177°T to the east tip of the 2 islands off "Ocean Beach" continuing along the east shore of that island and the next island immediately to the south to its southernmost point, then bearing approximately 181°T to Flashing Green light #13 off Lavallette, then bearing approximately 234°T to Flashing Green light #11 off West Point Island, then bearing approximately 159°T to Flashing Red light #10 off West Point Island, then bearing approximately 187°T to the northernmost point of the marsh island to the south of that light, continuing along the shore of that island to its southernmost point, then bearing approximately 221°T to the westernmost tip of Pelican Island, then bearing approximately 130°T to Flashing Green light #3 off Seaside Heights, then bearing approximately 170°T to the southwest corner of the bulkhead west of Berkeley Yacht Basin, then bearing approximately 176°T to the western end of the municipal pier off 5th Ave. in Seaside Park, then bearing approximately 210°T to the western end of the municipal pier off 14th Ave. in Seaside Park, then bearing approximately 186°T to the next point of land, then bearing approximately 178°T and terminating at the next point of land at Island Beach State Park.

11. Dover Township Area from Kettle Creek to Toms River

- (a) all of Kettle Creek and tributaries north and west from a straight line beginning at Seaweed Point and bearing approximately 241°T to Andrew Point at Green Island.
- (b) all of Silver Bay and tributaries west from a straight line beginning at Andrew Point at Green Island and bearing approximately 206°T to the next point of land (Cattus Island).
- (c) all of Applegates Cove and tributaries west of a straight line beginning at Tilton Point and bearing approximately 333°T to next point of land.

- (d) all of Shelter Cove west from a straight line connecting the points of land at its mouth.
- (e) all of Goose Creek and tributaries west from a straight line beginning at the southern point at the mouth of Shelter Cove and bearing approximately 195°T to the next point of land.

12. Toms River Area

- (a) all of Toms River and tributaries west from a straight line beginning at Goodluck Point and bearing approximately 353°T to the most easterly point of land at "Windsor Park", north of the Mathis Bridge.

13. Berkeley Township Area - Toms River to Cedar Creek

- (a) all the waters west from a line beginning at the northern tip of Berkeley Island, on the north side of Cedar Creek, and bearing approximately 294°T to the next point of land, closing off the first cove north of Berkeley Island, then bearing approximately 318°T to the next point of land, closing off the next cove to the north, then bearing approximately 351°T to the point of land on the north bank of Maple Creek, then bearing approximately 021°T to the most easterly of the small islands off the mouth of Clamming Creek, then bearing approximately 011°T to the most easterly point of land on the south bank of Potter Creek (Dicks Landing), then bearing 038°T to Flashing Red light #60 north of "Berkeley Shores", then bearing approximately 045°T to the eastern end of Barnegat Pier, then continuing in a generally northerly direction along the offshore ends of the piers and terminating on the north bank at the entrance to Goodluck Harbor Marina.

Cedar Creek (Lanoka Harbor Area)

- (a) all of Cedar Creek and tributaries west from a straight line beginning at the southeasterly tip of Berkeley Island on the north side of the mouth of Cedar Creek and bearing approximately 185°T to the next point of land east of Flashing light #1 on the south shore of Cedar Creek.

14. Forked River Area to Barnegat (Double Creek) Area

- (a) all those waters west from a line beginning at Flashing Red light #4 off the mouth of Forked River and bearing approximately 347°T to a point of land north of Forked River; also beginning at the same light the line bears approximately 219°T through Flashing light #3 marking the entrance channel at

Oyster Creek to the entrance channel at Holiday Harbor, then bearing approximately 187°T to the entrance channel at Waretown Creek, then bearing approximately 196°T to the entrance channel at Liberty Harbor, then bearing approximately 187°T to the entrance channel to Barnegat Beach, then bearing approximately 190°T to Flashing Red light #2 at the entrance to Double Creek, then bearing approximately 186°T to the point of land across the entrance to Double Creek, then bearing approximately 224°T to the next point of land to the southwest and continuing in a straight line to its terminus on the mainland.

15. Long Beach Island Area, Barnegat Light to Holgate

- (a) all that portion of Barnegat Bay, south and east from a line beginning at Barnegat Lighthouse and running in a northwesterly direction to red nun buoy #4, then running in a southwesterly direction through Flashing light #1, then continuing in a straight line to its terminus on High Bar peninsula.
- (b) all that portion of Barnegat Bay and Manahawkin Bay lying east and south from a line beginning at the western end of Arnold Rd. in High Bar Harbor and bearing approximately 217°T to the northeast point of the southernmost of the two islands just off shore, then along the east shore of that island to its southeast point, then bearing approximately 140°T to the most easterly tip of Vol Sedge, then along the east shore of that island and across to the southernmost tip of the other island of Vol Sedge, then bearing approximately 170°T to a point on the west side of the staked channel directly off the mouth of the lagoon at "Long Beach Club Estates", then bearing approximately 236°T to the west side of the staked channel around the outer perimeter of "Loveladies Harbor", then following the west side of that channel around to the southwest side of "Loveladies Harbor" until it intersects a straight line connecting Flashing Red light #2 off Harvey Cedars Harbor with Barnegat Lighthouse, then bearing approximately 204°T along that line to Flashing Red light #2, then bearing approximately 235°T toward Flashing Red marker #28 until it intersects a line connecting Barnegat Light and Woods Island, then along that line bearing 205°T to the westernmost tip of Woods Island which is adjacent to flashing light #85, then bearing approximately 112°T to the nearest point of land in Harvey Cedars, then bearing approximately 219°T to the next point of land, then bearing approximately 196°T to the point of land just north of Barbay Road in Long

Beach Twp., then bearing approximately 209°T to the end of the pier at the end of Bay Shore St. in Long Beach Twp., then bearing approximately 229°T to the pier at the end of N. 9th St. in Surf City (Surf City Yacht Club), then bearing approximately 239°T to the point of land at the end of N. 3rd St. in Surf City, then bearing approximately 263°T to a point of land on Cedar Bonnet Island, then along the north shore of that island and across the entrance to the two cuts into the island and terminating on the northwest bank at the entrance to Barnegat Isle Marina.

- (c) all that portion of Manahawkin Bay and Little Egg Harbor lying east and south from a line beginning at the southeast tip of Cedar Bonnet Island and bearing 181°T to Flashing Red light #8, then continuing to Flashing Green light #9, then continuing to Flashing Red light #34 marking the intracoastal waterway, then bearing approximately 198°T to the small island inshore from channel marker #36, then continuing to Flashing Red light #38, then following the west side of the intracoastal waterway to Flashing Red light #44, then in a straight line to Flashing Green light #47, then in a straight line to Flashing Green light #53, then continuing in a straight line to channel marker #54 and then following the west side of the intracoastal waterway to Flashing Red light #64, then bearing approximately 239°T to the southernmost tip of the small island off the Beach Haven Yacht Club, then bearing approximately 226°T to the northernmost tip of Mordecai Island, then along the shore of that island to its southwest point, then bearing approximately 267°T to Flashing light #75, then bearing approximately 191°T to a point of land, then continuing along the shoreline to the southwest closing off the entrances to Tobacco's Boat Basin and Silver Sands Marina, then from the bulkhead at the end of Inlet Drive, the line bears 215°T and terminates at the point of land on the south side of Holgate.

16. Beach Haven West - Mallard Island Area

- (a) all of Cedar Creek and Manahawkin Creek north and west from a line beginning on the northern bank at the entrance to Cedar Creek and bearing approximately 150°T to a small island, then bearing approximately 209°T to the western end of the most westerly island along the Manahawkin Causeway, then bearing approximately 173°T to the most easterly tip of Thorofare Island, then bearing 218°T toward the "Fish Factory" on Seven

Islands in Great Bay for a distance of approximately 750 yards until it intersects a line beginning at Flashing Red light #28 marking the inland waterway and bearing approximately 275°T toward Flashing light #1 off Cedar Run Cove. The condemned area boundary continues along said line bearing 275°T for a distance of approximately 1100 yards until it intersects a line beginning at the next point of land west from Popular Point and bearing approximately 214°T toward the above mentioned "Fish Factory". The condemned area boundary then continues along said line in a northeasterly direction and terminates at the point of land where the line begins.

17. Cedar Run Area (Seasonal)

- (a) all of Cedar Run and tributaries west from a straight line across the creek bearing 210°T from Flashing Red light #2 in Cedar Run.
- (b) all of Cedar Run Cove lying between the above described line and a straight line beginning at Horse Point and bearing approximately 037°T to a point of land on the opposite side of the cove shall be condemned from May 1 through October 31 of each year and approved for the harvest of shellfish from November 1 through April 30 of each year.

18. Westcunk Creek

- (a) all of Westcunk Creek and tributaries west from a straight line across the creek beginning at Flashing light #1 at the mouth of Westcunk Creek and bearing approximately 006°T to the southern point at the mouth of Dinner Point Creek.

19. Tuckerton Area (Seasonal)

- (a) all of Tuckerton Creek and tributaries north and west from a straight line beginning at Flashing light #17 at the mouth of Tuckerton Creek and bearing approximately 073°T to a point across Tuckerton Cove.
- (b) all of Tuckerton Cove lying between the above described line and a straight line connecting Thorofare Point and Gaunt Point shall be condemned from May 1 through October 31 of each year and approved for the harvest of shellfish from November 1 through April 30 of each year.

20. Atlantis and Mystic Isles Area

- (a) all of Big Thorofare and tributaries.
- (b) all of Big Creek and tributaries.

21. Mullica River - Great Bay Area

- (a) all of Bass River and tributaries.
- (b) all of Nacote Creek and tributaries.
- (c) all of Mott Creek upstream from a straight line beginning at Flashing Red light #2 at the mouth of Mott Creek and bearing approximately 226°T to the opposite shore of the creek.
- (d) all of Oyster Creek and tributaries.

22. Reed Bay Area

- (a) all the waters north and west of a line beginning at the most southerly point of land on the west side of Somers Cove and bearing approximately 215°T terminating on the mainland southwest from the mouth of Conover Creek.
- (b) all of Conover Creek and tributaries.

23. Brigantine Area

- (a) all of Golden Hammock Thorofare.
- (b) all of Bonita Tideway but not the creeks between Bonita Tideway and Eagle Bay.
- (c) all of Baremore Quarters.
- (d) Wading Thorofare from Bonita Tideway and Baremore Quarters northwest to a line beginning at Flashing Red light #6 and bearing approximately 196°T terminating on the opposite shore of Wading Thorofare and another line beginning at Flashing red light #6 bearing approximately 041°T terminating on the opposite shore of Obes Thorofare.
- (e) all of Black Hole.
- (f) all of Low Water Thorofare

24. Atlantic City - Absecon Area

- (a) all of Absecon Inlet.

- (b) all of Absecon Channel south and west from a line across Middle Thorofare beginning at Debs Point and bearing approximately 056⁰T through Inland Waterway Channel marker #73 terminating on the opposite shore; and south and west from a line across the southeast entrance to Wills Thorofare including; Mankiller Bay and Point Bar Thorofare.
- (c) all of Absecon Bay south and west from a line beginning at the southwest bank of the northwest entrance to Wills Thorofare bearing approximately 305⁰T and terminating on the mainland east of Absecon Creek.
- (d) all of Absecon Creek.
- (e) all of Jonathan Thorofare.
- (f) all of Newfound Thorofare.
- (g) all of Duck Thorofare.
- (h) all of Clam Thorofare and the canals in the Venice Park section of Atlantic City.
- (i) all of Clam Creek and contiguous harbors.
- (j) all of Beach Thorofare from Absecon Channel to Great Egg Harbor Inlet.
- (k) all of Inside Thorofare and West Canal.
- (l) all of Great Thorofare.

25. Pleasantville - Northfield - Linwood - Margate Area

- (a) all of Lakes Bay.
- (b) all of Shelter Island Bay.
- (c) all of Lakes Channel.
- (d) all of Dock Thorofare and tributaries.
- (e) all of Stillman Creek.
- (f) all of Mulberry Thorofare and tributaries.
- (g) all of Risley Channel.

- (h) all of Shelter Island Waters.
- (i) all of Whirlpool Channel.
- (j) all of Scull Bay.
- (k) all of Sod Thorofare and tributaries.
- (l) all of Broad Thorofare and tributaries.
- (m) all of Hospitality Creek.
- (n) all of Beach Thorofare as specified in Atlantic City Absecon Area.

26. Ocean City - Somers Point Area (Seasonal)

- (a) all of Great Egg Harbor Inlet.
- (b) Rainbow Channel northeast from the Ocean City - Somers Point Bridge.
- (c) all of Rainbow Thorofare northeast from the Ocean City - Somers Point Bridge.
- (d) all of Elbow Thorofare and Ship Channel north and east from the Ocean City - Somers Point Bridge within a line beginning at Anchorage Point and bearing approximately 210°T to the southeasterly end of an un-named island, then along that island to its opposite end, then bearing approximately 190°T to the largest of the Rainbow Islands, then along the shore of that island to the Ocean City - Somers Point Bridge, then along the bridge to Somers Point, then along the shore of Ship Channel, across the entrance to Bass Harbor and continuing to its starting point at Anchorage Point shall be condemned for the harvest of shellfish from May 1, through October 31 of each year and approved for the harvest of shellfish from November 1, through April 30 of each year.
- (e) all of Bass Harbor from Ship Channel to a line beginning on the southeast bank at the mouth of a ditch opposite the southeast side of an island at the entrance to Steelman Bay and bearing approximately 300°T terminating on the opposite side of Bass Harbor.
- (f) all of Steelman Bay and the tributary on the northwesterly side of the bay north and east from the line specified in section (e) above,

shall be condemned for the harvest of shellfish from May 1, through October 31 of each year and shall be approved for the harvest of shellfish from November 1, through April 30 of each year.

- (g) all of Patcong Creek and tributaries upstream from a line beginning at Channel Marker Fl "1" bearing approximately 110°T and terminating on the opposite side of Patcong Creek.
- (h) all of Beach Thorofare from Great Egg Harbor Inlet to a line beginning at the southwest point of Shooting Island bearing approximately 169°T and terminating on the opposite side of Beach Thorofare, including the waters south and east from a line beginning at Inland Waterway Marker Fl R "12" bearing 040°T passing through Channel Marker Fl R "6" and terminating on the island northeasterly from Fl R "6".
- (i) all of Peck Bay contained within a line beginning on the northerly point at the mouth of the unnamed ditch at Golders Point and bearing approximately 125°T to Shooting Island, then along the shore of Shooting Islands to and along the line described in section (h) as bearing 169°T from the southwest point of Shooting Island, then along the east shore of Peck Bay to and along a straight line transecting Peck Bay passing through Inland Waterway Marker "29" bearing approximately 306°T, then in a northerly direction along the west shore of Peck Bay to its beginning at Golders Point shall be condemned for the harvest of shellfish from May 1, through October 31 of each year and shall be approved for the harvest of shellfish from November 1, through April 30 of each year.
- (j) all of Peck Bay south and west from the line transecting Peck Bay through Channel Marker "29" bearing 306°T described in section (i) above.
- (k) all of Crook Horn Creek from Peck Bay to Middle Thorofare.
- (l) all of Upland Thorofare and tributaries.
- (m) all of Beach Creek.

27. Great Egg Harbor River (Seasonal)

- (a) all the waters of Great Egg Harbor River and

tributaries between a straight line beginning at Channel Marker Fl G "5" bearing approximately 93°T and terminating on the opposite shore of Great Egg Harbor River and a line beginning at the point of land on the west bank at the mouth of English Creek and bearing approximately 149°T to the point of land on the opposite side of Great Egg Harbor River shall be condemned for the harvest of shellfish from May 1, through October 31 of each year and shall be approved for the harvest of shellfish from November 1, through April 30 of each year.

- (b) all of Great Egg Harbor River and tributaries upstream from the line at English Creek described in section (a) above.

28. Tuckahoe River

- (a) all the waters of Tuckahoe River and tributaries upstream from a straight line beginning on the east bank at the mouth of Job Creek bearing approximately 23°T to the island off shore along the shore of the island and terminating on the opposite bank of the Tuckahoe River.

29. Sea Isle City Area

- (a) all of Maple Swamp (both branches) including the cove at the mouth.
- (b) all of Big Elder Creek.
- (c) all of Little Elder Creek.
- (d) the waters of Ludlam Bay south and west from a line beginning on the northwesterly point at the mouth of Maple Swamp, bearing approximately 130°T and terminating on the southerly side of Ludlam Bay.
- (e) all of Ludlam Thorofare from Ludlam Bay to Townsend Channel.
- (f) all of Sunks Creek and tributaries not including Ware Thorofare

30. Avalon Area

- (a) all of Avalon (Canfield) Canal.
- (b) all of Cornell Harbor.
- (c) all of Pennsylvania Harbor.

- (d) all of Princeton Harbor.
- (e) all of Graven Thorofare and tributaries.
- (f) all the stream between Avalon (Canfield) Canal and Long Reach.
- (g) all of Ingram Thorofare and tributaries from the Avalon Road bridge southwesterly to a straight line beginning at the point of land at the confluence of Long Reach and Ingram Thorofare, bearing approximately 35°T terminating at the point of land at the confluence of of Ingram Thorofare and Deep Thorofare.
- (h) all of South Channel from a straight line beginning at the point (on the un-named island) of confluence with North Channel, bearing approximately 138°T terminating on the opposite side of South Channel in a westerly direction to a straight line beginning on the northeast bank of the west entrance to South Channel (on the small island), bearing approximately 246°T terminating on the mainland at the entrance to Leonard Thorofare.
- (i) all of Leonard Thorofare in a southerly direction from the line specified in section (h) above (bearing 246°T).
- (j) Deep Thorofare from a straight line beginning on the northern bank at the entrance to Cat Run and running across Deep Creek to the northern bank at the entrance to Leonard Thorofare. (Cat Run is not condemned) to a line across the mouth of Deep Thorofare at Paddy Thorofare meeting the northeast end of the line across the mouth of Ingram Thorofare.

31. Stone Harbor Area

- (a) all of Gull Island Thorofare, Cresse Thorofare and Great Channel south and east from a straight line beginning at Halfmile Point, bearing approximately 110°T passing across the northern tip of Gull Island and terminating on the easterly bank at the entrance to Sturgeon Hole to a straight line transecting Great Channel beginning on the southwest bank at the entrance to a small ditch on the northwest shore of Great Channel near inland waterway marker #80 bearing approximately 126°T passing across the island and terminating on the opposite shore of Great Channel.

- (b) all that body of water running parallel with Seven Mile Beach, not including tributaries.
- (c) all of Oldman Creek.
- (d) all of Oyster Creek.
- (e) all of Scotch Bonnett.
- (f) all that creek connecting Oyster Creek and Scotch Bonnett.
- (g) all of Muddy Hole.
- (h) all of Stone Harbor Canal.
- (i) all of Hetty Creek.
- (j) all of Crooked Creek.
- (k) all of Mulford Creek and the creek connecting it with Crooked Creek.

32. Jenkins Sound (Seasonal)

- (a) all that portion of Jenkins Sound contained within a line beginning at the end of Shellbed Landing Road, bearing approximately 093°T to the northwest tip of the nearest island, then bearing approximately 046°T to the nearest point of land on the opposite side of Nichols Channel, then bearing approximately 305°T to the northern bank at the mouth of the creek north of Benny's Landing; shall be condemned for the harvest of shellfish from May 1, through October 31, of each year and shall be approved for the harvest of shellfish from November 1 through April 30, of each year.

33. The Wildwoods Area

- (a) all of Hereford Inlet lying south from a straight line connecting the most southerly tip of Nummy Island and the most southerly tip of land on the north side of the inlet.
- (b) all of Grassy Sound Channel and tributaries not including Jenkins Channel.
- (c) all those waters lying between North Wildwood Blvd. and Jenkins Channel and Jenkins Sound including Gravelly Run and Turtle Gut.

- (d) all of Beach Creek and tributaries.
- (e) all of Grassy Sound and tributaries.
- (f) all of Turtle Thorofare and tributaries.
- (g) all of Tempe Creek and tributaries.
- (h) all of Cresse Creek and tributaries.
- (i) all of Richardson Sound and tributaries.
- (j) all of Post Creek and Ottens Harbor and tributaries.
- (k) all of Sunset Lake and tributaries.
- (l) all of Richardson Channel and tributaries.
- (m) all of Swain Channel and tributaries.
- (n) all of Taylor Sound and tributaries including Jones Creek.
- (o) all of Reubens Thorofare and tributaries.
- (p) all of Jarvis Sound and tributaries.

34. Cape May Area

- (a) all of Upper Thorofare and tributaries.
- (b) all of Middle Thorofare and tributaries.
- (c) all of Lower Thorofare and tributaries.
- (d) all of Cape May Inlet (Cold Spring Inlet).
- (e) all of Cape May Harbor (Cold Spring Harbor).
- (f) all of Skunk Sound and tributaries.
- (g) all of Cape Island Creek and tributaries.
- (h) all of Cape May Canal and tributaries.

35. Delaware Bay Area

- (a) all that portion of Delaware Bay contained within a line beginning at the pumping station at the mouth of Fishing Creek, Cape May County

and extending into the bay for one nautical mile on a bearing of 295°T, then continuing on a bearing of approximately 196°T to Fl. light #5 at Crow Shoal, then continuing to Cape May Lighthouse and terminating. The closure includes all tributaries flowing into the above described area including Fishing Creek, Cox Hall Creek and Pond Creek.

- (b) all of Dias Creek.
- (c) all of Bidwell Creek and tributaries shall be condemned for the harvest of shellfish from May 1, through October 31, of each year and shall be approved for the harvest of shellfish from November 1, through April 30, of each year.
- (d) all of Dennis Creek and tributaries including Roaring Ditch upstream from a line beginning on the southwest bank at the entrance to Roaring Ditch and bearing 149°T to the opposite shore of Dennis Creek. That portion of Dennis Creek downstream from the above described line shall remain approved for the harvest of shellfish.
- (e) all of East Creek and tributaries.
- (f) all of Riggins Ditch and tributaries.
- (g) all of Maurice River and tributaries and that portion of Maurice River Cove north and east from a straight line known as the "Summer Line" beginning at the lighthouse on East Point and bearing 311°T to a marker on the western bank at the mouth of New England Creek.
- (h) all of Dividing Creek and tributaries upstream from a line beginning on the northerly bank at the entrance to Hansey Creek and bearing 217°T to the opposite shore of Dividing Creek. That portion of Dividing Creek and tributaries downstream from the above described line shall remain open for the harvest of shellfish.
- (i) all of Fortesque Creek and tributaries from the mouth to the confluence of each of its branches with Oranoaken Creek. Oranoaken Creek shall remain approved for the harvest of shellfish downstream from "The Glades".
- (j) all the waters known as The Glades north from their confluence with Weir Creek, including that

portion of Oranoaken Creek north from Weir Creek. Weir Creek shall remain approved for the harvest of shellfish.

- (k) all of Nantuxent Creek (Cumberland County) and tributaries upstream from a straight line beginning at the Fl. light on the southern bank at the mouth of Nantuxent Creek and bearing approximately 003°T to the mouth of the small ditch on the opposite shore of Nantuxent Creek.
- (l) all of Cedar Creek (Cumberland County) and tributaries upstream from a straight line beginning at the point of land on the southern bank and the entrance to Cedar Creek and bearing approximately 003°T to the opposite shore of Cedar Creek.
- (m) all of Cohansey River and tributaries upstream from a straight line beginning at the most easterly point of land on the island at the mouth of Cohansey River and bearing 330°T to the opposite shore of Cohansey River and from a straight line from the outer range light marking the entrance to Cohansey River to the most westerly point of the same island.

APPENDIX II

NEW JERSEY STREAM CLASSIFICATION

1. Water Quality Criteria
2. Classification-Atlantic Coastal
Basin
3. Wastewater Treatment Requirements
4. Typical Pollution Abatement Order
Under Classification

RULES AND REGULATIONS

* * *

REGULATIONS ESTABLISHING CERTAIN CLASSIFICATIONS TO BE ASSIGNED TO THE WATERS OF THIS STATE AND STANDARDS OF QUALITY TO BE MAINTAINED IN WATERS SO CLASSIFIED.

WHEREAS, Chapter 12 of Title 58 of the Revised Statutes of New Jersey (N.J.S.A. 58:12-3) provides that no plant for the treatment of domestic or industrial wastes or other polluting substance, from which the effluent is to flow into any of the waters of this State, shall be constructed except under such conditions as shall be approved by the State Department of Health, and

WHEREAS, The conservation of the quality and function of the waters of the streams of this State into which effluents from sewerage facilities are discharged and the minimizing of pollution of these waters is the over-riding consideration of the Department of Health of the State of New Jersey in its considerations of the approvals of designs for such treatment works, and

WHEREAS, The maintenance of reasonable quality of the waters of the streams of this State is the primary basis upon which the State Department of Health approves of the design of proposed sewerage facilities, and

WHEREAS, The Interdepartmental Committee on Stream Pollution Control Problems, established by the State Commissioners of Health and Conservation and Economic Development, on April 9, 1964, recommended certain classifications be assigned to the waters of this State and standards of quality to be maintained in waters so classified, be promulgated as regulations by the State Department of Health, and

WHEREAS, The State Department of Health has determined that classifications of the waters of this State and standards of quality to be maintained in such waters as proposed and recommended by the Interdepartmental

Committee on Stream Pollution Problems in this State are reasonable and constitute a valuable administrative instrument to the Department in the administration of the New Jersey Stream Pollution Control Program,

NOW THEREFORE, The State Department of Health, pursuant to authority vested in it, promulgates the following regulations establishing certain classifications to be assigned the waters of this State and standards of quality to be maintained in such waters which are to be implemented from time to time by further regulations promulgated after public hearing defining the water or waters of this State to be assigned certain classifications and standards of quality to be maintained in such waters.

NEW JERSEY STATE DEPARTMENT OF HEALTH

Roscoe P. Kandle, M.D.
State Commissioner of Health

Filed with Secretary of State: August 10, 1964

Effective Date: September 1, 1964

REGULATIONS ESTABLISHING CERTAIN CLASSIFICATIONS TO BE ASSIGNED TO THE WATERS OF THIS STATE AND STANDARDS OF QUALITY TO BE MAINTAINED IN WATERS SO CLASSIFIED.

Fresh Waters

The fresh non-tidal surface waters of the State are herein classified as Classes FW-1, FW-2, FW-3 and FW-4. For each classification there follow definitions and stream quality criteria.

Class FW-1

Definition: Fresh surface waters designated by authorized State Agencies as being set aside for posterity to represent the natural aquatic environment and its associated biota.

Criteria

These waters shall be maintained, as to quality, in their natural state.

Class FW-2

Definition: Fresh surface waters approved as sources of public potable water supply. These waters are to be suitable for public potable water supply after such treatment as shall be required by the State Department of Health. These waters shall be suitable also for all recreational purposes including fishing, the propagation of native fish species desired for angling and other fish and aquatic life necessary thereto as well as any other reasonable uses.

Criteria

Conditions

Allowable Limits

- | | |
|--|--|
| 1. Floating solids, settleable solids, oil, grease, artificial coloring matter and turbidity. | None of which are noticeable in the water or are deposited along the shore or on the aquatic |
| 2. Toxic or deleterious substances (including mineral acids, caustic alkali, cyanides, heavy metals carbon dioxide, ammonia or ammonium compounds, chlorine, etc.) | substrata in quantities detrimental to the natural biota. None which would affect humans or be detrimental to the natural aquatic biota. |

3. Odor and taste producing substances.

None which are offensive to humans, detrimental to the aquatic biota or capable of producing offensive tastes and/or odors in water supplies and fauna used for human consumption.

4. pH.

Between 6.5 and 8.5 unless naturally outside thereof.

5. Dissolved oxygen.

Not less than 5.0 p.p.m. for trout waters; otherwise 4.0 p.p.m.

6. Thermal discharges.

None which detrimentally affect the natural aquatic biota, or reasonably anticipated reuse of the waters.

Class FW-3

Definition: Fresh surface waters suitable for all purposes provided for under Class FW-2 except public potable water supply.

Criteria

Conditions

1. Floating solids, settleable solids, oil, grease and turbidity.

2. Toxic or deleterious substances (including mineral acids, caustic alkali, cyanides, heavy metals, carbon dioxide, ammonia or ammonium compounds, chlorine, etc.).

Allowable Limits

None which are noticeable in the water or are deposited along the shore or on the aquatic substrata in quantities detrimental to the natural biota.

None which would affect humans or be detrimental to the natural aquatic biota.

3. Color, odor and taste producing substances.

None which are offensive to humans, detrimental to the aquatic biota or capable of producing offensive tastes and/or odors in fauna used for human consumption.

4. pH.

Between 6.5 and 8.5 unless naturally outside thereof.

5. Dissolved oxygen.

Not less than 5.0 p.p.m. for trout waters; otherwise 4.0 p.p.m.

6. Thermal discharges.

None which detrimentally affect the natural aquatic biota, or reasonably anticipated reuse of the waters.

Class FW-4

Definition: Fresh surface waters except as provided for under Classes FW-1, FW-2, and FW-3. These waters are to have limited recreational value and ordinarily not be acceptable for bathing or fishing but shall be able to maintain some fish life even though they may not be suitable for the propagation of fish. These waters shall not be an odor nuisance and shall not cause damage to pleasure craft having occasion to traverse the waters.

Criteria

Conditions

Allowable Limits

1. Floating solids, settleable solids, oil and grease.

None which are noticeable in the water or contribute to the formation of sludge deposits along the shores.

2. Toxic and deleterious substances.

None in such concentrations as to cause fish mortality or inhibit their natural migration.

3. Taste and odor producing substances. None which shall be offensive or that would detrimentally affect finfish, shellfish or other aquatic life in higher quality receiving waters. Neither shall it inhibit the natural migration of fish.
4. Dissolved oxygen. Not less than 50% saturation.

Tidal Waters

The tidal surface waters of the State, including interstate waters, are herein classified as Classes TW-1, TW-2 and TW-3. For each classification there follow definitions and stream quality criteria.

Class TW-1

Definition: Tidal surface waters suitable for all recreational purposes, as a source of public potable water supply where permitted, and, where shellfishing is permitted, to be suitable for such purposes.

Criteria

<u>Conditions</u>	<u>Allowable Limits</u>
1. Floating solids, settleable solids, oil, grease, sleek and turbidity.	None which are noticeable in the water or are deposited along the shore or on the aquatic substrata in quantities detrimental to the natural biota.
2. Toxic or deleterious substances (including mineral acids, caustic alkali, cyanides, heavy metals, carbon dioxide, ammonia or ammonium compounds, chlorine, etc.).	None which would affect humans or be detrimental to the natural aquatic biota.

- | | |
|--|--|
| 3. Color, odor and taste producing substances. | None which are offensive to humans, detrimental to the aquatic biota or capable of producing offensive tastes and/or odors in water supplies and fauna used for human consumption. |
| 4. pH. | Between 6.5 and 8.5 unless naturally outside thereof. |
| 5. Dissolved oxygen. | Not less than 50% of saturation. |
| 6. Thermal discharges. | None which detrimentally affect the natural aquatic biota, or reasonably anticipated reuse of the waters. |
| 7. Coliform bacteria. | The median MPN value in shellfish growing areas shall not be in excess of 70 per 100 milliliters. |

CLASS TW-2 (As amended and filed with Secretary of State January 5, 1966.

Effective date: March 1, 1966).

Definition: Tidal surface waters having limited recreational value and ordinarily not acceptable for bathing but suitable for fish survival although perhaps not suitable for fish propagation. These waters shall not be an odor nuisance and shall not cause damage to pleasure craft having occasion to traverse the waters.

Criteria

- | <u>Conditions</u> | <u>Allowable Limits</u> |
|--------------------------------------|--|
| 1. Floating solids, oil and grease. | None which are noticeable in the water or contribute to the formation of sludge deposits along the shores. |
| 2. Toxic and deleterious substances. | None in such concentrations as to cause fish mortality or inhibit their natural migration. |

- | | |
|---|--|
| 3. Taste and odor producing substances. | None, either alone or in combination, which are offensive or that would produce offensive tastes and/or odors in fauna used for human consumption. |
| 4. pH. | Between 6.5 and 8.5 unless naturally outside thereof. |
| 5. Dissolved oxygen. | Not less than 50% saturation. |
| 6. Thermal discharges. | None which detrimentally affect reasonably anticipated reuse of the waters. |

Class TW-3

Definition: Tidal surface waters used primarily for navigation, not recreation. These waters, although not expected to be used for fishing, shall provide for fish survival. These waters shall not be an odor nuisance and shall not cause damage to pleasure craft traversing them.

Criteria

<u>Conditions</u>	<u>Allowable Limits</u>
1. Floating solids, settleable solids, oil and grease.	None which are noticeable in the water or contribute to the formation of sludge deposits along the shores.
2. Toxic and deleterious substances.	None in such concentrations as to cause fish mortality or inhibit their natural migration.
3. Taste and odor producing substances.	None which shall be offensive or that would detrimentally affect finfish, shellfish or other aquatic life in higher quality waters.
4. pH.	Between 6.5 and 8.5 unless naturally outside thereof.
5. Dissolved oxygen.	Not less than 30% of saturation or 3.0 p.p.m., whichever is less

Coastal Waters

The surf waters of the Atlantic Ocean are classified as Class CW-1.

Class CW-1

Definition: Ocean surf waters expected to be suitable for recreation use.

Criteria

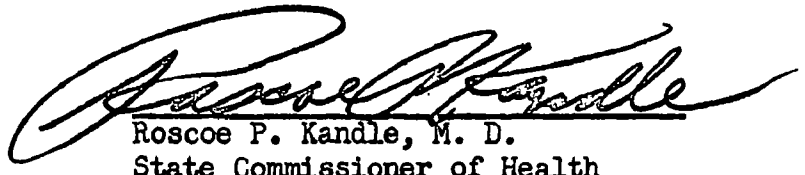
<u>Conditions</u>	<u>Allowable Limits</u>
1. Floating solids, settleable solids, oil, grease and turbidity.	None of which are noticeable in the water or contribute to the formation of sludge deposits along the shores.
2. Toxic and deleterious substances.	None which would affect humans or be detrimental to the natural aquatic biota.
3. Color, taste and odor producing substances.	None which are offensive to humans, detrimental to aquatic biota or capable of producing offensive tastes and/or odors in fauna used for human consumption.

RULES AND REGULATIONS

* * *

The State Department of Health of the State of New Jersey, pursuant to the authority vested in it by Chapter 177, Laws of 1947, hereby amends that portion of Regulations Establishing Certain Classifications to be Assigned to the Waters of this State and Standards of Quality to be Maintained in Waters So Classified relating to Class FW-2, FW-4 and Coastal Waters filed with the Secretary of State on August 10, 1964.

STATE DEPARTMENT OF HEALTH OF THE STATE OF NEW JERSEY



Roscoe P. Kandle, M. D.
State Commissioner of Health

Effective Date: May 1, 1967

Filed with Secretary of State: March 6, 1967

Class FW-2

Definition: Fresh surface waters approved as sources of public potable water supply. These waters are to be suitable for public potable water supply after such treatment as shall be required by the State Department of Health. These waters shall be suitable also for all recreational purposes including fishing, the propagation and migration of native fish species desired for angling and other fish and aquatic life necessary thereto as well as any other reasonable uses.

Class FW-4

Repealed

Coastal Waters

The waters of the Atlantic Ocean within 1500 feet from mean low tide or to a depth of 15 feet, whichever is more distant from the mean low tide line, are classified as CW-1.

The waters of the Atlantic Ocean not included under Class. CW-1 are classified as CW-2, out to the three (3) mile limit.

Class. CW-1

Definition: Ocean waters expected to be suitable for all recreational purposes including fishing, the propagation and migration of native fish species desired for angling and other fish and aquatic life necessary thereto as well as any other reasonable use.

Criteria

<u>Conditions</u>	<u>Allowable Limits</u>
1. Floating solids, settleable solids, oil, grease and turbidity.	None of which are noticeable in the water or contribute to the formation of sludge deposits along the shores.
2. Toxic and deleterious substances.	None which would affect humans or be detrimental to the natural aquatic biota.
3. Color, taste and odor producing substances.	None which are offensive to humans, capable of producing offensive tastes and/or odors in fauna used for human consumption.
4. pH	Between 6.5 and 8.5 unless naturally outside thereof.
5. Dissolved Oxygen	Not less than 50% saturation.
6. Thermal Discharges	None which detrimentally affect the natural aquatic biota.

Class. CW-2

Definition: Ocean waters expected to be suitable for all recreational uses, including those in Class. CW-1, except bathing.

Criteria

<u>Conditions</u>	<u>Allowable Limits</u>
1. Floating solids, settleable solids, oil, grease and turbidity.	None of which are noticeable in the water or contribute to the formation of sludge deposits along the shores.

Conditions

Allowable Limits

- | | |
|---|--|
| 2. Toxic and deleterious substances. | None which would affect humans or be detrimental to the natural aquatic biota. |
| 3. Color | None which would impair the quality of CW-1 waters or detrimental to aquatic biota. |
| 4. Taste and odor producing substances. | None which are offensive to humans, or capable of producing tastes and/or odors in fauna used for human consumption. |
| 5. Dissolved Oxygen | Not less than 50% saturation. |
| 6. Thermal Discharges | None which detrimentally affect the natural aquatic biota. |

REGULATIONS CONCERNING CLASSIFICATION OF THE SURFACE
WATERS OF THE ATLANTIC COASTAL PLAIN

- WHEREAS, the State Department of Health of the State of New Jersey did promulgate "Regulations Establishing Certain Classifications to be Assigned to the Waters of this State and Standards of Quality to be Maintained in Waters so Qualified," effective September 1, 1964, and amended the said Regulations on January 5, 1966 and March 6, 1967, and
- WHEREAS, in public hearings conducted by the State Department of Health on March 15, 22 and 29, 1967, classifications of the surface waters of the Atlantic Coastal Plain, as proposed by the State Department of Health, were presented to the general public, and
- WHEREAS, the State Department of Health has given careful and thorough consideration to all statements submitted at said hearings, as well as statements and briefs submitted thereafter, relating to the proposed Classifications of the Surface Waters of the Atlantic Coastal Plain,
- NOW, THEREFORE, the State Department of Health promulgates the following regulations entitled "Classification of the Surface Waters of the Atlantic Coastal Plain."

NEW JERSEY STATE DEPARTMENT OF HEALTH

Roscoe P. Kandle, M.D.
State Commissioner of Health

Filed with Secretary of State: April 27, 1967

Effective Date: May 24, 1967

CLASSIFICATION OF THE SURFACE WATERS OF THE
ATLANTIC COASTAL PLAIN

Pursuant to authority vested in it under the provisions of Chapter 12, Title 58 of the Revised Statutes, the State Department of Health hereby promulgates the following classifications of the surface waters of the Atlantic Coastal Plain. Standards of Quality to be maintained in these waters as established by the State Department of Health are attached hereto.

I. Class FW-1

Waters having the potential for this Class but which are not classified as such at this time may be recommended for such classification by public or private interests controlling the land area draining to the watercourse. Because of the restrictive-use nature of the FW-1 classification any waters thus designated must be contiguous with their source. Also, since the characteristics of surface waters are sometimes changed to the detriment of their natural biota by seemingly minor associations with domestic and/or agricultural activities, they must be inspected and approved before being classified. Requests for consideration in the classification of FW-1 waters should be directed to:

New Jersey State Department of Health
P.O. Box 1540
Trenton, N. J. 08625

A. FW-1 Manasquan River Drainage

Allaire State
Park

1. That portion of the second southerly tributary of the Manasquan River west of Hospital Road situated wholly within the Allaire State Park boundaries.
2. The easterly tributary of the brook feeding Brisbane Lake located wholly within the Allaire State Park boundaries downstream to its confluence with the westerly tributary.

B. FW-1 Cedar Creek Drainage

Greenwood
Forest Fish
& Game Tract

1. Webbs Mill Branch and tributaries situated wholly within the Greenwood Forest boundaries.
2. Chamberlain's Branch and tributaries situated wholly within the Greenwood Forest boundaries upstream from the blueberry farm exception, also other tributaries to Chamberlain's Branch situated wholly within the Greenwood Forest Tract boundaries.

FW-1 Wading River Drainage

1. Westerly tributary to the Howardsville Cranberry Bog Reservoir and tributaries thereto situated wholly within the Greenwood Forest Tract boundaries.

C. FW-1 Barnegat Bay Drainage

Island Beach
State Park

1. All the fresh water ponds on Island Beach State Park.

D. FW-1 Manahawkin Creek Drainage

1. Tommy's Branch from its headwaters downstream to the Bass River State Forest Recreation Area service road.
2. Falkenburg Branch of Lake Absegami from its headwaters downstream to the lake.

E. FW-1 Mullica River Drainage

Wharton Tract

1. Deep Run and tributaries thereto from its headwaters downstream to Springer's Brook.
2. Skit Branch from its headwaters downstream to its confluence with Robert's Branch.
3. Tulpehocken Creek and tributaries thereto from its origin downstream to its confluence with Featherbed Branch.
4. The westerly tributaries to Tulpehocken Creek and those natural ponds within the lands bounded by Hawkins Road, Hampton Gate Road, and Sandy Ridge Road.
5. Stream in the southeasterly corner of the Wharton Tract lying between Ridge Road and Seaf Weeks Road down to the Wharton Tract boundary.
6. Brook and tributaries between and immediately to the west of Tylertown and Crowleytown from its headwaters downstream to the head of tide at mean high water.
7. The easterly branches of the Batsto River from Batsto Village upstream to the confluence of Skits Branch.
8. Gun Branch from its headwaters downstream to U. S. Route 206.

NOTE: All boundaries referred to as they existed
December 1966.

F. FW-1 Great Egg Harbor River Drainage

Tuckahoe Public
Hunting and
Fishing Grounds

1. Hawkin's Creek and the next adjacent tributary to the Great Egg Harbor River lying to the north from their origin downstream to where the influence of impounding occurs.

II. Class FW-2

- A. Cranberry Brook and tributaries thereto upstream from the intake of the Monmouth Consolidated Water Company near the New York-Long Branch Railroad Crossing.
- B. Shark River and tributaries thereto upstream from Ramson's Mill Road.
- C. Jumping Brook and tributaries thereto above intake of Monmouth Consolidated Water Company near Old Corlies Avenue.
- D. Main stem of Manasquan River and tributaries thereto upstream from Garden State Parkway.
- E. All fresh waters of the Plain, from Manasquan River to and including the Mullica River, upstream from the head of tide.
- F. Absecon Creek and tributaries thereto upstream from Atlantic City Reservoir Dam in the City of Absecon.
- G. Patcong Creek and tributaries thereto upstream from Patcong Lake Dam.

III. Class FW-3

- A. Lake Takanassee
- B. Poplar Brook

Deal Lake and tributaries\thereto
Sunset Lake and " "
Lake Wesley and " "
Fletcher Lake and " "
Sylvan Lake and " "

- C. Shark River and tributaries thereto downstream from Ramson's Mill Road to head of tide.
- D. Jumping Brook and tributaries thereto downstream from Old Corlies Avenue to head of tide.
- E. Silver Lake and tributaries thereto
Lake Como " " "
Spring Lake " " "
Wreck Pond " " "
- F. Fresh water reaches of main stem of Manasquan River and tributaries downstream from Garden State Parkway.
- G. Absecon Creek and tributaries thereto downstream from above dam to head of tide.

- H. Patcong Creek and tributaries thereto downstream from Patcong Lake dam to head of tide.
- J. All other fresh waters of the Plain not delineated upstream from head of tide.

IV. Class TW-1

- A. All tidal waters of Shark River and tributaries thereto from head of tide to surf waters.
- B. All tidal waters of Jumping Brook and tributaries thereto downstream from head of tide to Shark River and to surf waters.
- C. Tidal waters of main stem of Manasquan River and of tributaries thereto downstream from near the Garden State Parkway to surf waters.
- D. All other tidal waters of the Plain downstream from the head of tide to surf waters.

V. Class CW-1

Ocean waters within 1,500 feet from mean low tide to a depth of 15 feet, whichever is more distant from the mean low tide line, from Sandy Hook to Cape May Point.

VI. Class CW-2

Ocean waters of the Plain not included under Class CW-1 out to the "three mile limit."

Filed with the Secretary of State: April 27, 1967

Effective Date: May 24, 1967

REGULATIONS CONCERNING TREATMENT OF WASTEWATERS, DOMESTIC AND INDUSTRIAL
SEPARATELY OR IN COMBINATION, DISCHARGED INTO THE WATERS OF THE ATLANTIC
COASTAL PLAIN, INCLUDING THE ATLANTIC OCEAN

WHEREAS, the State Department of Health is charged with the responsibility for the Water Pollution Control Program, including the approval of the designs of wastewater treatment facilities, in the State of New Jersey, and

WHEREAS, the citizens of this State, particularly the citizens in the Atlantic Coastal Plain, have been obliged in recent years to suffer repeatedly the consequences of serious oxygen depletion and other exemplifications of pollution in waters of the Atlantic Coastal Plain, said exemplifications of water pollution constituting threats to the public health, comfort or property of citizens of this State, and

WHEREAS, the State Department of Health did promulgate rules and regulations entitled "Regulations Establishing Certain Classifications to be Assigned to the Waters of this State and Standards of Quality to be Maintained in Waters so Classified," effective September 1, 1964, and amended said rules and regulations on January 5, 1966 and March 6, 1967, and

WHEREAS, the State Department of Health has concluded after extensive investigations and analyses of factual data that more intensive treatment of wastewaters must be provided throughout the Atlantic Coastal Plain in order to attain water quality specified by the aforesaid regulations of the Department, and

WHEREAS, the State Department is of the opinion that the attainment and maintenance of water quality in the Atlantic Coastal Plain as specified by the aforesaid regulations of the Department is necessary in order to abate a present threat to the public health, comfort or property of citizens of this State,

NOW, THEREFORE, the State Department of Health promulgates the following regulations entitled "Regulations Concerning Treatment of Wastewaters, Domestic and Industrial, Separately or in Combination, Discharged into the Waters of the Atlantic Coastal Plain, including the Atlantic Ocean."

NEW JERSEY STATE DEPARTMENT OF HEALTH

Filed with Secretary of State: May 1, 1967

Effective Date: June 1, 1967

REGULATIONS CONCERNING TREATMENT OF WASTEWATERS, DOMESTIC AND INDUSTRIAL
SEPARATELY OR IN COMBINATION, DISCHARGED INTO THE WATERS OF THE ATLANTIC
COASTAL PLAIN, INCLUDING THE ATLANTIC OCEAN

Pursuant to the authority vested in it under the provisions of Chapter 12, Title 58 of the Revised Statutes, the State Department of Health hereby promulgates the following regulations concerning treatment of wastewaters, domestic and industrial, separately or in combination, discharged into the waters of the Atlantic Coastal Plain.

- I. Henceforth, domestic wastes, separately or in combination with industrial wastes, prior to discharge into waters of the Atlantic Coastal Plain classified as FW-2 or FW-3 or TW-1, shall be treated to a degree providing, as a minimum, ninety-five percent (95%) of reduction of biochemical oxygen demand at all times including any four-hour period of a day when the strength of the wastes to be treated might be expected to exceed average conditions; it is an objective of this regulation that the biochemical oxygen demand of effluents discharged shall not exceed 15 parts per million.
- II. Henceforth, industrial wastes, prior to discharge into waters of the Atlantic Coastal Plain, classified as FW-2, FW-3 or TW-1, shall be treated to a degree providing, as a minimum, ninety-five percent (95%) of reduction of biochemical oxygen demand at all times and such further reduction in biochemical oxygen demand as may be necessary to maintain receiving waters, after reasonable effluent dispersion, as specified in the rules and regulations entitled "Regulations Concerning Classification of the Surface Waters of the Atlantic Coastal Plain," effective May 24, 1967; it is an objective of this regulation that the biochemical oxygen demand of effluent discharged shall not exceed 15 parts per million.
- III. Henceforth, domestic wastes, separately or in combination with industrial wastes, prior to discharge into waters of the Atlantic Coastal Plain classified as CW-1 or CW-2, shall be treated to a degree providing, as a minimum, eighty-five percent (85%) of reduction of biochemical oxygen demand at all times, including any four-hour period of a day when the average of the wastes to be treated might be expected to exceed average conditions; it is an objective of this regulation that the biochemical oxygen demand of effluents discharged shall not exceed 40 parts per million.
- IV. Henceforth, industrial wastes prior to discharge into waters of the Atlantic Coastal Plain, classified as CW-1 or CW-2, shall be treated to a degree providing, as a minimum, eighty-five percent (85%) of reduction of biochemical oxygen demand at all times and such further reduction of biochemical oxygen demand as may be necessary in order to maintain the receiving waters in a quality as specified by the rules and regulations entitled "Classification of the Surface Waters of the Atlantic Coastal Plain," effective May 24, 1967.
- V. It is recognized, especially in connection with some industrial wastes, that the pollution load imposed upon the waters of the Plain cannot be evaluated fully exclusively by the biochemical oxygen demand test; therefore, each industrial waste problem shall be considered individually and treatment shall be required as needed to effect compliance with the Water Quality Criteria established for the various classifications of waters in the Plain.
- VI. Treatment standards set by these regulations are the minimum acceptable for the Atlantic Coastal Plain. Treatment more intensive than that specified hereinabove shall be provided whenever it is determined by the State Department of Health that such treatment is necessary.

Filed with Secretary of State: May 1, 1967

Effective Date: June 1, 1967



State of New Jersey

DEPARTMENT OF HEALTH

JOHN FITCH PLAZA, P.O. BOX 1540, TRENTON, 08625

ORDER

WHEREAS, the State Department of Health of the State of New Jersey did promulgate "Regulations Establishing Certain Classifications to be Assigned to the Waters of this State and Standards of Quality to be Maintained in Waters so Classified," effective September 1, 1964 and amended the said regulations on January 5, 1966 and March 6, 1967, and

WHEREAS, the State Department of Health of the State of New Jersey did after public hearings conducted by the Department on March 15, 22 and 29, 1967 promulgate regulations entitled "Regulations Concerning Classification of the Surface Waters of the Atlantic Coastal Plain," effective May 24, 1967, and

WHEREAS, the State Department of Health of the State of New Jersey did promulgate regulations entitled "Regulations Concerning Treatment of Wastewaters, Domestic and Industrial Separately or in Combination, Discharged into the Waters of the Atlantic Coastal Plain, including the Atlantic Ocean," effective June 1, 1967, and

WHEREAS, the State Department of Health of the State of New Jersey has found through investigations made by its representatives that the sewage treatment plant owned and operated by the City of Pleasantville, in the County of Atlantic and the State of New Jersey, does not conform to the aforesaid regulations of the State Department of Health, and is inadequate in capacity or unit design to properly care for, treat and dispose of the sewage received therein before an effluent from the said sewage treatment plant is discharged into the waters of the Lakes Bay, being waters of the Atlantic Coastal Plain, being waters of this State, thereby causing or threatening injury to the inhabitants of this State either in their health, comfort or property, and

WHEREAS, the State Department of Health of the State of New Jersey, in consideration of the aforesaid, is of the opinion that in order for the sewage to be properly, adequately and sufficiently treated at the said sewage treatment plant before an effluent is discharged into the said waters of this State, the said sewage treatment plant must be altered, added to or improved in a manner approved by the State Department of Health, and


WHEREAS, it is incumbent upon the State Department of Health of the State of New Jersey to be specific as to the minimum degree of sewage treatment meeting the approval of the said State Department of Health, and a timetable of significant events including the contemplated dates for the completion of construction of sewage treatment projects,

THEREFORE, NOTICE IS HEREBY GIVEN by the State Department of Health of the State of New Jersey pursuant to R.S. 58:12-2 to the City of Pleasantville, in the County of Atlantic and the State of New Jersey, requiring that the said City of Pleasantville must and shall, prior to November 30, 1970, cease the discharge of improperly, inadequately and insufficiently treated sewage into the waters of the Lakes Bay being waters of the Atlantic Coastal Plain, being waters of this State, and must alter add to or improve the sewage treatment plant operated by the City of Pleasantville, including sewage treatment units designed to provide at all times a minimum of ninety-five percent (95%) reduction in biochemical oxygen demand of the sewage received at the said sewage treatment plant, the biochemical oxygen demand of the effluent of said plant not to exceed fifteen (15) parts per million, or, if in lieu of the discharge of the effluent to the Lakes Bay an effluent is to be discharged into the Atlantic Ocean, then the treatment units shall be designed to provide at all times a minimum of eighty-five percent (85%) reduction in biochemical oxygen demand of the sewage received at the said sewage treatment plant, the biochemical oxygen demand of the effluent of said plant not to exceed forty (40) parts per million, and including units for effective year around effluent disinfection, in order that the sewage received therein shall be cared for, treated and disposed of and the effluent discharged in a manner approved by the State Department of Health of the State of New Jersey, and in order that the treatment and disposal of said effluent shall meet the applicable standards of water quality described by regulations of the State Department of Health entitled "Regulations Concerning Classification of the Surface Waters of the Atlantic Coastal Plain," effective May 24, 1967, and, the regulations of the State Department of Health entitled "Regulations Concerning Treatment of Wastewaters, Domestic and Industrial Separately or in Combination, Discharged into the Waters of the Atlantic Coastal Plain, Including the Atlantic Ocean," effective June 1, 1967, and in effecting abatement of pollution of the waters of this State within the time hereinabove provided shall execute the following work performance schedule:

- (1) Complete an engineering report upon the proposed basis of design of additions and alterations with review and approval of same by the State Department of Health on or before April 30, 1968;
- (2) Complete preparation of and secure review and approval of preliminary engineering plans on or before October 30, 1968;
- (3) Complete preparation of and secure review and approval of detailed contract plans and specifications on or before June 1, 1969;
- (4) Award construction contracts on or before October 1, 1969;

- (5) Complete construction on or before November 30, 1970;
- (6) The work performance scheduled herein shall be in conformity with the master engineering plan for sewerage services in the County of Atlantic as approved by the New Jersey State Department of Health and the design of any ocean outfall sewer shall be in conformity with a feasibility study and report upon the design of such ocean outfalls along the coast of Atlantic County as approved by the New Jersey State Department of health.

STATE DEPARTMENT OF HEALTH OF THE STATE OF NEW JERSEY


Richard J. Sullivan, Director
Division of Clean Air and Water

Dated: June 16, 1967

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