

INVESTIGATIONS
RE
STEPPINGSTONES BEACH
LITTLE NECK BAY

Preliminary Copy

INTERSTATE SANITATION COMMISSION

New York • New Jersey • Connecticut

INVESTIGATIONS
RE
STEPPINGSTONES BEACH
LITTLE NECK BAY

DECEMBER, 1954
INTERSTATE SANITATION COMMISSION

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TECHNICAL MEMORANDUM

December 3, 1954

INVESTIGATIONS RE STEPPINGSTONES BEACH,
LITTLE NECK BAY.

SUMMARY

Analyses of data obtained by the Nassau County Department of Health, the New York City Department of Public Works, and by the Interstate Sanitation Commission indicate that the coliform densities of the waters in the vicinity of Steppingstones Beach have not changed significantly in the recent past. However, it is pertinent to note that waters in the same general locality (ie. in Eastchester Bay) have a significantly lower coliform density although Eastchester Bay is oriented with the same general proximity in respect to sewage treatment plant outfalls and known sources of pollution.

INTRODUCTION

The following constitutes a resume of the investigations that have been made by this office in relation to Steppingstones Beach. Data from the Nassau County Health Department, Department of Public Works, New York City, and data obtained directly by the Commission have been analyzed in an effort to arrive at a more complete understanding of the water conditions in the vicinity of Steppingstones Beach.

Steppingstones Beach is situated on the eastern shore of the Kings Point Peninsula. It lies due north of Little Neck Bay and is located just east of the Bronx County-Nassau County line.

The bathing beach at Steppingstones Beach is maintained by the Board of Commissioners of the Great Neck Park District and attendance at the park and beach area is limited to residents of the park district. The beach commands an excellent vista of Long Island Sound and one can survey the skyline of mid-Manhattan on a clear day. The grounds and bath-house situated in the park area are excellently maintained and previously constituted part of the estate of Walter P. Chrysler.

Although, in the opinion of the Nassau County Department of Health, the waters adjoining Steppingstones Beach "have always been on the border-line between bad and fair and are not expected to show any great improvement in the near future", the Beach was issued a permit by the Nassau County Department of Health up to and including the 1945 bathing season. However, because the logarithmic average of the most probable number of

* - Letter June 27, 1946 from Earl G. Brown, M.D., Commissioner, Nassau County Department of Health to Board of Commissioners, Great Neck Park District.

B-coli of the samples taken at the beach in 1946 were well in excess of the Nassau County Department of Health standards, and further since these bacteriological results confirmed the visible evidence of gross pollution of the beach, the Steppingstones Park beach was denied a permit for the 1946 bathing season. To date, a permit for bathing has not since been issued. Samples have continued to be taken on the beach since 1947, the results of which appear elsewhere in the report, and other samples have been obtained by the Commission and other agencies.

Prior to the presentation of the detailed data pertaining to the quality of the waters in the vicinity of Steppingstones Beach, the following material is presented in order to arrive at some determination of the general quality of waters in the upper East River and the western extremity of Long Island Sound.

Figure 1 is a map showing the sewage treatment plant outfalls in the upper East River and the western portion of Long Island Sound. In addition, there are shown the location of some of the raw sewage sources into the area. Table I lists these outfalls and raw sewage sources. It is evident from the Table that the greatest source, insofar as volume is concerned, is the discharge from the sewage treatment plant outfalls. Inasmuch as the net flow from Long Island Sound into the East River or, conversely, from the East River into Long Island Sound, has long been in dispute; that is to say, some individuals believe that there is a net transport of water from the Sound to the East River while others hold that the net transport is from the River to the Sound, it seems reasonable to assume that there is a comparatively small

MAJOR DISCHARGES INTO THE UPPER EAST RIVER AND LONG ISLAND SOUND



FIGURE I

Table I

**MAJOR DISCHARGES
INTO THE
UPPER EAST RIVER
AND
LONG ISLAND SOUND**

<u>TREATMENT PLANT OUTFALLS</u>	<u>SIZE OF DISCHARGE LINE</u>	<u>ESTIMATED VOLUME MGD</u>
Wards Island, N.Y.C.	2 - 60"; 1 - 84"	215.
Bowery Bay, N.Y.C.	72"	38.
Hunts Point, N.Y.C.	9" - 9" x 9' - 0"	93.
Tallman Island, N.Y.C.	48"	30.
Fort Totten, N.Y.C.	-	.1
Belgrave, L.I.	24"	1.5
Great Neck (Bayview)L.I.	-	1.0
New Rochelle, N.Y.	54"	8.0
Fort Slocum, N.Y.	-	.2
Orchard Beach, N.Y.C.	12"	Seasonal
Hart-City Island, N.Y.C.	18"	<u>0.7</u>
TOTAL		387.5

RAW SEWAGE DISCHARGES

Lafayette Avenue, Bronx	24"	3.0
Boston Road, Bronx	12"	2.0
Rikers Island	-	<u>0.5</u>
		5.5

AND:p

amount of fresh water introduced into the upper East River and further that the ratio of the treated sewage discharged to that of the fresh water introduced is rather high.

This is confirmed to some extent by Figure II which is a graphical description of coliform concentrations and dissolved oxygen saturations utilizing the data from the New York City Department of Public Works Harbor Pollution Survey for 1953. It is evident from Figure II that dissolved oxygen saturations reach their minimum and B-coli concentrations their maximum at Hell Gate. Proceeding southward toward the Narrows there is an increase in both these parameters; and similarly the dissolved oxygen saturations increase and the coliform concentrations decrease as one proceeds eastward from Hell Gate through the East River to Long Island Sound.

It should be noted that the graph of Figure II is for one year only and therefore cannot indicate any long term change in concentrations; and further, since the figures used in the graph are average results, they are in all likelihood closer to situations that would prevail during a dry period rather than those during a stormy period.

In all likelihood, during periods of rain, distribution of pollution in the upper East River undergoes a marked change. Table A, which appears in the Appendix, lists only those regulator discharge sites which are located in New York City. It is evident from the size of these discharge lines and their location that, should any flow occur from these lines after a period of storm, a considerable amount of sewage would be discharged at various places along the shore line which are not

normally subject to direct discharges of raw sewage.

NASSAU COUNTY DEPARTMENT OF HEALTH

Nassau County has rated its beaches in general accordance with the most probable number of coliform organisms obtained at the beach site. (Due allowance is of course made for any sanitary survey which is made and in general the presence of fecal material, contraceptives, etc. are considered sufficient reason for the closing of a beach regardless of the MPN obtained).

<u>CLASSIFICATION OF BEACH</u>	<u>MPN PER 100 ML.</u>
Excellent	0.0 - 9.1
Good	9.1 - 23
Fair	23 - 240
Bad	240+

The beaches bordering the Nassau County shore line are sampled regularly by the Nassau County Department of Health in order to arrive at a determination of the average MPN. Table II gives the geometric average of the MPN's obtained at Steppingstones Beach for the years 1940-41, and from 1947 to the present time. During the war years, ie, 1942-1946, samples were analyzed in Westchester County, and such records are not available at the Nassau County Department of Health.

Utilizing the data in Table II, an attempt has been made to determine whether there has been any significant change in the coliform densities at Steppingstones Beach with the progress of the years.

The analysis shown in Table B of the Appendix indicates that when the data of the Nassau County Department of Health is

TABLE II

COLIFORM DENSITIES AT STEPPINGSTONES BEACH L. I.
AS DETERMINED BY NASSAU COUNTY DEPARTMENT OF HEALTH

Year	Number of Investigation	M. P. N. per 100 ml.	
		Geometric Mean	Range
1940	14	414.	23.-2400.
1941	8	475.	230.-2400.
1947	12	780.	43.-2400.
1948	10	551.	93.-4600.
1949	18	418.	3.6-24,000+
1950	19	1,117.	43.-24,000+
1951	18	1,086.	240.-11,000.
1952	20	1,441.	230.-24,000+
1953	18	511.	43.-4600.
1954	28	1,026.	93.-24,000+

Data obtained from Nassau County Department of Health

characterized by the straight line that best fits the data there is an apparent increase in the MPN of coliform organisms from 1940 to the present. However, statistically, there is no evidence of a significant increase in the MPN, and further this increase amounts to but

$$8,758.5 / 202.5 = 43.25$$

This is the amount of increase per year of the average MPN/100 ml.

The validity of the analysis presented in Table B of the Appendix depends to some extent on the validity of the representation of the total of the samples for a given year by a geometric mean. This, in turn, requires that the waters which are sampled throughout the year are in essence the same waters, that is to say, they have a coliform population which does not change materially in numbers throughout the year. That this is not exactly true is an accepted fact, however, in the lack of any better method of presentation, geometric means continue to be used as a summary of a series of observations. An analysis of the validity of representation is presented below.

Table III presents the individual values that were obtained for the present year at Steppingstones Beach and indicates the variation to which a year's sampling may be subjected. Table IV is the means whereby the Nassau County Department of Health, 1954 Data for Steppingstones Beach, was analyzed to determine whether a geometric mean could be used to characterize the data of any one year. The chi-square () was used in this respect. The statistical analysis indicated that for the 1954 data the use of a geometric mean was justified. However, it should be realized that

TABLE III

COLIFORM DENSITIES DURING 1954
AT STEPPINGSTONES BEACH, L. I.
AS DETERMINED BY
NASSAU COUNTY DEPARTMENT OF HEALTH

DATE	TIME	MPN PER 100 ML.
April 13	14:10	430
15	14:00	-
20	14:25	930
22	13:29	2400
27	14:15	750
29	14:18	240
May 4	14:25	11,000
6	14:20	24,000+
11	14:29	11,000
13	14:40	150
20	14:20	930
25	14:45	93
27	14:35	930
June 3	14:20	930
8	13:20	2400
10	14:46	2400
15	13:30	1500
21	-	-
23	13:45	930
28	13:25	1500
July 7	14:00	240
12	14:00	240
14	13:45	240
19	13:50	930
21	-	-
26	13:35	430
28	14:00	430
August 4	10:30	930
26	-	2400
Sept. 1	-	2400
15	-	2400

III-A

CALCULATION OF MEAN AND VARIANCE FOR 1954
NASSAU COUNTY DATA (STEPPINGSTONES BEACH)

No. of Obs.	MPN/100 ml.	X=log ₁₀ MPN/100 ml.	X ²
1	93.	1.96848	3.87491
1	150.	2.17609	4.73537
4	240.	2.38021	5.66540
1	750.	2.87506	8.26597
7	930.	2.96848	8.81187
2	1500.	3.17609	10.08755
6	2400.	3.38021	11.42581
2	11,000.	4.04139	16.33283
1	24,000.	4.38021	19.18624

$$\text{Mean} = \bar{x} = \frac{\sum X}{N} = \frac{76.416,26}{25} = 3.056,65$$

$$\text{Variance} = \frac{\sum X^2 - (\sum X)^2/N}{N-1} = 0.342,71$$

Tab. IV

χ^2 TEST FOR 1954 NASSAU COUNTY DATA
(STEPPINGSTONES BEACH)

<u>Class Range</u>	<u>Midpoint</u>	<u>Number of Observations</u>	<u>Deviation of Class Limit From Mean</u>	<u>V</u>	<u>VI</u>	<u>VII</u>	<u>VIII</u>	<u>χ^2</u>
1.00-1.50	1.25	0	-2.06	-3.52	49.978	0.380	0.10	0.10
1.51-2.00	1.75	1	-1.55	-2.65	49.598	3.271	0.82	0.04
2.01-2.50	2.25	5	-1.05	-1.79	46.327	13.688	3.42	0.73
2.51-3.00	2.75	8	-0.55	-0.94	32.639	29.053	7.26	0.08
3.01-3.50	3.25	8	(-0.05 +0.44)	(-0.09 0.75)	(3.568 30.114)	33.700	8.43	0.02
3.51-4.00	3.75	0	+0.94	1.61	44.630	14.516	3.63	3.63
4.01-4.50	4.25	3	+1.44	2.46	49.305	4.675	1.17	2.86
4.51-5.00	4.75	0	+1.94	3.31	49.953	.648	.16	0.16

$$\Sigma x = 76.416,26, (\Sigma x)^2 = 5,839.444,792$$

$$\Sigma x^2 = 241.802,80, \text{MEAN} = 3.056,65$$

$$\sigma = \sqrt{34.271/10} = 0.585415$$

Column V = Column IV/standard deviation.

Column VI = Percent of area between class limit and mean.

Column VII = Percent of area in class interval.

Column VIII = Theoretical Frequency.

this analysis does not in any ways indicate that the use of a geometric mean for previous years is justified.

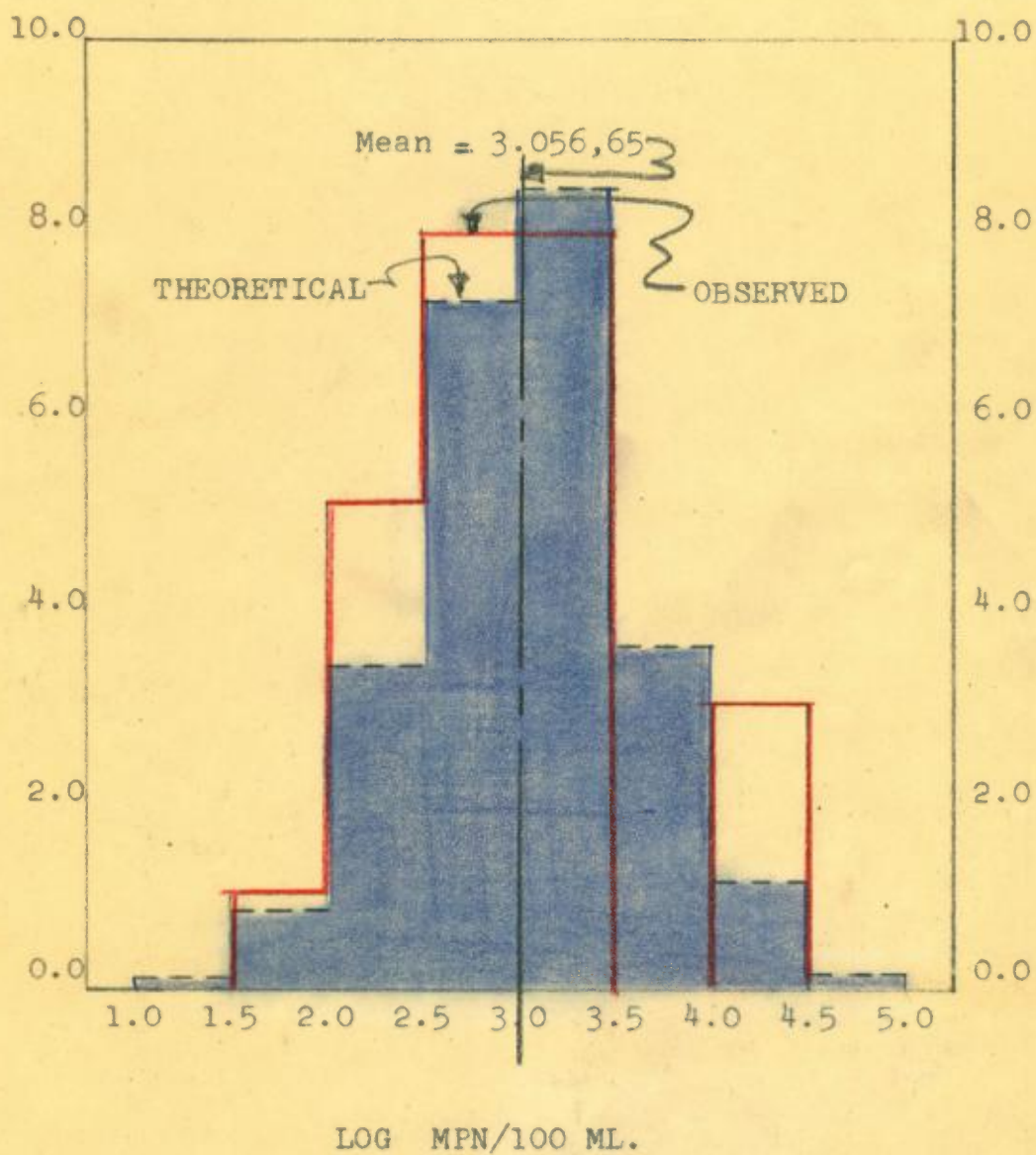
Figure III gives a graphical presentation of the observed and theoretical frequencies and that can be readily seen that there is no considerable difference between these two frequencies. Hence, the use of the geometric mean appears justified.

During 1947, a log of the appearance of the beach at Steppingstones Park together with observations of the tide, weather, and wind direction was kept for the period July - September, 1947. The material was entered on the log by the beach employees during this period, and a total of 212 observations were made. The material was collected at the request of both the Interstate Sanitation Commission and the Nassau County Department of Health.

These data have been analyzed to determine whether there was any correlation between the direction of the wind and the occurrence of objectionable floating material. Figure IV indicates that considering all velocities, 52% of the time when the wind was from the west, there were objectionable materials on Steppingstones Beach, as contrasted to 9% of the total observations when the wind was from the east. This indicates that percentage-wise, when the wind is out of the due west, objectionable material appears five times more frequently than it does when the wind is out of the east. However, there is no evidence to indicate that similar conditions exist at present. It should be kept in mind that the Hunts Point Plant has gone into operation since 1947.

Summarizing, three tentative conclusions can be drawn from the data available from the Nassau County Department of Health;

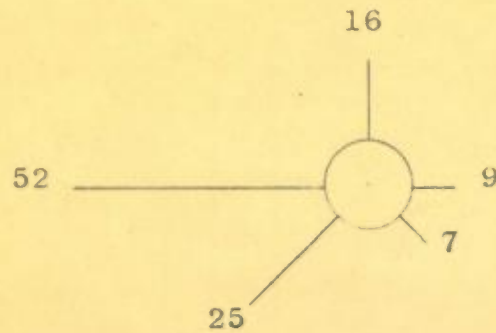
NUMBER OF OBSERVATIONS



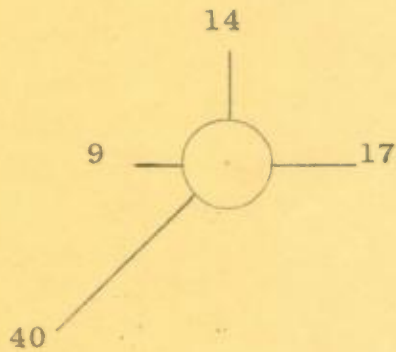
OBSERVED AND THEORETICAL
COLIFORM DENSITY FREQUENCY CURVES
1954 DATA - STEPPINGSTONES BEACH

FIGURE III

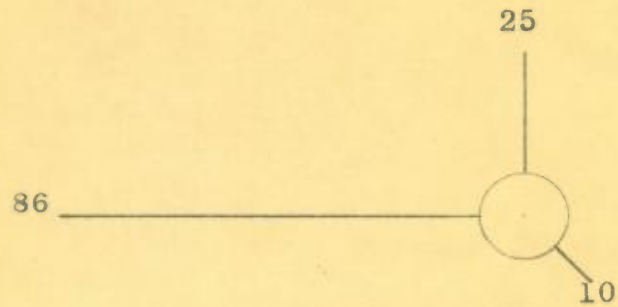
All Velocities



Less Than 10 MPH



Greater Than 10 MPH



Frequency of Positive Observation For a Given Wind Direction and Velocity Range

	Less Than 10 MPH	Greater Than 10 MPH	All Velocities
N	14	25	16
NE	0	0	0
E	17	0	9
SE	0	10	7
S	0	0	0
SW	40	0	25
W	9	86	52
NW	0	0	0

FIGURE IV

1. There is an apparent increase in the coliform densities of the waters off Steppingstones Beach, although this increase is not statistically significant.
2. An analysis of the data for 1954 indicates that the geometric mean value was justifiably used.
3. Objectionable floating material apparently occurred at the Steppinstones Beach more frequently when the wind is from the west than when the wind is from the east, although there is no evidence that this condition prevails at present.

NEW YORK CITY DEPARTMENT OF PUBLIC WORKS

The Department of Public Works has conducted an annual survey of the New York harbor waters since its inception in 1938. Prior to this time, the Department of Sanitation of New York City and other City agencies conducted harbor surveys. In general, the surveys of the Department of Public Works are conducted from June 1 through October 1 of any given year. In addition to dissolved oxygen concentrations, salinities, and temperatures, determinations are made of the most probable number of organisms. One of the regular sampling stations utilized by the Department of Public Works in its surveys is off the Steppingstones Light.

Data relating to the Steppingstones Light sampling station are tabulated in Table V. An analysis has also been made of the change in the MPN at Steppingstones Light from 1938 to the present time. (The analysis is similar to that previously made for the data of the Nassau County Department of Health). The analysis indicates that there is a statistically non-significant decrease in the MPN from 1938 to the present time. This apparent decrease in the MPN of coliform organisms is in apparent contradiction with the tentative conclusion reached as a result of the analysis of the Nassau County Department of Health data. However, since each of these analyses indicated that the apparent increase

TABLE V

COLIFORM DENSITIES OFF STEPPINGSTONES LIGHT
AS DETERMINED BY THE
NEW YORK CITY DEPARTMENT OF PUBLIC WORKS

YEAR	NUMBER OF INVESTIGATIONS	X	MPN PER 100 ML GEOMETRIC MEAN	Y LOG MPN
1938	6.	0	4000.	3.60206
1939	16.	1	1500.	3.17609
1940	18.	2	600.	2.77815
1945	16.	7	1300.	3.11394
1946	16.	8	800.	2.90309
1947	12.	9	300.	2.47712
1948	18.	10	400.	2.60206
1949	7.	11	363.	2.55991
1950	18.	12	1300.	3.11394
1951	18.	13	1600.	3.20412
1952	20.	14	1300.	3.11394
1953	18.	15	160.	2.20412
1954	8.	16	1900.	3.27875

$$\sum Y = 38.12729$$

$$\sum Y^2 = 1,136.330103305$$

$$\sum X = 118.$$

$$\sum X^2 = 1410.$$

$$\sum xy = 338.36618$$

$$n = 11$$

$$r = -0.185$$

$$0.10 < P(H)$$

or decrease was non-significant, in all likelihood, there has been no marked change in the quality of the waters adjacent to Steppingstones Beach in the past 15 years insofar as MPN values are concerned. Other criteria such as dissolved oxygen saturation values for the Steppingstones and other areas may well indicate marked changes.

Table VI lists the individual sample MPN's which are obtained by the Department of Public Works off Steppingstones Light, and thereby affords some indication of the variation in the MPN readings to be expected.

The geometric averages obtained by the New York City Department of Public Works for the waters off Steppingstones Light and the Nassau County Department of Health for the waters immediately adjacent to Steppingstones Beach have been compared statistically. The "t" test is used to test any apparent difference.

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sigma \sqrt{\frac{N_1 N_2}{N_1 + N_2}}} = \frac{3.166,183 - 3.056,65}{0.613325} \sqrt{\frac{225}{34}} =$$

$$= \frac{0.109,533 \times 2.57248}{0.613,325} = 0.459$$

$$\sigma^2 = (8.225,01 + 3.812,43) / (25+9-2) = 0.37617$$

$$\sigma = 0.613325$$

$$D.F. = 25 + 9 - 2 = 32$$

The "t" test above indicates that there is no significant difference between the mean MPN at Steppingstones Light and that at the Beach itself. (The mean MPN at Steppingstones Beach

TABLE VI

COLIFORM DENSITIES OF SAMPLES TAKEN AT
STEPPINGSTONES LIGHT BY NEW YORK CITY
DEPARTMENT OF PUBLIC WORKS DURING 1954

<u>DATE</u>	<u>MPN/100 ML</u>	<u>LOG MPN = X</u>
June 17, 1954	2,300.	3.36173.
June 29, 1954	36.	1.55630.
July 6, 1954	2,400.	3.38021.
July 15, 1954	930.	2.96848.
July 22, 1954	4,600.	3.66276.
August 10, 1954	2,400.	3.38021.
August 23, 1954	1,500.	3.17609.
August 26, 1954	930.	2.96848.
September 14, 1954	11,000.	4.04139.

$$N = 9$$

$$\sum X = 28.49565$$

$$\bar{X} = 3.166,183$$

$$\sum X^2 = 94.034,876 \quad (\sum X)^2/N = 90.222,452$$

$$s^2 = \frac{3.812,43}{8} = 0.47655$$

for 1954 was 1140/100 ml. as compared to the mean of 1470/100 ml. as obtained by the New York City Department of Public Works.)

As regards interpretation of the "t" test above, it is to be noted that although the test indicates that there is no difference insofar as the MPN values are concerned it cannot be concluded that these waters are the same for the MPN values may have resulted from different causes.

Tentative conclusions that can be drawn from the New York City Department of Public Works data are:

1. There has been a statistically non-significant decrease in the coliform densities of the samples obtained off Steppingstones Light for the period 1938 to the present.
2. There is no statistically significant difference between the coliform densities obtained in 1954 by the Nassau County Department of Health for Steppingstones Beach and the densities obtained by the New York City Department of Public Works for the waters off Steppingstones Light and the waters of Eastchester Bay.

INTERSTATE SANITATION COMMISSION DATA

During the past year a survey was conducted in the Upper East River. A total of 14 sampling stations extending from the Lower East River to a point somewhere between Kings Point and Harts Island were sampled regularly from July through September. The general results on this survey are shown in Figure IV. Two of the regular sampling stations were located at the East and West ends of Steppingstones Beach respectively.

The general results of the Upper East River survey are shown in Figure IV. It is interesting to note that both stations J and K, located in Eastchester Bay and off City Island respectively have lower average MPN concentrations as compared to the



UPPER EAST RIVER SURVEY

	Average Percent Salinity			Average Coliform Count MPN		
	Surface	Mid Depth	Bottom	Surface	Mid Depth	Bottom
A.	75.50	76.67	75.50	1000.	600.	640.
B.	75.67	76.67		565.	950.	
C.	78.67	79.37		410.	650.	
D.	78.20	79.50		580.	451.	
E.	78.40			460.		
F.	79.50			1200.		
G.	79.50			500.		
H.	81.60	83.40	84.30	180.	75.	41.
I.	80.50			85.		
J.	82.50			10.		
K.	82.80	84.20	84.80	15.	9.	7.
L.	82.87*	83.00**		27.*	43.**	
M.	83.80	84.60	84.90	35.	8.	7.5

* East end of beach

** West end of beach

FIGURE ~~IV~~ V

Steppingstones Beach locations.

Table VII lists the MPN values for the individual samples taken. The geometric mean of these samples is 2,560/100 ml. Statistical analyses indicate that there is no significant difference between this mean MPN and either the average MPN for Steppingstones Beach obtained by the Nassau County Health Department or the average MPN obtained by the New York City Department of Public Works for waters at Steppingstones Light. A statistical analysis has been made, as indicated below, to demonstrate whether there is any significant statistical difference between the average MPN of the waters in Eastchester Bay and of the waters off Steppingstones Beach.

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\frac{s\sqrt{n}}{0.36175}} = \frac{3.407574 - 2.894,90}{0.36175} = 0.512,67$$

$$= \frac{3(0.512,67)}{0.36175} = 4.25$$

The probability that such a difference in the averages occurring by chance alone is about one in five hundred. However, there is some doubt as to the validity of this difference due to the number of readings in Eastchester Bay which were not determined accurately, that is to say, five of the nine values obtained are indicated as being below a certain amount. Some indication of how the reliability of the test given above may be affected by the unreliability of the data is given by the analysis below, which is a test for the difference between the Nassau County Department of Health data for Steppingstones Beach and the Interstate Sanitation Commission data for Eastchester Bay.

Table VII

INTERSTATE SANITATION COMMISSION
DATA FOR STEPPINGSTONES BEACH, 1954

<u>DATE</u>	<u>MPN/100 ml.</u>	<u>log MPN/100 ml.</u>
July 21, 1954	930.	2.96848
July 21, 1954	930.*	2.96848
August 18, 1954	930.	2.96848
August 18, 1954	2,400.*	3.38021
September 1, 1954	4,600.	3.66276
September 1, 1954	11,000.*	4.04139
September 8, 1954	4,600.	3.66276
September 8, 1954	4,600.*	3.66276
September 15, 1954	2,400.	3.38021
September 15, 1954	2,400.*	3.38021

$$\sum X = 34.07574 \quad (\sum X)^2/N = 116.115,606$$

$$\sum X^2 = 117.293,345$$

$$\sigma^2 = 1.177,739/9 = 0.13086$$

$$\sigma = 0.36175$$

Note: Observations marked with an asterik were collected close to the southern extremity of Steppingstones Beach while the others were obtained some 1200 feet to the north. All samples were obtained about 150-200 feet offshore by boat.

TABLE VIII

INTERSTATE SANITATION COMMISSION
DATA FOR EASTCHESTER BAY

<u>DATE</u>	<u>MPN/100 ML.</u>	<u>X = LOG MPN</u>
July 7, 1954	3000.-	3.47712
July 14, 1954	360.	2.55630
July 21, 1954	2300.	3.36173
August 11, 1954	6200.	3.79239
August 18, 1954	300.-	2.47712
September 1, 1954	300.-	2.47712
September 8, 1954	300.-	2.47712
September 15, 1954	910.	2.95904
September 22, 1954	300.-	2.47712

$$\sum X = 26.054,06$$

$$\bar{X} = 2.894.90$$

$$\sum x^2 = 77.601,312$$

$$(\sum X)^2/N = 75.423,783$$

$$N = 9$$

$$\sigma_{EST}^2 = \frac{77.601,312 - 75.423,783}{8} = 0.272,191$$

$$\sigma = 0.52172$$

$$t = \frac{\bar{X}_A - \bar{X}_B}{\sigma} \sqrt{\frac{N_1 N_2}{N_1 + N_2}}$$

$$= \frac{0.161,75}{0.57015} \sqrt{\frac{25 \times 9}{25+9}} = 0.4512$$

$$\sigma^2 = \frac{8.225,01 + 2.177,53}{25 + 9 - 2} - \frac{10.402,54}{32} = 0.325,079$$

$$\sigma = 0.57015$$

Although this analysis indicates that there is about one chance in a hundred that there is no difference between these two means, the apparent difference is not as great as for the previous analyses.

Summarizing, it appears that these tentative conclusions can be drawn from the data obtained by the Commission.

1. There are no significant differences between the mean MPN of the samples obtained during 1954 by the Commission and either those obtained by the Nassau County Department of Health for 1954 and the samples obtained during 1954 off Steppingstones Light by the New York City Department of Public Works.
2. Statistically significant differences in MPN coliform densities are evident for the waters of Steppingstones Light and the waters of Eastchester Bay.

AND:p

Respectfully submitted,

Alex N. Diachishin

Alex N. Diachishin

Assistant Chief Engineer

A P P E N D I X

Table A

COMBINED SANITARY AND STORM SEWERS DISCHARGING TO THE UPPER EAST RIVER AND WESTERN LONG ISLAND SOUND

LOCATION	SIZE OF DISCHARGE LINE
1 - 37th Street and Bowery Bay, Queens	
2 - 79th Street and Bowery Bay	
3 - 81st Street and Bowery Bay	
4 - Laguardia Airport and Bowery Bay	
5 - College Place and Flushing Bay, Queens	
6 - 9th Avenue and Flushing Bay	
7 - 20th Avenue and Flushing Bay	
8 - 22nd Avenue and Flushing Bay	
9 - 23rd Avenue and Flushing Bay	
10 - 25th Avenue and Flushing Bay	
11 - 14th Avenue and Flushing Bay	
12 - 15th Avenue and Flushing Bay	
13 - 32nd Avenue and Flushing Bay	
14 - 138th Street and Powells Cove, Queens	
15 - 151st Street and East River, Queens	
16 - 154th Street and East River	
17 - Willets Point Boulevard and East River, Queens	
18 - Robinson and Schury Avenues and East River, Bronx	4'-0"
19 - Emerson and Schury Avenues and East River, Bronx	14'-0" x 8'-0"
20 - Hunts Point and Ryawa Avenues and East River, Bronx	14'-0" x 12'-1"
21 - East Bay Avenue, Tiffany Street and East River, Bronx	12'-0" x 8'-2"
22 - Oak Point Avenue, Truxton Street and East River, Bronx	11'-6" x 7'-3"
23 - Lilard and O'Brien Avenues and East River, Bronx	8'-9" x 8'-0"
24 - O'Brien Avenue and White Plains Road and East River, Bronx	12'-0" x 8'-0"
25 - White Plains Road, Bronx River Avenue and East River, Bronx	2 - 13'-0" x 9'-0" each
26 - Brush Avenue, Bruckner Boulevard and Westchester Creek, Bronx	10'-0" x 8'-6"
27 - Pennyfield Avenue and East River	6'-3" x 6'-6"
28 - East 177th Street, Tierney Place, and Long Island Sound, Bronx	8'-0" x 8'-0"
29 - Calhoun and Schury Avenues, Bronx	7'-0" x 5'-6"
30 - 134th Street and East River, Bronx	3'-2" x 4'-2"
31 - 138th Street and East River, Bronx	5'-0"
32 - 149th Street and East River, Bronx	7'-8" x 6'-9"

AND:p

COMBINED SANITARY AND STORM SEWERS
DISCHARGING TO THE UPPER EAST RIVER
AND WESTERN LONG ISLAND SOUND

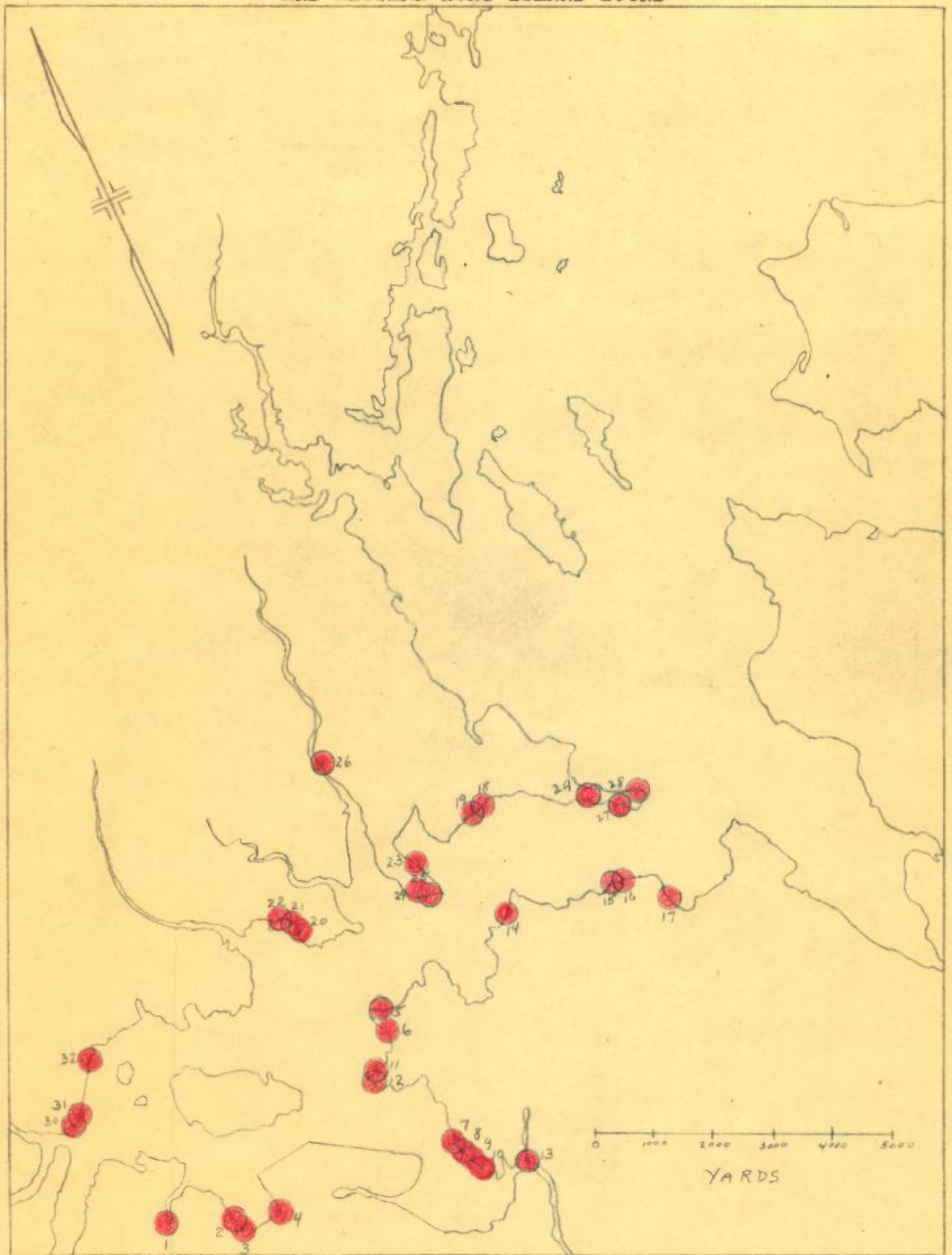


TABLE B

ANALYSIS OF COLIFORM DENSITIES
AT STEPPINGSTONES BEACH

<u>X</u>	<u>Y</u>
0	414
1	475
7	780
8	551
9	418
10	1117
11	1086
12	1441
13	511
14	1026

$$\begin{aligned}
 \sum X &= 85 \\
 \sum X^2 &= 925 \\
 \sum Y &= 7819. \\
 \sum Y^2 &= 7,301,109. \\
 \sum XY &= 75,520. \\
 N &= 10
 \end{aligned}$$

$$r = \frac{\sum XY - \sum X \sum Y / N}{\sqrt{(\sum X^2 - (\sum X)^2 / N)(\sum Y^2 - (\sum Y)^2 / N)}}$$

$$\begin{aligned}
 r &= \frac{75,520 - 66,461.5}{\sqrt{(925 - 722.5)(7,301,109. - 6,113,676.1)}} \\
 &= \frac{8,758.5}{\sqrt{(202.5)(1,187,432.9)}}
 \end{aligned}$$

$$r = 8,758.5 / \sqrt{240,455,162.25} = 8,758.5 / 15,500 = 0.565$$

$$0.05 < P(H) < 0.10$$

DISTRICT DATA MEMORANDUM

October 1, 1954

Steppingstones Beach
Nassau County

During the East River Survey trip conducted Wednesday, September 29, 1954, Mr. Harry Coxall, Captain of the charter boat Flash II, expressed several opinions concerning the alleged presence of pollution at Steppingstones Beach which may be of interest. Mr. Coxall said that during the war when ships were anchored in the East River off Kings Point and Steppingstones Beach, a considerable amount of the fecal material from these ships appeared on Steppingstones Beach. In addition, on several occasions, garbage which had been collected from these ships by a scavenger and was supposed to be incinerated, appeared on Steppingstones Beach after a period of several days. Mr. Coxall said that in his opinion, the cove in the area of Steppingstones Beach constituted a natural backwater wherein a considerable amount of the debris and refuse dumped into the harbor collected. The current in the vicinity of Steppingstones Beach, according to Mr. Coxall, was always in a northerly direction. (The tidal current charts for Long Island Sound do not indicate this peculiarity of the current, although the scale of the current charts may not be submissioned to show this relatively minor variation).

During a conversation with Mr. Gorman of the Nassau County Department of Health, some further information was obtained pertaining to the Steppingstones Bathing Beach. Mr. Gorman said that the average geometric MPN at Steppingstones Beach was approximately 1500 per 100 ml., which is acceptable by the Health Department. A total of 28 samples was taken during the present year at

Steppingstones Beach by the Nassau County Department of Health. However, Mr. Gorman said that regardless of the MPN count at Steppingstones Beach, the Beach would not be opened because of the relatively frequent presence of contraceptives on the Beach. Apparently, fecal material has not been observed at the Beach on any of the occasions when the Beachwaters were being sampled but contraceptives, as previously stated, do appear frequently. The Nassau County Department of Health is contemplating a shore survey in and around the Steppingstones Beach area in order to determine whether there is any source of raw sewage which may account for the pollution at Steppingstones Beach. In Mr. Gorman's opinion, the pollution is not a result of raw sewage discharges in the near vicinity. The shore survey work will start in approximately two weeks (the week of October 11th). I informed Mr. Gorman that the Commission was anxious to determine the source of pollutional material at the Beach and would try to make some current studies in and around the Kings Point-Steppingstones Beach area. Mr. Gorman said that the Nassau County Department of Health would cooperate in any way possible in the study.

An inspection of the Steppingstones Beach area by Messrs. Diachishin and Gross was conducted on the afternoon of September 30, 1954. Three samples were taken on the Beach area, and reports on the analysis of the samples is appended hereto. The undersigned spoke with both Mr. Edward Brady, a resident of Great Neck and a boat owner and Mr. Morris Warmuth, a caretaker of the Steppingstones Beach. Both Mr. Brady and Mr. Warmuth said that contraceptives appeared on the Beach frequently although they could not give any idea of its frequency. However, Mr. Warmuth

who has been caretaker of the Beach for about twenty years said that whenever it was a westerly wind and a rising tide, contraceptives appeared in great numbers.

AND:p

Alex N. Diachishin

Copy: Mr. Hess
Mr. Deitch

Copy:120154:p

INTERSTATE SANITATION COMMISSION
110 William Street, New York 7, N.Y.

FIELD INVESTIGATION RECORD

Municipality Great Neck Village Spec. Invest. No. 73-S
Investigation of Stepping Stones Beach Date Sept. 30, 1954
By F. Gross & A. N. Elachishin

Weather: clear, wind 5-8 mph - from East

, Sample No. 1 - Taken at South end of beach near south pier 2 feet

from shore, 1300 EST. Air Temp. 25.5°C.
Water Temp. 18.0°C.
pH greater than 7.6
Coliform Dilutions 1.0-0.1-0.01

Sample No. 2 - Taken at South end of beach off end of pier 1315 EST

Air Temp. 25.5°C.
Water Temp. 18.0°C.
pH greater than 7.6
Coliform Dilutions 1.0-0.1-0.01

Sample No. 3 - Taken at North end of beach, 2 feet from shore,

near rock jetty, 1330 EST

Air Temp. 25.5°C.
Water Temp. 19.0°C.
pH greater than 7.6
Coliform Dilutions 1.0-0.1-0.01

Note: No contraceptives or other evidences of pollution were
evident on the beach.

ANALYSES:

	Sample No. 1	Sample No. 2	Sample No. 3
Coliform Organisms			
M.P.N. per ml.	2.3	2.3	2.3