

INTERSTATE SANITATION COMMISSION

1969

LONG ISLAND SOUND SURVEY

1969 LONG ISLAND SOUND SURVEY

INTRODUCTION

A water pollution survey was conducted in the westerly end of the Long Island Sound during the summer of 1969. The results of this survey were compared with those obtained from a similar survey conducted in 1959.*

Because of an engine failure on the survey boat during the study on August 19, only 14 hours of sampling were completed. Twelve additional hours of sampling were conducted on September 8. This sampling represented 2 complete tidal cycles.

In addition to the 4 sampling stations which were also used in the 1959 survey, 3 new stations reaching farther east in Long Island Sound were selected. A description of these stations is given and the stations are shown on the survey map. In each survey, the samples collected at each station were analyzed for percent saturation of dissolved oxygen, chlorides, and the Most Probable Number of coliform organisms.

RESULTS AND CONCLUSIONS

Table 1 and Figures 1 through 3 summarize the results of the 1959 and 1969 surveys.

Table 1 and Figure 1 show a comparison of the percent dissolved oxygen saturations during both surveys. Except for Station 16, the stations sampled during both surveys show a marked decrease in the percent saturation of dissolved oxygen. It can be seen on Figure 1 that the 50 percent D.O. saturation requirement was not met in 1969 until Station 18, whereas it was met between Station 16 and Station 17

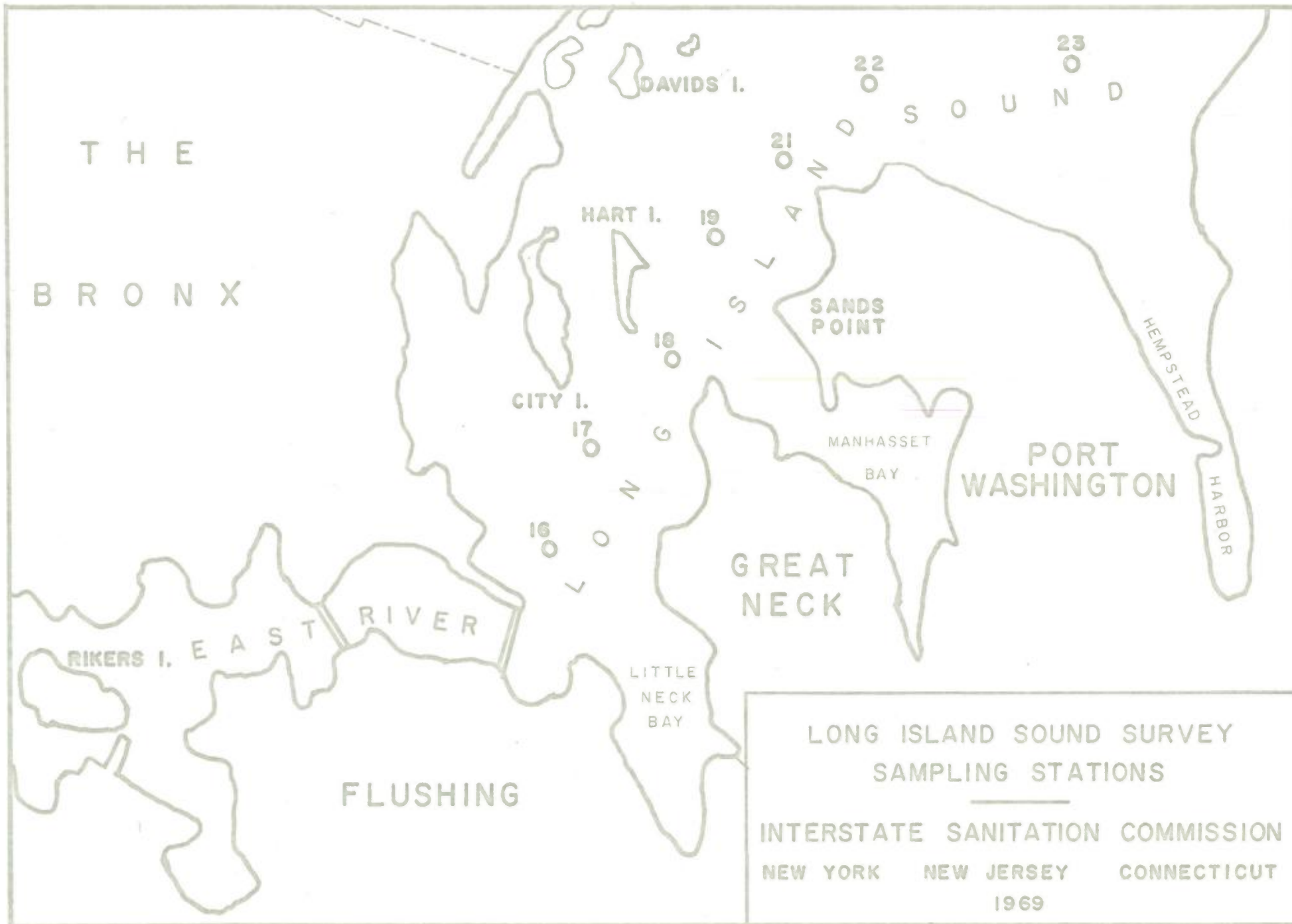
*1959 Water Pollution Survey in the East River and Long Island Sound, Interstate Sanitation Commission

in 1959.

Figure 2 shows the chloride concentrations had very little variation between the 1959 and August 1969 surveys.

Figure 3 shows a significant increase in the coliform density in 1969 over 1959. In 1959, the maximum MPN per 100 ml was 2959 at Station 16 as compared to 22924 at the same station in 1969. All stations sampled showed significant increases in the coliform density.

Using the percent dissolved oxygen saturation and the coliform density as indicators, it is concluded that the quality of the water in Long Island Sound decreased in the area common to the 1959 and 1969 surveys.



THE
BRONX

DAVIDS I.

HART I.

CITY I.

SANDS
POINT

MANHASSET
BAY

GREAT
NECK

LITTLE
NECK
BAY

RIKERS I.

EAST RIVER

FLUSHING

PORT
WASHINGTON

HEMPSTEAD
HARBOR

LONG ISLAND SOUND SURVEY
SAMPLING STATIONS
INTERSTATE SANITATION COMMISSION
NEW YORK NEW JERSEY CONNECTICUT
1969

DESCRIPTION OF SAMPLING STATIONS
used in the
1959 and 1969 AREA WATER SURVEYS
of
LONG ISLAND SOUND

- STATION 16* Mid-channel of Long Island Sound
- East-West Range --
Mast at Kings Pt. with water tower
(Fort Schuyler)
- North-South Range --
Stepping Stone Light with Fl. R.
#48 Bell Buoy
(Fort Schuyler)
- STATION 17* Off Stepping Stone Light
(Approx. 300 yds. to N.)
- North-South Range --
Stack on Hart Island with Bridge Tower
(Fort Schuyler)
- East-West Range --
Stepping Stone Light with Mast at Kings Pt.
- STATION 18* Off Fl. R. Bell - Hart Island
- North-South Range --
Gangway Rock Light with Stepping Stone Light
- East-West Range --
Fl. R. Bell (Hart Island)
with tip of Hewlett Pt.
- STATION 19* Off Gangway Rock Light
- North-South Range --
Tower on Sands Point with stack
on Hart Island
- East-West Range --
#1 Gong with Fl. Bell Buoy #27
(Gangway Rock)
- STATION 21** East-West Range --
#23 Black Bell and #25 Fl. Green
- North-South Range --
Sands Point Light and Execution Light

STATION 22** East-West Range --
Execution Light and Matinicock Point

North-South Range --
1000 feet North of Bell Buoy #23

STATION 23** East-West Range --
Execution Light and #21 Flashing
Green on Matinicock Point

North-South Range --
Water Tower on Glen Cove and
Larchmont Breakwater Light

* Sampling point used in 1959 and 1969 surveys

**Sampling point used only in 1969 survey

TABLE 1

Mean Values
of
Percent Saturation of Dissolved Oxygen
and
Chloride Concentrations
and
Geometric Means
of the
Most Probable Number of Coliform Organisms

Station	Mean Percent D.O. Saturation			Mean Chlorides (PPM)			Geometric Mean (MPN/100 ml)		
	1959	8/19/69	9/8/69	1959	8/19/69	9/8/69	1959	8/19/69	9/8/69
16	42.2	42.4	41.0	14637	14758	13770	2959	22924	11483
17	52.6	44.2	43.4	14758	14732	13858	1050	15511	6239
18	57.8	50.8	51.6	14767	14683	13718	650	6886	4098
19	65.2	59.2	53.9	14794	14515	13848	250	3820	2401
21	*	67.7	63.6	*	14983	13911	*	2547	875
22	*	75.7	75.5	*	14927	13841	*	1305	992
23	*	83.6	85.9	*	14917	13813	*	417	459

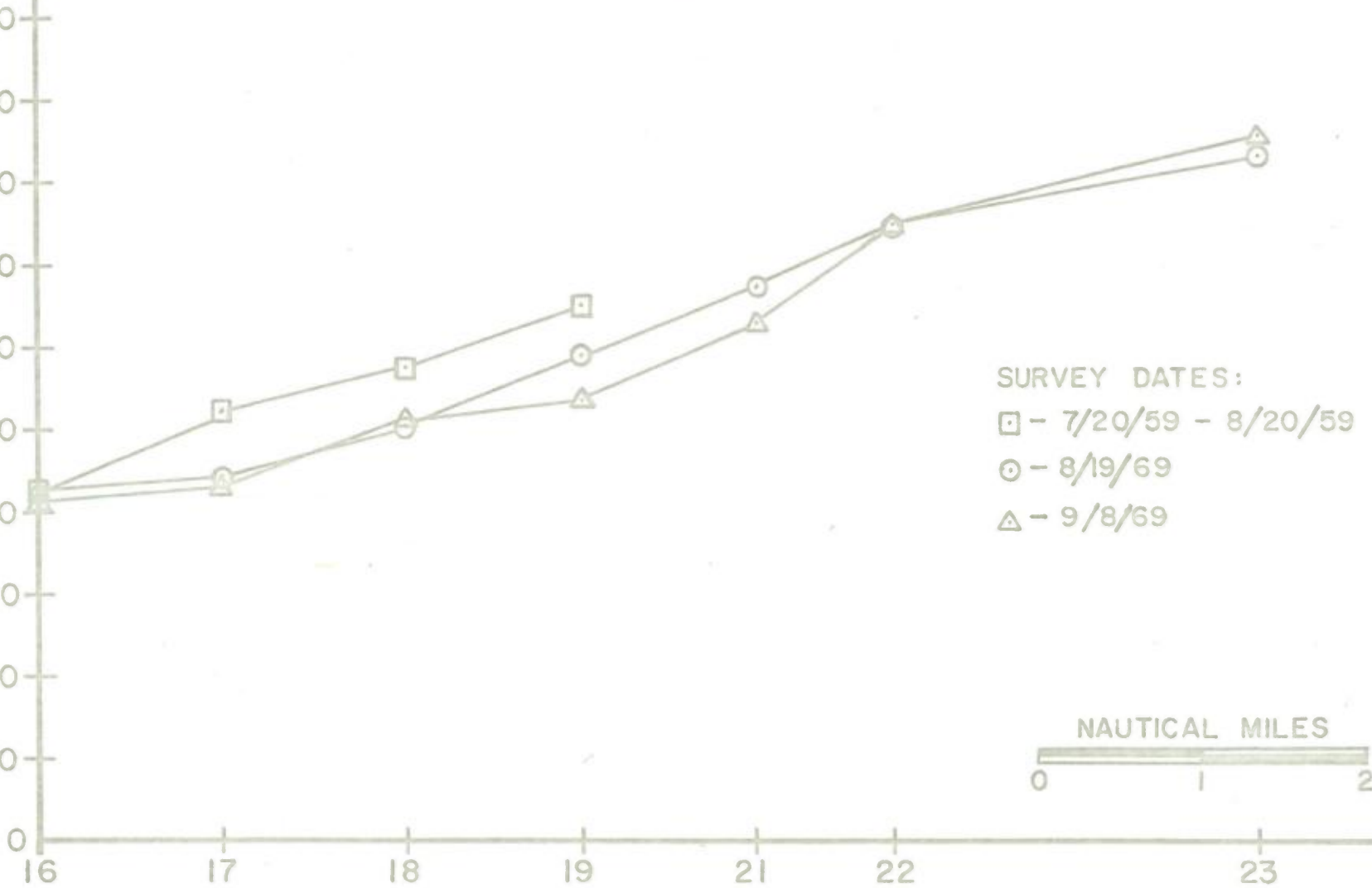
*Sampled only in 1969

FIG. 1
DISSOLVED OXYGEN
IN
LONG ISLAND SOUND

PERCENT SATURATION OF DISSOLVED OXYGEN

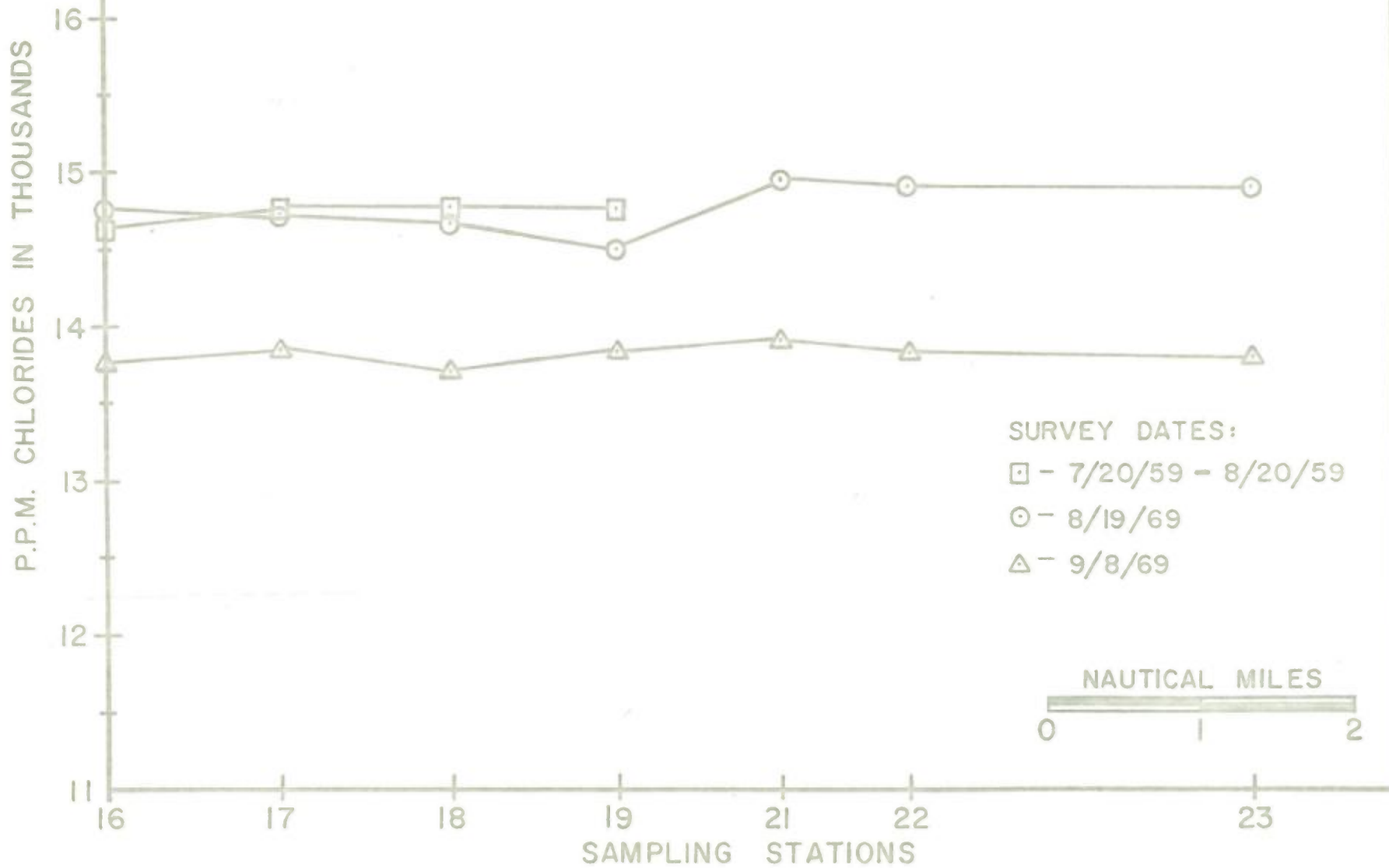
SURVEY DATES:
□ - 7/20/59 - 8/20/59
○ - 8/19/69
△ - 9/8/69

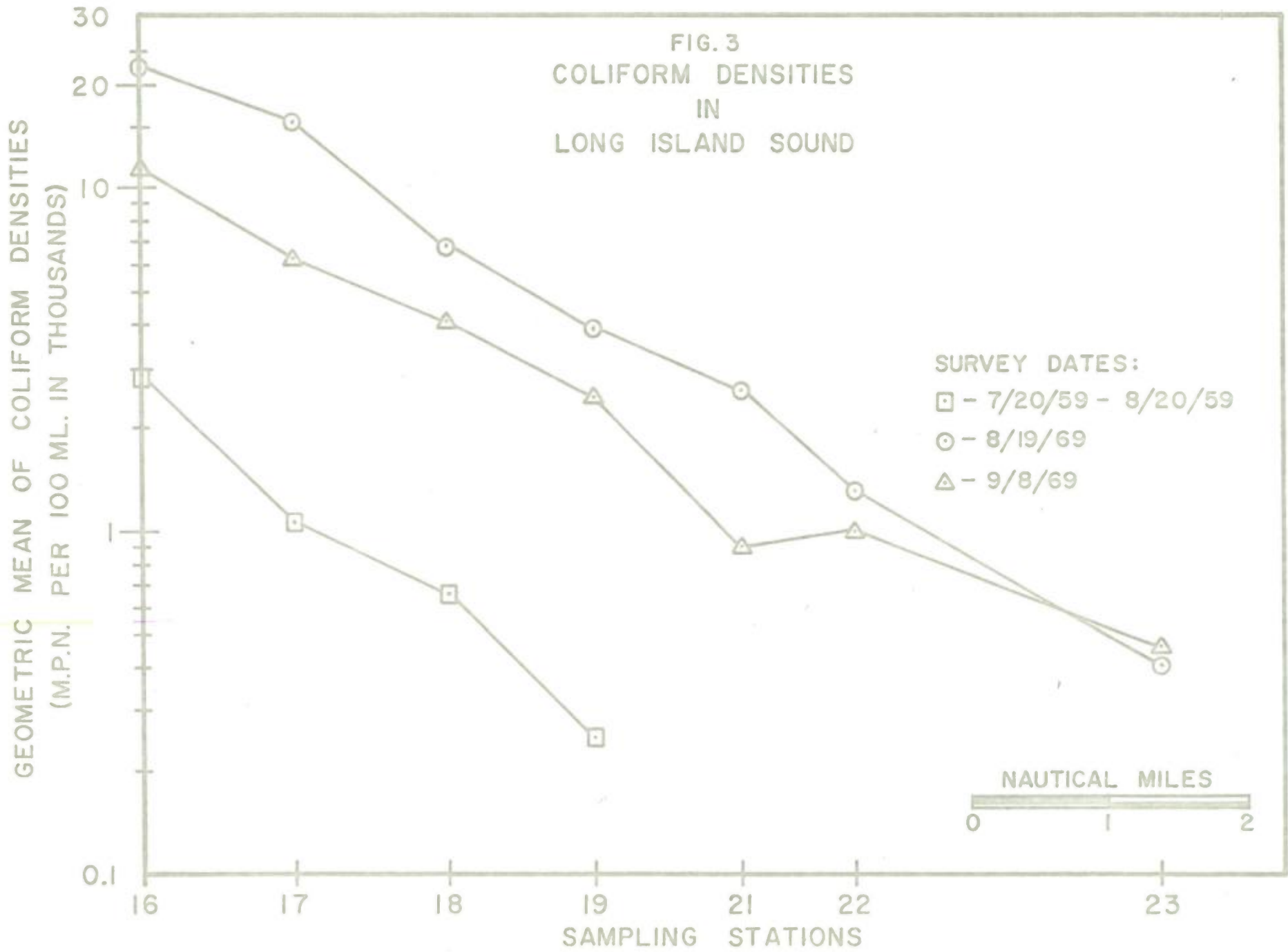
NAUTICAL MILES
0 1 2



SAMPLING STATIONS

FIG. 2
CHLORIDE CONCENTRATIONS
IN
LONG ISLAND SOUND





Aug 19, 1969

MEAN VALUES
OF
PERCENT SATURATION OF DISSOLVED OXYGEN
AND
CHLORIDE CONCENTRATIONS
AND
GEOMETRIC MEANS
OF THE
MOST PROBABLE NUMBER OF COLIFORM ORGANISMS

STATION	MEAN PERCENT SATURATION	MEAN CHLORIDES (PPM)	GEOMETRIC MEAN MPN/100 ML
16	42.4	14758	22924
17	44.2	14732	15511
18	50.8	14683	6886
19	59.2	14515	3820
21	67.7	14983	2547
22	75.7	14927	1305
23	83.6	14917	417

SEPT 8, 1969

MEAN VALUES
OF
PERCENT SATURATION OF DISSOLVED OXYGEN
AND
CHLORIDE CONCENTRATIONS
AND
GEOMETRIC MEANS
OF THE
MOST PROBABLE NUMBER OF COLIFORM ORGANISMS

STATION	MEAN PERCENT SATURATION	MEAN CHLORIDES (PPM)	GEOMETRIC MEAN MPN/100 ML
16	41.0	13770	11483
17	43.4	13858	6239
18	51.6	13718	4098
19	53.9	13848	2401
21	63.6	13911	875
22	75.5	13841	992
23	85.9	13813	459

AUG 19, 1969

AVERAGE BOD VALUES
(PPM)

STATION	AVERAGE BOD	NUMBER OF VALUES
16	0.82	6
17	0.95	6
18	0.73	6
19	1.37	7
21	1.35	6
22	1.52	6
23	1.76	5

SEPT 8, 1969

AVERAGE BOD VALUES
(PPM)

STATION	AVERAGE BOD	NUMBER OF VALUES
16	1.93	4
17	1.23	6
18	1.58	6
19	1.57	6
21	1.56	6
22	2.02	6
23	2.46	6

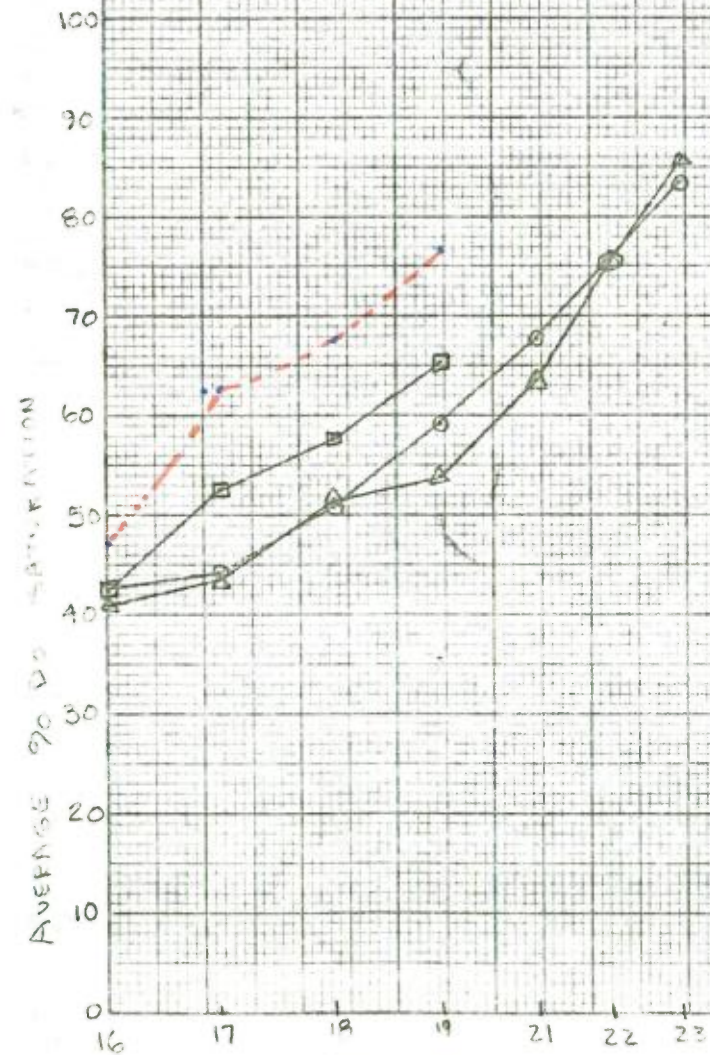
DISSOLVED OXYGEN

SURVEY DATES

□ - 7/20/59 - 8/20/59

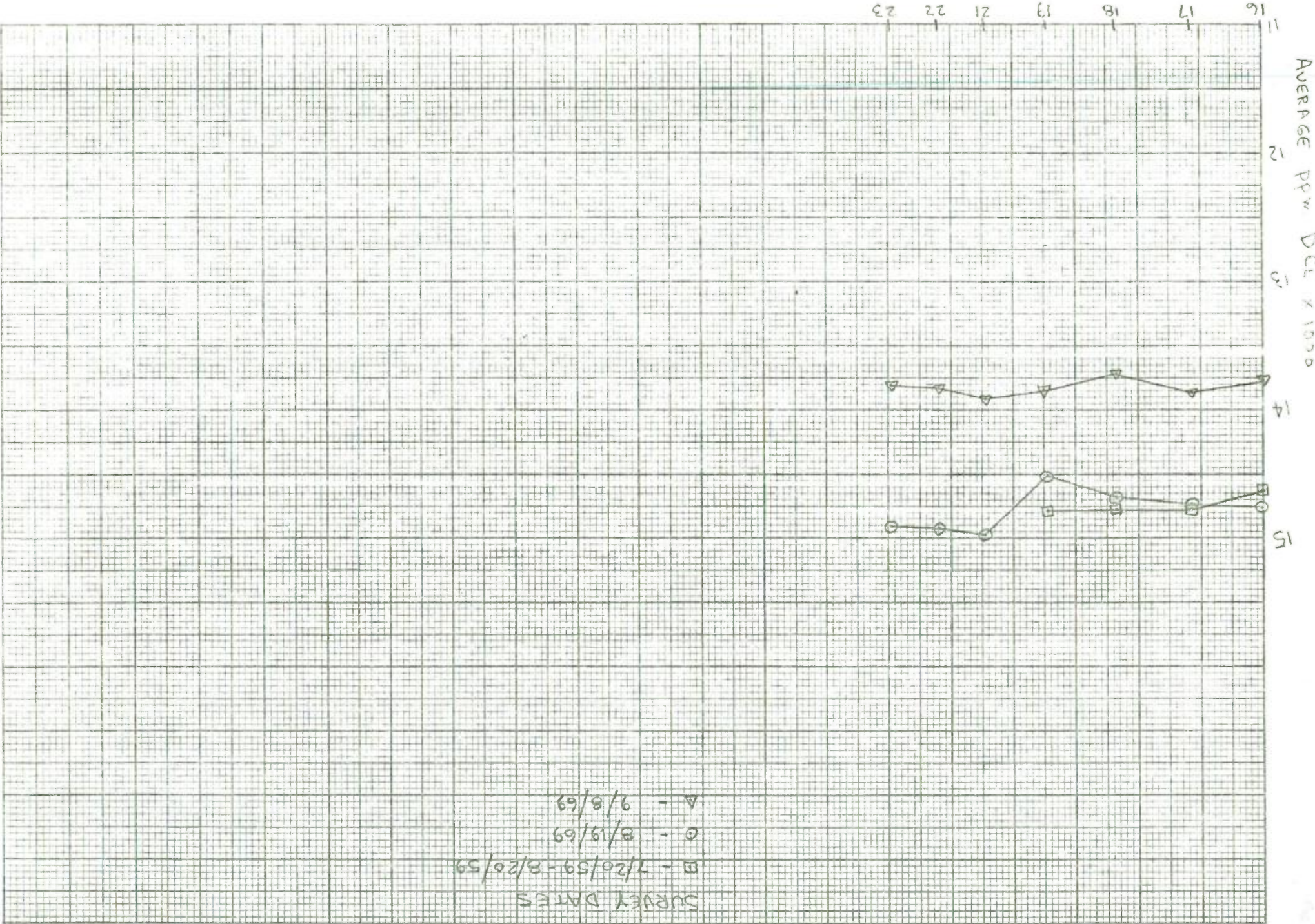
○ - 8/19/69

△ - 9/8/69



CHLORIDES

SURVEY DATES
 □ - 7/20/59 - 8/20/59
 ○ - 8/19/69
 △ - 9/8/69

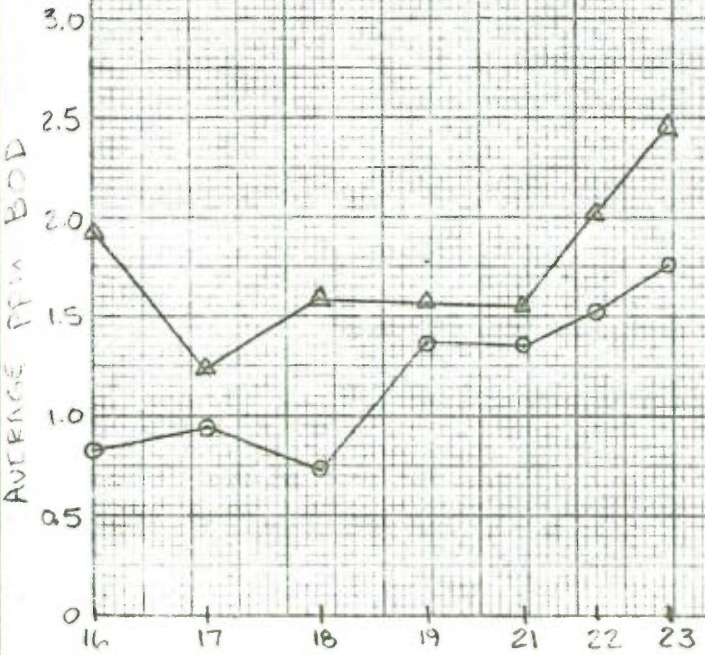


BOD

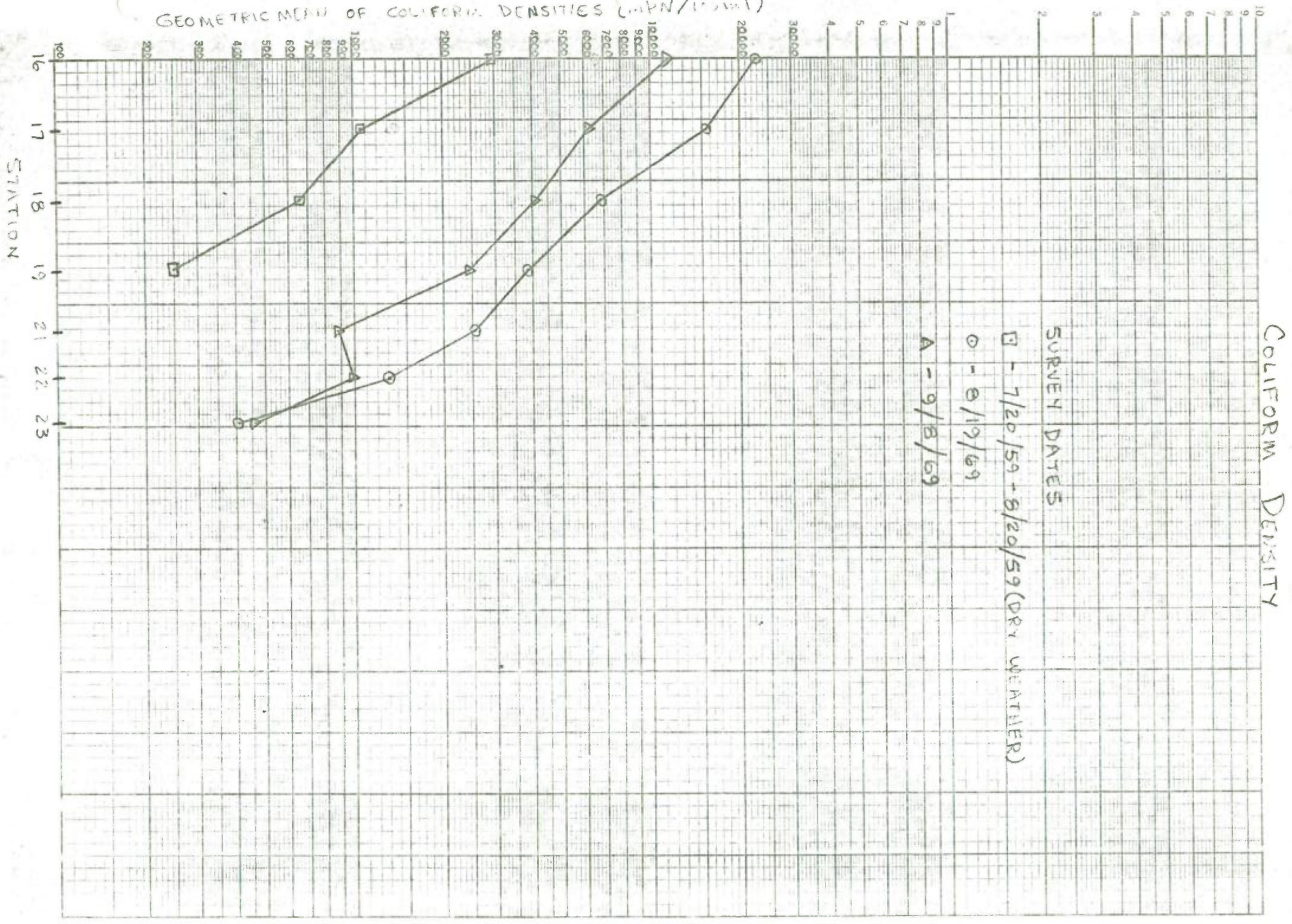
SURVEY DATES

○ - 8/19/69

△ - 9/8/69



GEOMETRIC MEAN OF COLIFORM DENSITIES (MPN/100ML)



COLIFORM DENSITY

SURVEY DATES

□ - 7/20/59 - 8/20/59 (DRY WEATHER)

○ - 8/19/69

△ - 9/8/69

STATION

LIST

```

101. = CF PROGRAM SURVEY
102. = C N=NUMBER OF READINGS PER STATION
103. = C M=NUMBER OF STATIONS
104. = ODIMENSION ISTA(100),T(100),DO(100),CL(100),AMPN(100),DOS(100),PCTS
      4A(100)
105. = READ (2,1)N,M
106. = 1 FORMAT(2I2)
107. = MN=M*N
108. = DO 2 I=1,MN
109. = 2 READ (2,3)ISTA(I),T(I),DO(I),CL(I),AMPN(I)
110. = 3 FORMAT(1X,12,16X,F4.1,4X,F4.2,23X,F5.0,4X,F6.1)
111. = CALL EJECT
112. = PRINT 5
113. = 5 FORMAT(33X,11HMEAN VALUES)
114. = PRINT 6
115. = 6 FORMAT(37X,2HOF)
116. = PRINT 7
117. = 7 FORMAT(20X,38HPERCENT SATURATION OF DISSOLVED OXYGEN)
118. = PRINT 8
119. = 8 FORMAT(37X,3HAND)
120. = PRINT 9
121. = 9 FORMAT(27X,23HCHLORIDE CONCENTRATIONS)
122. = PRINT 8
123. = PRINT 24
124. = 24 FORMAT(31X,15HGEOMETRIC MEANS)
125. = PRINT 21
126. = 21 FORMAT(36X,6HOF THE)
127. = PRINT 22
128. = 22 FORMAT(17X,42HMOST PROBABLE NUMBER OF COLIFORM ORGANISMS//)
129. = PRINT 10
130. = 100FORMAT(17X,12HMEAN PERCENT,10X,14HMEAN CHLORIDES,10X,14HGEOMETRIC
      4MEAN)
131. = PRINT 11
132. = 11 FORMAT(7HSTATION,11X,10HSATURATION,15X5H(PPM),17X,10HMPN/100 ML/)
133. = JJ=0
134. = DO 13 J=1,M
135. = SPCT=0.
136. = SCL=0.
137. = BB=1.
138. = K=0
139. = KK=JJ+1
140. = LL=JJ+N
141. = DO 4 I=KK,LL
142. = Q=5338.6609
143. = R=Q+.0000458
144. = X=-(R/(T(I)+273.))+21.082098
145. = A=(760.-2.7182818**X)*(1.42904/760.)
146. = B=10.291-0.2809*T(I)+0.006009*T(I)*T(I)-0.0000632*T(I)*T(I)*T(I)
147. = C=CL(I)/1000.*(0.1161-0.003922*T(I)+0.0000631*T(I)*T(I))
148. = DOS(I)=A*(B-C)
149. = PCTSA(I)=DO(I)*100./DOS(I)
150. = SPCT=SPCT+PCTSA(I)
151. = SCL=SCL+CL(I)
152. = IF(AMPN(I))14,14,15
153. = 14 K=K+1
154. = GO TO 4
155. = 15 IF(AMPN(I)-99999.9)16,14,14
156. = 16 BB=BB*AMPN(I)*100.

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157. =          4 CONTINUE
158. =          JJ=JJ+N
159. =          D=N
160. =          APCT=SPCT/D
161. =          ACL=SCL/D
162. =          IACL=ACL
163. =          L=N-K
164. =          DD=L
165. =          RR=1./DD
166. =          BMPN=BB**RR
167. =          MPN=BMPN
168. =          PRINT 12, I STA(JJ), APCT, IACL, MPN
169. =          12 FORMAT(1X, I3, 16X, F5.1, 16X, I7, 17X, I7/)
170. =          13 CONTINUE
171. =          CALL EJECT
172. +READY ;EJECT
```

12
11
10
9
8
7
6
5
4
3
2

LIST

```
101. = CF PROGRAM SURBOD
102. = C N=NUMBER OF READINGS PER STATION
103. = C M=NUMBER OF STATIONS
104. = DIMENSION Ista(100),BOD(100)
105. = READ (2,1)N,M
106. = 1 FORMAT(2I2)
107. = MN=M*N
108. = DO 2 I=1,MN
109. = 2 READ (2,3)Ista(I),BOD(I)
110. = 3 FORMAT(1X,12,28X,F4.2)
111. = CALL EJECT
112. = PRINT 5
113. = 5 FORMAT(12X,18HAVERAGE BOD VALUES)
114. = PRINT 6
115. = 6 FORMAT(19X,5H(PPM)//)
116. = PRINT 7
117. = 7 FORMAT(17X,7HAVERAGE,10X,9HNUMBER OF)
118. = PRINT 8
119. = 8 FORMAT(7HSTATION,12X,3HBOD,13X,6HVALUES/)
120. = JJ=0
121. = DO 13 J=1,M
122. = SBOD=0.
123. = K=0
124. = KK=JJ+1
124.1= LL=JJ+N
124.2= DO 4 I=KK,LL
125. = IF(BOD(I)-99.99)10,4,4
127. = 10 SBOD=SBOD+BOD(I)
128. = K=K+1
129. = 4 CONTINUE
130. = JJ=JJ+N
131. = D=K
132. = ABOD=SBOD/D
133. = PRINT 12,Ista(JJ),ABOD,K
134. = 12 FORMAT(1X,13,13X,F6.2,13X,13/)
135. = 13 CONTINUE
136. = CALL EJECT
137. +READY ;EJECT
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172. +READY START[0]

0807

116LI	08196905300218	03110033	062	147000228003500	161210000
216LI	08196907220218	03410005	073	142800235001400	161110000
316LI	08196909000222	03309999	075	148300248002400	071110000
416LI	08196910360225	03000062	073	145800260005400	271110000
516LI	08196912350226	03250066	076	148300275003500	271110000
616LI	08196914200225	02820102	074	150800280002400	071210000
716LI	08196917350220	03350225	076	152800250001100	272510000
816LI	08196919060220	03459999	059	144900233001300	171120000
117LI	08196905400214	03429999	064	146700225000490	161210000
217LI	08196907270212	03879999	072	146900234000490	161110000
317LI	08196909040222	03450035	062	143800248002400	071110000
417LI	08196910410220	02600037	073	151800260001100	271110000
517LI	08196912410222	03420091	076	144900268005400	271110000
617LI	08196914280225	03620082	073	147600280001700	071210000
717LI	08196917450220	03400151	055	149000242002400	272510000
817LI	08196919100220	03100175	058	147900232002400	171120000
118LI	08196905520204	03279999	068	147800228000700	161210000
218LI	08196907360216	04000003	073	144800232000280	161110000
318LI	08196909140218	03559999	065	147100250001700	071110000
418LI	08196910500222	03480046	074	145800262001700	271110000
518LI	08196912500226	04100058	075	147800275001100	271110000
618LI	08196914370220	04450094	074	147800264000130	071210000
718LI	08196917580220	03950165	051	147300242000790	072130000
818LI	08196919200220	04150070	060	146300232000790	171120000
119LI	08196906000216	04759999	069	149800230000130	161210000
219LI	08196907420220	04780024	074	144600235000170	161000000
319LI	08196909200220	04050081	068	146500250000790	071110000
419LI	08196910560220	03900038	074	150600262999999	271110000
519LI	08196913000225	04320107	062	143500280001300	271110000
619LI	08196914450225	05050112	074	128800270001100	071210000
719LI	08196918000220	04850403	056	148600238000170	072510000
819LI	08196919260220	04300193	061	148800230000280	171120000
121LI	08196906100220	04219999	071	146300228000240	161210000
221LI	08196907470216	04199999	074	150800238000540	161000000
321LI	08196909250220	04750118	070	151600250000350	071110000
421LI	08196911050226	05750045	075	148900262999999	271110000
521LI	08196913050230	06300080	067	150800290000033	271110000
621LI	08196914580226	05950144	074	147600264000110	071210000
721LI	08196918080220	05200260	055	153800240000920	172130000
821LI	08196919330220	04450165	061	148900230000460	171120000
122LI	08196906200216	05249999	073	149800230000110	161210000
222LI	08196907550220	04870057	074	147800236000240	161000000
322LI	08196909320220	05279999	072	150300250000220	071110000
422LI	08196911070225	04780125	075	146800262000130	271110000
522LI	08196913100230	07650215	072	150900284000079	271110000
622LI	08196915040230	06750103	075	147800270000031	071210000
722LI	08196918140220	06100179	057	152000238000000	171120000
822LI	08196919400220	04950234	061	148800228000350	171120000
123LI	08196906350216	04899999	073	151000228000049	161210000
223LI	08196908060220	05599999	075	150800240000079	161000000
323LI	08196909480222	06649999	073	149900250000033	071110000
423LI	08196911250230	07100146	076	141800278000017	271110000
523LI	08196913250232	07380197	072	151000285000079	271110000
623LI	08196915150225	06250125	075	148900264000033	071210000
723LI	08196919000210	06400250	059	152100238000049	171120000
823LI	08196919480220	06250163	060	147900228000033	171120000

171. =HALT END OF PROGRAM ENCOUNTERED DURING EXECUTION

172. +READY BLANK

172. +READY START[0]

0607

116LI	09086906000220	02550197	063.	137800200009200	242520000
216LI	09086907420225	02059999	062	140000222999999	052230000
316LI	09086909170225	02900146	064	136800232001300	122230000
416LI	09086910550225	03700190	065	139000212001100	122530000
516LI	09086913200225	04000240	066	132600227000460	122030000
616LI	09086114500230	03509999	064	140000223000330	262230000
117LI	09086906070215	02550095	064	134800205000790	242520000
217LI	09086907500225	03050117	066	136900213001100	052230000
317LI	09086909230225	03450125	066	139800227001100	122230000
417LI	09086911000225	03600130	071	139900212001100	122520000
517LI	09086913280225	03350140	068	141900228000330	122230000
617LI	09086114550228	03800130	071	138200228000170	262230000
118LI	09086906180225	03550160	066	132100217000790	242520000
218LI	09086907580220	03600080	065	138900213000490	152230000
318LI	09086909350225	04000132	069	137000220000220	122230000
418LI	09086911100225	04250186	072	137100212000220	122520000
518LI	09086913380225	04200232	071	138000227001100	122230000
618LI	09086115030227	04000160	072	139980230000230	262230000
119LI	09086906270220	03950240	069	136200208999999	242520000
219LI	09086908070225	04250117	066	138900213000270	152230000
319LI	09086909450225	04100110	069	141100220000170	122230000
419LI	09086911370222	04400183	071	138900210000170	122520000
519LI	09086113450225	04350175	072	138900222000330	122230000
619LI	09086115130225	03600116	072	136900223000310	262230000
121LI	09086906350225	04150121	066	140000205000170	242520000
221LI	09086908130215	05200125	065	135500215000045	152230000
321LI	09086909500225	06100175	069	138900220000020	122230000
421LI	09086911450220	04300126	068	141200222000020	122520000
521LI	09086113500228	03550133	073	139980220000230	122230000
621LI	09086115200225	05800254	073	139100220000640	262230000
122LI	09086906400227	04400130	063	138200225000078	242520000
222LI	09086908220220	06250139	066	141100215000450	122230000
322LI	09086909580225	07000200	067	138100215000000	122510000
422LI	09086911500225	06650213	072	135000227000045	122510000
522LI	09086114000228	05950380	075	138100220000078	122230000
622LI	09086115250225	04200152	073	140000220000078	262230000
123LI	09086906550220	05250095	066	140700225000045	242520000
223LI	09086908320225	05150095	064	138800217000061	122230000
323LI	09086910090225	06400215	065	136900217000083	122510000
423LI	09086912000225	07650330	070	137400215000020	122510000
523LI	09086114050225	07250364	076	136600220000045	122530000
623LI	09086115380222	07600376	076	138400218000000	262230000