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Bay of Green Bay
Lower Fox River
LWQM

SPECIAL DISSOLVED OXYGEN STUDY IN LOWER GREEN BAY

SUMMER 1981

Introduction

The lower Green Bay's commercial fishery produces about 58% of the yellow perch in Lake Michigan. In 1979, a commercial drop net sampling was run on 15 separate days by the LMD fisheries section. A typical random drop net catch was monitored in early June 1979. Of a typical catch, a 21% mortality was found. This is far more than was observed in the northern portion of the bay. In 1980 the LMD fisheries section monitored Dissolved Oxygen (D.O.) levels throughout the southern bay at areas where commercial nets were placed. The two studies concluded yellow perch mortalities can be attributed to at least three factors: 1) period of low dissolved oxygen; 2) handling of sub-legal portions of catch; and 3) seagull predation. Low D.O. levels were documented during 1979 where a one night set produced and entirely unmarketable catch. Many commercial fishermen maintain some periods of yellow perch mortality can be attributed to "bad water" moving through the area. If this "bad water" is in fact areas of low D.O. moving through, how can we find these areas?

High yellow perch mortality could be lessened if commercial nets were not placed in these "bad water", low D.O. areas. Determining if these areas are related to the Fox River channel moving through the bay or if they exist at all could greatly increase yellow perch commercial and sport productivity. This study was prompted by the LMD fisheries

section in an effort to determine what if any action can be taken to increase yellow perch productivity.

Our goal is to define:

1. What these areas of low D.O. can be attributed to. If they are attributed to the Fox River or the eutrophic conditions of the bay.

2. If the areas are isolated or conditions that occur throughout the study area.

3. If there is a pattern which could be used by the commercial fishermen to decrease yellow perch mortality.

Description of Study Area

The study area consists of the southern portion of Green Bay from Little Tail Point southeast to Vincent Point on the east shore as the north boundary. The southern boundary is the tip of Long Tail Point to Point Sauble. (Figure 1)

The lower bay is shallow and very eutrophic. The area studied covers approximately 45 KM^2 with a mean depth of 2 meters. The Fox River has a major influence on the southern bay. Although the confluence with the river is directly impacted, greater dilution takes place in our study area.

Water Quality Problems

Several studies and many years have been spent on the lower Green Bay in

determining water quality problems. It is generally agreed that two major water quality problems exist in the lower Green Bay:

1. Dissolved oxygen levels.
2. Nutrient loadings from its tributaries, primarily the lower Fox River.

During summer low flow periods critical D.O. levels often occur in the lower Green Bay. Winter periods of heavy ice cover have caused low D.O. problems in the middle bay.

Nutrient loading from the Fox River causes highly eutrophic conditions. Loading of high oxygen demand material causes severe algae blooms to nuisance level. Bacterial decomposition of phytoplankton utilize oxygen and release ammonia. (With ammonia nitrification, there is also a D.O. deficiency).

Methodology

The study area was defined as a location where a large amount of commercial fishing pressure occurs. A number of complaints received from commercial fishermen and concern by the fisheries personnel prompted this study.

D. O. profiles were taken using a Yellow Springs Instrument Dissolved Oxygen (D.O.) 54 RC. Temperature and D.O. readings were recorded at the surface, one, two, three meters and every two meters thereafter.

Readings were taken at various locations throughout the study area, with many correlated to commercial fishing activity. Background D.O. profiles were taken on 5/29/81 before any major algae bloom could affect the levels. D. O. profiles were taken three weeks in July and one in August.

Results, Discussion, and Conclusion

The data attained for background D.O. levels of the bay was collected 5/29/81. The information and location are in Table 1 and Figure 2, respectively. Weather conditions ranged from partly cloudy in the A.M. to mostly sunny in the P.M. Wind was from the NE 5-10 MPH, temperature 62-75° F. The bay was calm with 0-1' waves. Algae blooms had already started. A secchi disk reading of approximately 1 M was taken.

The first actual field D.O. profiles were collected on 7/7/81. See Table 2 and Figure 3 for this data. Weather conditions were partly cloudy, winds from the SW 0-10 MPH, temperature was 80-85° F and hazy. The bay was calm with 0-2' waves. Large algae blooms occur south of the study area inside Long Tail Point. Some algae mats were found in the study area mainly west of the ship channel.

The 7/16/81 data is recorded in Table 3 and Figure 4. Weather for that day was sunny with NW winds 5-15 MPH, temperature was 78-85° F, waves from 1-2'. Some precipitation has occurred since the 7/7/81 sampling, but no major storms. Algae mats occur throughout the entire study area but are broken up by wave action.

On 7/30/81, the weather was sunny and hazy. Temperature was in the mid

to upper 70'so F and winds were SE at 5-10 MPH. We talked to a commercial fisherman checking his nets who stated he "hasn't had dead fish in his nets since the weeks of July 5-18th." He also stated "not many fish are left in the southern portion of the bay. They have moved out because of the problem weeks earlier." Algae mats occur throughout the entire sampling area. The data for this sampling date is located on Table 4 and Figure 5.

The final sampling date was 8/17/81. This data is recorded in Table 5 and Figure 6. The weather was sunny with the temperature in the upper 60's and lower 70's. Wind was NE 0-5 MPH, waves 0-2'. Algae blooms occur but floating mats of dead algae are more common.

Data collected on July 7 and 16th show areas of critical D.O. levels throughout the study area. Although the July 7th data reveals only low D.O. levels at the bottom portion of the water column, fish are held in the nets at these levels. Low D.O. readings occurred at various levels throughout the water column on the 16th. Surface levels were also low. This data was collected after a period of rain and winds which probably mixed the water column.

It appears that a general lowering of D.O. levels throughout the study area can be correlated to periods of hot, sunny weather with little or no precipitation or wind. These periods produce large amounts of algae which produce higher levels of oxygen in the limnetic zone through photosynthesis but during respiration and decomposition consume D.O. This is extremely important at night when little oxygen is being produced. Re-aeration is only taking place through the atmosphere and D.O. is consumed at a rapid rate.

In interpreting the D.O. data taken, it seems that the portion of the study area which has the greatest probability of receiving influence from the Fox River shows a trend toward lower D.O. levels. This would be the waters between Long Tail Point and Point Sauble, although future data will help to draw a more complete picture of the short term effect the Fox River might have on the bay's D.O. levels.

Perch fishermen most often place their nets to fish off the bottom. Fishing in depths of 6 meters is not uncommon. Most fish are caught in the bottom section of the nets.

There are a number of conclusions which can be drawn:

1. Fish caught in the bottom of nets during periods of daytime high D.O. level could die during the diurnal low periods.

2. There does appear to be a period correlated to massive algae blooms where low D.O. levels occur in the study area. This is caused by ammonia nitrification of decaying algae and diurnal effect where oxygen has to be replenished through the atmosphere rather than photosynthesis.

3. Water movement from the Fox River depends on wind action and general bay oscillations. We were unable to verify any actual relationship with the river water and low D.O. levels, although sludge deposits which can accumulate in this area will have an effect.

4. Although no actual relation with the Fox River was found, there are sections of the study area which have significantly

higher and lower D.O. levels during critical periods. The cause of these variations is yet unknown. Future data collection and chemical sampling could answer these ultimate questions.

MR:jmg Michael Russo

cc: District Office (2)
Green Bay Area

STUDY AREA

FIGURE 1

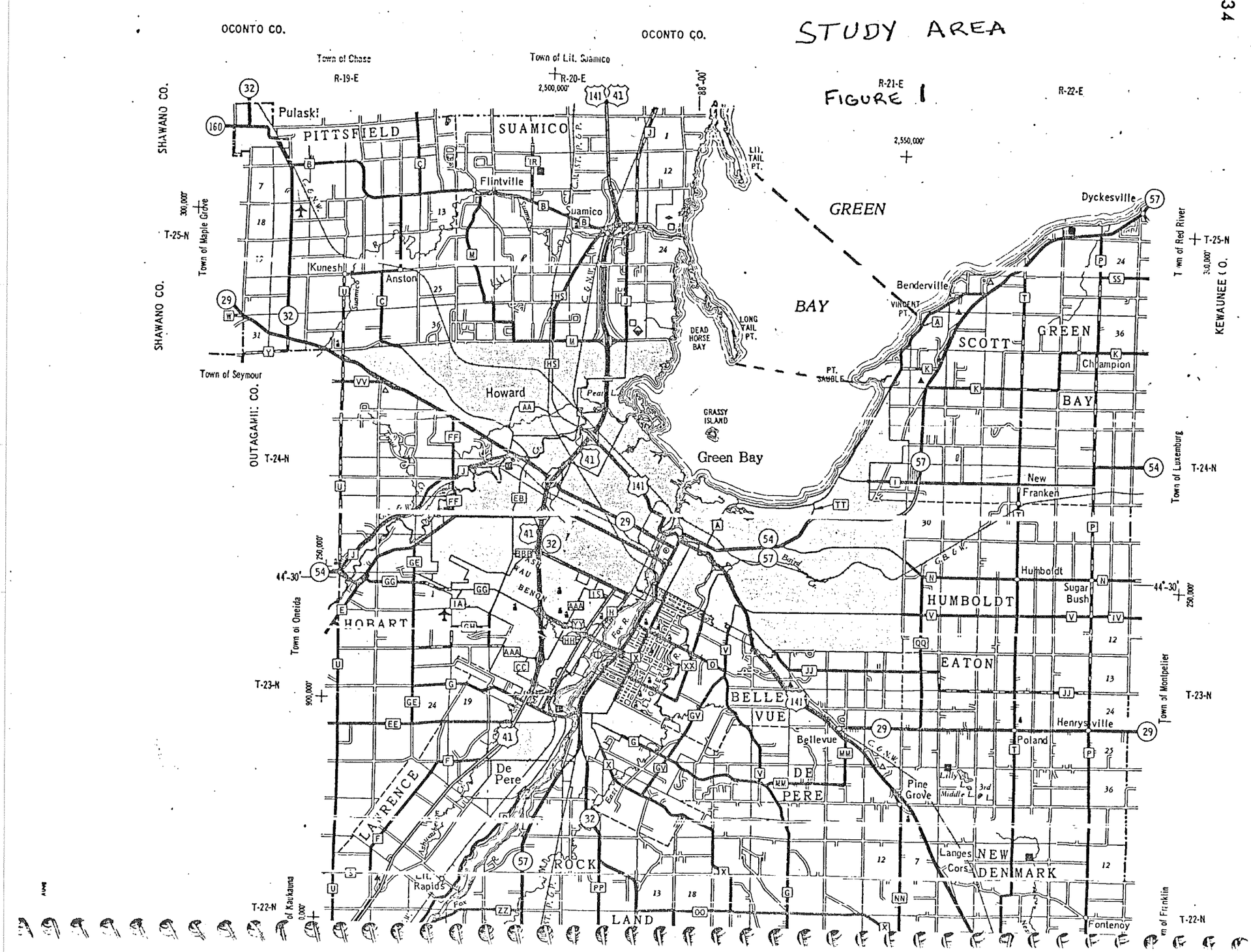
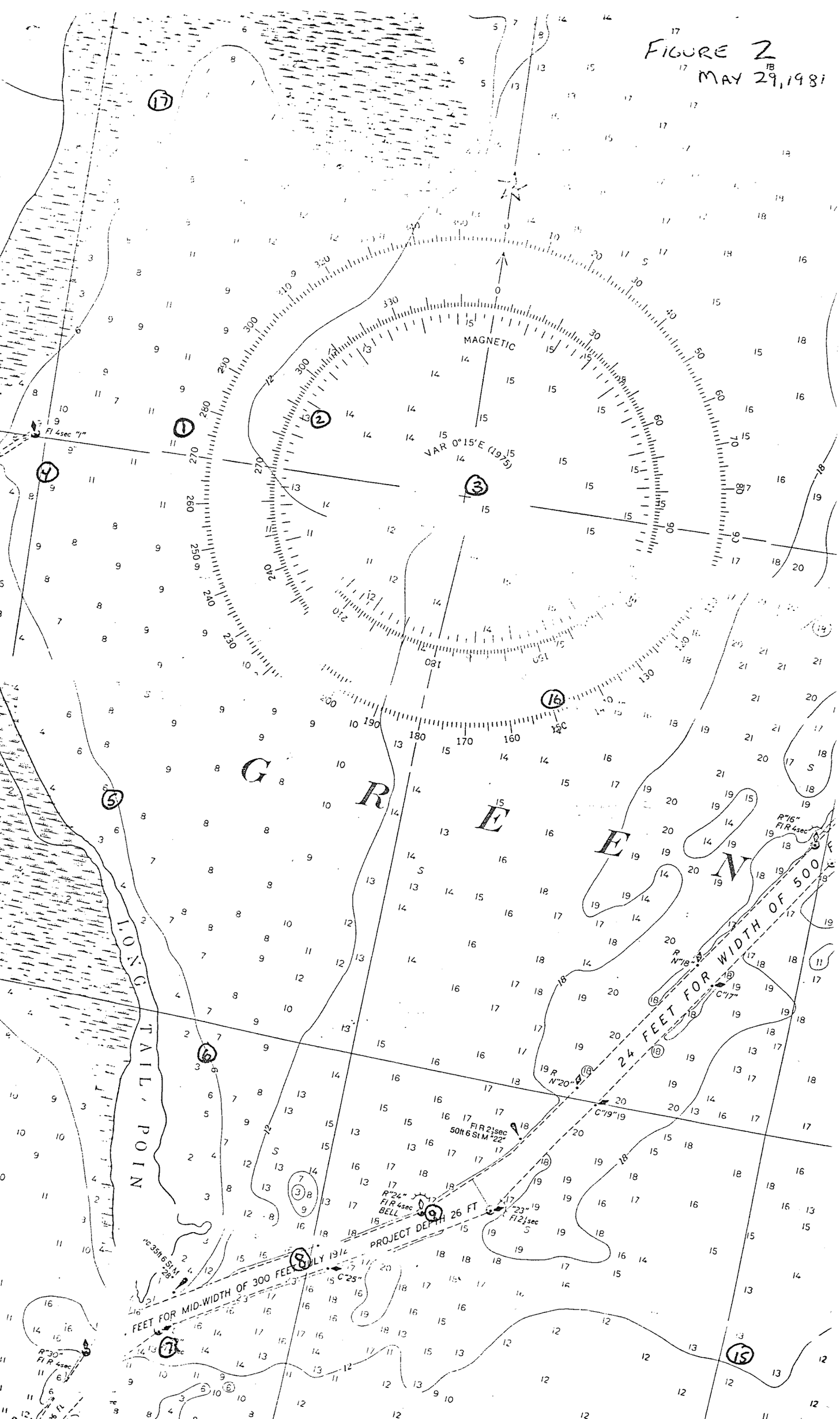


FIGURE 2
MAY 29, 1981



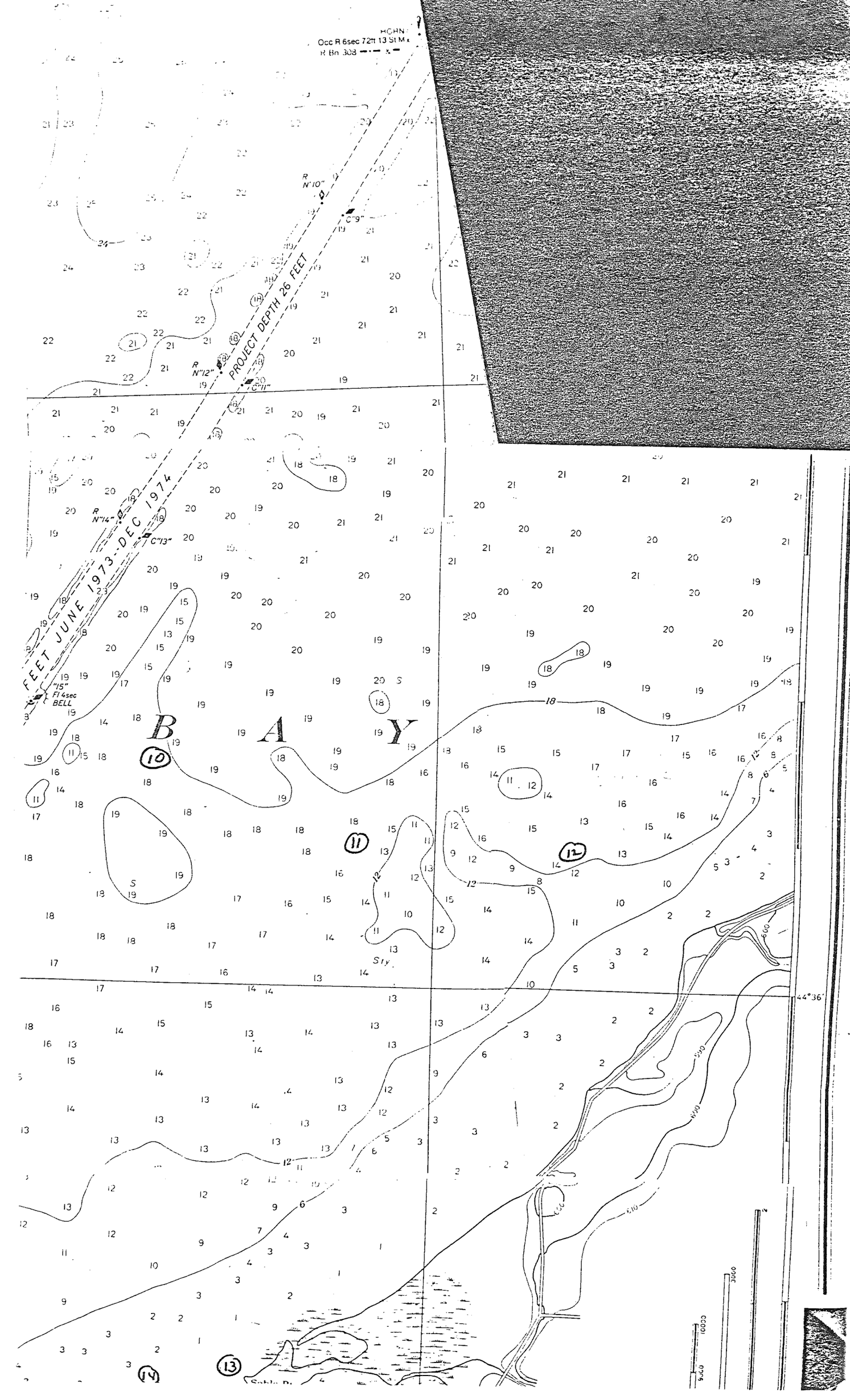

HORN
Occ R 6sec 72ft 13 St M
R Bn 308
R N°10"
C"9"
PROJECT DEPTH 26 FEET
R N°12"
C"11"
R N°14"
C"13"
FEET JUNE 1973 - DEC 1974
"15"
Fl 4sec
BELL
B A Y
(10)
(11)
(12)
(13)
(14)
S
Sty
44°36'

TABLE 1A

GREEN BAY D.O. STUDY - MAY 29, 1981

TIME	LOCATION	D.O. ppm	TEMP °C	M	COMMENTS
10:49	1	10.2	18	0	
		10.6	18	1	
		10.6	18	2	
		9.9	17	3	
10:58	2	10.0	18	0	
		9.8	17	1	
		9.7	17	2	
		9.7	17	3	
		9.0	17	5	
11:06	3	9.9	17	0	
		9.9	16.5	1	
		10.0	16.5	2	
		10.0	16.0	3	
		7.9	15.0	5	7 M Bottom
11:30	4	11.2	18.0	0	
		11.0	18.0	1	
		10.4	17.0	2	2.2 M Bottom
11:50	5	10.4	18.0	0	
		10.8	17.0	1	
		9.6	16.5	2	
		9.1	16.0	3	3.5 M Bottom

TABLE 1B

GREEN BAY D.O. STUDY - MAY 29, 1981

TIME	LOCATION	D.O. ppm	TEMP °C	M	COMMENTS
12:42	6	11.2	17.0	0	
		11.0	16.0	1	
		10.4	16.0	2	
		9.8	16.0	3	4 M Bottom
13:10	7	11.0	18.5	0	
		10.8	17.5	1	
		10.4	17.0	2	
		10.0	16.0	3	
		9.1	15.0	5	
		8.3	14.5	7	
		8.1	14.0	9	Approx.Bottom
13:20	8	10.2	19.0	0	Some Algae
		10.3	17.0	1	
		10.2	16.0	2	
		10.2	15.5	3	
		9.6	15.0	5	
		7.9	14.0	7	
		6.9	14.0	9	
		6.7	14.0	11	

TABLE 1C

GREEN BAY D.O. STUDY - MAY 29, 1981

TIME	LOCATION	D.O. ppm	TEMP °C	M	COMMENTS
13:40	9	9.9	18.0	0	
		10.2	16.0	1	
		10.6	15.5	2	
		10.3	15.0	3	
		9.8	15.0	5	
		9.4	14.0	7	
		7.1	14.5	9	
		6.4	13.5	11	11.2 M Bottom
13:55	10	10.0	18.0	0	
		9.8	15.5	1	
		10.0	15.0	2	
		10.0	14.5	3	
		9.9	14.5	5	
		7.8	13.0	7	8 M Bottom
14:10	11	10.1	18.0	0	
		10.6	16.0	1	
		10.6	15.0	2	
		10.2	15.0	3	
		8.4	14.5	5	7 M Bottom

TABLE 1D

GREEN BAY D.O. STUDY - MAY 29, 1981

TIME	LOCATION	D.O. ppm	TEMP °C	M	COMMENTS
14:25	12	10.0	18	0	
		10.4	16	1	
		10.4	15	2	
		10.4	15	3	
		9.3	14	5	5 M Bottom
14:50	13	11.4	19	0	
		11.8	16	1	1.5 M Bottom
15:10	14	9.8	19	0	
		10.6	18	1	
		10.6	16	2	
		10.4	15	3	
		10.4	15	3	
		9.8	15	5	
15:20	15	9.9	18	0	
		11.0	16	1	
		11.4	15	2	
		11.0	15	3	
		9.6	14.5	5	
		7.1	13.5	6	

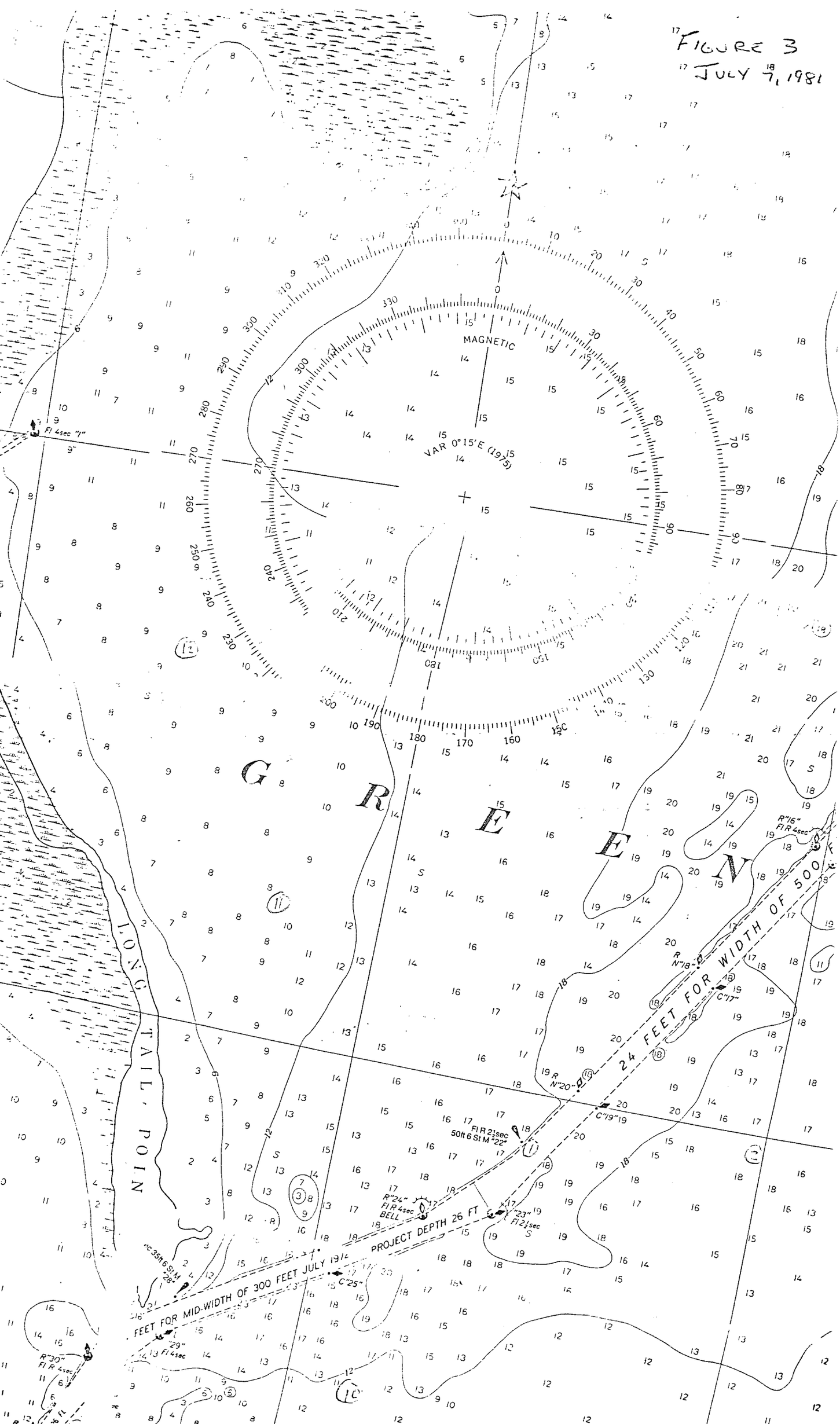
TABLE 1E

GREEN BAY D.O. STUDY - MAY 29, 1981

TIME	LOCATION	D.O. ppm	TEMP ^{o}C	M	COMMENTS
15:45	16	9.8	18.0	0	
		9.8	16.0	1	
		10.4	15.5	2	
		10.4	15.0	3	
		9.6	15.0	5	
		8.1	13.5	7	
16:00	17	10.0	19.0	0	
		10.2	16.0	1	
		10.2	15.0	2	
		10.0	15.0	3	3.5 Bottom

FIGURE 3

JULY 7, 1981



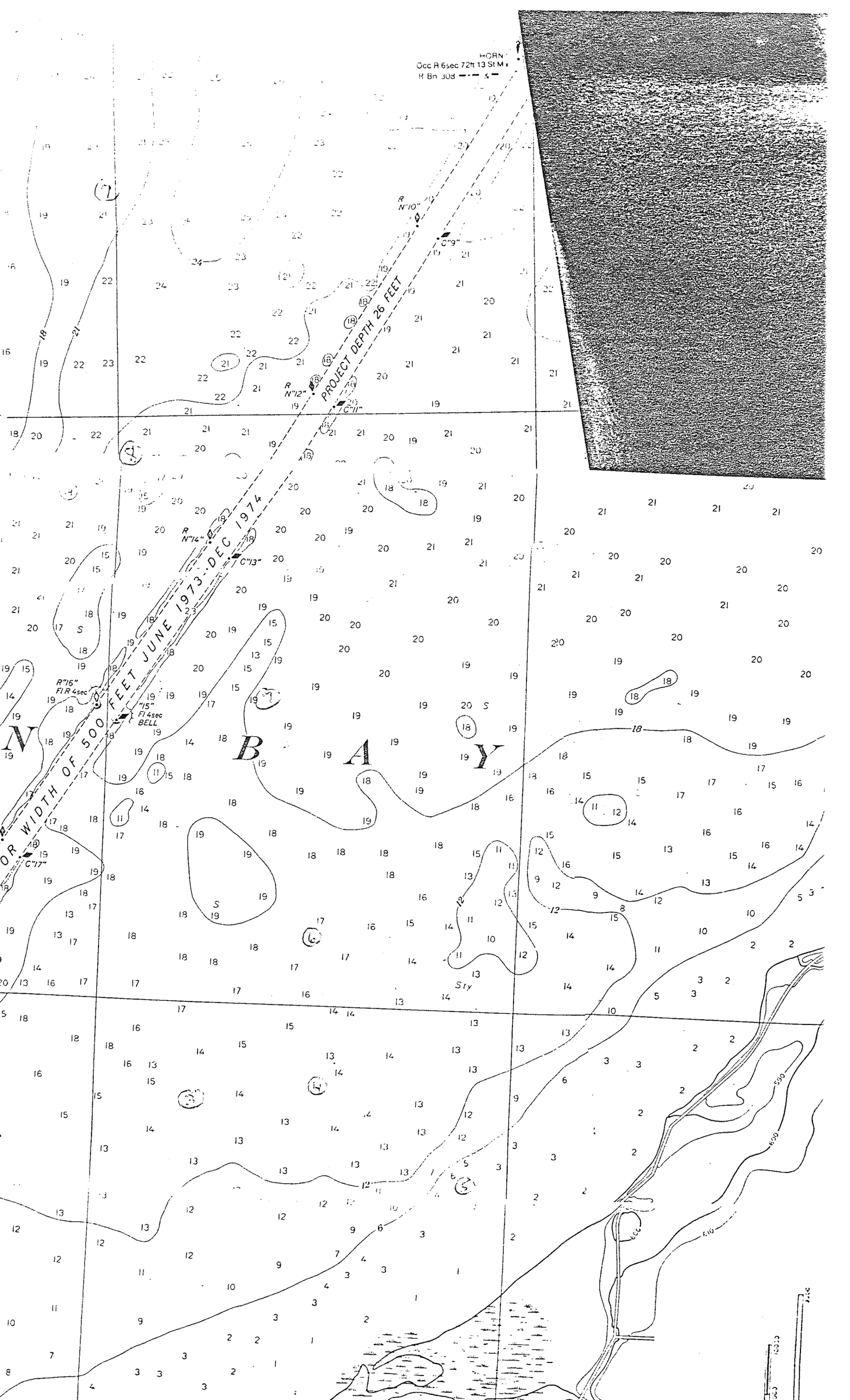

HORN
Occ R 6sec 72ft 13 St M
R Bn 30ft
R N"10"
C"9"
PROJECT DEPTH 26 FEET
R N"12"
C"11"
R N"14"
C"13"
WIDTH OF 500 FEET JUNE 1973-DEC 1974
R"16" Fl R 4sec
"15" Fl 4sec BELL
C"17"
B A Y
Sty

TABLE 2A

GREEN BAY D.O. STUDY - JULY 7, 1981

TIME	LOCATION	D.O. ppm	TEMP °C	M	COMMENTS
9:05	1	10.1	23	0	
		10.3	23	1	
		10.4	22.5	2	
		9.6	22.5	3	
		2.4	20	5	
9:16	2	9.8	23	0	
		9.9	23	1	
		9.9	23	2	
		9.8	23	3	
		2.8	20	5	
9:35	3	11.3	24	0	
		11.4	23	1	
		10.8	23	2	
		10.6	22	3	
		.7	20	5	1' Off Bottom
10:02	4	10.9	24	0	
		11.6	23	1	
		11.6	22.5	2	
		10.3	22	3	1 M Off Bottom

TABLE 2B

GREEN BAY D.O. STUDY - JULY 7, 1981

TIME	LOCATION	D.O. ppm	TEMP°C	M	COMMENTS
10:09	5	12.2	23	0	
		11.8	23	1	
		11.3	23.5	2	
		10.4	22.5	3	
		9.4	22	4	4.3 M Bottom
10:43	6	10.2	24	0	Commercial Net
		10.6	23	1	
		10.6	23	2	
		10.4	23	3	
		1.6	20	5	5 M Bottom
10:55	7	10	24	0	
		9.7	23	1	
		9.9	22.5	2	
		9.6	22	3	
		2.1	19	5	
		1.5	18.5	6	6.1 M Bottom
11:11	8	9.6	24	0	Commercial Net
		9.8	23	1	
		9.9	22	2	
		9.9	22	3	
		3.6	19	5	

TABLE 2C

GREEN BAY D.O. STUDY - JULY 7, 1981

TIME	LOCATION	D.O. ppm	TEMP°C	M	COMMENTS
11:11	8 (cont.)	3.7	18	7	
		2.9	18	9	
		2.7	18	11	
11:37	9	11.6	25	0	Commercial Net
		11.8	24	1	
		11	23	2	
		10.4	23	3	
		2.4	20	5	
		1.3	19	7	7.5 M Bottom
13:03	10	11.6	24	0	
		11.6	24	1	
		11.6	23	2	
		9.6	22	3	
		2.3	19	5	5.5 M Bottom
13:48	11	10.4	25.5	0	
		10.6	25	1	
		10.6	22	2	
		8.2	21.5	3	

TABLE 2D

GREEN BAY D.O. STUDY - JULY 7, 1981

TIME	LOCATION	D.O. ppm	TEMP ^{o}C	M	COMMENTS
14:10	12	10.4	25	0	
		10.8	24	1	
		10.6	22	2	
		8.8	21	3	
		6.3	19	5	
		6.1	19	6	6.2 M Bottom

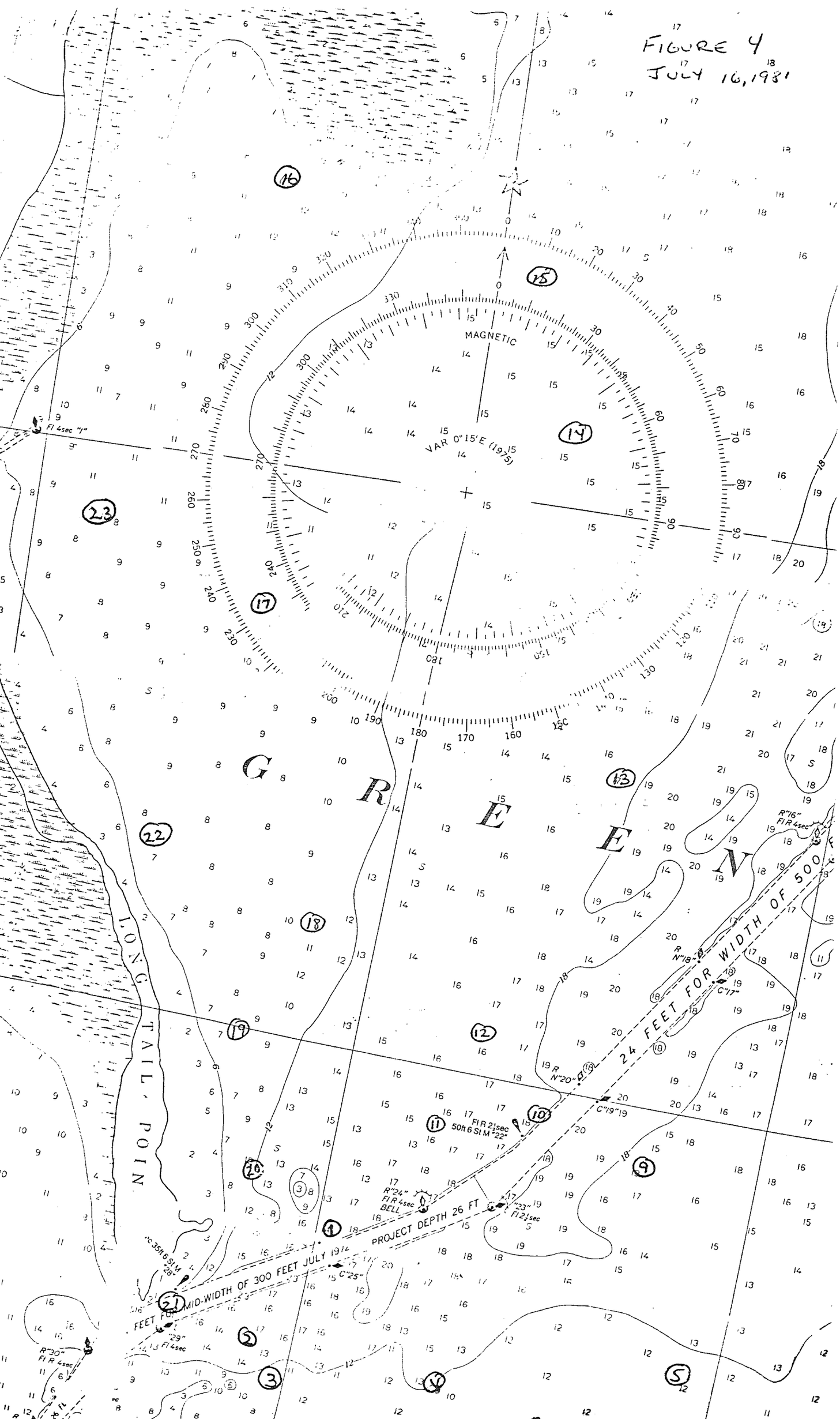


FIGURE 4
JULY 16, 1981
MAGNETIC
VAR 0°15'E (1975)
GREEN
LONG TAIL POIN
24 FEET FOR WIDTH OF 500
PROJECT DEPTH 26 FT
MID-WIDTH OF 300 FEET JULY 19
Fl 4sec "1"
R"16" Fl R 4sec
R"18"
C"17"
R"20"
C"19"
Fl R 2½sec 50ft 6 St M "22"
R"24" Fl R 4sec BELL
"23" Fl 2½sec
C"25"
"29" Fl 4sec
R"30" Fl R 4sec

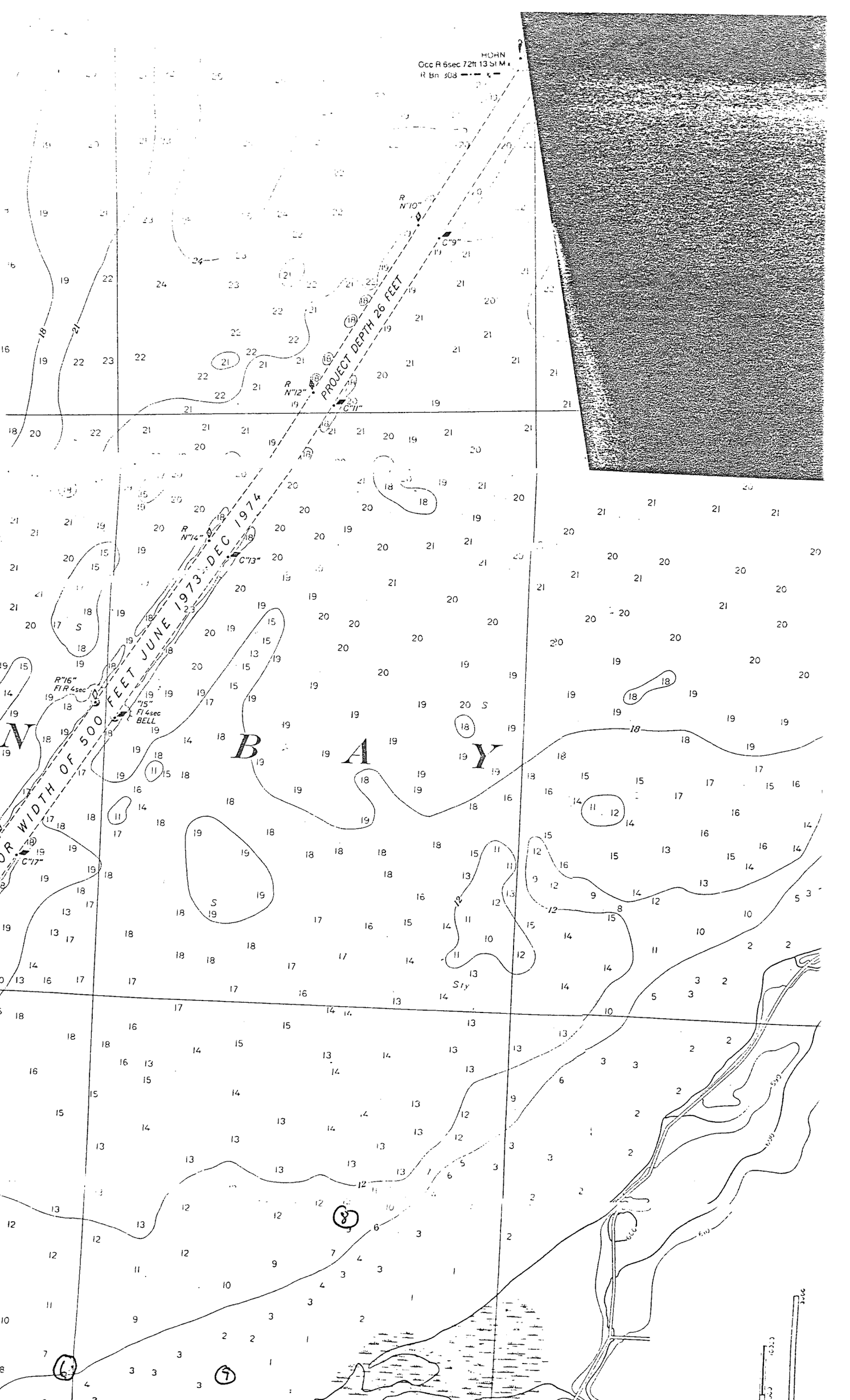

HORN
Occ R 6sec 72ft 13 St M
R Bn 108
R N"10"
C"9"
PROJECT DEPTH 26 FEET
R N"12"
C"11"
R N"14"
C"13"
WIDTH OF 500 FEET JUNE 1973-DEC 1974
R"16" Fl R 4sec
"15" Fl 4sec BELL
C"17"
BAY
Sty

TABLE 3A

GREEN BAY D.O. STUDY - JULY 16, 1981

TIME	LOCATION	D.O. ppm	TEMP°C	M	COMMENTS
9:18	1	6.1	22	0	
		6.1	22	1	
		5.8	22	2	
		5.7	21.5	3	
		5.6	21.5	5	
		5.2	21.5	7	
		2.8	21	9	9.2 M Bottom
9:44	2	6.1	22	0	
		6.1	22	1	
		5.3	22	2	
		5.3	21.5	3	
		4.9	21.5	4	4.5 Bottom
9:59	3	6.2	22	0	
		6.1	22	1	
		5.4	22	2	
		5.4	21.5	3	
		4.8	21.5	4.5	4.6 Bottom
10:18	4	6.7	21	0	
		6.5	21	1	
		5.9	21	2	2.6 M Bottom

TABLE 3B

GREEN BAY D.O. STUDY - JULY 16, 1981

TIME	LOCATION	D.O. ppm	TEMP°C	M	COMMENTS
10:25	5	6.4	21.5	0	
		6.2	21.5	1	
		5.7	21.5	2	
		5.2	21.5	3	
		4.8	21.5	3.5	4 M Bottom
10:35	6	6.4	22	0	
		6.4	22	1	
		6.1	22	2	
		5.4	21.5	3	
		5.3	21.5	3.5	4.1 M Bottom
11:15	7	6.5	21	0	
		6.3	21	1	1.5 M Bottom
11:25	8	5.9	22	0	
		5.9	22	1	
		5.7	21.5	2	
		5.7	21.5	3	
		5.5	21	5	5.4 M Bottom
12:00	9	6.0	21.5	0	
		6.0	21.5	1	
		5.8	21.5	2	
		5.6	21.5	3	

TABLE 3C

GREEN BAY D.O. STUDY - JULY 16, 1981

TIME	LOCATION	D.O. ppm	TEMP°C	M	COMMENTS
12:00	9 (cont.)	5.4	21.5	5	
		5.4	21.5	6	6.5 M Bottom
12:10	10	7.3	22	0	
		6.4	22	1	
		5.8	21.5	2	
		5.8	21.5	3	
		5.7	21.5	5	
		5.1	21.5	6.5	6.7 M Bottom
12:21	11	7.1	22	0	
		7.3	22	1	
		6.3	22	2	
		5.4	22	3	
		5.6	21.5	5	5.2 M Bottom
12:30	12	6.3	21.5	0	
		6.4	21.5	1	
		6.4	21.5	2	
		5.9	21.5	3	
		5.9	21.5	5	
		5.4	21.0	6	6.2 M Bottom

TABLE 3D

GREEN BAY D.O. STUDY - JULY 16, 1981

TIME	LOCATION	D.O. ppm	TEMP°C	M	COMMENT
12:54	13	7.1	22	0	Commercial Net
		7.2	22	1	
		6.8	21.5	2	
		6.7	21.5	3	
		6.4	21.5	5	
		5.8	21.5	5.5	GM Bottom
13:06	14	7.5	22	0	Commercial Net
		6.8	22	1	
		6.2	22	2	
		5.9	22	3	
		5.6	22	5	
		5.1	21.5	6	6.5 M Bottom
13:15	15	9.4	21.5	0	Commercial Net
		9.3	21.5	1	
		8.6	21.5	2	
		6.1	21	3	
		5.6	21	4.5	5 M Bottom
13:30	16	7.2	21.5	0	Commercial Net
		6.7	21.5	1	
		6.4	21	2	
		5.2	21	3	
		3.7	21	3.5	3.8 M Bottom

TABLE 3 E

GREEN BAY D.O. STUDY - JULY 16, 1981

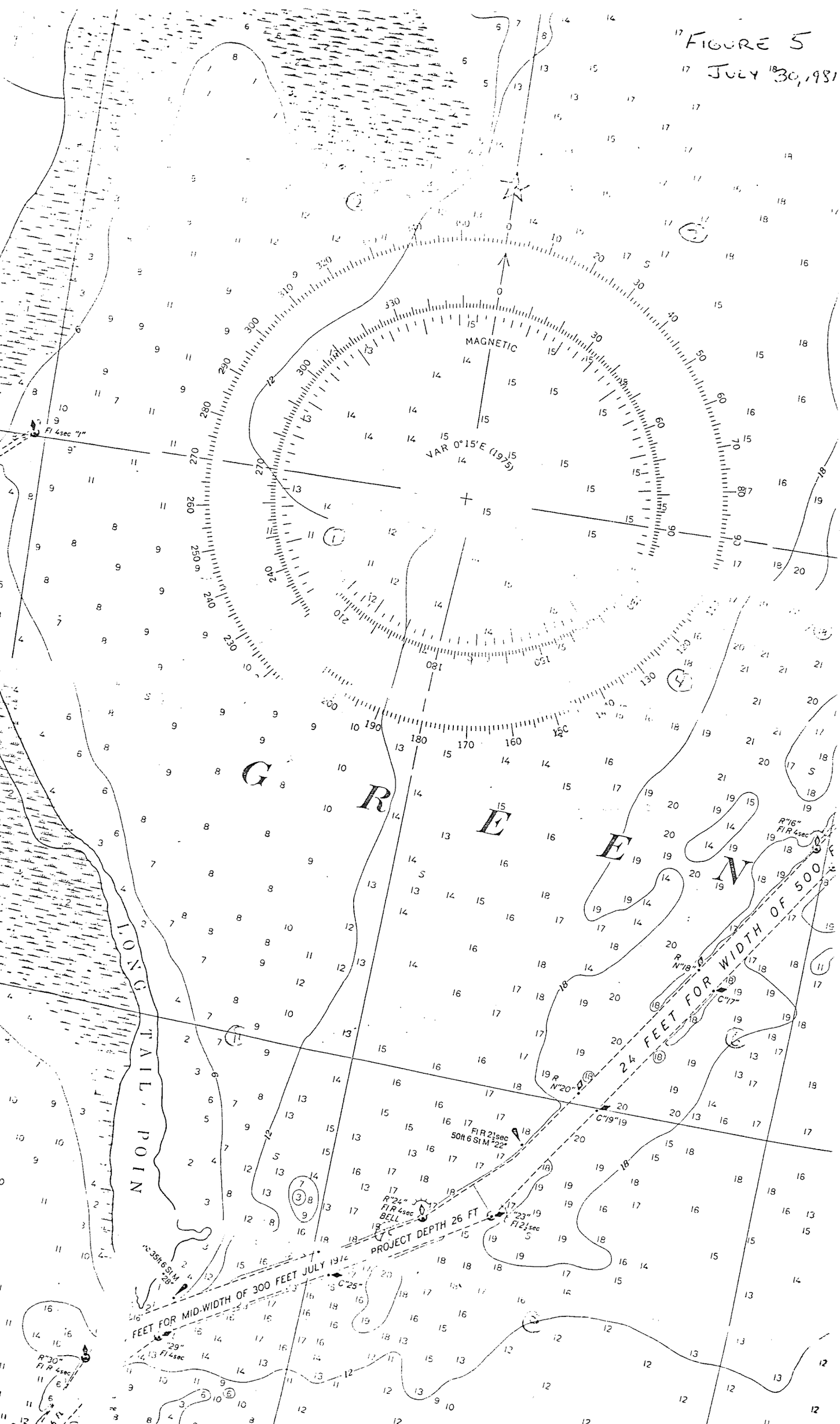
TIME	LOCATION	D.O. ppm	TEMP ^{0}C	M	COMMENT
13:35	17	7.5	22	0	
		7.3	22	1	
		6.6	21.5	2	
		6.4	21.5	3	
		5.9	21	4	4.4 M. Bottom
13:40	18	7.0	23	0	Commercial Net
		7.0	22	1	
		6.4	22	2	
		6.3	21.5	3	
		6.0	21.5	4	4.1 M Bottom
13:45	19	8.4	23	0	
		8.3	23	1	
		5.9	22	2	
		5.7	22	3	
		5.5	21.5	4.5	4.8 Bottom
13:52	20	7.3	23.5	0	
		7.4	22	1	
		6.1	22	2	
		4.8	21.5	3	
		4.9	21.5	4	4.5 M Bottom

TABLE 3F

GREEN BAY D.O. STUDY - JULY 16, 1981

TIME	LOCATION	D.O. ppm	TEMP°C	M	COMMENT
14:05	21	5.6	22	0	
		5.3	22	1	
		4.9	22	2	
		4.9	22	3	
		4.8	22	5	
		4.9	22	7	
		4.8	22	9	9.1 Bottom
14:20	22	7.4	23	0	
		6.4	22	1	
		5.8	21.5	2	
		5.7	21.5	3	3.3 M Bottom
14:35	23	8.9	22	0	
		8.5	21.5	1	
		9.6	21.5	2	2.3 M Bottom

FIGURE 5
JULY 30, 1981



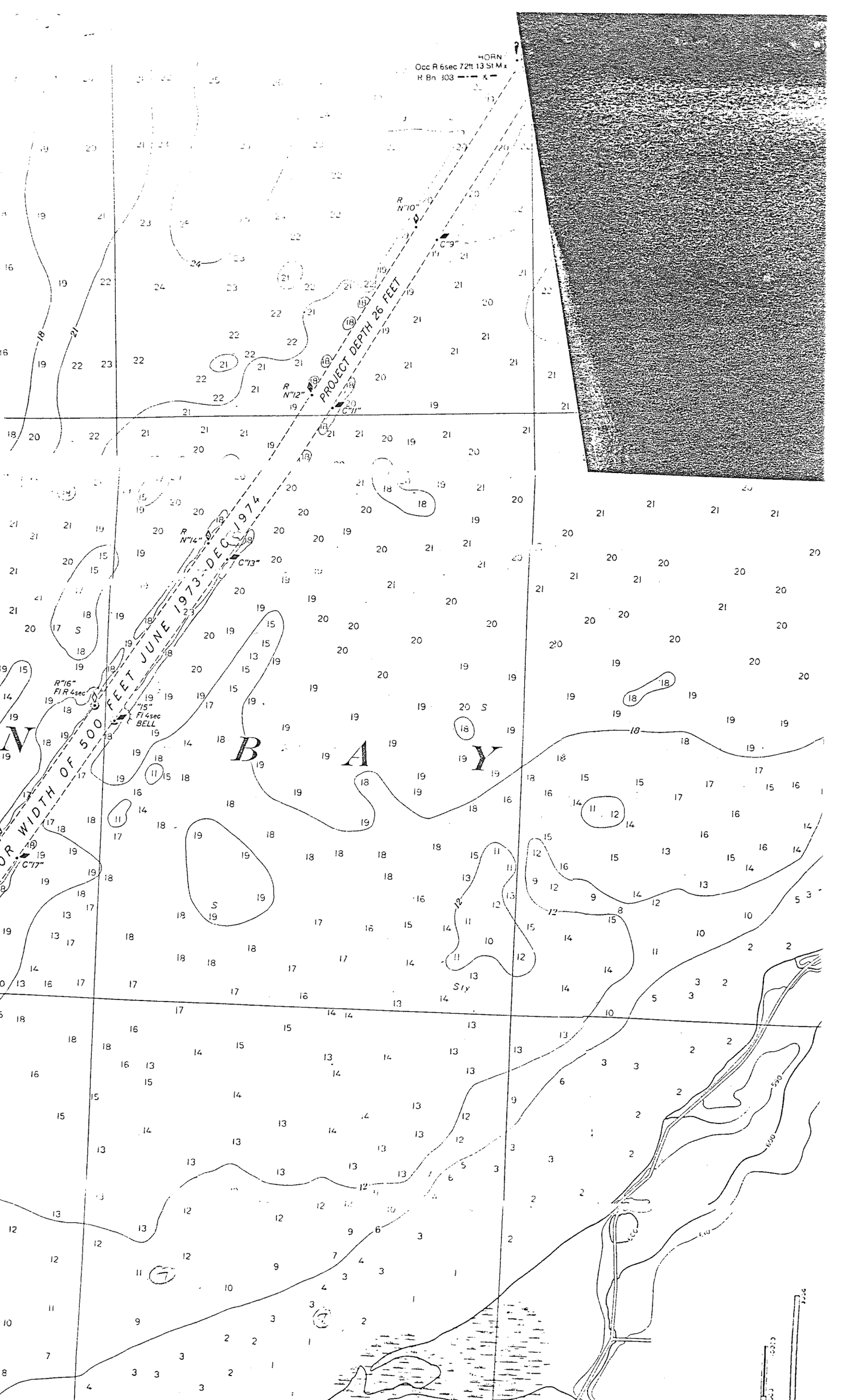

HORN
Occ R 6sec 72ft 13 St M x
R Bn 303
R N"10"
C"9"
PROJECT DEPTH 26 FEET
R N"12"
C"11"
R N"14"
C"13"
WIDTH OF 500 FEET JUNE 1973 - DEC 1974
R"16" Fl R 4sec
"15" Fl 4sec BELL
C"17"
B A Y
S
Sty

TABLE 4A

GREEN BAY D.O. STUDY - JULY 30, 1981

TIME	LOCATION	D.O. ppm	TEMP ^{0}C	M	COMMENT
9:05	1	8.7	21	0	Commercial Net
		8.8	20	1	
		8.8	20	2	
		8.8	20	3	
		8.6	20	5	
		8.4	20	7	
9:15	2	9.2	20	0	Commercial Net
		9.0	20	1	
		9.0	20	2	
		9.0	20	3	
		6.5	20	5	5.1 Bottom
9:36	3	9.5	21	0	
		9.5	21	1	
		9.5	20.5	2	
		9.5	20.5	3	
		9.5	20.5	5	
		9.2	20.5	6.5	6.6 Bottom
9:45	4	8.8	21	0	Commercial Nets
		8.8	21	1	
		8.8	21	2	
		8.7	21	3	
		8.6	21	5	

TABLE 4B

GREEN BAY D.O. STUDY - JULY 30, 1981

TIME	LOCATION	D.O. ppm	TEMP°C	M	COMMENT
9:45	4 continued	8.2	20.5	6.5	6.6 M Bottom
9:55	5	8.7	21	0	
		8.6	21	1	
		8.5	21	2	
		8.4	21	3	
		8.3	21	5	
		8.3	21	7	
10:10	6	8.0	21	0	
		8.0	21	1	
		7.9	21	2	
		7.8	21	3	
		7.5	21	5	
		6.9	21	6	6.2 M Bottom
10:25	7	9.0	21.5	0	
		8.9	21.5	1	
		8.9	21.5	2	
		8.4	21	3	
		8.0	21	5	
		7.0	21	6	6.1 Bottom

TABLE 4C

GREEN BAY D.O. STUDY - JULY 30, 1981

TIME	LOCATION	D.O. ppm	TEMP°C	M	COMMENTS
10:45	8	10.2	22	0	
		10.2	22	1	
		10.2	22	2	
		10	22	3	
		8.6	21.5	5	5.1 Bottom
11:15	9	9.8	21.5	0	
		9.8	21.5	1	
		9.7	21.5	2	
		9.7	21.5	3	
		9.5	21	5	
11:40	10	7.6	21	0	
		7.5	21	1	
		7.5	21	2	
		7.5	21	3	
		7.2	21	5	
		6.8	21	7	
		6.2	21	9	9.2 M. Bottom
12:20	11	8.1	21	0	
		8.0	21	1	
		7.8	21	2	
		7.5	20.5	3	

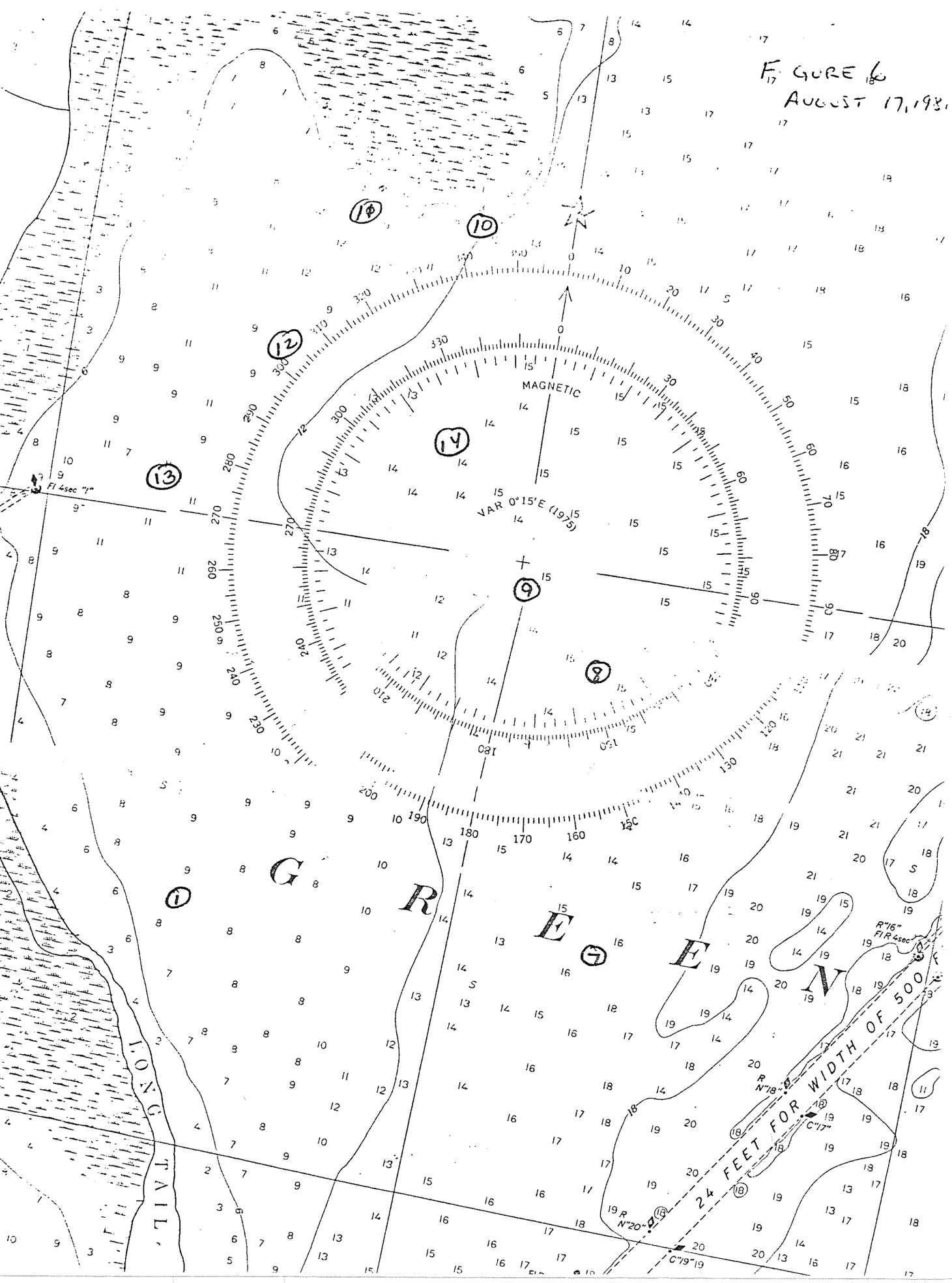
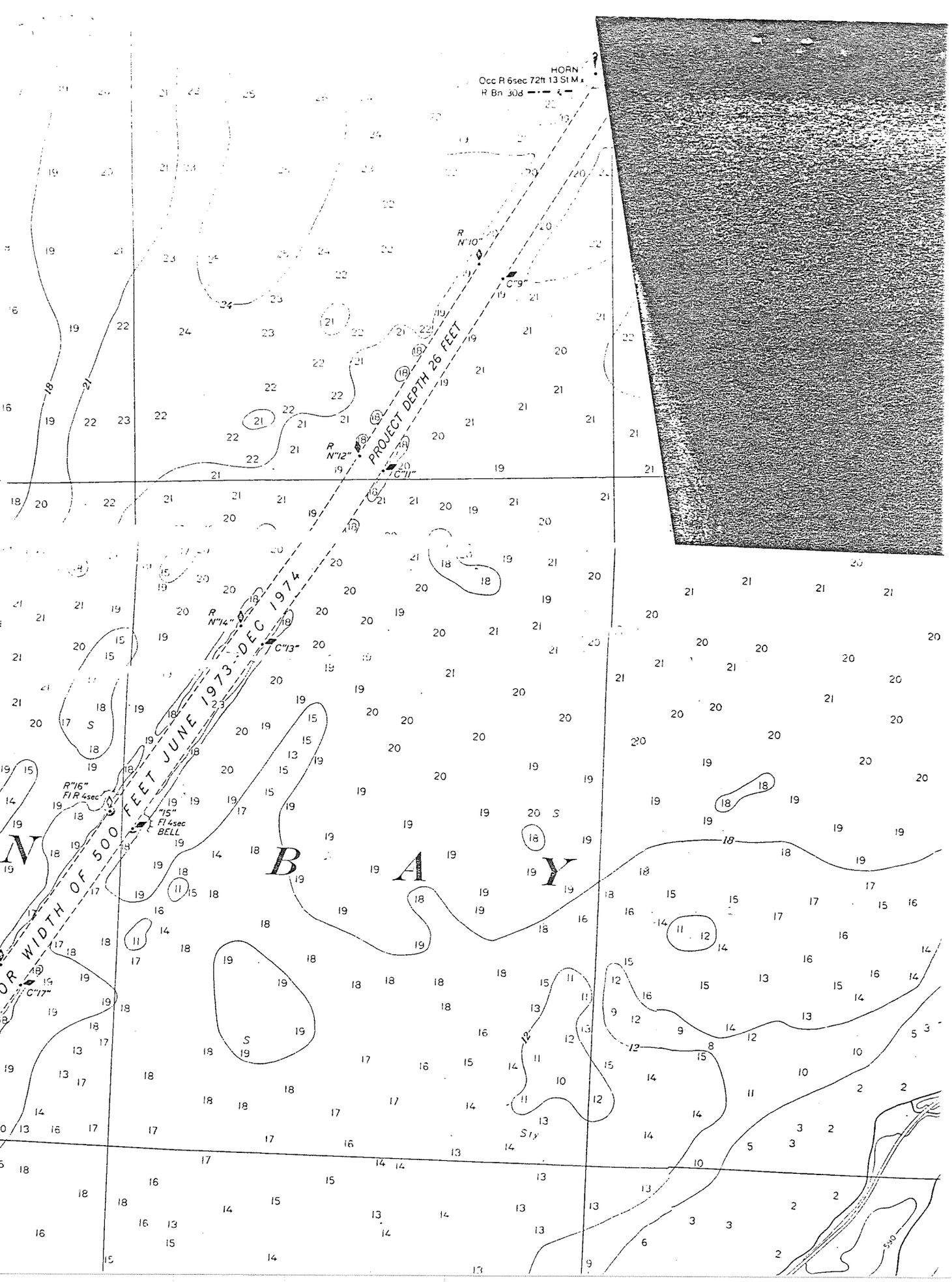


FIGURE 6
AUGUST 17, 19
MAGNETIC
VAR 0°15'E (1975)
GREEN
LONG TAIL
24 FEET FOR WIDTH OF 500
Fl 4sec "1"
R"16"
Fl R 4sec
R N"18"
C"17"
R N"20"
C"19"


HORN
Occ R 6sec 72ft 13 St M
R Bn 30d
R N°10"
C°9"
PROJECT DEPTH 26 FEET
R N°12"
C°11"
R N°14"
C°13"
DEC 1974
JUNE 1973
OF 500 FEET
R°16"
Fl R 4sec
°15"
Fl 4sec
BELL
C°17"
B A Y
S
Sty

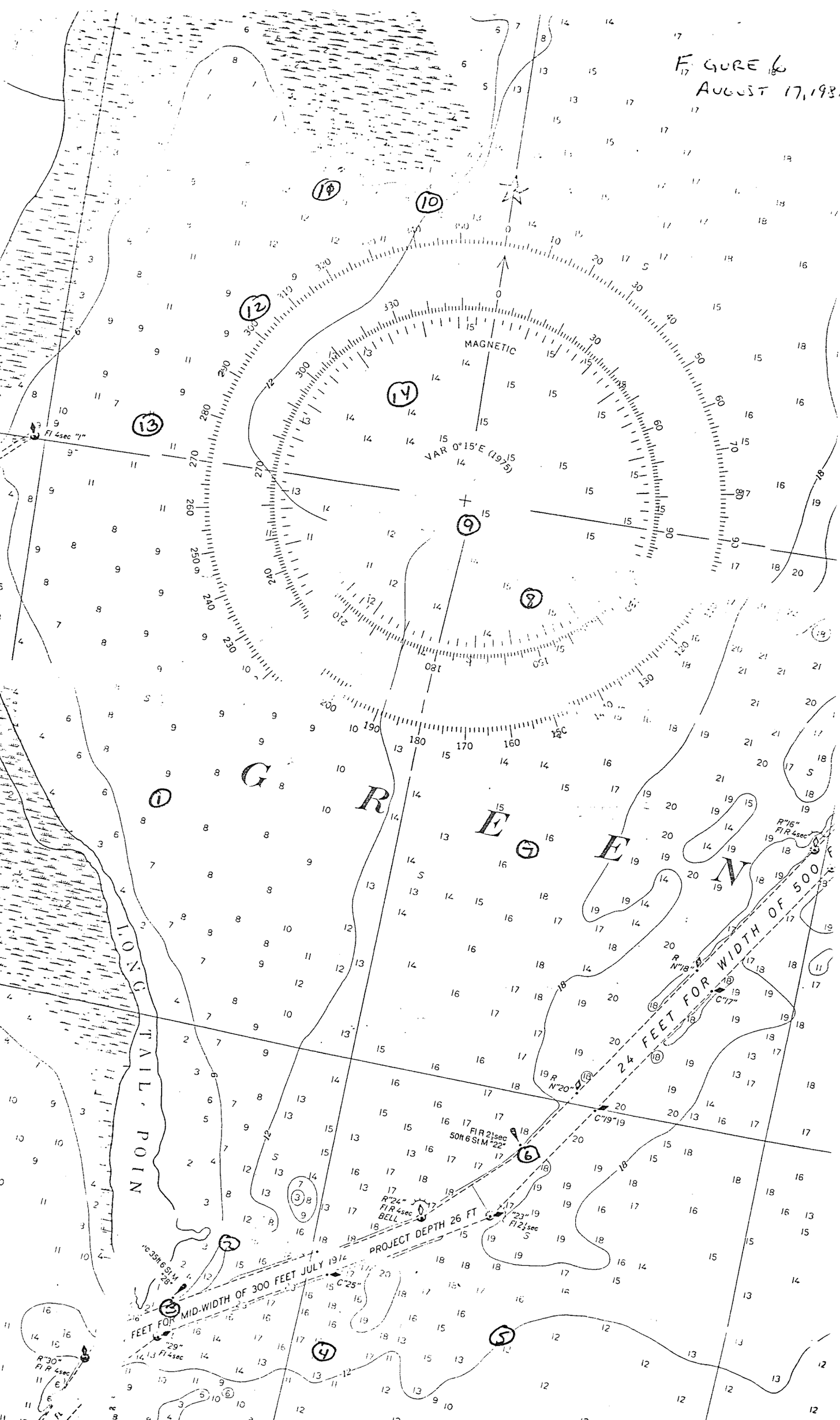


FIGURE 6
AUGUST 17, 198
MAGNETIC
VAR 0°15'E (1975)
LONG TAIL POINT
GREEN
24 FEET FOR WIDTH OF 500
PROJECT DEPTH 26 FT
FEET FOR MID-WIDTH OF 300 FEET JULY 19
Fl 4sec "1"
R "16" Fl R 4sec
R "18"
C "17"
R N "20"
C "19"
Fl R 2½sec 50ft 6 St M "22"
R "24" Fl R 4sec BELL
"23" Fl 2½sec
C "25"
"C 35ft 6 St M "28"
"29" Fl 4sec
R "30" Fl R 4sec

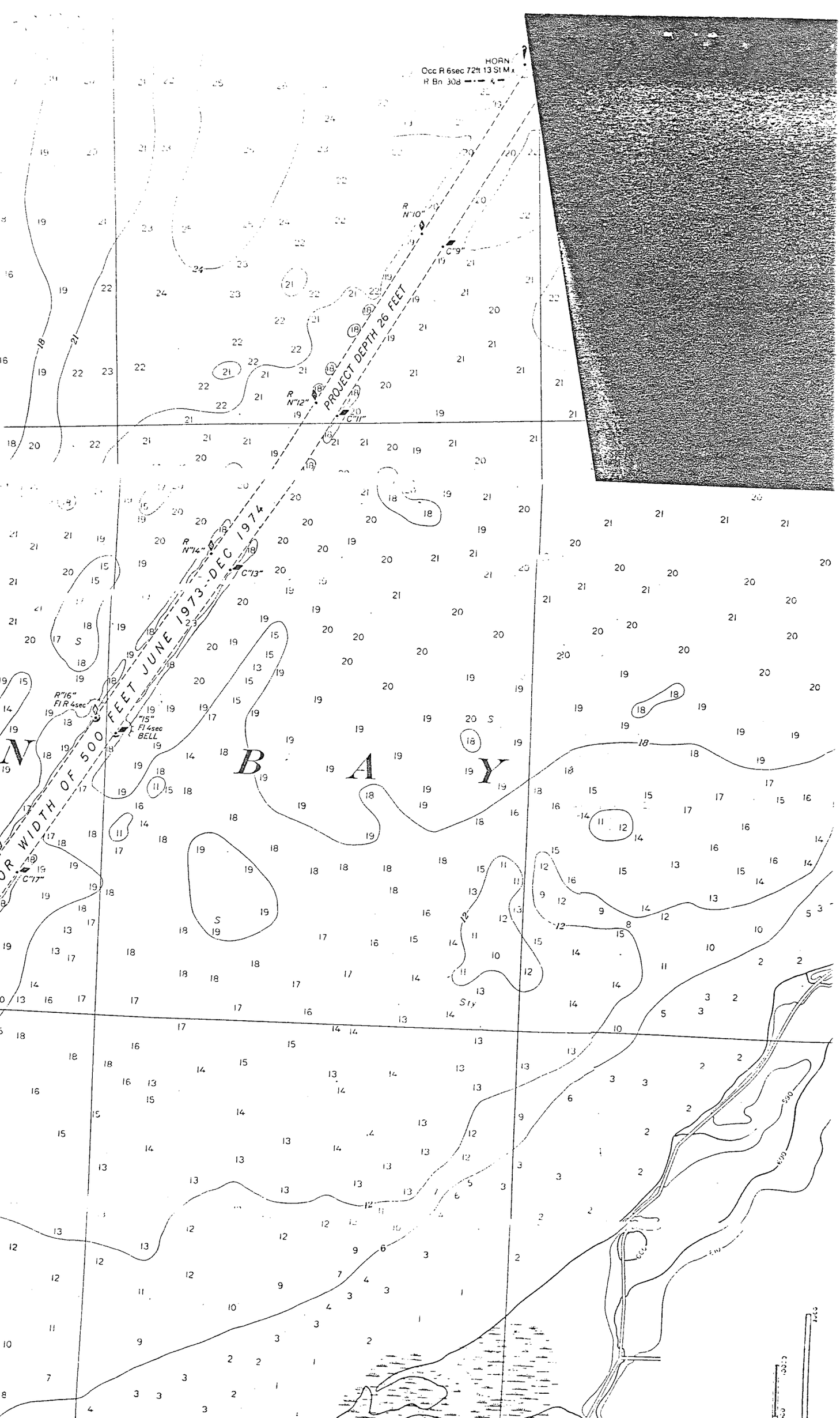

HORN
Occ R 6sec 72ft 13 St M
R Bn 308
PROJECT DEPTH 26 FEET
R"10"
C"9"
R"12"
C"11"
R"14"
C"13"
R"16"
Fl R 4sec
"15"
Fl 4sec
BELL
C"17"
B A Y
S
Sty
500
400

TABLE 5A

GREEN BAY D.O. STUDY - JULY 30, 1981

TIME	LOCATION	D.O. ppm	TEMP°C	M	COMMENT
9:20	1	8.9	20	0	
		8.8	20	1	
		8.5	20	2	
		8.6	20	3	
9:40	2	9.2	20	0	
		9.4	20	1	
		9.0	19	2	
9:45	3	9.0	19	0	
		9.1	19	1	
		8.6	19	2	
		8.6	21	3	
		7.5	21	5	
		7.8	21	7	
		8.1	21	9	
		6.3	20	10.5	10.6 Bottom
10:00	4	8.4	21	0	
		8.4	21	1	
		8.1	21	2	
		7.9	21	3	
		7.7	21	4	

TABLE 5B

GREEN BAY D.O. STUDY - JULY 30, 1981

TIME	LOCATION	D.O. ppm	TEMP°C	M	COMMENT
10:15	5	9.0	21	0	
		9.1	21	1	
		8.6	21	2	
		8.4	21	3	
		7.4	21	4	4.2 Bottom
10:40	6	9.0	21	0	
		9.0	21	1	
		8.6	21	2	
		8.5	21	3	
		8.1	21	5	
		7.6	21	7	
		1.0	21	9	9.2 Bottom
11:00	7	8.8	21.5	0	
		8.9	21	1	
		8.5	21	2	
		8.3	21	3	
		7.9	21	4	
		7.5	21	5	5.3 Bottom
11:25	8	9.0	22	0	
		9.0	21	1	
		8.7	21	2	
		8.6	21	3	

TABLE 5C

GREEN BAY D.O. STUDY - JULY 30, 1981

TIME	LOCATION	D.O. ppm	TEMP°C	M	COMMENT
11:25	8 Continued	8.1	21	5	5.5 M Bottom
11:40	9	8.9	21.5	0	
		9.1	21	1	
		8.9	21	2	
		8.7	21	3	
		8.1	21	5	
11:55	10	8.6	21	0	
		8.8	20.5	1	
		8.7	20.5	2	
		8.5	20	3	
		7.8	19.5	4.5	4.6 Bottom
12:35	11	8.5	21.5	0	
		8.8	21	1	
		8.7	20	2	
		7.9	20	3	
		5.4	19.5	4	4.2 Bottom
12:45	12	8.4	22	0	
		8.7	21	1	
		8.5	21	2	
		8.1	20.5	3	
		7.6	20.5	4	

TABLE 5D

GREEN BAY D.O. STUDY - JULY 30, 1981

TIME	LOCATION	D.O. ppm	TEMP°C	M	COMMENT
13:10	13	8.4	22	0	
		8.8	21	1	
		8.3	20.5	2	
		8.2	20.5	3	
		7.5	20	3.5	Bottom
13:35	14	8.6	21	0	
		8.9	21	1	
		8.5	20.5	2	
		8.1	20.5	3	
		7.4	20.5	4.5	Bottom