

Section III—Status of Pollution

AREA

The Interstate Sanitation District includes within its boundaries in New York State—Westchester County, the easterly part of Rockland County, New York City; Bronx, Manhattan, Queens, Brooklyn and Richmond; Nassau County and the westerly half of Suffolk County; in New Jersey, the District comprises the easterly part of Bergen County along the Hudson River, the eastern and southern parts of Hudson County, Essex County along Newark Bay, Union County along Arthur Kill, Middlesex County along Arthur Kill and Raritan Bay and Monmouth County along Raritan Bay and Sandy Hook Bay.

POLLUTION

Pollution in the tidal waters receiving sewage may be physical, chemical or bacterial in character, or all of these. Physical pollution is caused by suspended matter creating conditions offensive to the senses. Chemical pollution is caused by organic matter and depletes the dissolved oxygen content of the water. Bacterial pollution is caused by disease-producing bacteria.

Physical pollution in New York Harbor consists of putrefying deposits of sewage solids on the bottom and shores of the bay and of floating matters of sewage origin. Discharges of oil, refuse and other wastes from industrial plants and harbor craft augment the effect of pollution from sewage. Black and unsightly water out of which odorous gases are bubbling is further evidence of sewage pollution. It is most marked in tidal estuaries, such as Newtown Creek and Gowanus Canal and Wallabout Basin which serve as open sewers to carry pollution to the bay. It is also very noticeable in slips and similar stagnant areas near sewer outlets.

Our point of vantage is often unsatisfactory to distinguish this condition and fortunately so. Driving along the shore affords only an oblique view, so that the edge of the sewage field merges with the water. Observe, however, how clearly the sewage field is distinguishable in the accompanying aerial photographs.

Organic matter in sewage has a part in both physical and chemical pollution in the harbor. It is offensive in character and action. Composed of unstable complex chemical substances that are excellent food for bacteria, it is readily broken down by biological action into simpler compounds. In the process of decomposition, the bacteria draw upon the dissolved oxygen in the water to meet the needs of their metabolism, thereby continuously reducing the quantity of dissolved oxygen (chemical pollution). As the oxygen in the waters of the harbor is reduced below 70% of the natural quantity, fish life is first threatened and then disappears altogether. So long as some dissolved oxygen is present, the decomposition proceeds without the formation of offensive gases. Eventually, however, when the dissolved oxygen is all gone, putrefaction takes place and produces the nauseous odors that are an accompaniment of the physical pollution in the harbor caused by sewage.

Bacteria in sewage number literally millions even in a thimble full. Most of them are harmless to man and are useful agents in reducing organic substances to a stable, or non-putrescible, condition. Some are pathogens capable of causing typhoid, dysentery and other gastro-intestinal diseases in man. Their presence in waters of the harbor makes it unsafe for shellfish culture or for bathing.

Sewage has been defined by the American Public Health Association as "a combination of



Photographs by Courtesy of New York City Department of Parks

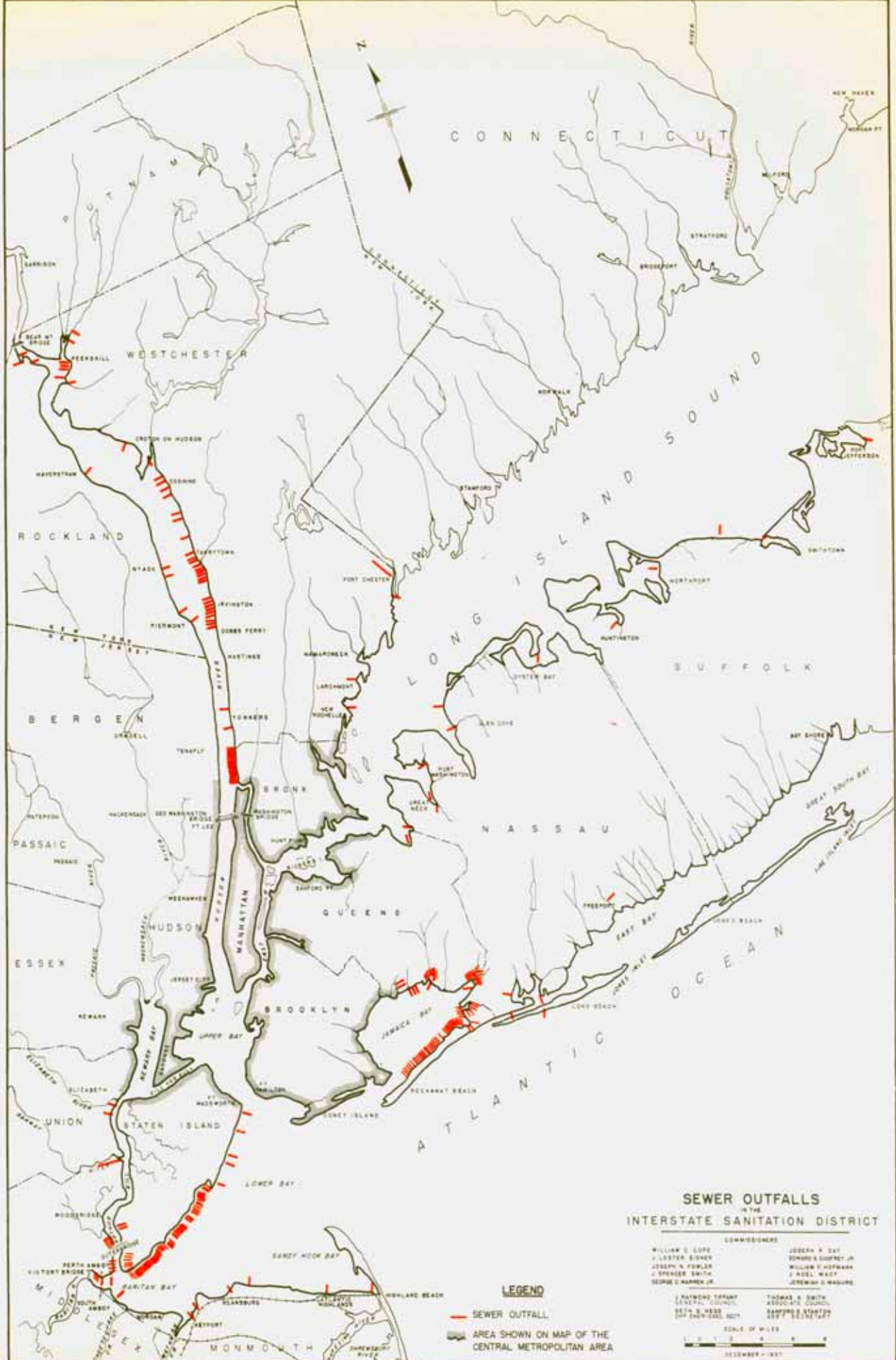
The new Henry Hudson Drive along the Hudson River, New York City, looking north from 72nd St. The discolored water areas show sewage flowing from the 72nd St., 80th St. and 91st St. sewers.

The new East River Drive approach to Triborough Bridge looking north from 90th St. The tide has been running north and just changed to bring fresh water in from Long Island Sound through Hell Gate between Wards and Welfare Islands—at the right edge of picture. The contrast between the grossly polluted water and the inflow from the Sound may be seen.



The discolored area around the end of the pier is sewage from the four-foot sewer at West 46th Street, Manhattan.

Photograph by Courtesy 27th Division Aviation, N.Y.N.G.



SEWER OUTFALLS
IN THE
INTERSTATE SANITATION DISTRICT

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LEGEND

— SEWER OUTFALL

▭ AREA SHOWN ON MAP OF THE CENTRAL METROPOLITAN AREA



DECEMBER - 1937

- (a) the liquid wastes conducted away from residences, business buildings and institutions and
- (b) from industrial establishments, with
- (c) such ground water, surface and storm water as may be admitted or finds its way into the sewers."

Domestic sewage is a combination of elements (a) and (c). Industrial wastes are composed of elements (b) and (c). In appearance, sewage is gray, like dirty, soapy dishwater, with small pieces of floating or settling matter such as fecal solids, paper, rags, matches, grease, vegetable debris, fruit skins, seeds, etc.

Sewage is nearly all (99.9%) water, but the other substances present usually are offensive aesthetically or dangerous to health, or both. The objectionable elements in sewage may be classed as suspended matter (organic and inorganic), organic substances (in suspension and solution) and living organisms, mainly bacteria.

The most offensive constituents of sewage from a sanitary viewpoint are the waste products of the human body. It is this portion of the sewage that contains bacteria of various diseases. Untreated sewage discharged into waterways is a sinister means of transmitting diseases by polluting water supplies, the water at bathing beaches, or by infecting shellfish.

RIVERS ENTERING THE DISTRICT

The waters of the District are greatly influenced by the discharge of rivers into the District waterways. These rivers are listed below:

	<i>Length in Miles</i>	<i>Drainage Area in Square Miles</i>
Bronx River	30	60
Hudson River	300	13,500
Hackensack River	34	202
Passaic River	61	949
Elizabeth River	9	19
Rahway River	17	84
Raritan River	67	1,105
Total of Drainage Area		15,919

In addition to these, there are many small tidal creeks and upland streams, some of which are very badly polluted at the present time, which discharge into the various waters of the District.

POLLUTION ENTERING DISTRICT

Although New York City discharges more sewage into the waterways within the Interstate Sanitation District than all other places combined, nevertheless, a substantial portion of the pollution in these waters originates in other New York State and New Jersey municipalities.

In addition to sewage from New York City, the Hudson River receives sewage along its east shore from Yonkers and other Westchester County municipalities and, along its west shore, from Jersey City, Hoboken, Weehawken and other towns along the New Jersey Palisades and in Rockland County.

Long Island Sound receives sewage mainly from the Westchester municipalities of Pelham, New Rochelle, Mamaroneck and Rye; from Connecticut, the shore municipalities which contribute treated, partially treated and some untreated sewage; and from the Long Island communities of Great Neck, Port Washington, Glen Cove, Oyster Bay and Port Jefferson.

The East River receives sewage from the easterly portion of Manhattan and the Bronx from the northerly part of Queens, and from the northwesterly part of Brooklyn.

In the Upper Bay is the outlet of the Passaic Valley outfall sewer discharging sewage from Newark, Paterson and twenty other municipalities in the Passaic River Valley, N. J. Sewer outlets from lower Manhattan and the western part of Brooklyn also empty into the Upper Bay.

Bayonne, N. J., has sewer outlets into the Upper Bay, Kill van Kull and Newark Bay. The Passaic and Hackensack Rivers empty into Newark Bay, which finds an outlet through Kill van Kull into Upper Bay and

through Arthur Kill into Raritan Bay. Arthur Kill also receives sewage from Staten Island and the discharge of two joint trunk sewers in New Jersey. One of these trunk sewers serves thirteen communities in the Elizabeth River valley and the other serves cities and towns in the Rahway River valley.

The Lower Bay receives New Jersey sewage from New Brunswick, Perth Amboy and other places along the Raritan River and from the coastal communities of Highlands, Keansburg, etc. Sewer outlets along the west shore of Staten Island and the southwest shore of Brooklyn also discharge into the Lower Bay.

The Atlantic Ocean and Jamaica Bay, East Bay and other small bays north of the beaches along the ocean front receive sewage from some of the communities located along the south side of Long Island, including the southern portions of Brooklyn and Queens.

Tides cause tremendously large flows of water into and out of New York Harbor. Unfortunately they do not sweep clean each time. Sewage carried toward the ocean by an ebb tide is partly returned by the succeeding flood tide, tending to diffuse the pollution throughout the harbor. The flow of the Hudson, Passaic and other rivers into the harbor assists in carrying pollution out into the ocean. However, their influence in this respect, as well as in adding to the dilution of the sewage, is relatively small compared with that of the tidal action. Most of the suspended solids in the sewage is deposited on the bottom of the harbor, particularly during periods of slack tides.

SOME SEWAGE TREATMENT REQUIRED AT AN EARLY DATE

The tentative plans of the World's Fair provide for waterway access through a water-gate near the head of Flushing Bay to be made accessible by a suitable channel in the bay. The upper East River has for years been heavily polluted with sewage and Flushing Bay, which drains into it, is con-

taminated not only by tidal waters from the larger body, but by direct pollution from communities around it. The waters in the bay are now not only dangerous for bathing but offensive to eye and nose.

It is hoped that the East River pollution from those parts of Manhattan and The Bronx adjoining the Harlem River will soon be lessened by the completion of the Ward's Island intercepting sewers. This will not be enough to remedy conditions in Flushing Bay, and it is desirable that additional treatment plants to serve areas affecting the waters of Flushing Bay be in operation before the opening of the Fair.

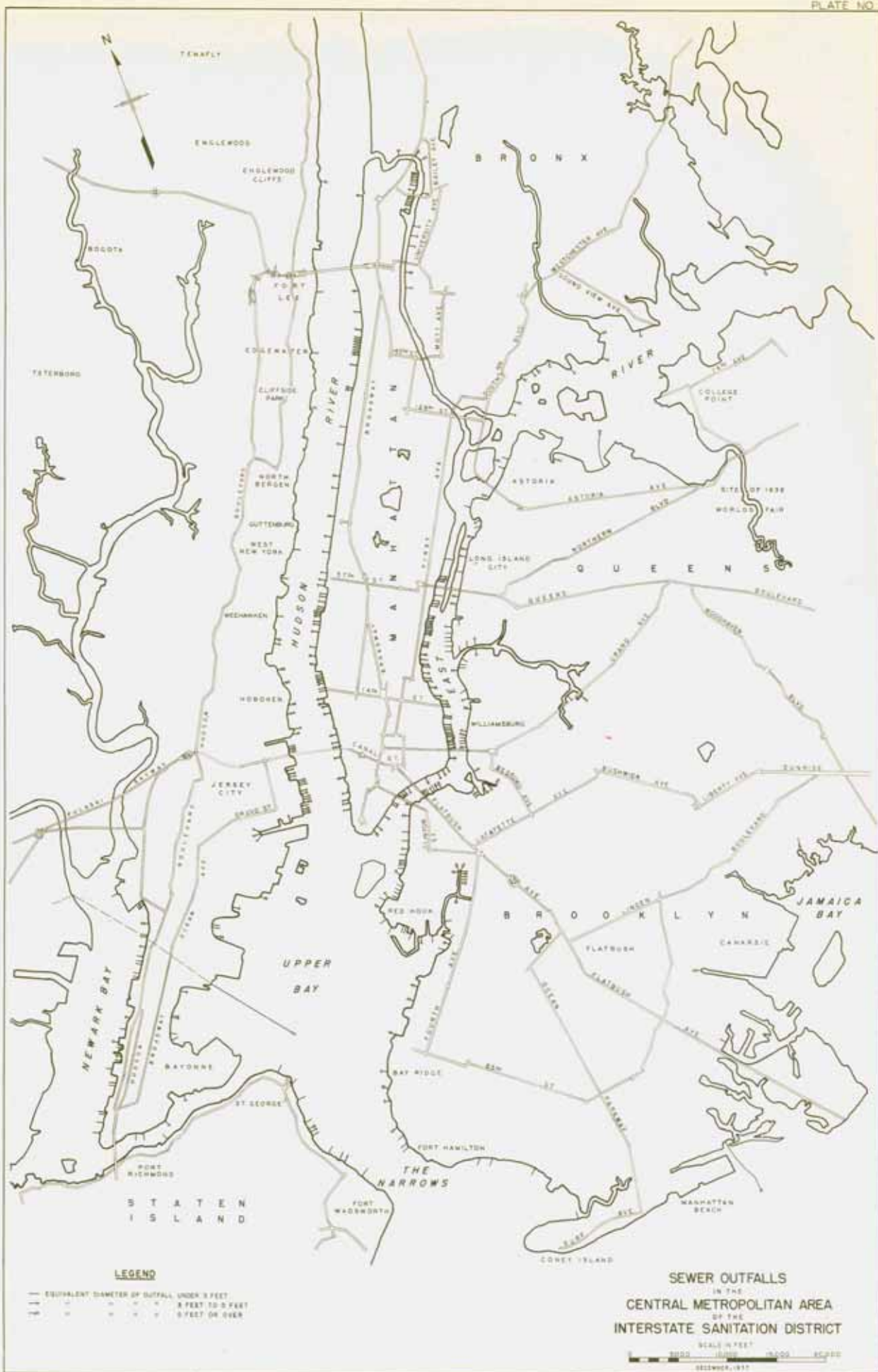
Construction is under way for an activated sludge plant at Tallman's Island which would serve the built-up areas in Flushing, College Point and Whitestone. The initial installation will have a capacity of 40,000,000 gallons daily to serve about 300,000 people.

This project will have the most immediate effect on the conditions in Flushing River and Flushing Bay.

POPULATION

A most satisfactory study of the present and future population of the New York Metropolitan Region as a whole has been made by the Regional Plan Association, Inc. In a recent revision of this entire region for 1940 to be 13,426,000, and that this population will increase to 15,355,000 in 1950 and to 16,379,000 in 1960. In making their estimates, this Commission includes several rural counties which are not within the limits of the Interstate Sanitation District. It is a fact, however, that the drainage from all of the counties included in their estimate and also from other counties of New York State eventually flow into waters which are tributary to the Interstate Sanitation District.

In the following tables, Nos. 1-6, there are given the 1930 populations of the various municipalities in the Sanitation District from which sewage is discharged directly into the various waters in the vicinity of



New York City. The tables further indicate whether or not the sewage is subjected to some kind of treatment to make it less objectionable before it is discharged into the waters of the District. These municipalities are all within the Interstate Sanitation District as defined by legislation. They have been grouped in accordance with the parts of the harbor waters into which the raw or treated sewage is discharged. It should be understood that by the word "treated," it is not intended to convey the meaning that the effluent discharged from the sewage treatment works is in compliance with the terms of the legislation establishing the Interstate Sanitation District. In many instances it is known that the treatment of the sewage is inadequate, and plans are being made for improvements and extension of some of the sewage treatment plants.

The population data does not include any municipalities in the State of Connecticut nor in the State of New York above the northern boundary of Westchester County. The population data is taken from the 1930 Federal Census.

The total population now residing in the District is 9,905,175.

TABLE NO. 1

Population of Municipalities in the Interstate Sanitation District Discharging Raw or Treated Sewage Directly into the Hudson River above the George Washington Bridge. Data from 1930 Census.

	Population Contributing Sewage	
	Untreated	Treatment
New York State—		
Bear Mountain—3 Plants	19,000	
Briarcliff Manor	1,794	
Buchanan	1,346	
Croton-on-Hudson	2,447	
Dobbs Ferry	5,741	
Hastings	7,097	
Haverstraw	5,621	
Irvington	3,067	
Montrose	*	
North Tarrytown	7,417	
Nyack	5,392	
Ossining	15,241	
Peekskill	17,125	

Piermont		1,765
South Nyack	2,212	
Tarrytown		6,841
Verplank	*	
Westchester Trunk Sewers—		
North and South Yonkers Outlets—		
Ardsley		1,135
Bronxville		6,387
East Chester		20,340
Elmsford		2,935
Greenburgh		35,821
Mount Vernon		61,499
North Castle		2,540
North Pelham		4,890
Pelham		2,053
Pelham Manor		4,908
Pleasantville		4,540
Scarsdale		9,690
Tuckahoe		6,138
Valhalla (Est.)		1,600
White Plains		35,830
Yonkers		134,646
West Haverstraw	2,034	800
New York City—		
Bronx	25,000	
Manhattan (Dyckman St.)		36,000
New Jersey State—		
Englewood Cliffs		809
	57,510	444,191

SUMMARY:

Population from which sewage is discharged into the Hudson River from North boundary of Westchester County to the George Washington Bridge—

Untreated	57,510
After some form of Treatment	444,191
	501,701

*Data incomplete, under investigation.

TABLE NO. 2

Population of Municipalities in the Interstate Sanitation District Discharging Raw or Treated Sewage Directly into Long Island Sound and the East River, North of Riker's Island. (Municipalities in Connecticut State omitted from Table.) Data from 1930 Census.

	Population Contributing Sewage	
	Untreated	Treatment
New York State—		
Glen Cove	11,430	
Great Neck	5,824	

Huntington	6,500	
Kings Park State Hospital	6,200	
Larchmont	5,282	
Mineola	8,155	
New Rochelle	54,000	
North Hempstead	4,000	
North Port	2,528	
Oyster Bay	5,500	
Port Chester	22,662	
Port Jefferson	1,300	
Port Washington	6,000	
Sunken Meadows State Park	7,500	
Westchester Trunk Sewers—		
Harrison Town	7,000	
Mamaroneck	11,766	
Rye	8,712	
New York City—		
Bronx*	350,000	
Queens	440,000	40,000
	<u>790,000</u>	<u>214,359</u>

SUMMARY:

Population from which sewage is discharged into Long Island Sound and the East River from Port Jefferson to Riker's Island—		
Untreated	790,000	
After some form of Treatment	214,359	
	<u>1,004,359</u>	

*With the completion of trunk sewer construction the sewage will be treated at the recently completed Ward's Island Sewage Treatment Plant.

TABLE NO. 3

Population of Municipalities in the Interstate Sanitation District Discharging Raw or Treated Sewage Directly into the Hudson River south of the George Washington Bridge, the East River south of Riker's Island and the Upper Bay. Data from 1930 Census.

		<i>Population Contributing Sewage</i>	
		<i>Some Form of</i>	
		<i>Untreated</i>	<i>Treatment</i>
New York State—			
New York City (Est)—			
Bronx	355,000	535,000	
Queens	259,000		
Manhattan	1,166,000	665,000	
Brooklyn	1,970,000		
Richmond	25,000		
New Jersey State—			
Bayonne	58,979		
Cliffside Park		15,267	
Edgewater	4,089		

Fort Lee	8,759	
Guttenberg	6,535	
Hoboken	59,261	
Jersey City	236,715	
Union City	58,659	
Weehawken	14,807	
West New York	37,107	
Passaic Valley Trunk Sewer (1,024,954)		
Belleville		26,974
Bloomfield		38,077
Clifton		46,875
East Newark		2,686
East Orange		68,020
East Rutherford		7,080
Garfield		29,739
Glen Ridge		7,365
Haledon		4,812
Harrison		15,601
Kearney		40,716
Lyndhurst		17,362
Montclair		42,017
Newark		382,037
North Arlington		8,263
Nutley		20,572
Orange		35,399
Passaic		62,959
Paterson		138,513
Prospect Park		5,909
Rutherford		14,915
Wallington		9,063

4,259,911 2,240,221

SUMMARY:

Population from which sewage is discharged into the Hudson River south of the George Washington Bridge, the East River south of Riker's Island and Upper New York Bay—	
Untreated	4,259,911
After some form of Treatment	2,240,221
	<u>6,500,132</u>

TABLE NO. 4

Population of Municipalities in the Interstate Sanitation District Discharging Raw or Treated Sewage Directly into Newark Bay, Kill van Kull and Arthur Kill. Data from 1930 Census.

		<i>Population Contributing Sewage</i>	
		<i>Some Form of</i>	
		<i>Untreated</i>	<i>Treatment</i>
New York State—			
Richmond (Staten Island)	55,000		
New Jersey State—			
Bayonne	30,000		
Jersey City	80,000		

Elizabeth	50,000	
Joint Outlet Sewer (370,780)		
East Orange	13,600	
Hillside	17,600	
Irvington	56,730	
Maplewood	21,320	
Millburn	8,600	
Newark	60,300	
Roselle Park	8,070	
South Orange	13,600	
Summit	15,570	
Union	16,470	
West Orange	24,330	
Elizabeth	64,590	
Rahway Valley Trunk Sewer (59,670)		
Cranford	11,126	
Garwood	3,344	
Rahway	16,011	
Springfield	3,725	
Kenilworth	2,243	
Roselle Park	896	
Westfield	15,801	
Clark Twp.	1,474	
Woodbridge	5,050	
Carteret	13,339	
Linden	21,206	
Woodbridge	10,216	10,000
	259,761	390,450

SUMMARY:

Population from which sewage is discharged into Newark Bay, Kill van Kull and Arthur Kill—		
Untreated	259,761	
After some form of Treatment	390,450	
		650,211

TABLE NO. 5

Population of Municipalities in the Interstate Sanitation District Discharging Raw or Treated Sewage Directly into Raritan Bay, Lower New York Bay and Sandy Hook Bay. Data from 1930 Census.

	Population Contributing Sewage	
	Some Form of	
	Untreated	Treatment
New York State—		
Mount Loretto Home	*	
New York City, Boro of Richmond	20,000	24,000
Richmond Hospital	*	
S. S. White Laboratories	*	
New Jersey State—		
Atlantic Highlands		2,000
Highlands		1,877

Keansburg	2,190
Keyport	4,940
Perth Amboy	43,516
South Amboy	8,476
	28,476
	78,523

SUMMARY:

Population from which sewage is discharged into Raritan Bay, Lower New York Bay and Sandy Hook Bay—	
Untreated	28,476
After some form of Treatment	78,523
	106,999

*Data incomplete, under investigation.

TABLE NO. 6

Population of Municipalities in the Interstate Sanitation District Discharging Raw or Treated Sewage Directly into the Waterways along the South Shore of Long Island, West of Fire Island Inlet. Data from 1930 Census.

	Population Contributing Sewage	
	Some Form of	
	Untreated	Treatment
New York State—		
Beth Page State Park	2,300	
Cedarhurst	5,000	
Central Islip Hospital	8,100	
Freeport	15,467	
Garden City	7,180	
Hempstead	12,650	
Hempstead Lake	9,500	
Jones Beach	100,000	
Lawrence	3,041	
Long Beach	5,817	
New York City—		
Brooklyn	125,000	465,000
Queens		340,000
Pilgrim State Hospital	9,500	
Rockville Center	13,718	
Valley Stream State Park	17,500	
West Long Beach	2,000	
	125,000	1,016,773

SUMMARY:

Population from which sewage is discharged into Waters on the south shore of Long Island, west of Fire Island Inlet—	
Untreated	125,000
After some form of Treatment	1,016,773
	1,141,773

TABLE NO. 7

Summary of Population of Municipalities in the Interstate Sanitation District Discharging Raw or Treated Sewage Directly into the Waterways of the District. Data from 1930 Census.

Section No.	District	Population Contributing Sewage	
		Untreated	Some Form of Treatment
1.	Hudson River above Washington Bridge	57,510	444,191
2.	East River and Long Island Sound North of Riker's Island	790,000	214,359
3.	Hudson River below Washington Bridge, East River South of Riker's Island and Upper New York Bay	4,259,911	2,240,221
4.	Kill van Kull, Newark Bay and Arthur Kill	259,761	390,450
5.	Lower New York Bay Sandy Hook Bay and Raritan Bay	28,476	78,523
6.	South Shore of Long Island, West of Fire Island Inlet	125,000	1,016,773
		<u>5,520,658</u>	<u>4,384,517</u>

SUMMARY:

Population from which sewage is discharged directly into the waters of the Interstate Sanitation District—

Untreated	5,520,658
After some form of Treatment	4,384,517
	<u>9,905,175</u>

Practically all of this population is of an urban character. There are six municipalities in the area, the populations of which are over 100,000. These are as follows:

New York City	6,930,446
Newark	442,337
Jersey City	316,715
Paterson	138,513
Yonkers	134,646
Elizabeth	114,589

Twenty-five of the municipalities have populations of over 25,000. Within the district there are 68 municipalities having populations between 5,000 and 20,000.

In Table No. 8 that follows, there is given a list of municipalities and their populations, not within the Sanitation District, but from which the sewage, either treated or untreated, is discharged into comparatively short waterways which are tributary to the district as defined by law. Most of the sewage from the municipalities listed in the table is treated before it is discharged into the rivers or tidal waters.

TABLE NO. 8

Population of Municipalities from which Sewage, either Treated or Untreated, is Discharged into Rivers (Other than the Hudson) which are tributary to the Waters of the Interstate Sanitation District.

Municipality	Population Contributing Sewage	
	Untreated	Some Form of Treatment
New Jersey—		
Bergenfield-Dumont		14,677
Bernardsville		3,336
Bogota		7,341
Boonton, Dover, etc.		16,807
Bound Brook*	7,372	
Butler-Bloomington		5,935
Caldwell		9,547
Carlstadt		5,425
Chatham-Madison		11,350
East Rutherford		7,080
Englewood		17,805
Essex Fells		1,115
Fairview		9,067
Hackensack		24,568
Hasbrouck Heights		5,658
Highland Park		8,690
Hohokus-Mahwah		3,536
Kearney		40,716
Leonia		5,350
Little Falls		5,161
Little Ferry		4,151
Lodi		1,294
Lyndhurst		17,362
Manville		5,440
Maywood		3,398
Metuchen		5,748
Middlesex Boro		3,504
New Brunswick		34,550
North Arlington		8,263
North Bergen		40,714
North Brunswick		3,622
Oradell		2,360
Palisades Park		7,065
Plainfield, North Plainfield, Dunellen		51,011

Raritan Twp.*	10,025
Red Bank		11,622
Ridgefield		4,671
Ridgefield Park		10,764
Riverside (Bergen Co.)		2,210
Rumson		2,073
Rutherford		14,915
Sayreville*	8,660
Secaucus		8,950
Somerville*	8,255
South Bound Brook		1,763
South River*	10,759
Teaneck Twp.		16,513
Totowa		4,600
Verona		7,161
	45,071	476,888

SUMMARY:

Treatment plant under construction	45,071
Some form of Sewage Treatment	466,888
	<hr/>
	511,959

*Plant under construction.

It can be readily understood that the discharge of sewage from a population as large as that indicated in the above tables must have an injurious effect upon part or all of the waters into which the sewage is discharged unless it is first subjected to proper purification treatment.

Practically all of the New York Metropolitan District is an industrial and commercial development which has grown very rapidly in the past. There is no reason to doubt that this growth will continue, although recent estimates indicate that it will be at a somewhat slower rate. The metropolitan district has well developed transportation facilities which are constantly being expanded. It is needless to point out that this is necessary since New York City and vicinity has developed the greatest amount of ocean commerce on the eastern seaboard. Even as the transportation facilities must be developed, the sanitation of the metropolitan district must be maintained at a high standard for the satisfactory continuation of the growth and the development of the territory.

NEW SOURCES OF WATER SUPPLIES

From a sanitary standpoint, the population studies are significant as they are a measure of the rate at which water used for domestic and manufacturing purposes is converted into sewage. As a further indication of the increased amount of sewage which will be produced in the District in the future, it is of interest to note that the City of New York is now engaged in the construction of the first parts of a water supply system from which 440,000,000 gallons of water per day will be obtained from tributaries of the Delaware River and 100,000,000 gallons daily from Rondout. In New Jersey plans have been made and the necessity fully recognized, for the early construction of a water supply that will be capable of delivering 100,000,000 gallons of additional water daily to the North Jersey metropolitan area. It is probable that this source of supply will be taken from the upper branches of the Raritan River.

The five boroughs of the City of New York in the year 1936 used an average of 972,000,000 gallons of water daily of which 913,000,000 gallons were derived from city water supplies and 59,000,000 gallons were taken from private companies. The maximum water consumption of New York City during the summer months (July 10th) was 1,240,300,000 gallons per day.

It can be seen from the above that the total amount of the new water supplies which are projected for the New Jersey Metropolitan District and for New York City amount to 540,000,000 gallons per day. This is sufficient water to supply approximately 4,500,000 people. If this number of inhabitants is added to the 9,905,000, as listed by the 1930 census figures above, it will be seen that the total population will be about 14,405,000. This figure is somewhat below the population as given by the Regional Plan Association, Inc., for the year 1950 estimate for the entire metropolitan district.

QUANTITY OF SEWAGE

The total quantity of sewage which is produced daily in the Interstate Sanitation District reaches almost inconceivable figures. It is difficult to realize that any body of water could receive 1,608,870,000 gallons of sewage a day without producing a general nuisance. That this was not the case can be attributed to the fact that the large waterways which compose New York Harbor bring each day a very large amount of oxygen into it. This oxygen is used for the oxidization of the sewage organic matter and is nature's means of again purifying the water and converting the putrescible organic matter into an inert stable material. As long as there is a sufficient surplus of oxygen in the waterway, offensive conditions of a general character will not be produced. However, due to the fact that most sewers discharge their contents at or near the shore line, the sewage is not intimately mixed with the fresh sea and upland river water which contains the oxygen required for stabilization.

And as most of the solid materials contained in raw sewage are deposited along the shore by settling out of the mixture of sewage and water and accumulate there, it often happens that, although there is sufficient oxygen present in the whole body of water, local offensive conditions exist along the shore and small estuaries.

In the following table Number 9 is given the quantity of sewage originating in each municipality in the Sanitation District. The table further shows, whether or not the sewage has received some form of treatment before being discharged into the natural waterways and also briefly indicates the kind of sewage treatment provided. For the purpose of facilitating the use of the data in administrative work the table has been arranged in several sections which relate to particular sections of the harbor waters.

Briefly summarized the quantity of untreated sewage which is discharged into the Sanitation District waterways without treatment is 1,066,454,000 gallons daily. An additional quantity of effluents from

sewage treatment plants amounts to 542,416,000 gallons per day. This makes a total quantity of 1,608,870,000 gallons of sewage and sewage effluents which are discharged in the District waters. This amount will be increased from year to year from increasing population and also from the extension and construction of sewer systems in areas in which they do not exist at present.

One billion, six hundred million gallons of sewage each day is an immense quantity. If Central Park were flat and surrounded by a wall, this flow of sewage for one day would fill it to a depth of six feet and the sewage flow for a week would fill it to a depth of forty-two feet. This will give some idea as to the quantity of sewage originating in the Sanitation District each day.

That the discharge of such a very large quantity of untreated sewage has not caused a terrible offensive condition in the past is due to the great natural waterways that comprise the Hudson River and New York Harbor. Nevertheless, it is true that in some of the more restricted areas, such as the Passaic River, the Harlem River and several small inlets and bays, there have been very offensive conditions in the past. Remedial measures, either by changing the location of the sewer outlet or by treating the sewage in some manner, have temporarily abated the offensive conditions or changed their location to less populous districts. It is obvious that with a continual growth in population, there will be a necessary increase in the quantity of sewage originating in the District. Therefore, if present conditions are to be maintained or improved, it is necessary that plans now be made for the construction of additional sewage treatment plants to reduce to a considerable extent the ever increasing burden placed upon the harbor waters. Otherwise the extent of the offensive waterways will be considerably extended. As we find at the end of the year 1937 that 1,066,454,000 gallons of untreated sewage are daily being discharged into a waterway, it is apparent that there is much work to be done both in designing and constructing main sewers and sewage treatment plants.

TABLE NO. 9

Quantity of Sewage, Untreated or Treated in Some Form, which is Discharged into Various Sections of the Waterways included in the Interstate Sanitation District.

Section No.	Municipality	Quantity of Sewage		Treatment	Effluent Discharges Into
		Untreated	Treated		
		(Gallons Daily)			
1 HUDSON RIVER SECTION					
	Bear Mountain		206,000	Sedimentation, Chlorine	Hudson River
	Briarcliff Manor		108,000	Sedimentation, Sand filters Chlorine (4 months)	Pocantico River Hudson River
	Buchanan	*			
	Croton-on-Hudson		300,000	Chlorine	Hudson River
	Dobbs Ferry	574,000		None	Hudson River
	Hastings	700,000		None (Part through North Yonkers)	Hudson River
	Haverstraw	560,000		None	Hudson River
	Irvington	300,000		None	Hudson River
	Montrose	*			
	North Tarrytown		{ 1,000,000	Chlorine	Hudson River
			{ 30,000	Sedimentation	Hudson River
	Nyack	540,000		None	Hudson River
	Ossining		1,525,000	Chlorine (4 Months)	Hudson River
	Peekskill		1,750,000	Chlorine (4 Months)	Hudson River
	Piermont		176,000	Sedimentation	Hudson River
	South Nyack	250,000		None	Hudson River
	Tarrytown		700,000	Chlorine (4 Months)	Hudson River
	Verplank	*			
	Westchester County—				
	North Yonkers		10,600,000	Fine Screens, Chlorine	Hudson River
	South Yonkers		29,200,000	Fine Screens, Chlorine	Hudson River
	West Haverstraw	200,000	75,000	Sedimentation, Chlorine	Minisceongo Creek
	New York City—				
	Bronx	4,250,000		None	Hudson River
	Manhattan (Dyckman St.)		6,120,000	Fine Screens	Hudson River
	Englewood Cliffs, N. J.		216,000	Sedimentation	Hudson River
	Sub-Total	7,374,000	52,006,000		
2 LONG ISLAND SOUND SECTION					
	Glen Cove		1,600,000	Sedimentation, Chlorine	Long Island Sound
	Great Neck (2 Plants)		1,320,000	Sedimentation, Chlorine	Manhasset Bay
	Huntington		600,000	Sedimentation, Chlorine	Huntington Harbor
	King's Park		800,000	Activated Sludge, Chlorine	Long Island Sound
	Larchmont		1,000,000	Sedimentation, Chlorine	Larchmont Harbor
	Mamaroneck		300,000	Sedimentation, Chlorine	Larchmont Harbor
	Mineola		640,000	Activated Sludge, Sand Filters	Ground Water
	New Rochelle		5,400,000	Fine Screens, Chlorine	Long Island Sound
	North Hempsted		300,000	Sedimentation, Chlorine	Little Neck Bay
	Northport		250,000	Sedimentation, Chlorine	Northport Harbor
	Oyster Bay		1,000,000	Sedimentation, Chlorine	Oyster Bay
	Port Chester		2,150,000	Sedimentation, Chlorine	Port Chester Harbor

TABLE NO. 9—Continued

Quantity of Sewage, Untreated or Treated in Some Form, which is Discharged into Various Sections of the Waterways included in the Interstate Sanitation District.

Section No.	Municipality	Quantity of Sewage (Gallons Daily)		Treatment	Effluent Discharges Into
		Untreated	Treated		
	Port Jefferson		120,000	Sedimentation, Chlorine	Port Jefferson Harbor
	Port Washington		800,000	Sedimentation, Chlorine	Manhasset Bay
	Sunken Meadows		75,000	Sedimentation, sub- surface irrigation	Ground Water
	Westchester County Sewers—				
	Mamaroneck		9,670,000	Fine Screens, Chlorine	Long Island Sound
	Blind Brook		1,050,000	Fine Screens, Chlorine	Long Island Sound
	New York City—				
	Bronx	59,500,000		None	East River and Long Island Sound
	Queens	81,600,000		None	East River and Long Island Sound
	North Beach		5,000,000	Fine Screens	Flushing Bay
	Sub-Total	141,100,000	32,075,000		
3	CENTRAL METROPOLITAN SECTION				
	New York City—				
	Bronx	60,350,000		None	East and Harlem Rivers
	Ward's Island		90,950,000	Activated Sludge	East River
	Manhattan	198,220,000		None	Hudson, East Rivers, Upper Bay
	Ward's Island		104,550,000	Activated Sludge	East River
	Canal Street		8,500,000	Fine Screens	Hudson River
	Brooklyn	334,900,000		None	East River and Upper Bay
	Queens	34,030,000		None	East River
	Richmond	4,250,000		None	Upper New York Bay
	Bayonne	7,500,000		None	Upper New York Bay
	Cliffside Park		1,500,000	Sedimentation	Hudson River
	Edgewater	500,000		None	Hudson River
	Fort Lee	1,000,000		None	Hudson River
	Guttenberg	800,000		None	Hudson River
	Hoboken	7,500,000		None	Hudson River
	Jersey City	25,000,000		None	Hudson River
	Union City	7,500,000		None	Hudson River
	Weehawken	1,800,000		None	Hudson River
	West New York	4,600,000		None	Hudson River
	Passaic Valley Trunk Sewer		100,000,000	Sedimentation	Upper New York Bay
	Sub-Total	687,950,000	305,500,000		

TABLE NO. 9—Continued

Quantity of Sewage, Untreated or Treated in Some Form, which is Discharged into Various Sections of the Waterways included in the Interstate Sanitation District.

Section No.	Municipality	Quantity of Sewage		Treatment	Effluent Discharges Into
		Untreated	Treated (Gallons Daily)		
4 KILLS AND NEWARK BAY SECTION					
	New York City—				
	Richmond	9,350,000		None	Kill van Kull and Arthur Kill
	Bayonne	3,000,000		None	Kill van Kull and Newark Bay
	Jersey City (80,000)	15,000,000		None	Newark Bay
	Elizabeth	10,000,000		None	Arthur Kill, etc.
	Joint Meeting Sewer		22,000,000	Sedimentation, Chlorine	Arthur Kill
	Rahway Valley Sewer		10,000,000	Sedimentation, Chlorine	Arthur Kill
	Carteret	800,000		None	Arthur Kill
	Linden	2,000,000		None	Creek
	Woodbridge	1,200,000	1,000,000	Sedimentation	Woodbridge Creek, etc.
	Sub-Total	41,350,000	33,000,000		
5 LOWER BAY SECTION					
	New York City	3,400,000		None	Raritan, Lower Bay
	(Richmond Boro)		4,080,000		Lower New York Bay
	Atlantic Highlands		600,000	Sedimentation, Chlorine	Sandy Hook Bay
	Highlands		1,200,000	Sedimentation, Chlorine	Sandy Hook Bay
	Keansburg		2,000,000	Fine Screens, Chlorine	Raritan Bay
	Keyport		500,000	Sedimentation, Hypochlorite	Raritan Bay
	Perth Amboy		10,000,000	Chem. prec., Sedimentation, Chlorine	Raritan River
	South Amboy	750,000		None	Raritan River
	Sub-Total	4,150,000	18,380,000		
6 OCEAN SECTION					
	Beth Page Park		50,000	Sedimentation	Ground Water
	Cedarhurst		350,000	Sedimentation	Jamaica Bay
	Central Islip Hospital		800,000	Sedimentation, Sand Filters	Ground Water
	Freeport		1,500,000	Chemical Precipitation, Chlorine	Cow Creek, East Bay
	Garden City		900,000	Sedimentation, Sand Filters	Ground Water
	Hempstead		1,140,000	Sedimentation, Sand Filters	Ground Water
	Hempstead Lake		285,000	Sedimentation, Sub-Surface Irrigation	Ground Water
	Jones Beach		3,000,000	Sedimentation, Sub-Surface Irrigation	Ground Water
	Lawrence		480,000	Sedimentation, Chlorine	Bannister Creek
	Long Beach		1,500,000	Sedimentation, Chlorine	Atlantic Ocean

TABLE NO. 9—Continued

Quantity of Sewage, Untreated or Treated in Some Form, which is Discharged into Various Sections of the Waterways included in the Interstate Sanitation District.

Section No.	Municipality	Quantity of Sewage		Treatment	Effluent Discharges Into
		Untreated	Treated		
	New York City—				
	Brooklyn	161,030,000		None	Coastal Waters
	Coney Island		18,000,000	Sedimentation, 8 Months	
	26th Ward		35,000,000	Chemical Precipitation & Chlorine, 4 Months	Rockaway Inlet
	Queens	23,500,000		Fine Screens	Jamaica Bay
	Hammels		5,300,000	None	Coastal Waters
	Jamaica		29,000,000	Fine Screens	Jamaica Bay
	Pilgrim State Hospital		1,200,000	Fine Screens	Jamaica Bay
	Rockville Center		1,650,000	Sedimentation, Sand Filters	Ground Water
	Valley Stream Park		600,000	Activated Sludge, Pulp Filters, Chlorine	Parson's Creek
	West Long Beach		700,000	Sedimentation, Sub- Surface Irrigation	Ground Water
				Sedimentation, Chlorine	East Rockaway Inlet
	Sub-Total	184,530,000	101,455,000		

SUMMARY

1	Hudson River from the Northerly Boundary of Westchester County to George Washington Bridge	7,374,000	52,006,000
2	Long Island Sound and East River North of Riker's Island	141,100,000	32,075,000
3	Lower Hudson, Upper New York Bay and East River South of Riker's Island	687,950,000	305,500,000
4	Kill van Kull, Newark Bay and Arthur Kill	41,350,000	33,000,000
5	Lower New York Bay and Raritan Bay	4,150,000	18,380,000
6	Tide Waters, South Shore of Long Island, West of Fire Island	184,530,000	101,455,000
	Total	1,066,454,000	542,416,000