

SELECTED DATA FOR STUDY  
of N.Y. Harbor Coliform Densities  
in reference to the  
Auxiliary (Marginal) W.P.Control Program  
for N.Y.C. - D.P.W.  
April 1965

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THE CITY OF NEW YORK  
DEPARTMENT OF PUBLIC WORKS



MUNICIPAL BUILDING

NEW YORK, N. Y., 10007

April 19, 1965

COMMISSIONER  
BRADFORD N. CLARK, P. E.

DEPUTY COMMISSIONERS  
MEYER F. WILES, P. E.  
JOSEPH M. GIBLIN

ADDRESS ALL COMMUNICATIONS TO THE DEPARTMENT

IN REPLY REFER TO

State of New York  
Department of Health  
84 Holland Avenue  
Albany, N. Y. 12208

Gentlemen:

Att: Mr. Irving Grossman, P. E.  
Chief, Water Pollution Control Sec.

As requested by you, please find enclosed two copies of a brochure of selected data for study of New York Harbor coliform densities in reference to the Auxiliary (Marginal) Water Pollution Control Program for New York City.

This brochure has been prepared as a basis for discussion at the meeting called by you for 9:30 A.M. on April 30, 1965, in the Public Health Council Room No. 372, at 80 Centre Street, New York City.

I am scheduled to be out of the city at this time but you are assured that the Department of Public Works will be adequately represented by Mr. Wilbur N. Torpey, Deputy Director of Water Pollution Control, and others.

Very truly yours,

A handwritten signature in cursive script, reading "S. W. Steffensen".

S. W. STEFFENSEN  
Director  
Bureau of Water Pollution Control

Encl.

cc: With Brochures to:

Mr. Thomas R. Glenn, Jr., Chief Engineer  
Interstate Sanitation Commission  
10 Columbus Circle  
New York, N. Y. 10019

Mr. Harold Romer  
New York State Dept. of Health  
93 Worth Street  
New York, N. Y. 10013

Professor Wm. Ingram  
New York City Dept. of Health  
125 Worth Street  
New York, N. Y. 10013

Mr. Paul DeFalco  
U. S. Public Health Service  
42 Broadway  
New York, N. Y. 10004

Mr. John A. Mulcahy, Executive Officer  
New York City Department of Parks  
Arsenal Bldg. 64th St. and 5th Ave.  
New York, N. Y. 10021

City of New York  
Department of Public Works  
Bureau of Water Pollution Control

SELECTED DATA FOR STUDY  
of  
NEW YORK HARBOR COLIFORM DENSITIES  
in reference to the  
AUXILIARY (MARGINAL) WATER POLLUTION CONTROL PROGRAM  
FOR NEW YORK CITY

APRIL, 1965

Prepared for discussion at meeting called  
by the N. Y. State Department of Health for 9:30 A.M.  
on April 30, 1965 in the Public Health Council Room  
No. 372 at 80 Centre Street, N. Y. C.

Note

This brochure contains privileged information which  
is not for public statement or publication without  
the approval of the N. Y. C. Department of Public Works

Table of Contents

- Section 1 - Introduction
- " 2 - Pgs. 1-4 incl. of Greeley and Hansen Report on Elimination of Marginal Pollution, Jamaica Bay, March, 1959.
- " 3 - Pgs. A1, A2, A3, A4 and A10 and prepared summary of Pages A12-A16 from Appendices to above report (with compiler's comments).
- " 4 - a. Location Map of N.Y.C. - D.P.W. Harbor Survey Sampling Stations.  
b. Eight (8) Plates from 1964 Harbor Pollution Survey.  
c. Summary of Coliform Densities - Jamaica Bay August 1964 (Rainfall 0.24 in.).

## INTRODUCTION

New York City embarked on a pollution control construction program some thirty years ago with a view of ultimately taking all the steps necessary to reduce adequately its contribution of pollution to the waters of New York Harbor. This program has been steadfastly directed towards treating all the sewage having its source in New York City to the extent necessary to help raise the quality of the receiving Harbor waters to the standards set forth by the regulatory agencies involved.

In the light of adverse circumstances existing in the sewage collection system, the objective of this program could be satisfied only by dividing it into two phases, namely, (1) the basic program of constructing and operating plants capable of treating all the dry weather sewage flow emanating from within the City and (2) the elimination of pollution resulting from the overflow from combined sewers during periods of substantial rainfall in specific areas that could serve the public for recreation.

The Department of Public Works was assigned the task of constructing and operating the facilities necessary to accomplish these ends. According-

ly, the first phase or basic program has been carried forward to the extent that facilities have been constructed and are actually treating more than 800 MGD by secondary biological processes in 12 plants whose capacity is over 1000 MGD. The steps necessary to provide facilities for an additional 500 MGD of capacity are already underway. Ultimately, the basic program envisions 18 plants with a total capacity of almost 1800 MGD.

The second phase of the program arose because storm overflows from combined sewers represented a serious problem and deterrent, from a bacteriological standpoint, in the use of certain waters for recreational purposes. Consequently, the Department of Public Works enlisted the engineering services of the consulting firm of Greeley and Hansen to evaluate the problem and to make recommendations for restoring certain waters to recreational use. For this reason, they carried on extensive studies of the waters of Jamaica Bay, the Upper East River and Eastchester Bay.

Specifically relevant to Jamaica Bay, the firm of Greeley and Hansen has studied the chemical and bacteriological characteristics of these waters and has recommended that certain remedial measures be taken to recover that area for recreational use. These remedial measures

consisted of effecting modifications and additions to the local sewage collection system as well as constructing Combined Sewer Overflow Works. These works were to be designed with a capacity sufficient to contain all the combined sewer overflow in about one-half of the summer storms and to provide detention for disinfection of the remaining summer storm flows that could not be completely contained.

Accordingly, contracts were let for engineering services to prepare plans and specifications for the construction of these treatment works. When the final design of the first plant had been well advanced, it was decided to review the bacteriological status of the waters of Jamaica Bay, as indicated by the data of the annual Harbor Survey prepared by the Department of Public Works. It was surprising to learn that according to the annual harbor records, the coliform density had been increasing steadily since the engineers had finished their studies. The semi-logarithmic plots of coliform densities over the past decade indicated that the curves had taken straight line form and upward direction. Moreover, this increase in coliform density was noted to have taken place over the



last decade at a constant percentage rate varying from 8 to 18% per year in all the branches of the inner harbor as well as in Jamaica Bay.

Importantly, these curves indicate only the average coliform density and, as such, do not differentiate between dry weather and post storm conditions. For that reason the Coliform data for Jamaica Bay during August, 1964, one of the driest months on record, was separately tabulated. Inspection of these data showed that the coliform counts had risen quite radically even in this dry weather period as compared with the data for the years 1954-1957 studied by the engineering consultants. It became evident, therefore, that the coliform density in 1964 had risen substantially above the allowable safe limit which would render the waters unsuitable for bathing purposes even during dry weather.

In the light of the foregoing, it appears that a problem has emerged in connection with the restoration of certain waters for recreational use. Much effort must be directed towards defining this problem and determining its causes so as to obtain a satisfactory resolution. In the meantime, the recommended construction program will necessarily have to be held in abeyance. The design is proceeding.

REPORT  
ON  
ELIMINATION OF MARGINAL POLLUTION  
JAMAICA BAY  
March, 1959

Greeley and Hansen  
Engineers

1. Objectives

The objectives of the engineering study, in connection with the elimination of marginal pollution in Jamaica Bay, are defined in the contract for engineering services dated May 26, 1958, in part as follows:

"The objective .... is to study what steps should be taken by the City to obtain water of safe quality so that safe bathing will be possible in the areas outlined herein ....."

The areas in Jamaica Bay are defined as follows:

"Waters of satisfactory quality are desired so that safe bathing will be possible at proposed Park Department beach locations in Jamaica Bay and Rockaway Inlet, specifically at Canarsie Beach, Broad Channel, Marine Park and Plumb Beach".

The locations of the proposed beaches are shown on Figure 1.

This report presents a summary of the investigations and studies made, of conclusions resulting from these studies, and of recommendations for remedial measures necessary to accomplish the objectives as defined. Also presented are estimates of initial cost and of costs for operating and maintaining the remedial facilities.

The studies have shown some deficiencies in existing sewerage and drainage systems. Recommendations are presented for needed extensions and improvements to the sewerage and drainage systems which are not classified as remedial measures directly concerned with the elimination of marginal pollution.

## 2. Present Conditions

To be attractive, it is desirable that bathing waters be reasonably clear, although even the best of the ocean beaches sometimes encounter conditions where the waters are turbid and cloudy within the surf line. In general, the waters of Jamaica Bay at the proposed beach locations are reasonably clear and comparable to the ocean beaches. It has been concluded that the physical condition and appearance of the waters at the proposed beach locations will be satisfactory for bathing purposes.

The New York City Health Department has at present selected a B. Coli count of 2,400 per 100 m.l. as the standard for waters considered safe for bathing. This standard appears to be reasonable. Other conditions, determined by a sanitary survey, such as direct pollution, could eliminate any area from use for bathing purposes.

Samples have been taken and analyzed from the waters at or near the proposed beach areas under many conditions and over a period of years. These data have been studied in relation to meteorological and tidal conditions. The samples have been taken in such limited numbers and groupings as to preclude a conclusive determination of relationships between storm overflows, tidal conditions, and other factors, to the apparent range in the B. Coli concentrations. General conclusions, however, can be stated as follows:

- A. The records of analyses indicate that the waters at the proposed beach locations generally can be expected to be within the quality limitations, during long dry periods.
- B. Immediately following heavy rainstorms, the sanitary quality of the water, at the proposed beach locations, deteriorates to a condition with counts above present standards.

These studies have demonstrated the general relationship between beach water quality and overflows of mingled sewage and storm water. The periodic deterioration of quality must be eliminated by treatment of storm water overflows.

### 3. Sewage Treatment at Present

Essentially all of the sewage produced in areas tributary to Jamaica Bay now receives treatment before it is discharged. A sanitary survey by the New York City Department of Health of the Jamaica Bay area, made in 1954, revealed some locations in which sanitary sewage was discharged without treatment. Most of these outlets are from individual houses or business establishments in areas where public sewer systems do not exist at present. The locations of such discharges are shown on Figure 1.

The City of New York, through the Department of Public Works, has constructed and now has in operation four major sewage treatment plants tributary to Jamaica Bay, identified as the Jamaica, the 26th Ward, the Coney Island and the Rockaway Pollution Control Works. The locations of these treatment works and of the points of discharge of treated sewage are shown on Figure 1. At the present time, all of these plants, with the exception of the Coney Island plant, provide treatment by the activated sludge

*We should get a  
Copy of this*

REPORT  
ON  
ELIMINATION OF MARGINAL POLLUTION

JAMAICA BAY

March, 1959

Appendix A

Bacterial Quality of the Waters  
of Jamaica Bay

Bacterial analyses of the waters of Jamaica Bay have been made, over the years, by the Departments of Public Works and Health.

The analyses by the Department of Public Works, in addition to certain physical and other determinations, include counts of B. Cell expressed as the most probable number (M.P.N.) per milliliter. These are single spot samples taken at the top and bottom, made during the annual summer harbor pollution survey. Photostats of the work sheets for the years 1954-1957 have been examined and studied. These results have been tabulated in groups as shown on pages A5 to A8.

In addition to the above more or less routine analyses, the Department of Public Works carried out a special investigation, in August, 1954, of the waters adjacent to

Canarsie. Analyses for B. Coli were made for a continuous period of 17 days with hourly samples taken throughout each 24 hour period. Samples were taken at the Canarsie pier and at the Parkway bridges crossing Paerdegat and Fresh Creek basins, on either side of the Canarsie pier. Meteorological and tidal conditions were noted. This constitutes the most important and informative study available on conditions in this area. The results were plotted by the Department of Public Works and are attached as pages A9, A10 and A11.

Each year the Department of Health makes extensive bacterial analyses of the waters at bathing beaches throughout the City. The records in the Jamaica Bay area for the years 1953-1957 have been examined and studied. Summaries of some of these results are tabulated on pages A12 to A16.

The records from all sources have been examined in an effort to establish the effect of the overflows of mingled sanitary sewage and storm water to the waters of Jamaica Bay during periods of rainfall.

The study of August, 1954 presents a clear indication of the effect of overflows from combined sewers on water quality. During the period of the study, several substantial rainfalls occurred with overflows from the combined sewers at the head of Paerdegat Basin and at Fresh Creek. In each case, following a rain, the quality of the waters

Canarsie deteriorated quickly and the B. Coli counts rose above acceptable standards. Within one or two days following the rains, however, the action of the tides and other influences had so dispersed or destroyed polluting influences that the waters were restored to a standard acceptable for bathing. The conclusion is clear that, except for the influence of untreated storm overflows from combined sewers, the waters would meet present standards for bathing waters. In reaching this conclusion, it must be understood that occasional counts above the standard of bathing waters can occur at times due to disturbance from some transient source that may have little sanitary significance.

The summer survey records of the Department of Public Works have been grouped in two parts, one including those taken within two days of a rain, as recorded at La Guardia Field, and the others taken when there had been no rain for two days. Logarithmic averages of all results over the four year period are shown for the several sampling stations. The results, as shown on pages A17 to A20, are summarized as follows:



	B. Coli - M.P.H. per Ml.		Ratio of Wet Weather Count to Dry Weather Count (1) / (2)
	Rain Within 2 Days (1)	No Rain For 2 Days (2)	
J-1 Rockaway Inlet	18.4	5.23	5.7
J-5 L.I.R.R. Trestle	8.3	2.4	3.5
J-7 Bergen Basin	60.1	34.5	2.33
J-3 Canarsie	134	73.8	2.0

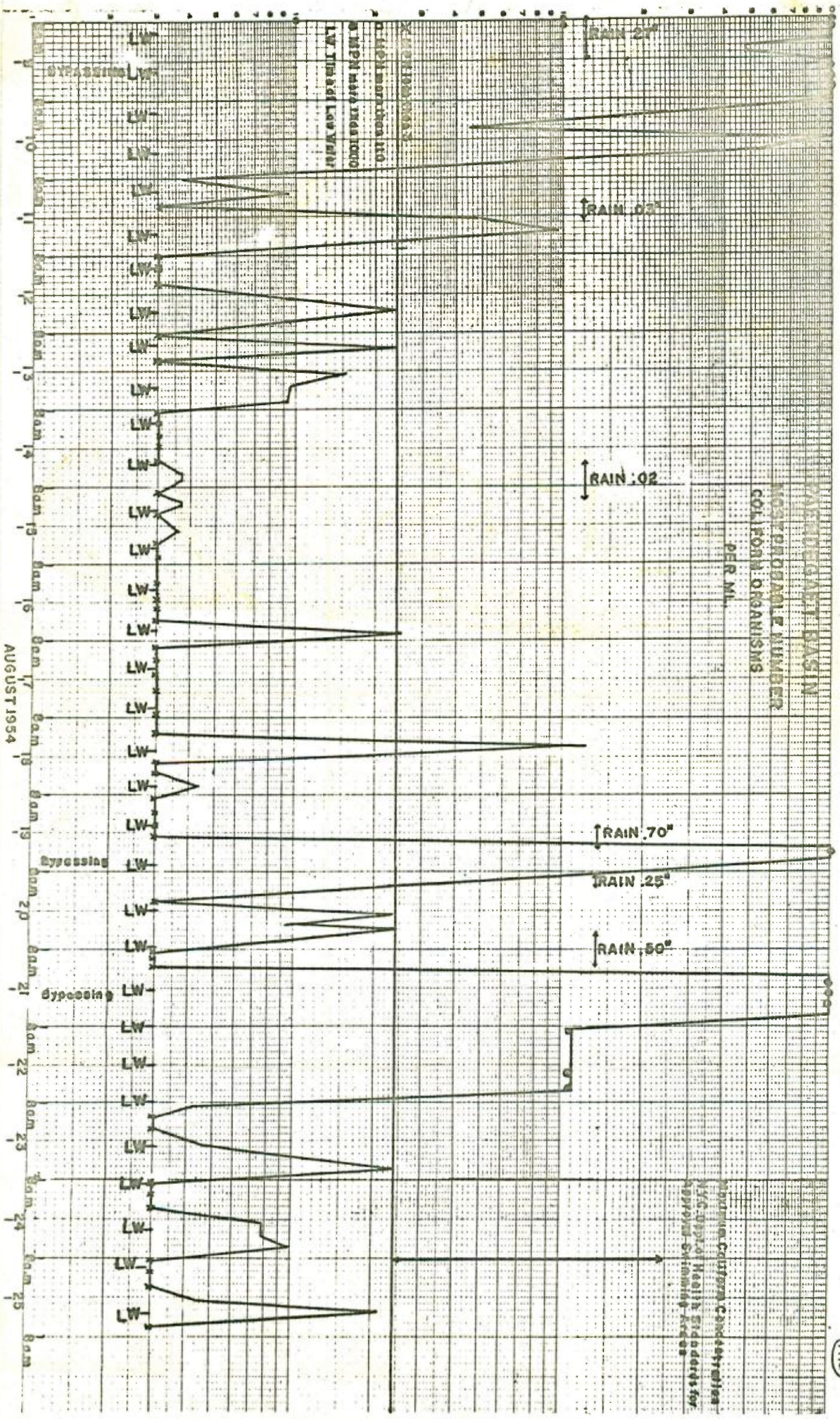
From the foregoing it is apparent that the bacterial content of the waters throughout the bay deteriorates sharply following a rainfall and overflows from combined sewers.

A similar condition is apparent from inspection of the Health Department results shown on pages A12 to A16.

The records of analyses indicate that the waters at the proposed beach locations can generally be expected to be within the quality limitations, except for the influence of overflows of mingled sanitary sewage and storm water from combined sewers.

COMPILER'S COMMENTS FOR THE INFORMATION OF THE READER

1. Pages A5 to A8 were analyzed by the Consultants, transposed to Pages A17 to A20 and a summary of that data is shown on Page A4.
2. The Appendix to the Consultants' report refers to Pages A9, A10 and A11. It was decided, however, that only Page A10 would be included as it is fully representative. (see graph below)



3. Relative to the data secured by the New York City Department of Health, a summary of that data taken directly from the detailed tabulation on Pages A12 to A16 of the Consultants' report is shown herewith.

DEPARTMENT OF HEALTH

DATA FOR

JAMAICA BAY

YEARS 1953 - 1957



DEPT. HEALTH SAMPLING STATIONS *	NUMBER OF SAMPLES	% OF TIME B COLIFORM COUNT WAS FOUND TO BE UNDER 2400/ml.	
		DRY WEATHER	WITHIN 2 DAYS OF SUBSTANTIAL RAIN
CANARSIE	25	50	8
GRASS HASSOCK and at MOTT AVENUE	10	100	100
PLUMB BEACH	8	100	75
CROSS BAY BLVD. adj. to HOWARD BEACH	6	50	50
BROAD CHANNEL (So. End)	21	100	100

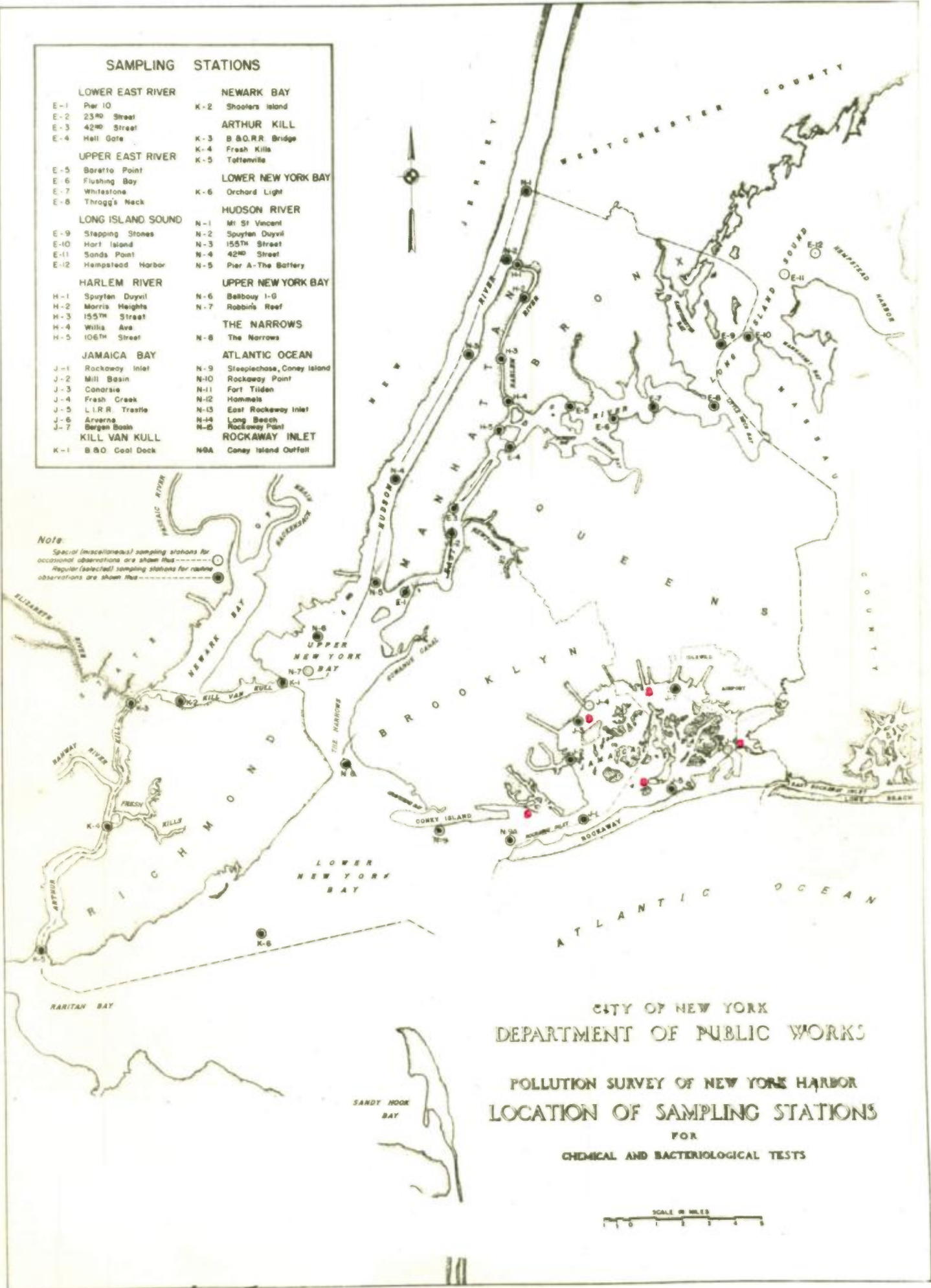
\* The location of the above sampling stations has been superimposed in red on the map entitled "Location of Sampling Stations". (See first page of Section 4.)

### SAMPLING STATIONS

<b>LOWER EAST RIVER</b>		<b>NEWARK BAY</b>	
E-1 Pier 10		K-2 Shooters Island	
E-2 23rd Street		<b>ARTHUR KILL</b>	
E-3 42nd Street		K-3 B.S.O.R.R. Bridge	
E-4 Hell Gate		K-4 Fresh Kills	
<b>UPPER EAST RIVER</b>		K-5 Tottenville	
E-5 Boreto Point		<b>LOWER NEW YORK BAY</b>	
E-6 Flushing Bay		K-6 Orchard Light	
E-7 Whitestone		<b>HUDSON RIVER</b>	
E-8 Throggs Neck		N-1 Mt St Vincent	
<b>LONG ISLAND SOUND</b>		N-2 Spuyten Duyvil	
E-9 Stepping Stones		N-3 155th Street	
E-10 Hart Island		N-4 42nd Street	
E-11 Sands Point		N-5 Pier A-The Battery	
E-12 Hempstead Harbor		<b>UPPER NEW YORK BAY</b>	
<b>HARLEM RIVER</b>		N-6 Belbony I-G	
H-1 Spuyten Duyvil		N-7 Robbin's Reef	
H-2 Morris Heights		<b>THE NARROWS</b>	
H-3 155th Street		N-8 The Narrows	
H-4 Willis Ave		<b>ATLANTIC OCEAN</b>	
H-5 106th Street		N-9 Sleepycove, Coney Island	
<b>JAMAICA BAY</b>		N-10 Rockaway Point	
J-1 Rockaway Inlet		N-11 Fort Tilden	
J-2 Mill Basin		N-12 Hammets	
J-3 Conorsie		N-13 East Rockaway Inlet	
J-4 Fresh Creek		N-14 Long Beach	
J-5 L.I.R.R. Trestle		N-5 Rockaway Point	
J-6 Arverne		<b>ROCKAWAY INLET</b>	
J-7 Bergen Basin		N-6 Coney Island Outfall	
<b>KILL VAN KULL</b>			
K-1 B.S.O. Cool Dock			

**Note**

Special (miscellaneous) sampling stations for occasional observations are shown thus  Regular (selected) sampling stations for routine observations are shown thus 



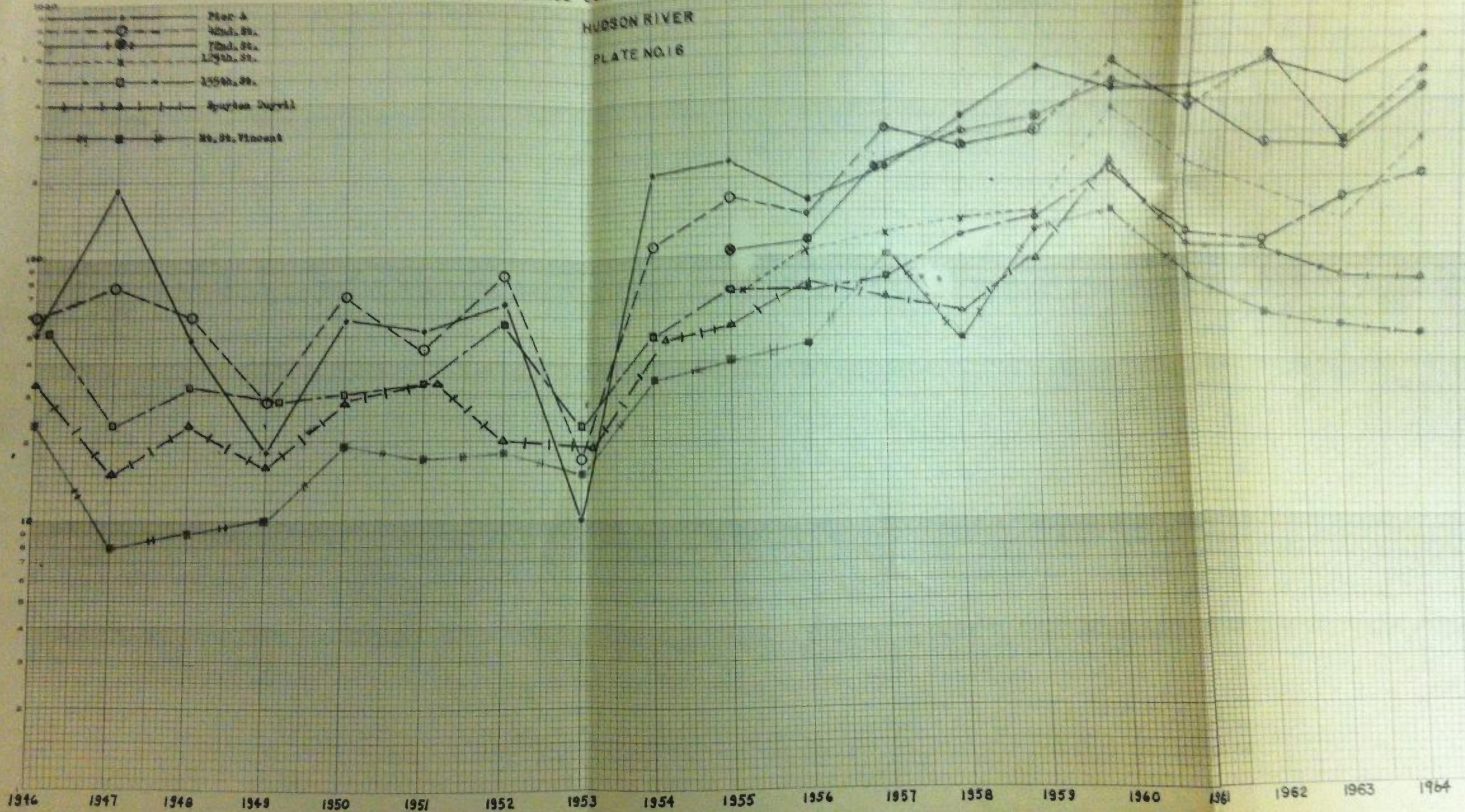
CITY OF NEW YORK  
 DEPARTMENT OF PUBLIC WORKS  
 POLLUTION SURVEY OF NEW YORK HARBOR  
 LOCATION OF SAMPLING STATIONS  
 FOR  
 CHEMICAL AND BACTERIOLOGICAL TESTS

SCALE IN MILES  
 0 1 2 3 4 5

ANNUAL AVERAGE COLIFORM CONCENTRATION /ML.

HUDSON RIVER  
PLATE NO. 16

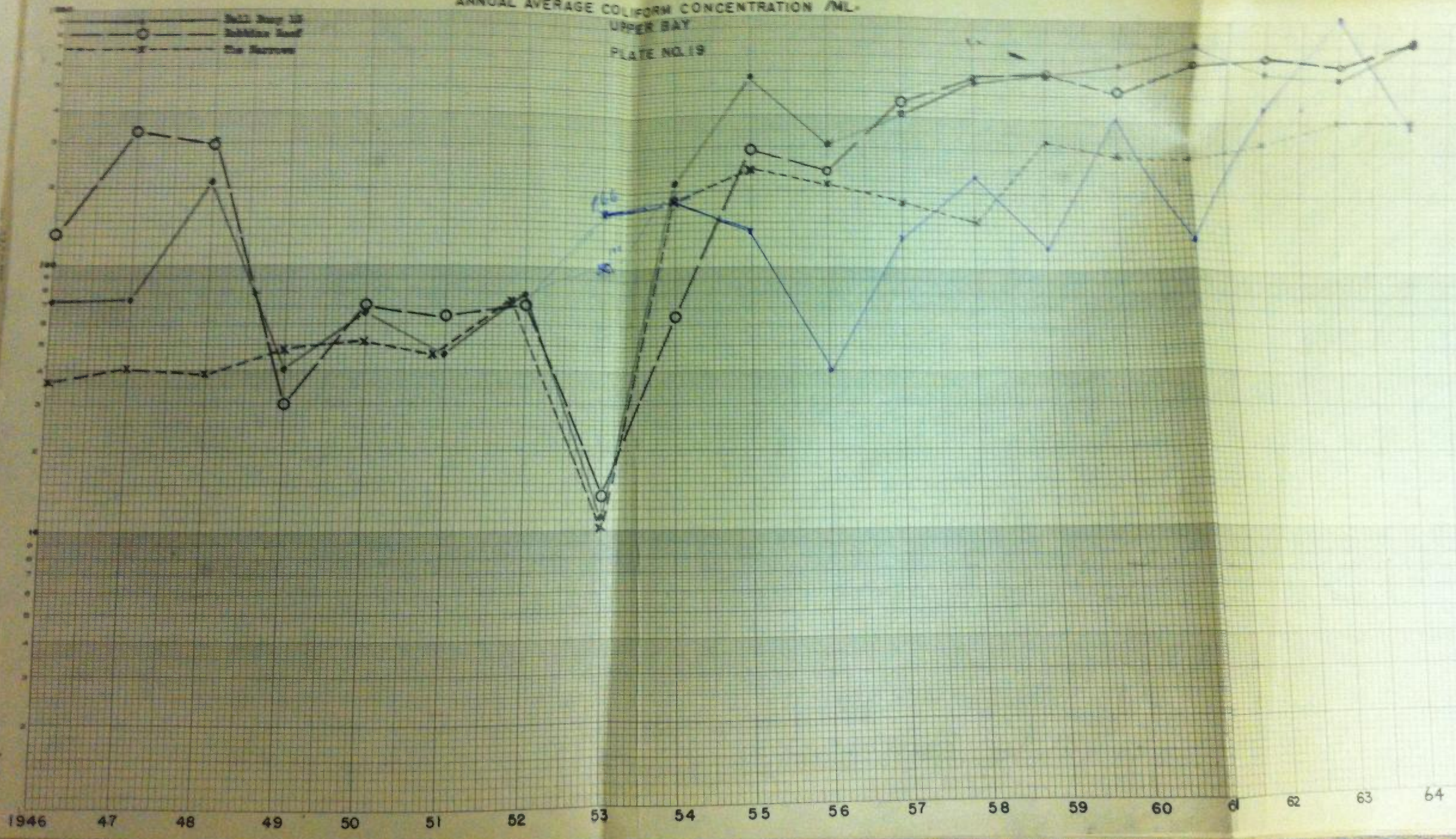
- 1000 ———●——— Pier 4
- 100 ———○——— 42nd St.
- 10 ———●——— 72nd St.
- 1 ———●——— 129th St.
- 155th St.
- Spuyten Duyvil
- No. St. Vincent



THE SEWER & WATER DIVISION HAS BEEN  
 REORGANIZED AND THE DIVISIONS ARE NOW  
 AS FOLLOWS:

ANNUAL AVERAGE COLIFORM CONCENTRATION /ML-  
UPPER BAY  
PLATE NO. 19

—●— Salt Bay 10  
 —○— Middle Reef  
 —x— The Narrows



STANDARDIZATION DIVISION  
 DIVISION OF WATER RESOURCES  
 STATE OF CALIFORNIA

1/a

ANNUAL AVERAGE COLIFORM CONCENTRATION /ML.

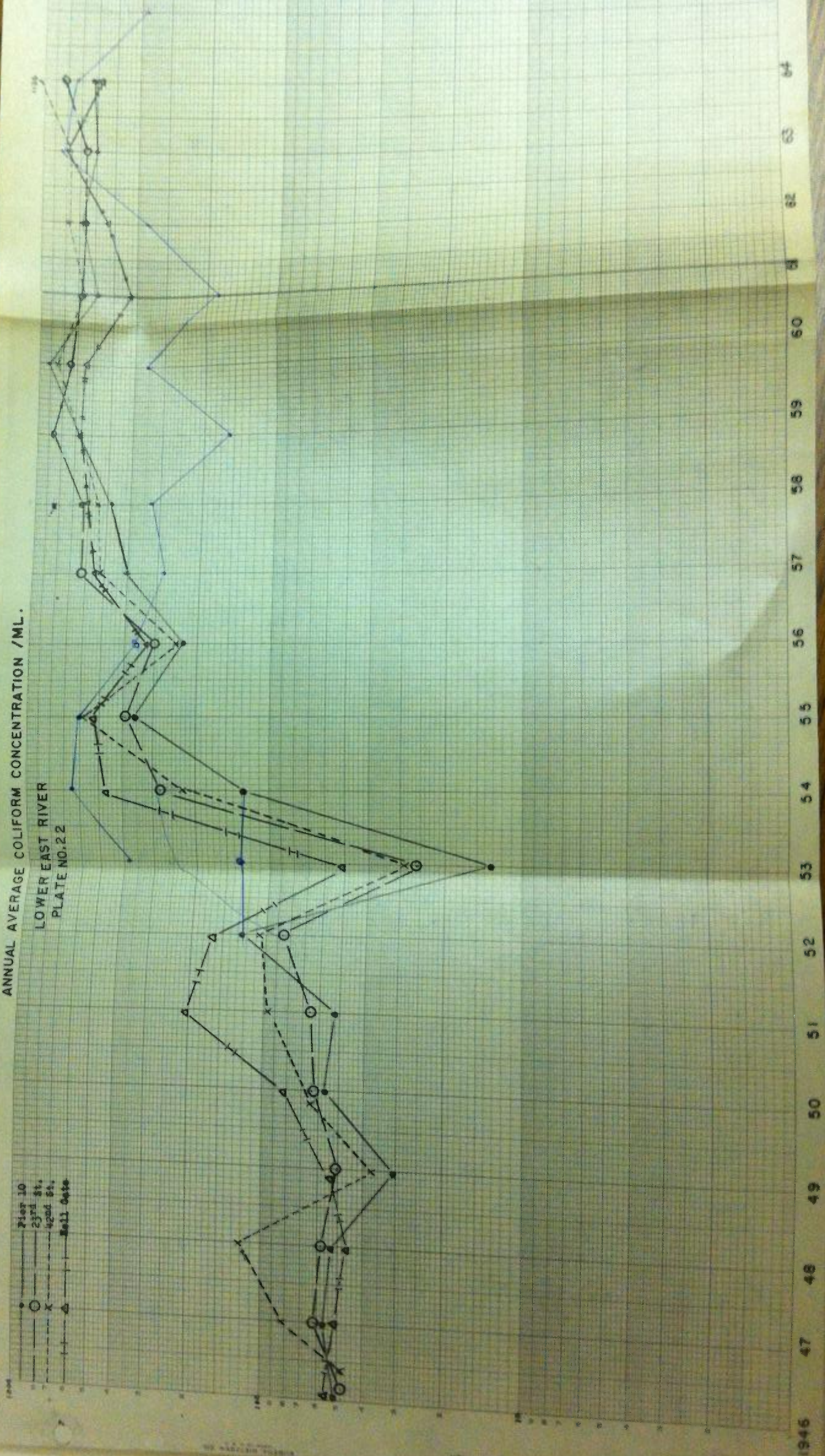
23rd St.  
42nd St.  
Bell Co. Sta.

23rd St.  
42nd St.  
Bell Co. Sta.

1946

LOWER EAST RIVER  
PLATE NO. 22

1964



1946

47

48

49

50

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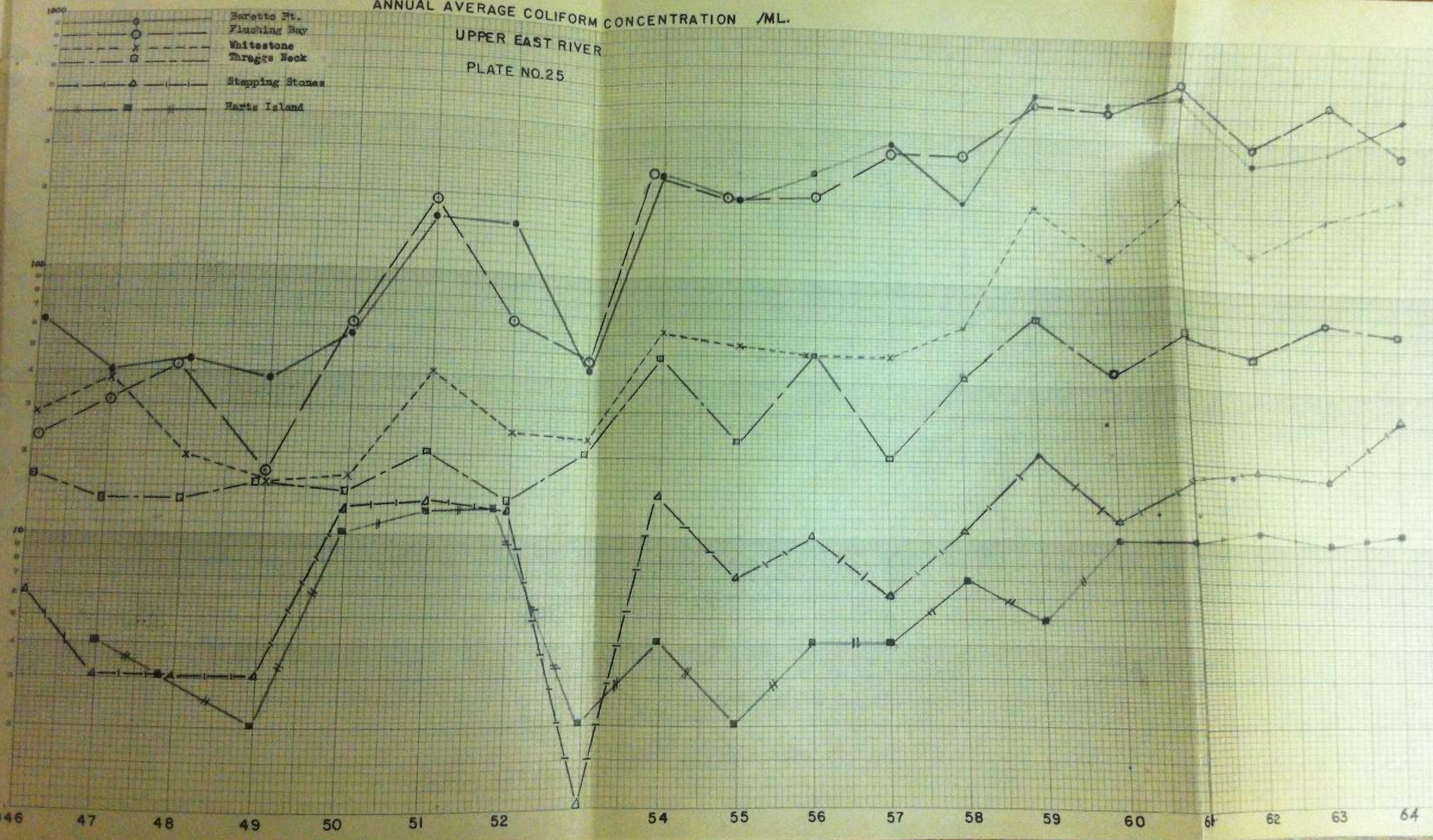
63

64



ANNUAL AVERAGE COLIFORM CONCENTRATION /ML.  
 UPPER EAST RIVER  
 PLATE NO.25

- Beretto Ft.
- Flushing Bay
- x Whitestone
- Throgs Neck
- △ Stepping Stones
- Raritan Island

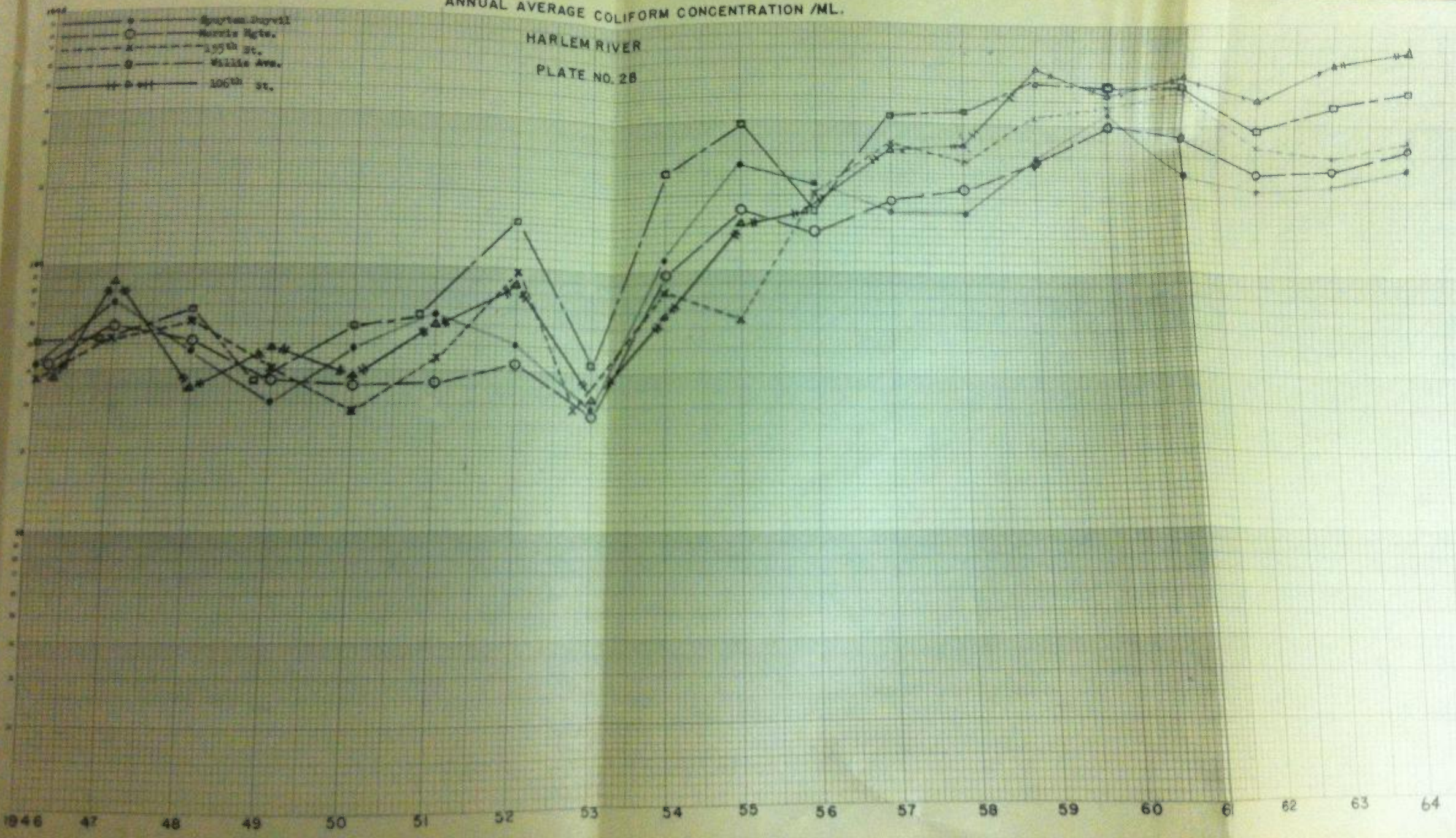


ANNUAL AVERAGE COLIFORM CONCENTRATION /ML.

HARLEM RIVER

PLATE NO. 28

- Spring Canal
- Morris Hgts.
- △ 135th St.
- ⊙ Willie Ave.
- ✱ 106th St.

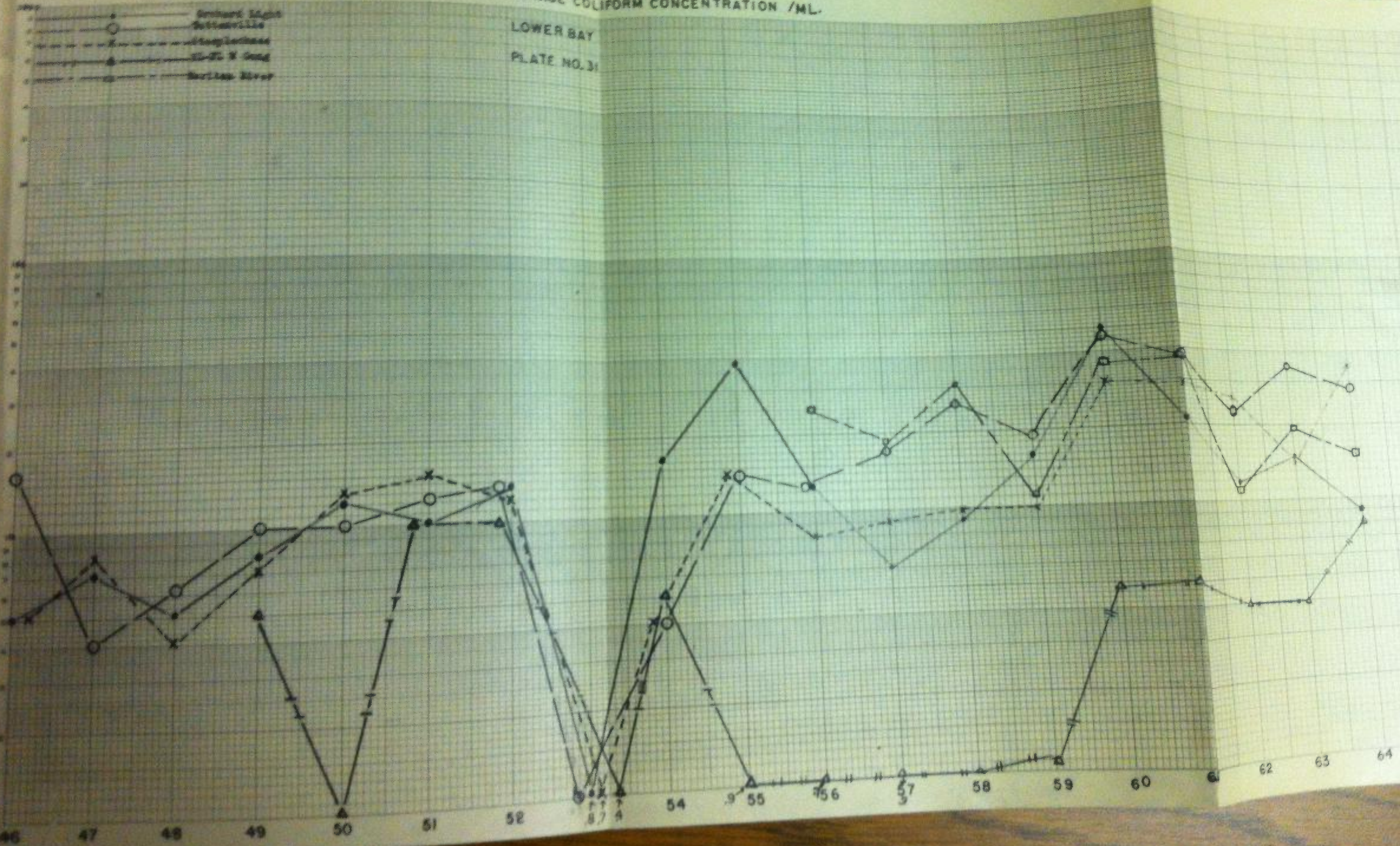


ANNUAL AVERAGE COLIFORM CONCENTRATION /ML.

LOWER BAY

PLATE NO. 31

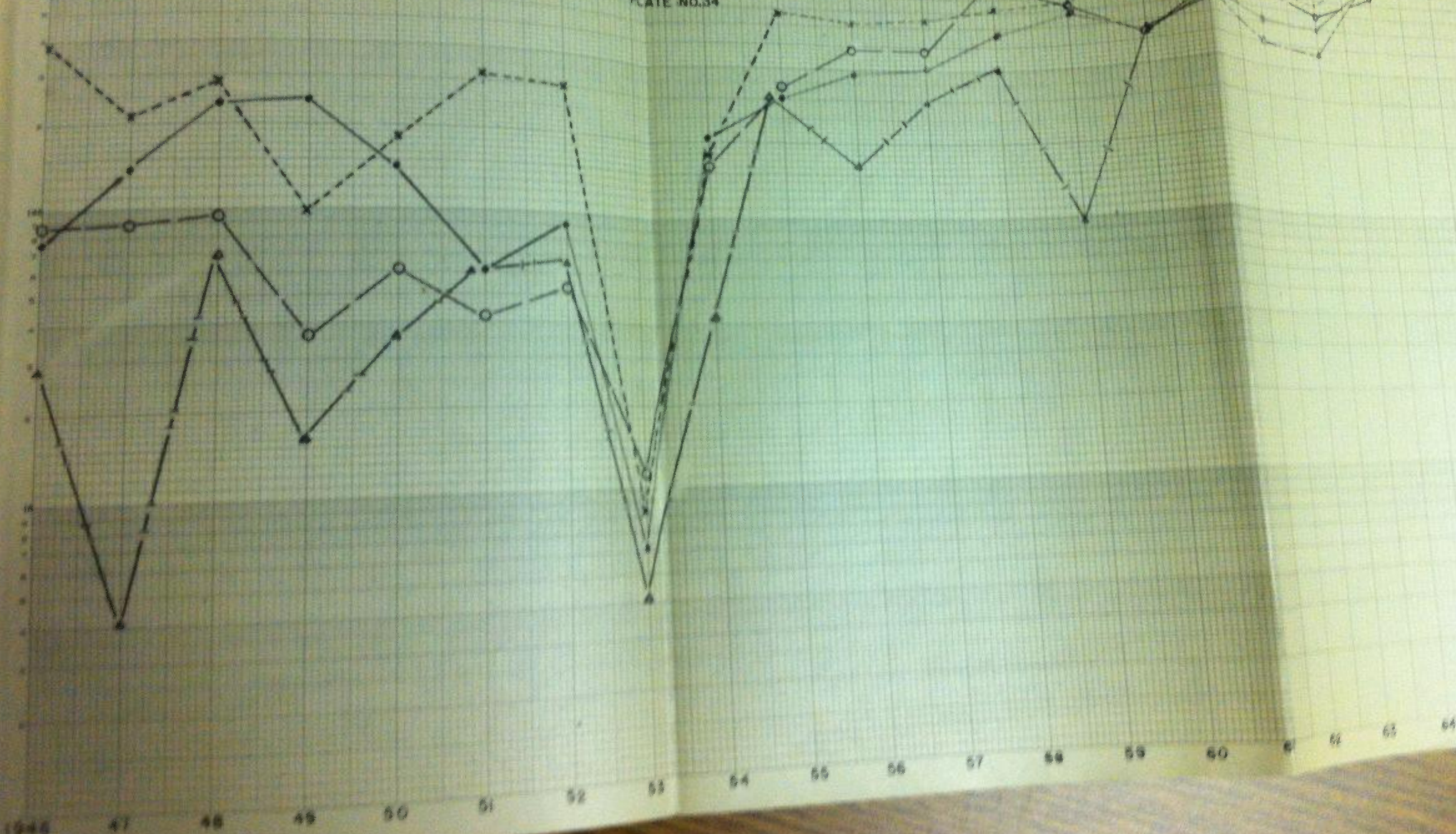
- Edward Light
- Sutterville
- x— Alameda
- ▲— El Estero
- San Juan River



ANNUAL AVERAGE COLIFORM CONCENTRATION /ML.

THE KILLS  
PLATE NO.34

- 1947
- 1946 Dock
- 1946 Motters Island
- 1946 1940 Bridge
- 1946 Fresh Kills



COLIFORM CONCENTRATIONS IN JAMAICA BAY

August 1964

MPN/ML

	<u>Top</u>	<u>Bottom</u>
Coney Island Outfall	24	9.3
	9.3	2.3
	240 E	46
	46	2.3
Rockaway Inlet	24	24
	46	110
	2.3	2.3
	24	24
Railroad Trestle	15	4.3
	15	24
	110	46
	24	7.5
Mill Basin	1100	1100
	2400 E	2400 E
	1100	460
	1100	23
Canarsie Pier	2400 E	1100
	2400 E	1100
	2400 E	2400 E
	2400 E	460
Bergen Basin	240	240
	1100	2400 E
	2400 E	460
	460	1100

MPNs followed by E are the results of applying the next higher MPN to samples in which all tubes were positive.

INTERSTATE SANITATION COMMISSION

PLANT INVESTIGATION DATA

State \_\_\_\_\_ County \_\_\_\_\_ Municipality \_\_\_\_\_

Plant Location \_\_\_\_\_

Date of Investigation	No. of Investigation	AV. Flow M. G. D. Previous 24 hrs	Total Suspended Solids			Calculated Settleable Solids			B.O.D. 5 Day 20°C.			Coliforms			Av. Res. Cl <sub>2</sub>	
			Inf. ppm	Eff. ppm	% Rem.	Inf. ppm	Eff. ppm	% Rem.	Inf. ppm	Eff. ppm	% Rem.	MPN per ml.	% over 1/ml	Lbs. Cl <sub>2</sub> Daily Pre Post		
Jamaica Bay	4/23/65 5367	88.0	238	61	74	133	20	85	256	176	31	5.5	100			
26 Ward	6/24/65 5369	55.6	225	24	89	62	1	98	88	42	52	2240+	100			
Rockaway	7/19/65 5389	21 Rain	174	21	88	—	—	—	194	73	62	1.34	25			
Coney Island	7/19/65 5388	85.6	248	12	95	—	—	—	264	69	74	11.2	75			

120364:k