1978

Biological description of Old Plantation Flats Deep Trough, a proposed dredged material disposal site: Interim report

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COMMONWEALTH of VIRGINIA
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October 3, 1978

Dr. Robert L. Lippson
Research Coordinator
Environmental and Technical
Services Division
Environmental Assessment
Branch
National Marine Fisheries
Service
Oxford, MD 21654

Dear Dr. Lippson:

Enclosed is an Interim Report on the Old Plantation Flats Deep Trough survey, conducted during August and September 1978. Details reported here are those agreed to in our telephone conversation of August 2 and stated in your letter of August 3, 1978.

I trust that you will forward copies of this information, or extracts of it, to interested and concerned individuals in the National Marine Fisheries Service, the U.S. Fish and Wildlife Services and the U.S. Army Corps of Engineers.

Sincerely,

W. A. Van Engel
Senior Marine Scientist

WAVE/bjt

Enclosure

Interim Report

to

U.S. Army Corps of Engineers, Baltimore District

Biological Description of Old Plantation Flats Deep Trough: A Proposed Dredged Material Disposal Site.

by

Virginia Institute of Marine Science

and

School of Marine Science, College of
William and Mary
Gloucester Point, Virginia 23062

Prepared by: W. A. Van Engel, Senior Marine Scientist
J. V. Merriner, Senior Marine Scientist
F. J. Wojcik, Assistant Marine Scientist

October 3, 1978

The Old Plantation Deep Trough sampling area in the Virginia portion of the Chesapeake Bay began at the latitudes of the southwestern end of the Cherrystone Inlet channel near Old Plantation Flats (approximately 37°13.5'N) and extended north to the latitude of Church Neck at Hungars Creek (approximately 37°25.5'N) (see attached Figure 1: Disposal Area 2 and area to the north). Twenty-one stations, one-quarter mile square grid, were occupied on August 29 and 30, 1978 (Table 1 and accompanying Charts). Seven stations were sampled with a lined, 30-foot semi-balloon otter trawl, seven sampled with a 48-inch wide crab dredge, and seven were sampled with both gears (Table 1).

Hydrographic data were taken at every station except 1069 and 1052 (tows 13 and 21). Surface and bottom water samples were collected, temperature measured and the samples returned to VIMS for analysis of salinity (induction salinometer RS-5A) and dissolved oxygen (modified Winkler). Meteorological data are reported in codes established by the U.S. Naval Oceanographic office. Bottom profiles were recorded for six transects and for the entire axis of the sampling area. Sites were located by Loran C and by fathometer depth recordings (chart series and Table 3).

Twenty-eight species of fish were collected by trawl (Table 4), 21 species of invertebrates were collected by trawl (Table 5) and 20 species of invertebrates were collected by dredge.

Summary

The demersal biological community in the Old Plantation Flats Deep Trough study area was shown to have relatively high diversity, as evidenced by the large number of species of fishes and invertebrates taken in our August 29-30, 1978 survey. These data are indicative of a seasonally stable environment, not a stressed or transitional environment. This is borne out by the constancy of the physical and chemical features of the Deep Trough (Table 2). The addition of spoil to the Deep Trough would obliterate the benthos, increase the physiological stress to organisms by particle size or adsorbed pollutants and thus reduce the biotic richness (diversity and biomass) in the trough. The magnitude and permanency of the loss, or shift in biotic composition, would depend on the quantity and permanency of the spoil. The apparent persistency of depth and contour, evidenced from a review of older charts, suggest that the Deep Trough is flushed strongly.

Our tentative conclusion is that the Old Plantation Flats Deep Trough should not be used as a spoil disposal site.

Table 1 : Deep trough survey stations, Chesapeake Bay, August 29-30, 1978

No.	Bay Station	Lat °N	Long °W	Date Occupied	30' Trawl	Dredge	Trawl & Dredge
1	R 1096	3714	7604	29 Aug 30 Aug			X
2	R 1036	3714	7603	29 Aug 30 Aug			X
3	R 1077	3715	7605	29 Aug	X		
4	R 2000	3715	7606	30 Aug		X	
5	R 1064	3716	7605	29 Aug	X		
6	R 1081	3716	7606	30 Aug		X	
7	R 1057	3717	7605	30 Aug		X	
8	R 1013	3717	7606	29 Aug	X		
9	R 993	3718	7606	30 Aug		X	
10	R 1029	3718	7605	29 Aug	X		
11	R 1038	3719	7605	29 Aug 30 Aug			X
12	R 1020	3720	7605	29 Aug	X		
13	R 1069	3720	7605	30 Aug		X	
14	R 998	3721	7602	29 Aug 30 Aug			X
15	R 1040	3722	7604	29 Aug 30 Aug			X
16	R 1002	3723	7604	30 Aug			X
17	R 1075	3724	7604	30 Aug			X
18	R 1032	3725	7604	30 Aug		X	
19	R 979	3725	7605	30 Aug	X		
20	R 1010	3726	7605	30 Aug	X		
21	R 1052	3726	7604	30 Aug		X	

Table 2 : Deep trough survey, Chesapeake Bay, Aug 29-30, 1978, hydrographic data.

No.	Bay Station	Date	Time EST	Mean Depth m	Temp°C Air	Temp°C S.	Temp°C B.	Salinity °/00 S.	Salinity °/00 B.	D.O. mg/ℓ S.	D.O. mg/ℓ B.	Tide[1]	Wind[2] Dir Sp.	Secchi, m
1	1096	29 Aug	0909	13.7	28.1	-	-	-	-	-	-	5	225-6	-
2	1036	29 Aug	1004	29.0	29.8	27.5	-	20.0	27.3	7.12	-	5	225-4	2.1
3	1077	29 Aug	1145	45.7	29.9	27.8	26.6	-	28.0	7.42	3.92	5	225-3	2.2
5	1064	29 Aug	1303	29.0	30.6	28.3	26.2	18.4	27.4	7.78	3.66	5	225-2	2.1
8	1013	29 Aug	1415	21.9	30.7	28.8	26.6	17.5	26.6	7.52	3.14	5	225-2	2.0
10	1029	29 Aug	1455	22.3	29.6	28.5	26.4	16.7	26.9	6.68	3.06	5	225-2	1.8
12	1020	29 Aug	1556	18.9	31.9	28.4	26.4	16.3	26.0	7.96	3.06	5	225-2	2.0
11	1038	29 Aug	1648	19.8	29.5	28.2	24.9	16.3	26.1	7.94	2.78	5	225-2	2.0
15	1040	29 Aug	1740	23.8	30.1	28.2	26.5	16.3	25.8	8.06	2.86	5	225-1	1.8
14	998	29 Aug	1805	18.3	30.0	28.0	26.6	16.2	26.3	7.68	3.14	5	225-2	1.9
16	1002	30 Aug	0644	18.9	26.0	27.0	25.6	17.9	26.4	7.06	2.94	3	315-2	2.1
17	1075	30 Aug	0758	20.4	28.5	28.2	26.2	16.4	26.1	7.54	2.88	3	315-2	2.5
19	979	30 Aug	0850	29.0	28.5	28.5	25.6	16.2	25.8	7.28	2.92	3	99-99	2.4
20	1010	30 Aug	0920	22.9	28.8	28.0	26.5	16.2	26.0	7.32	2.92	3	99-99	2.3
21	1052	30 Aug	1035	18.0	30.3	-	-	-	-	-	-	4	99-99	-
18	1032	30 Aug	1112	20.7	30.2	29.2	26.3	16.4	26.1	7.30	2.82	4	99-99	2.4
17	1075	30 Aug	1138	21.3	31.0	-	-	-	-	-	-	4	99-99	-
16	1002	30 Aug	1223	23.5	29.9	29.0	26.6	16.5	26.5	7.40	2.66	4	99-99	2.2
15	1040	30 Aug	1242	22.3	32.2	-	-	-	-	-	-	5	99-99	-
14	998	30 Aug	1302	19.8	31.3	30.4	27.0	16.7	25.2	7.16	3.08	5	99-99	2.1
13	1069	30 Aug	1325	18.3	31.5	-	-	-	-	-	-	5	99-99	-
11	1038	30 Aug	1400	19.8	30.0	29.8	27.1	16.5	26.1	7.66	3.96	5	99-99	2.3
9	993	30 Aug	1437	19.8	30.3	29.2	26.7	16.5	26.6	7.86	3.24	5	99-99	1.7
7	1057	30 Aug	1508	23.8	29.4	29.0	26.5	16.5	26.5	7.76	3.30	5	99-99	1.8
6	1081	30 Aug	1531	25.9	30.1	28.8	26.2	16.6	26.5	8.62	3.42	5	99-99	1.0
4	2000	30 Aug	1612	32.9	30.3	29.0	26.3	16.6	26.4	8.00	3.38	5	135-5	0.9
1	1096	30 Aug	1642	21.9	30.8	28.8	26.5	17.9	25.3	7.78	3.68	5	135-6	1.5
2	1036	30 Aug	1708	29.0	29.5	27.7	26.2	21.2	27.0	6.98	3.96	5	135-5	1.6

[2]Wind direction and speed
Degrees and m/sec
99=variable and light

[1]Tide: coded
3 = flood
4 = high slack
5 = early ebb

Table 3: Deep trough survey, Chesapeake Bay, August 29-30, September 19, 1978, bottom profiles.

Chart Page	Bottom Profiles
4	Transect No. 1
5	Transect No. 2
6	Transect No. 3
7	Transect No. 4
8-9	Transect No. 5, 2p.
10-12	Transect No. 6, 3p.
13-25	North-South Transect, 13p.
	Profile
26	R1096 Hydro
27	R1036 Hydro, Trawl
28 a+b	Ditto Hydro, Dredge
29	R1077 Hydro, Trawl
30	R2000 Hydro
31	R1064 Hydro
32	R1081 Dredge
33	Ditto Hydro
34	R1057 Hydro, Dredge
35	R1013 Hydro, Trawl
36	R 993 Hydro, Dredge
37	R1029 Hydro
38	R1038 Hydro, Trawl
39	Ditto Dredge
40	R1020 Hydro, Trawl
41	R1040 Hydro
42	Ditto Dredge
43	R 998 Trawl, Hydro
44	Ditto Hydro, Dredge
45	R1075 Hydro
46	R1075 Dredge & R1002 Hydro
47	R1032 Hydro
48	R 979 Hydro
49	Ditto Trawl
50	R1010 Hydro, Trawl
51	R1052 Dredge

Table 4 : Deep trough survey, Chesapeake Bay, August 29-30, 1978, species list of fishes and tow numbers. See Table 1 for location of tow.

Raja eglanteria	2, 3, 5, 8, 11, 12, 14, 15
Dasyatis sayi	3, 10, 14, 15, 16
Gymnura altavela	1
Myliobatis freminvillei	11
Anchoa mitchilli	2, 11, 12, 15, 16, 17, 19, 20
Synodus foetens	4, 5, 6, 9, 10, 11, 12
Conger oceanicus	14, 17, 19, 20
Urophycis regius	3, 5
Syngnathus fuscus	17
Centropristis striata	2, 10, 12, 14, 16, 17
Cynoscion regalis	1, 2, 3, 5, 8, 10, 11, 12, 14, 15, 16, 17, 19, 20
Leiostomus xanthurus	1, 2, 3, 5, 8, 10, 11, 12, 14, 15, 16, 17, 19, 20
Menticirrhus americanus	1, 2, 3, 5, 15, 16, 19, 20
Menticirrhus saxatilis	3
Micropogonias undulatus	2, 8, 12, 14, 16, 17
Gobiosoma ginsburgi	15
Prionotus carolinus	1, 8, 15
Prionotus evolans	8, 10, 12
Hypsoblennius hentzi	1
Peprilus triacanthus	1, 5, 7, 11, 12, 15, 16, 17, 18, 19, 20
Rissola marginata	2, 3, 5
Etropus microstomus	1, 2, 15, 16, 17
Paralichthys dentatus	1, 2, 10, 11, 12, 14, 16, 17, 19, 20
Scophthalmus aquosus	1, 2, 12, 14, 16
Trinectes maculatus	1, 2, 3, 5, 8, 10, 11, 12, 14, 16, 17, 18, 19, 20
Symphurus plagiusa	1, 6, 9, 11
Sphoeroides maculatus	16
Stephanolepis hispidus	3, 16

Table 5 : Deep trough survey, Chesapeake Bay, August 29-30, 1978, species list of invertebrates caught by trawl and tow numbers. See Table 1 for location of tow.

Cnidarians	
Astrangia danae	17
Mollusks	
Busycon carica	1, 2, 3, 5, 12, 14, 16
Busycon canaliculatum	10, 17
Polinices duplicatus	11, 14, 15, 16, 17, 20
Lolliguncula brevis	1, 2, 8, 16
Crustaceans, decapods	
Penaeus aztecus	1, 3, 8, 10, 11, 14, 16, 17, 19
Penaeus duorarum	2, 3, 5, 10, 11, 14, 15, 17
Trachypenaeus constrictus	2
Palaemonetes sp.	2, 3, 5, 14
Crangon septemspinosa	1, 2, 3, 5, 8, 10, 11, 12, 14, 15, 16, 17, 19, 20
Pagurus pollicaris	1, 2, 3, 8, 11, 12, 15, 16, 17, 19, 20
Hepatus pudibundus	5
Callinectes sapidus	1, 2, 3, 8, 10, 11, 12, 14, 15, 16, 17, 19, 20
Ovalipes ocellatus	2, 15, 16, 17
Portunus gibbesii	1, 2, 3, 5, 8, 10, 11, 12, 14, 15, 16, 17, 19, 20
Portunus spinimanus	2
xanthids	2, 5, 8, 11, 12, 16, 17, 19, 20
Libinia dubia	1, 3, 8, 10, 12, 14, 15, 16, 17, 19, 20
Crustaceans, stomatopods	
Squilla empusa	1, 2, 3, 5, 8, 10, 12, 14, 15, 16, 17, 19, 20
Other arthropods	
Limulus polyphemus	2, 3, 5, 8, 10, 12, 16, 17, 19
Echinoderms	
Asterias forbesi	3, 5, 8, 10, 12

Table 6 : Deep trough survey, Chesapeake Bay, August 29-30, 1978, species list of invertebrates caught by dredge and tow numbers. See Table 1 for location of tow.

Cnidarians	
Ceriantheopsis americanus	7, 11, 13, 14, 15, 16, 17, 18, 21
Ectoprocts	
Electra crustulenta	1, 2, 4, 6, 7, 9, 11, 13, 14, 15, 16, 17, 18, 21
Annelids	
Nereis succinea	1, 2, 4, 6, 7, 9, 11, 13, 14, 15, 16, 17, 18, 21
Mollusks	
Anadara transversa	7, 9, 13, 14, 15, 16, 17, 18, 21
Mytilus edulis	1, 2, 4, 6, 7, 9, 11, 13, 14, 15, 16, 17, 18, 21
Mercenaria mercenaria	
Mya arenaria	7, 13, 14, 15, 17, 21
Busycon carica	1, 2, 4, 14, 17, 18
Busycon canaliculatum	2, 6, 9, 17, 18
Polinices duplicatus	7, 11, 13, 14, 18
Crustaceans	
Pagurus pollicaris	2
Callinectes sapidus	2, 6
Portunus gibbesii	2
xanthids	18
Libinia dubia	7, 15, 17
Crustaceans, stomatopods	
Squilla empusa	1, 6, 17, 18
Other arthropods	
Limulus polyphemus	2, 4, 11
Echinoderms	
Asterias forbesi	2, 4
Cucumaria pulcherrima	1, 4, 6, 7, 9
Micropholis atara	1, 2, 4, 6, 7, 9, 11, 13, 14, 15, 16, 17, 18, 21

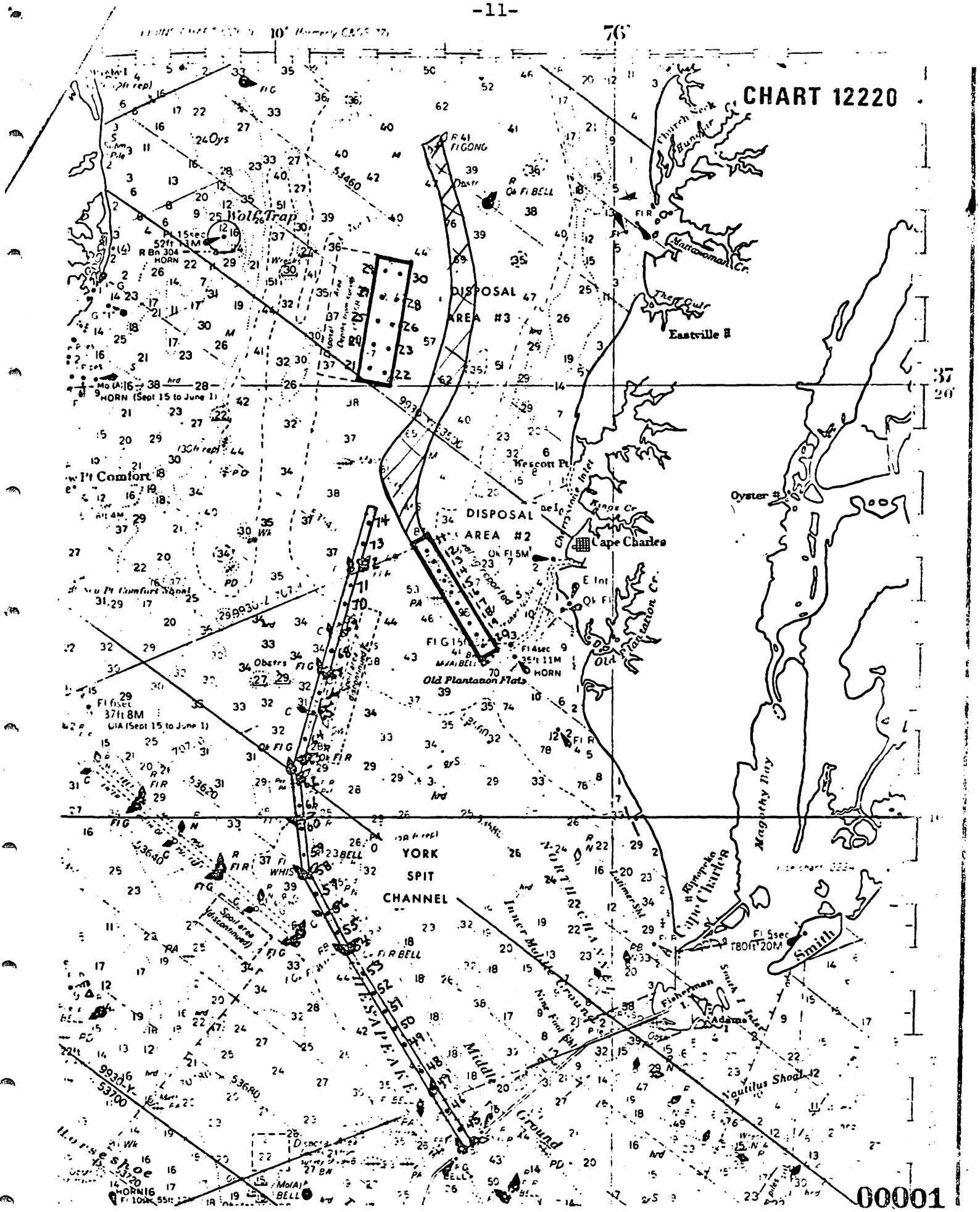
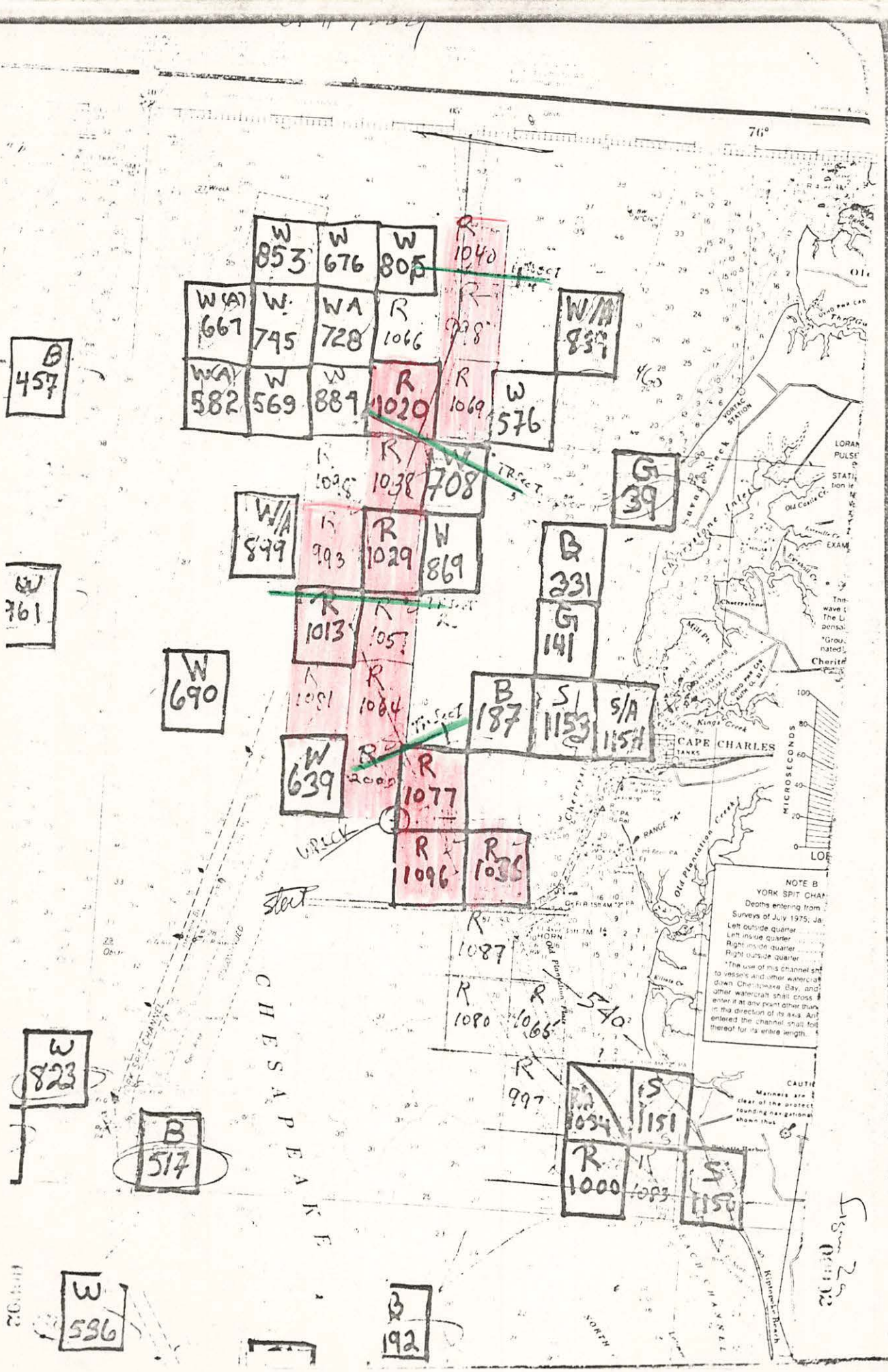
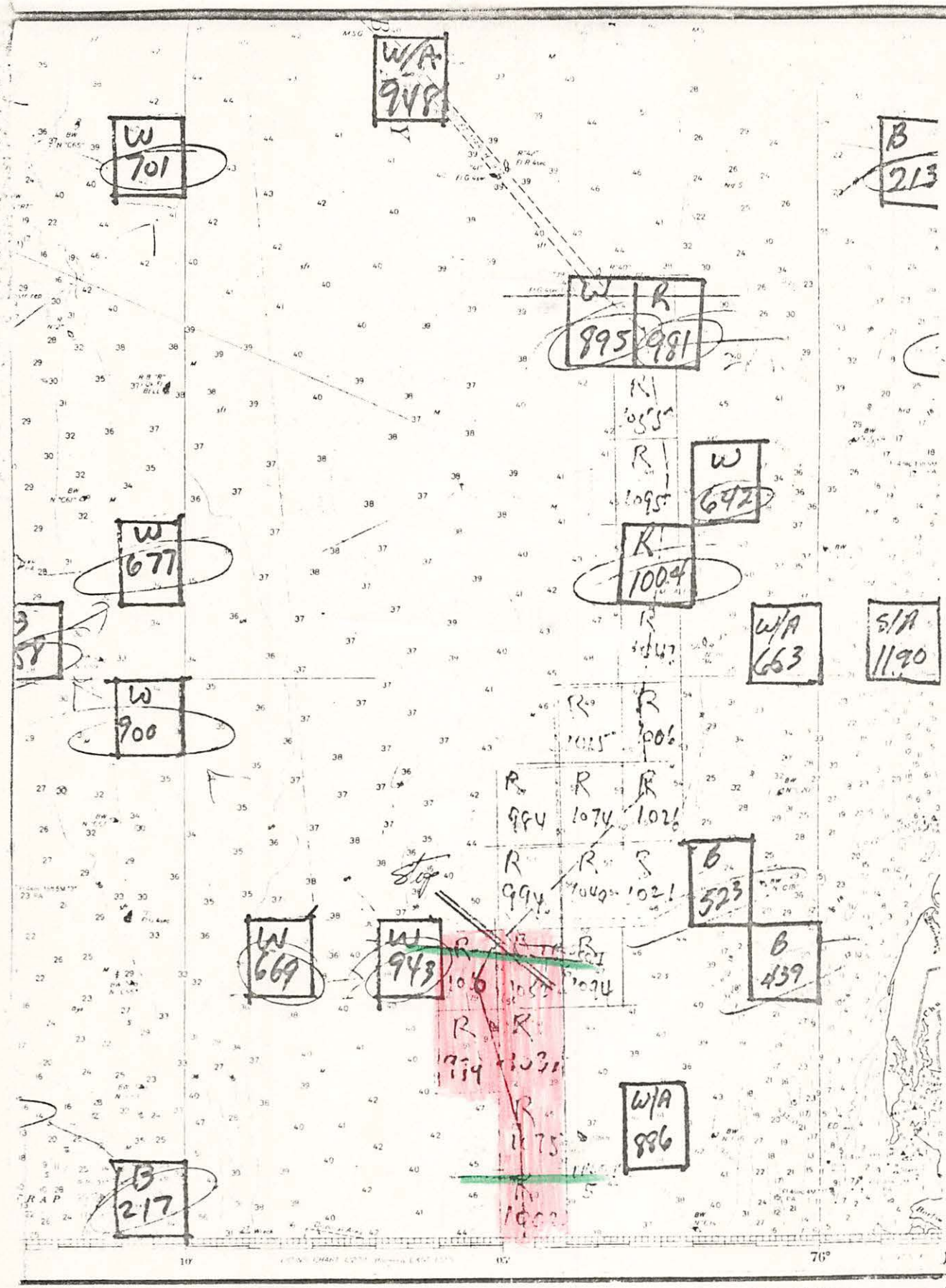


CHART 12220
76
37
20
DISPOSAL AREA #3
DISPOSAL AREA #2
Wolf Trap
Pt Comfort
Cape Charles
Eastville
Oyster
Old Plantation Flats
YORK SPIT CHANNEL
Middle Ground
Inner Middle Ground
Nautilus Shoal
Smith I.
Fisherman I.
Watts I.
Magothy Bay
Kiptopeke
Chesapeake
Old Plantation Cr
Kings Cr
Church Creek
Bunker Cr
Nassawadox Cr
The Gulf
Wescott Pt
Channelside Inlet
Fl 5sec 37ft 8M
Fl 5sec 80ft 20M
HORN (Sept 15 to June 1)
00001

FIGURE


W 853
W 676
W 805
R 1040
W(A) 667
W 795
WA 728
R 1066
W/A 857
WA 582
W 569
W 889
R 1029
R 1069
W 576
R 1038
W 708
G 39
W/A 849
R 993
R 1029
W 869
B 331
G 141
R 1013
R 1057
R 1051
R 1064
B 187
S/A 1153
S/A 1154
W 690
W 639
R 2000
R 1077
R 1096
R 1035
R 1087
R 1080
R 1065
R 997
S 1151
R 1000
S 1150
W 823
B 517
W 586
B 192
W 761
B 457
CAPE CHARLES
CHESAPEAKE
Old Plantation Creek
Kings Creek
Cherrystone
Mill Pt.
Old Castle Cr.
Sand Neck
Cherrystone Inlet
VORTAC STATION
RANGE "A"
RANGE "B"
MICROSECONDS
NOTE B
YORK SPIT CHAN
Depths entering from
Surveys of July 1975; Ja
Left outside quarter
Left inside quarter
Right inside quarter
Right outside quarter
CAUTI
Kiptopeke Beach
00002



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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SURVEY

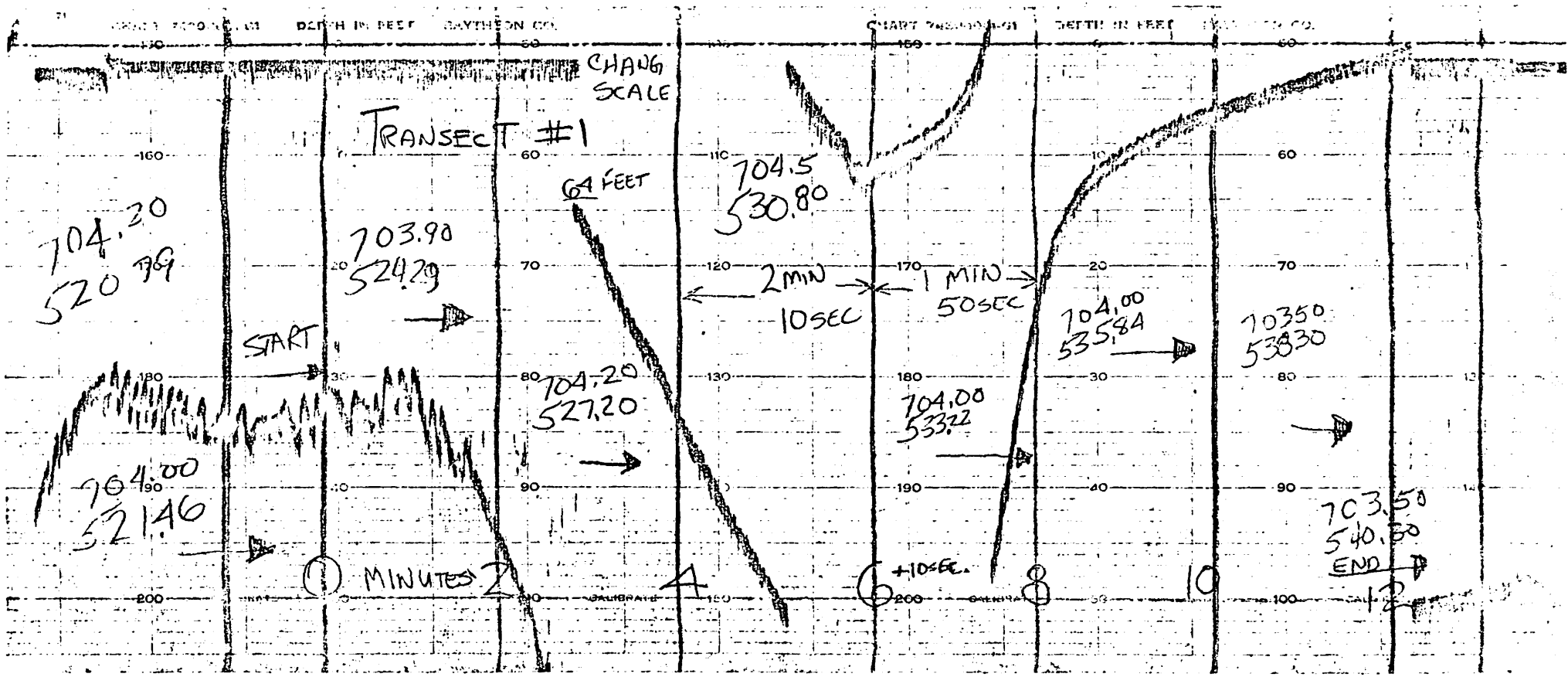
SOUNDS

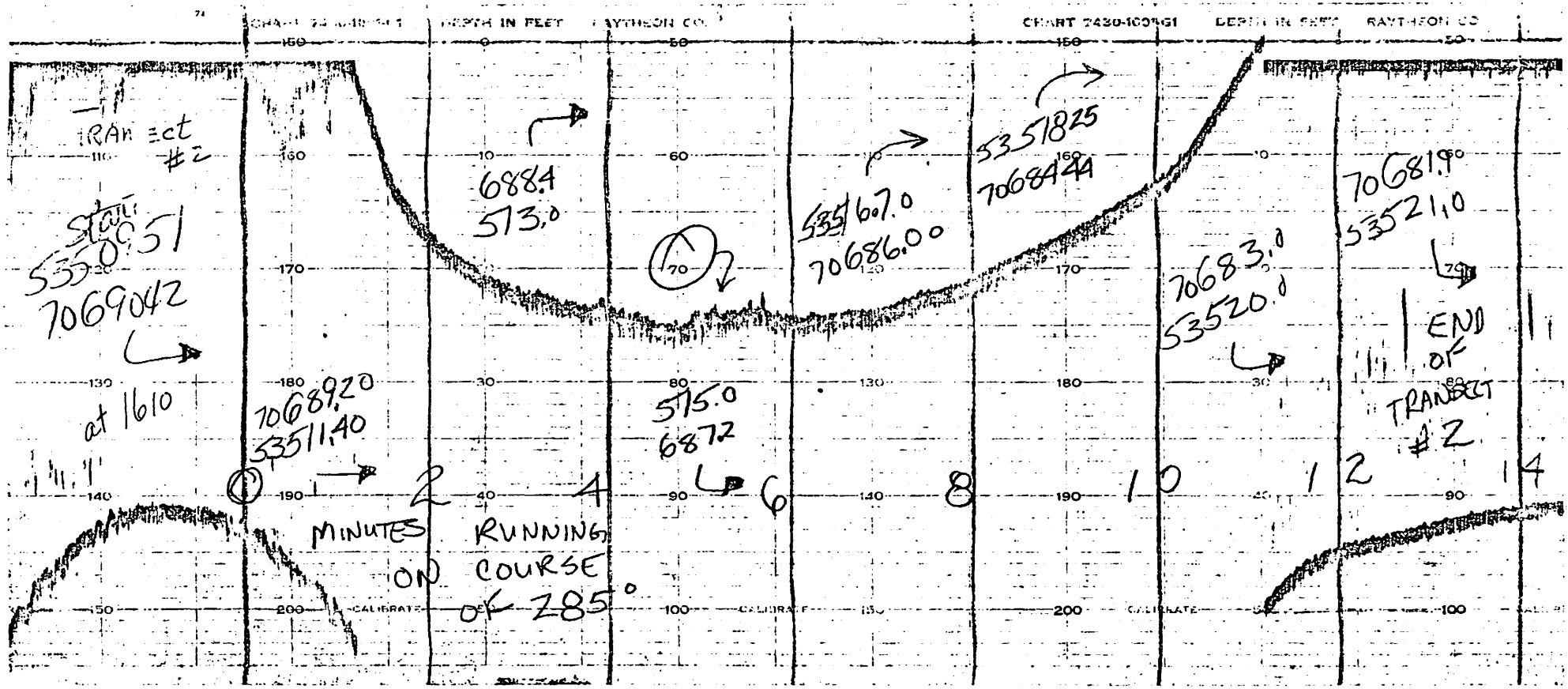
(There is also another copy, this used by the Capt. J. Lowell)

Chart #12225

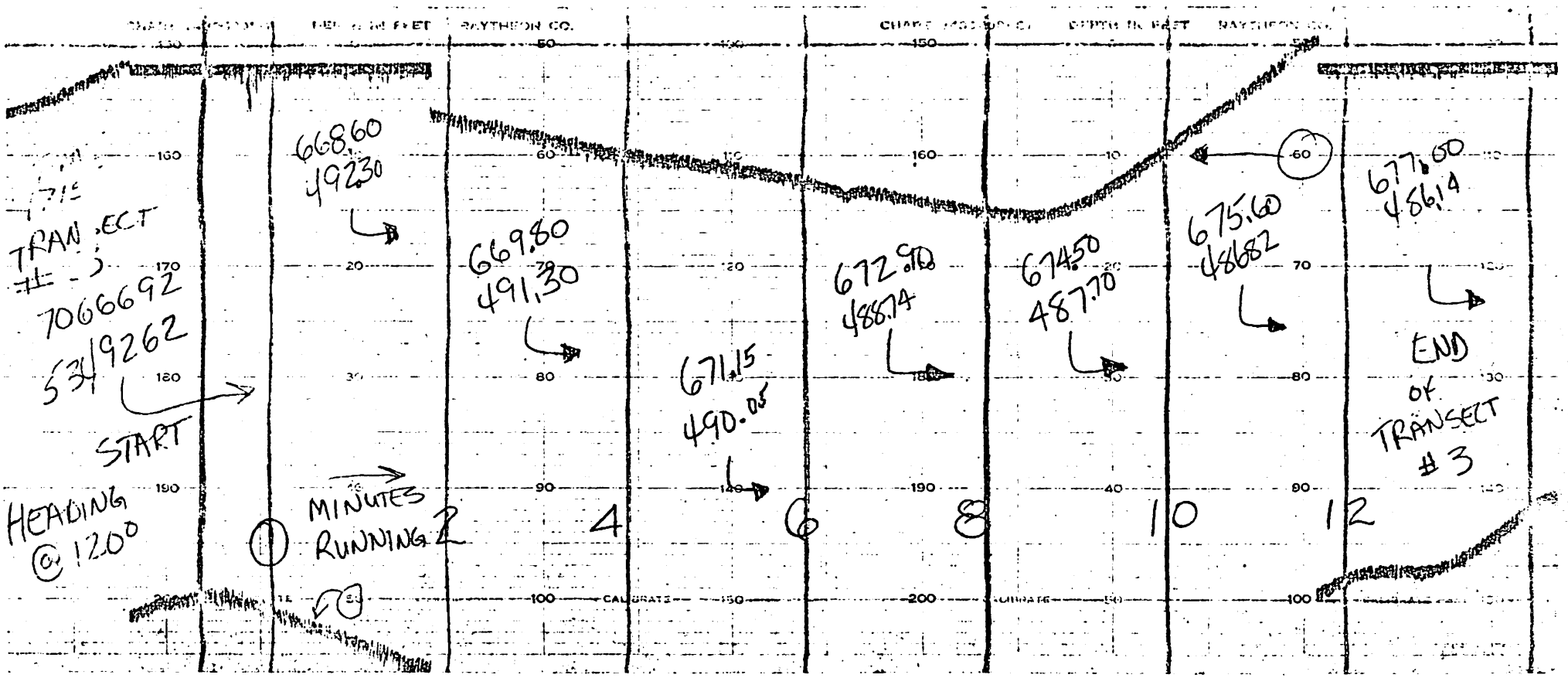
60003

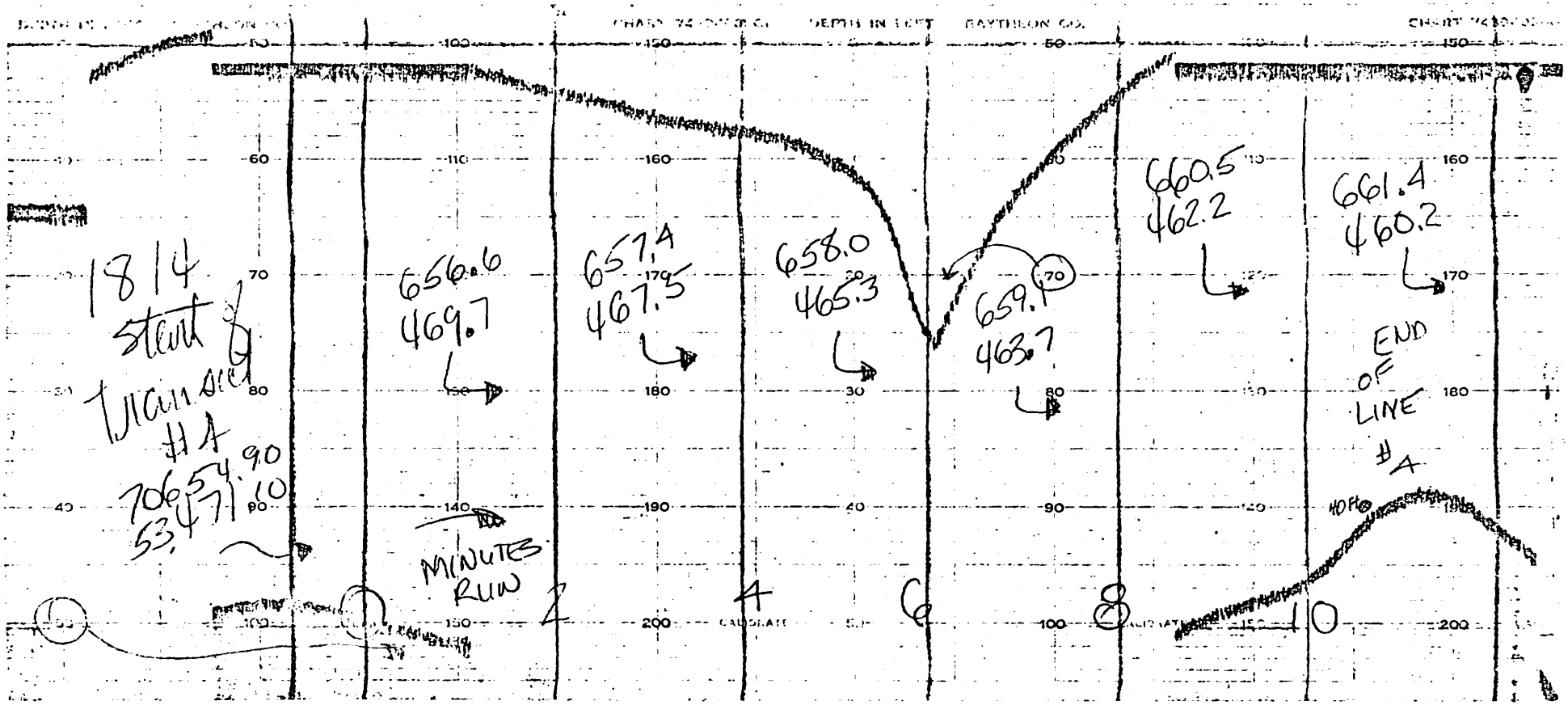
~~60002~~
~~60004~~

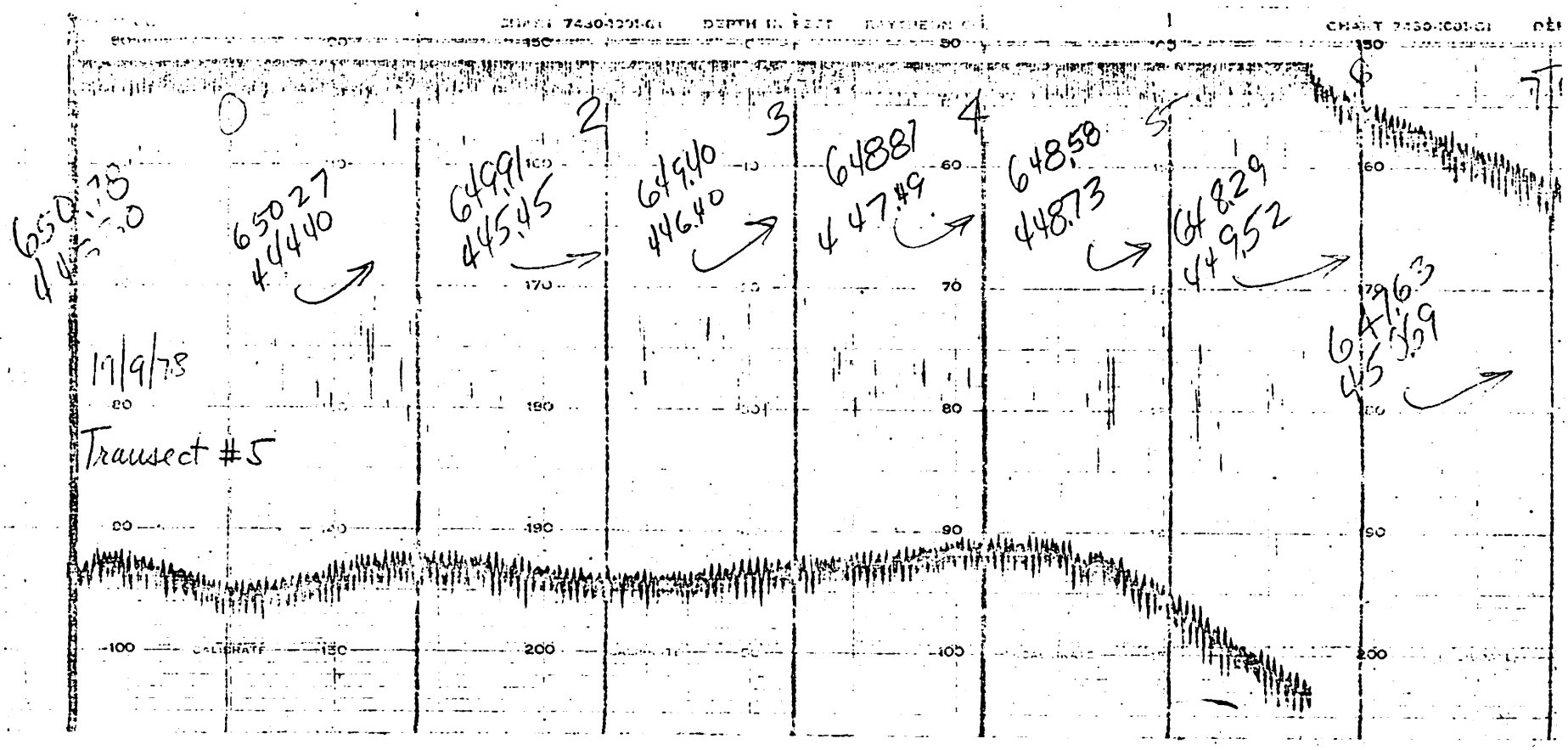

DEPTH IN FEET RAYTHEON CO.
CHANG SCALE
TRANSECT #1
64 FEET
704.20
520 789
START
703.90
524.29
704.00
521.46
0 MINUTES 2
704.20
527.20
704.5
530.80
2 MIN
-10SEC
1 MIN
50SEC
+10SEC.
704.00
533.22
704.00
535.84
703.50
539.30
703.50
540.60
END

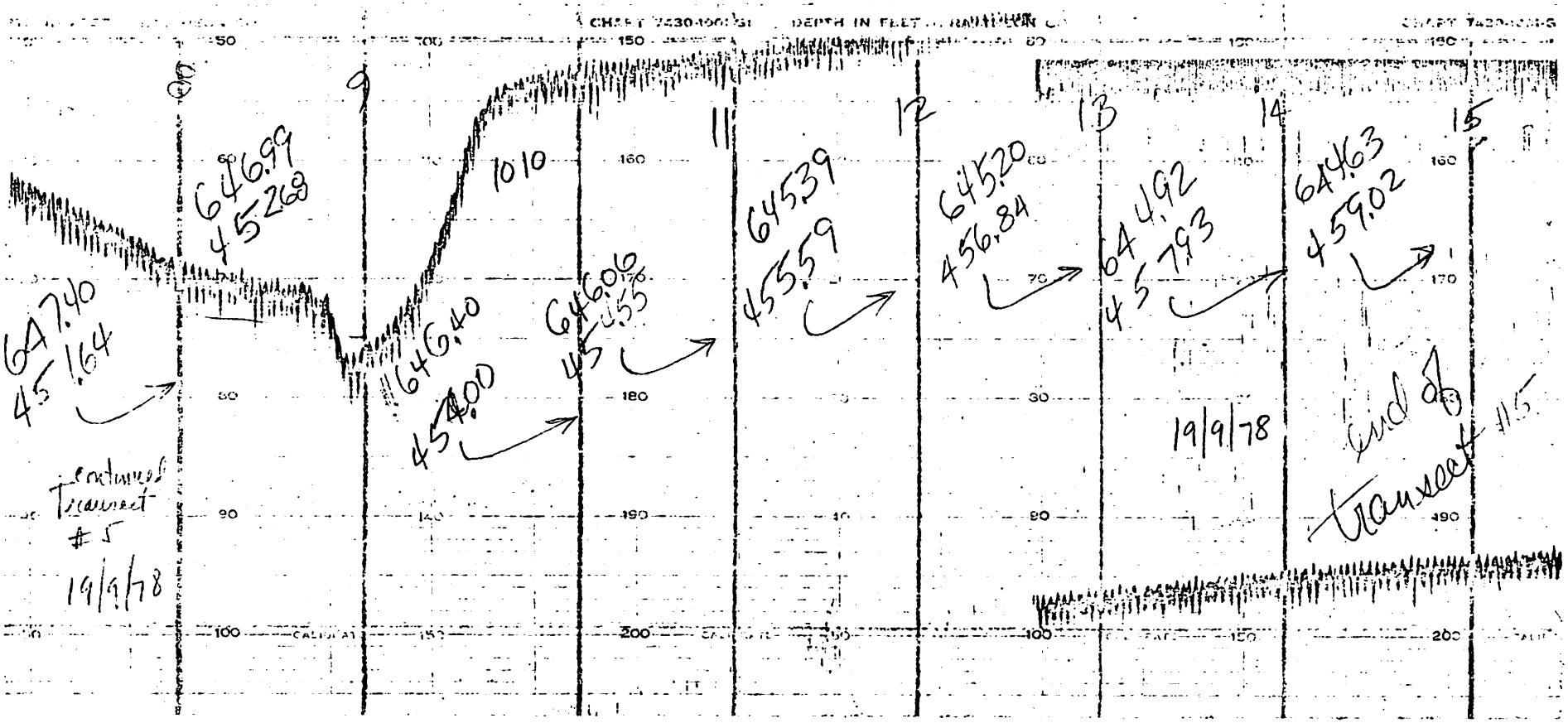

DEPTH IN FEET
RAYTHEON CO.
TRANSECT #2
START
5350.51
7069042
at 1610
7068.20
53511.40
6884
513.0
515.0
6872
53607.0
7068600
5351825
7068444
7068.30
53520.0
7068.90
53521.0
END OF TRANSECT #2
MINUTES RUNNING
ON COURSE OF 285°
CALIBRATE

00005


DEPTH IN FEET RAYTHEON CO.
TRANSECT #3
7066692
531 9262
START
HEADING @ 120°
668.60
492.30
669.80
491.30
671.15
490.05
672.90
488.14
674.50
487.70
675.60
486.82
677.60
486.14
END of TRANSECT #3
MINUTES RUNNING
2
4
6
8
10
12
CALIBRATE


1814
start of
transect
#A
706 54.90
53 71.10
656.6
469.7
MINUTES
RUN
657.4
467.5
658.0
465.3
659.1
463.7
660.5
462.2
661.4
460.2
END
OF
LINE
#A
40 Hz


0
1
2
3
4
5
6
7
650.27
444.40
649.91
445.45
649.40
446.40
648.87
447.49
648.58
448.73
648.29
449.52
649.63
450.29
1/9/78
Transect #5


DEPTH IN FEET
9
10
11
12
13
14
15
647.40
451.64
continued Transect #5
19/9/78
646.99
452.68
1010
646.40
454.00
646.06
455.55
645.39
455.59
645.20
456.84
644.92
457.93
19/9/78
644.63
459.02
end of Transect #15

60003

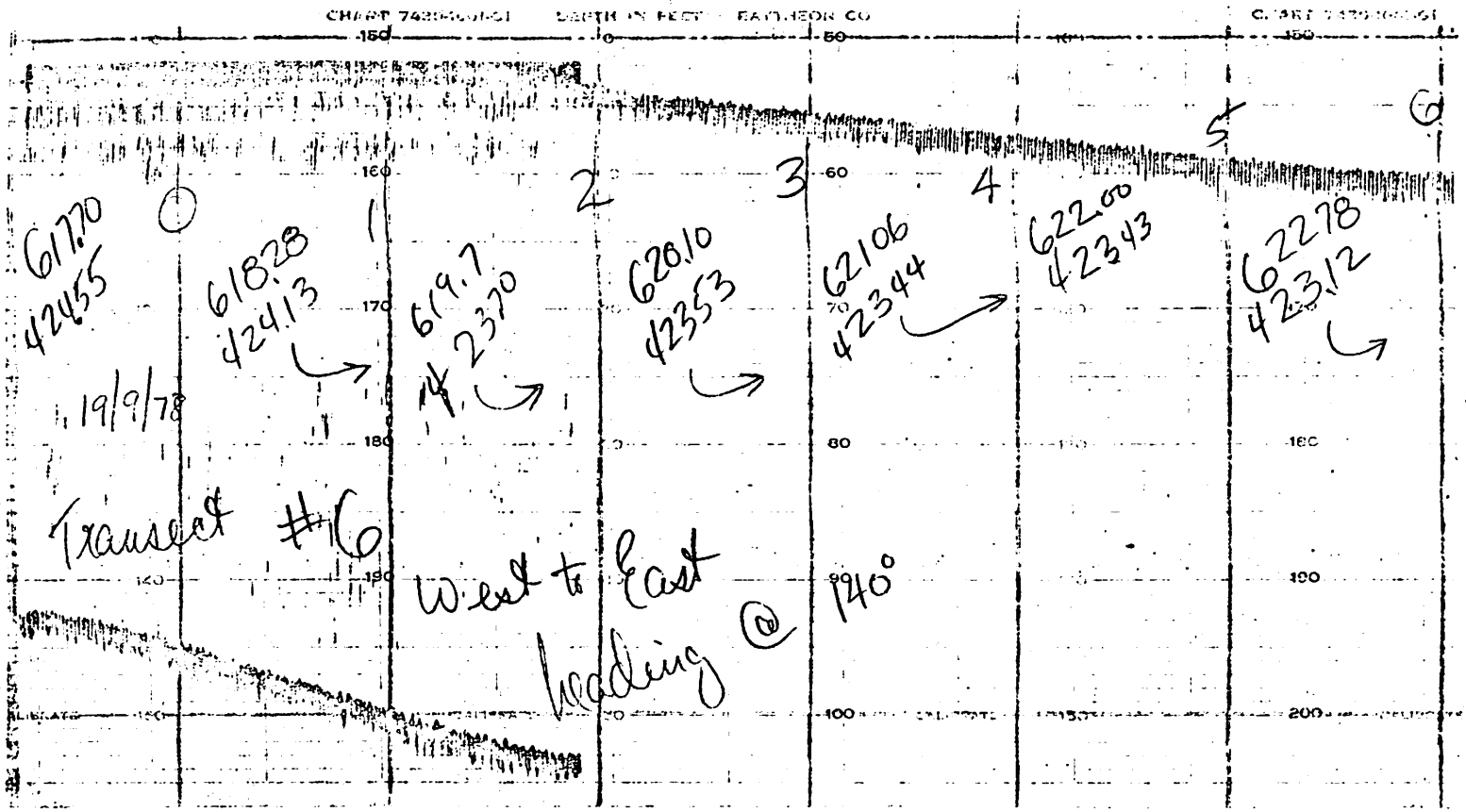
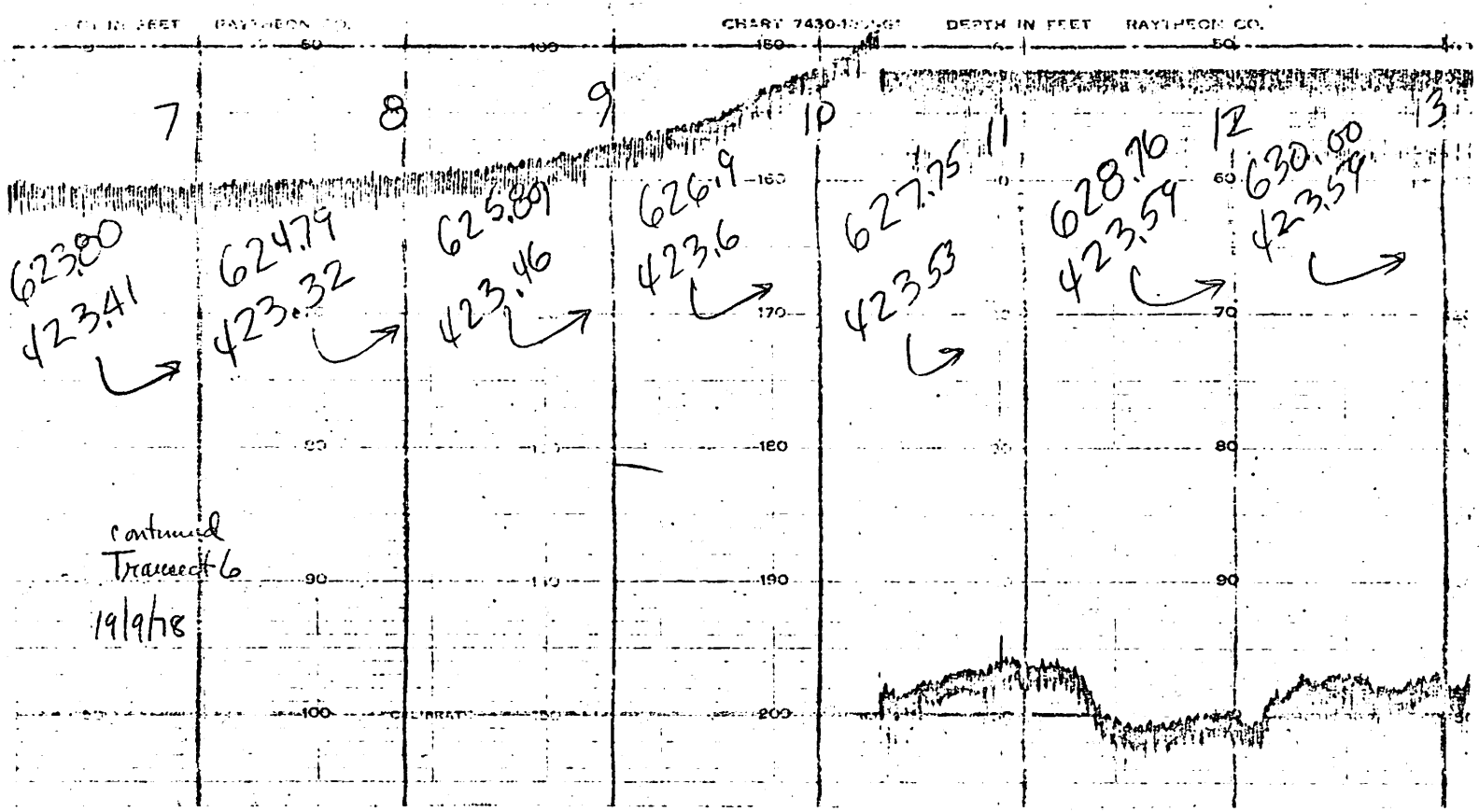
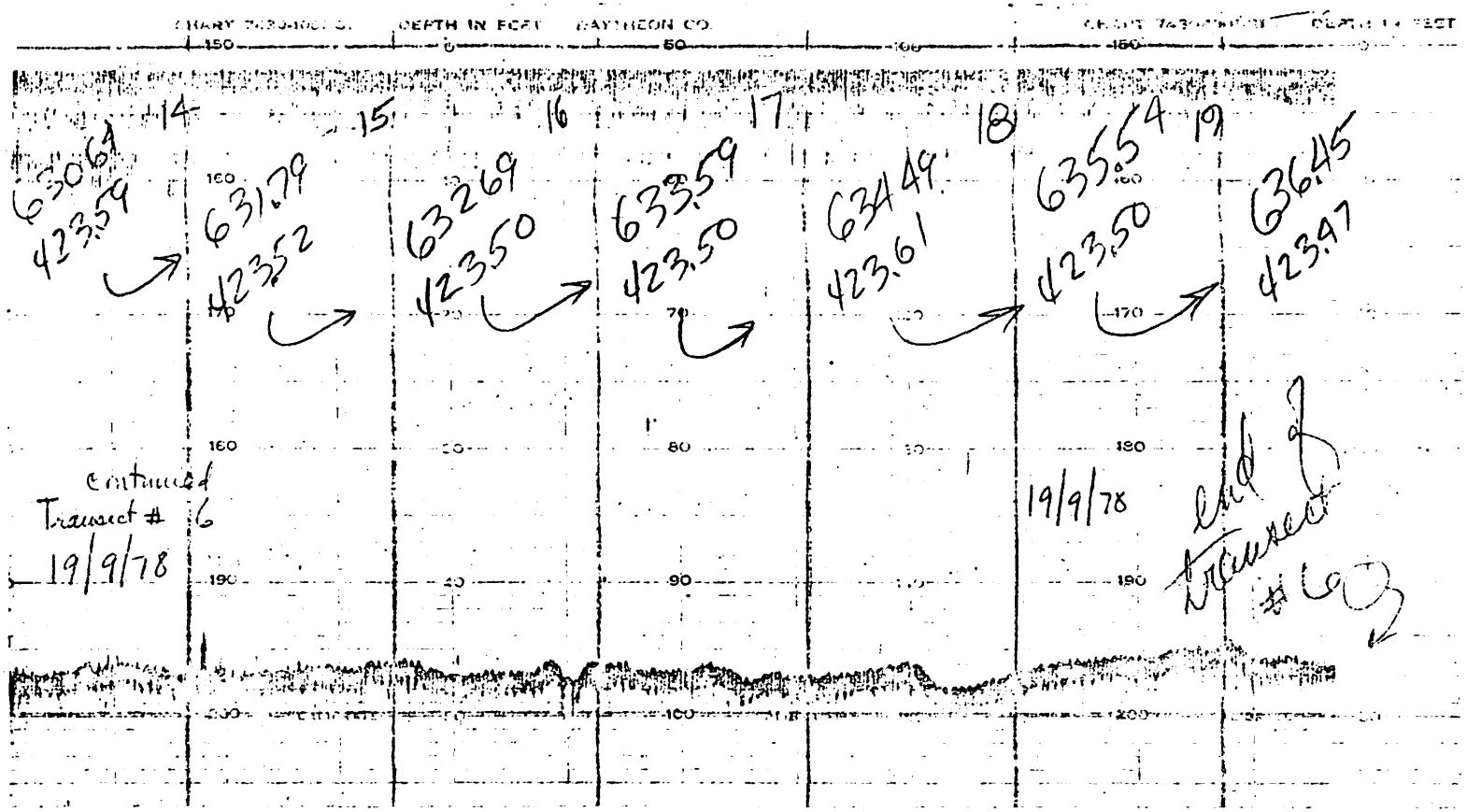
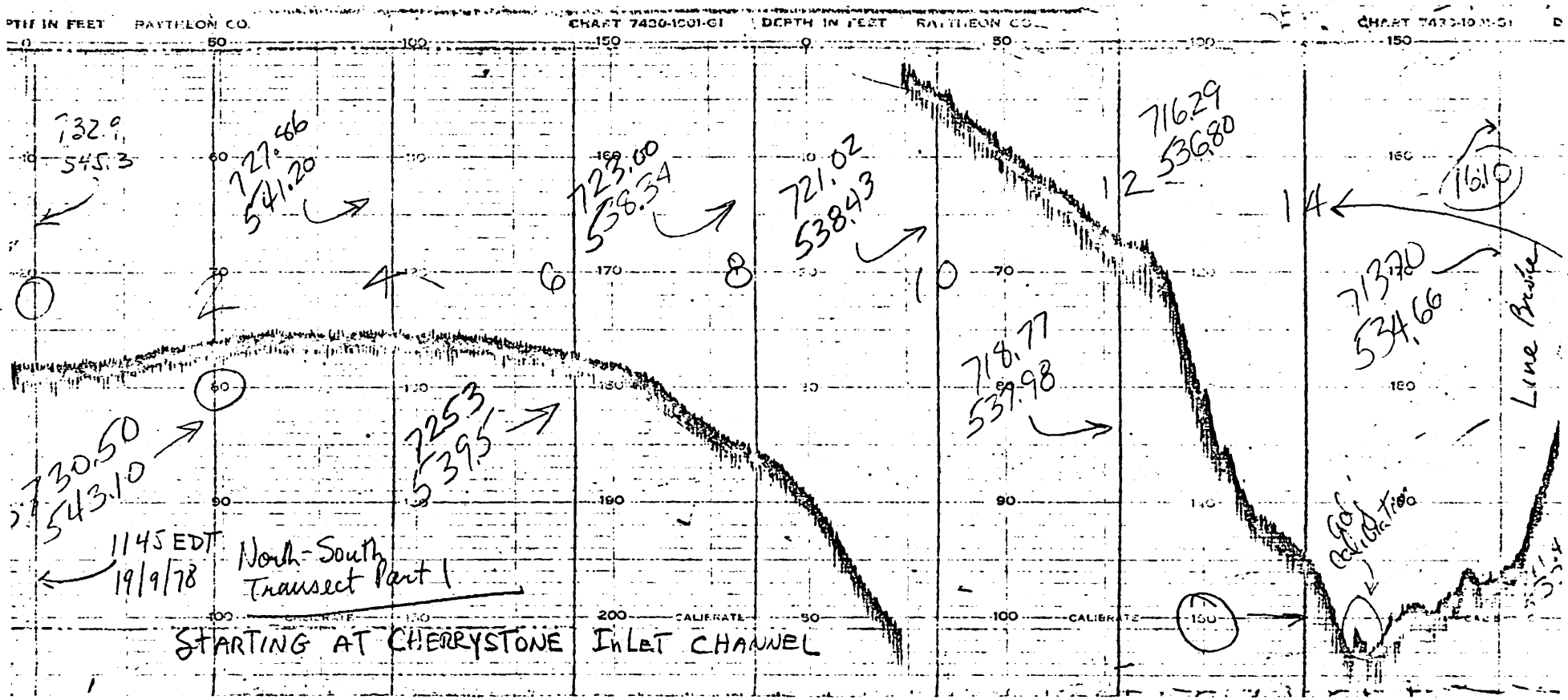


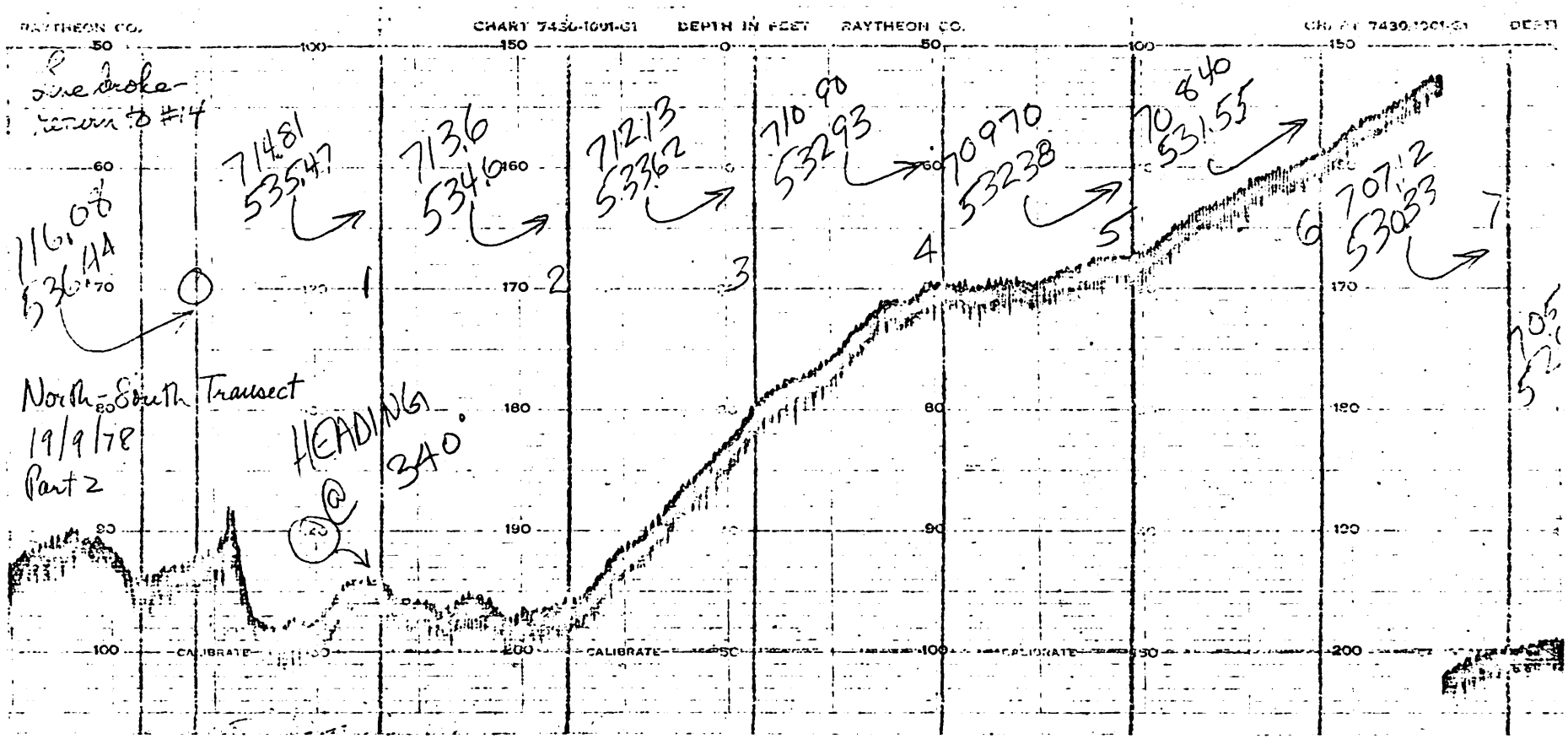
CHART 7430-01-01 DEPTH IN FEET RAYTHEON CO
150
160
170
180
190
200
50
60
70
80
90
100
1
2
3
4
5
6
617.70
424.55
618.28
424.13
619.7
423.70
620.10
423.53
621.06
423.44
622.00
423.43
622.78
423.12
19/9/78
Transect #6
West to East
leading @ 140°

C0010


DEPTH IN FEET RAYTHEON CO.
DEPTH IN FEET RAYTHEON CO.
7
8
9
10
11
12
13
623.00
423.41
624.79
423.32
625.89
423.46
626.9
423.6
627.75
423.53
628.76
423.54
630.00
423.59
continued
Transect 6
19/9/78


DEPTH IN FEET RAYTHEON CO.
14
15
16
17
18
19
63069
42359
63179
42352
63269
42350
63359
42350
63449
42361
63554
42350
63645
42347
Continued
Transect # 6
19/9/78
19/9/78
End Transect #6




RAYTHEON CO.
CHART 7430-1001-G1 DEPTH IN FEET RAYTHEON CO.
? we broke return to #14
116.00
536.14
714.81
535.47
713.6
534.6
712.13
533.62
710.90
532.93
709.70
532.38
710.40
531.55
707.2
530.33
North-South Transect
19/9/78
Part 2
HEADING
340°
CALIBRATE
CALIBRATE
CALIBRATE

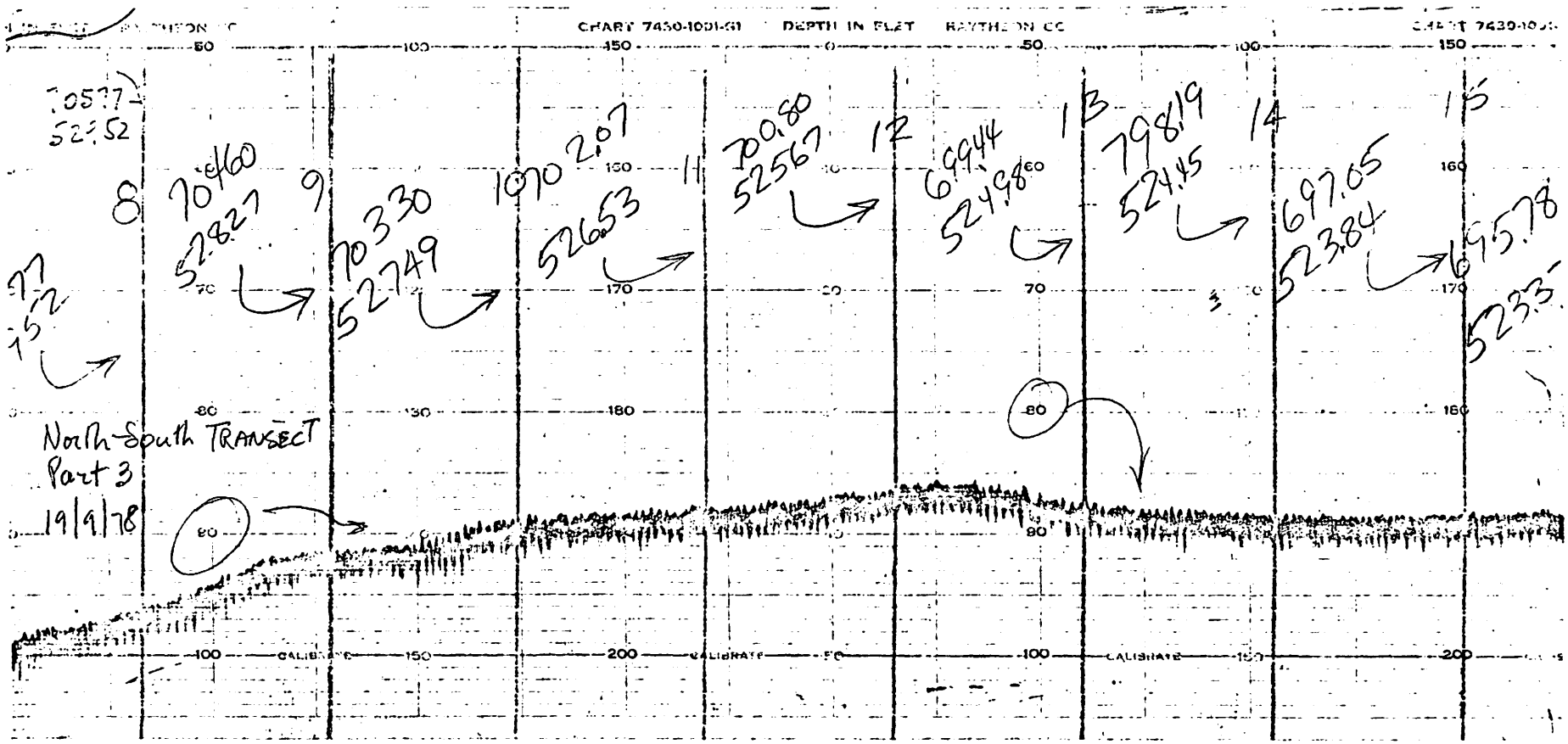
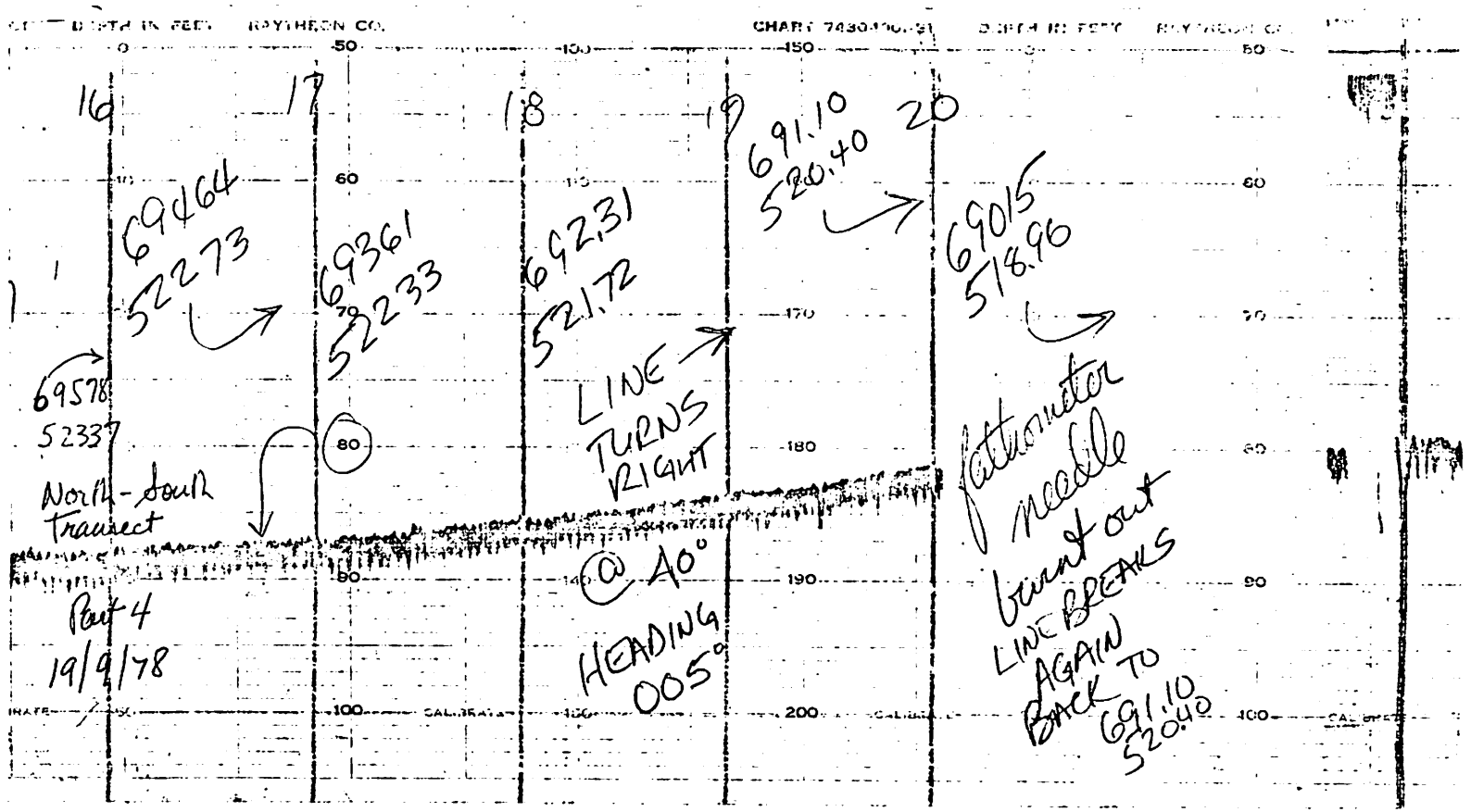
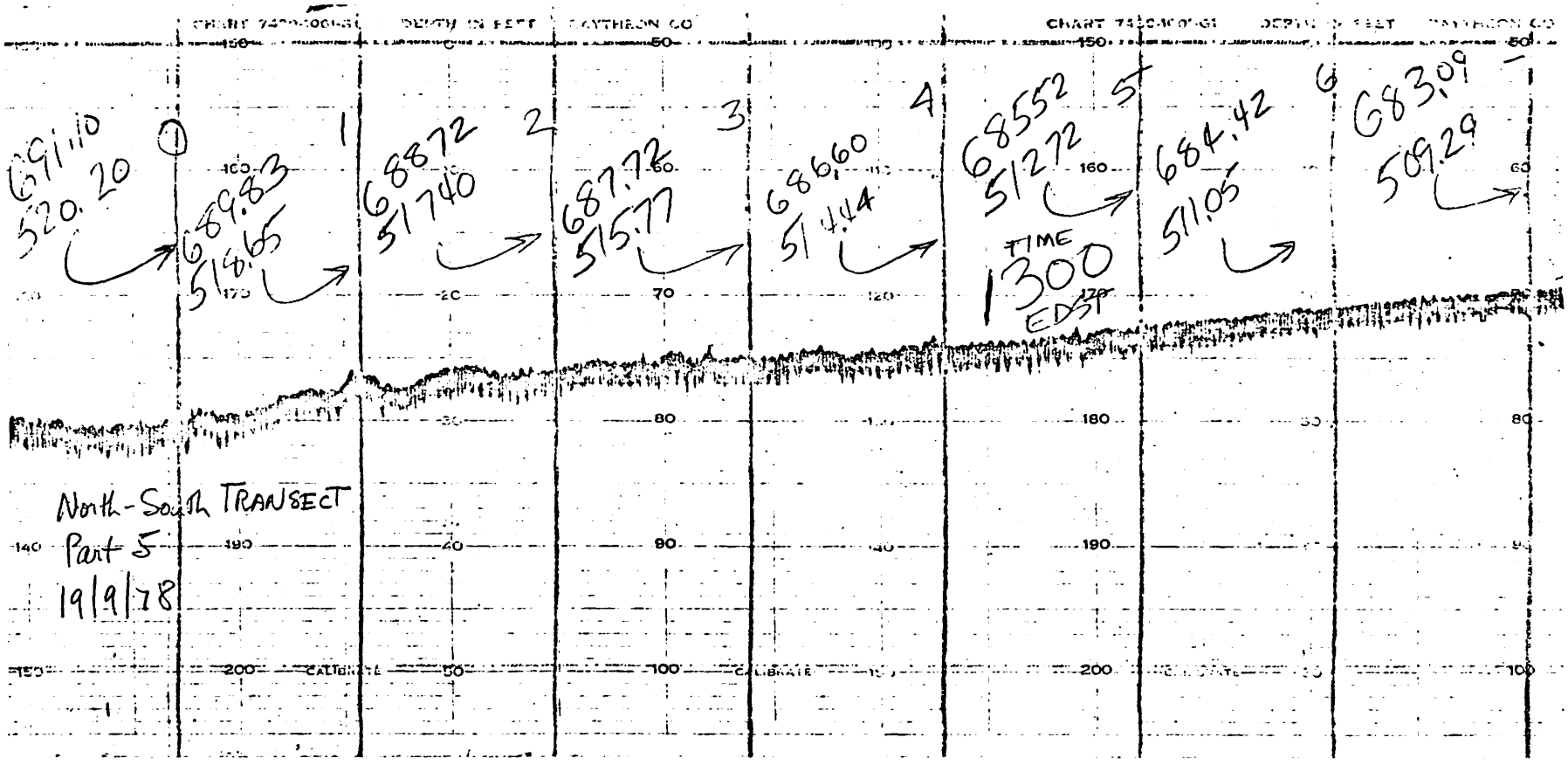
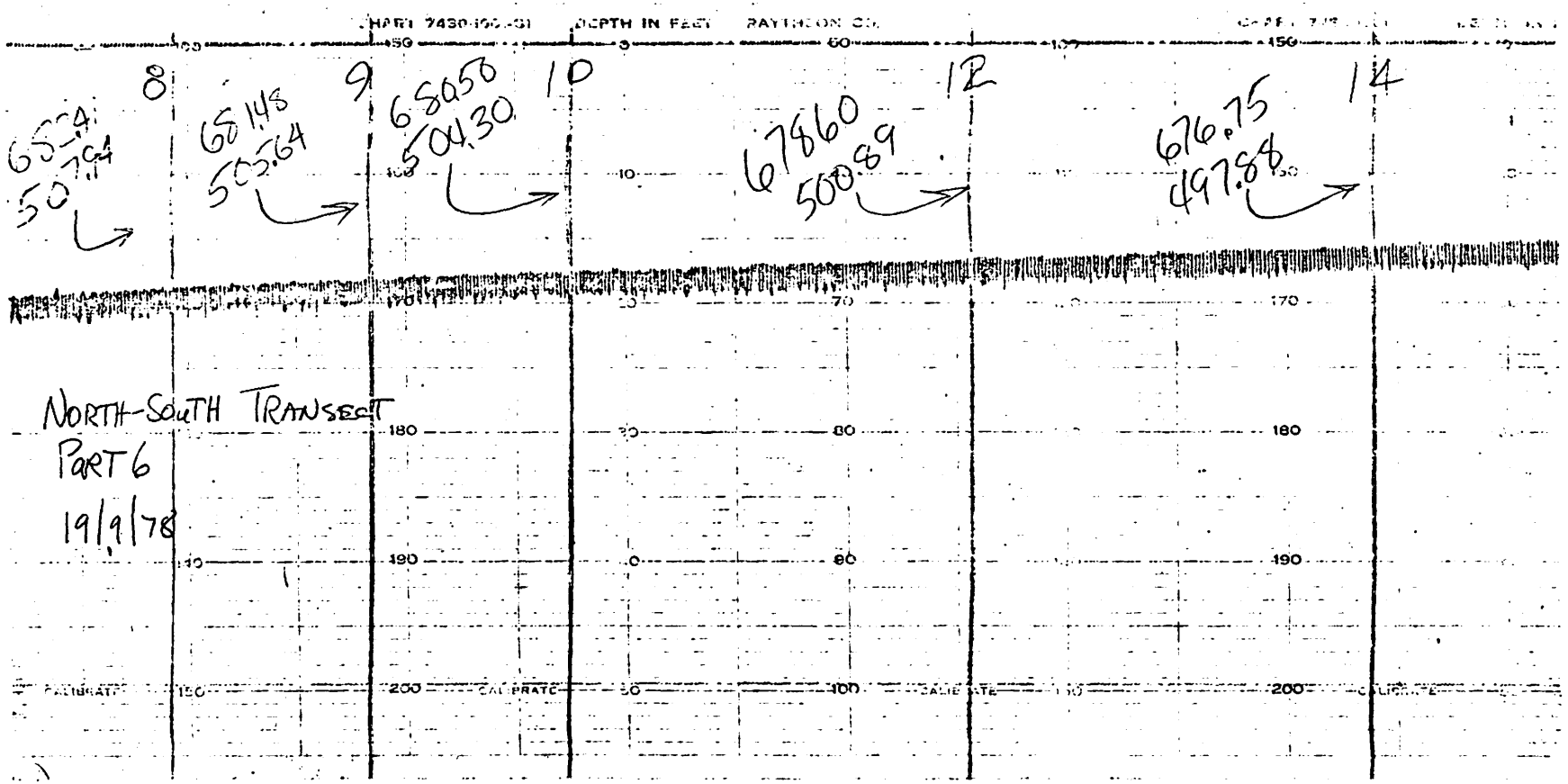


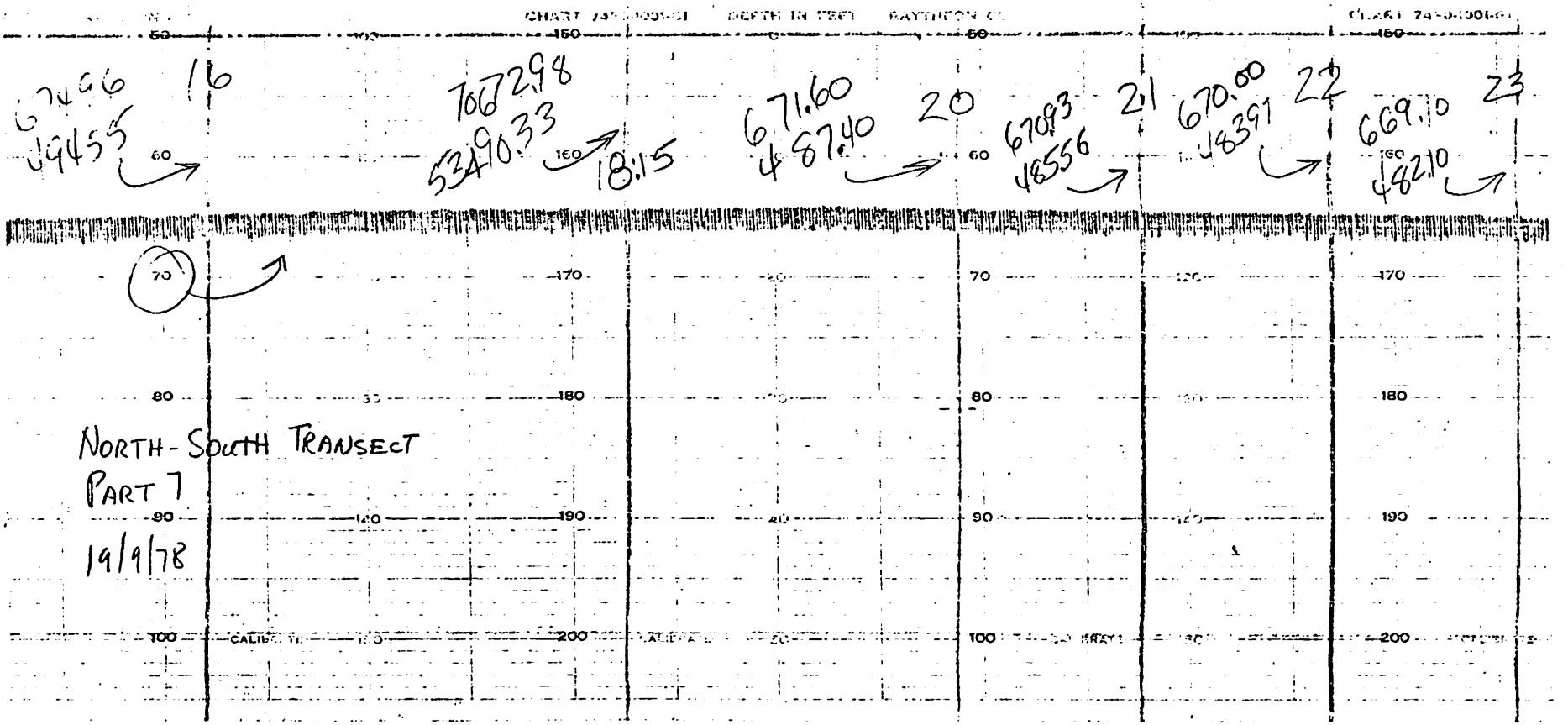
CHART 7430-1001-G1 DEPTH IN FEET RAYTHEON CO
North-South TRANSECT
Part 3
19/9/78
CALIBRATE
CALIBRATE
CALIBRATE

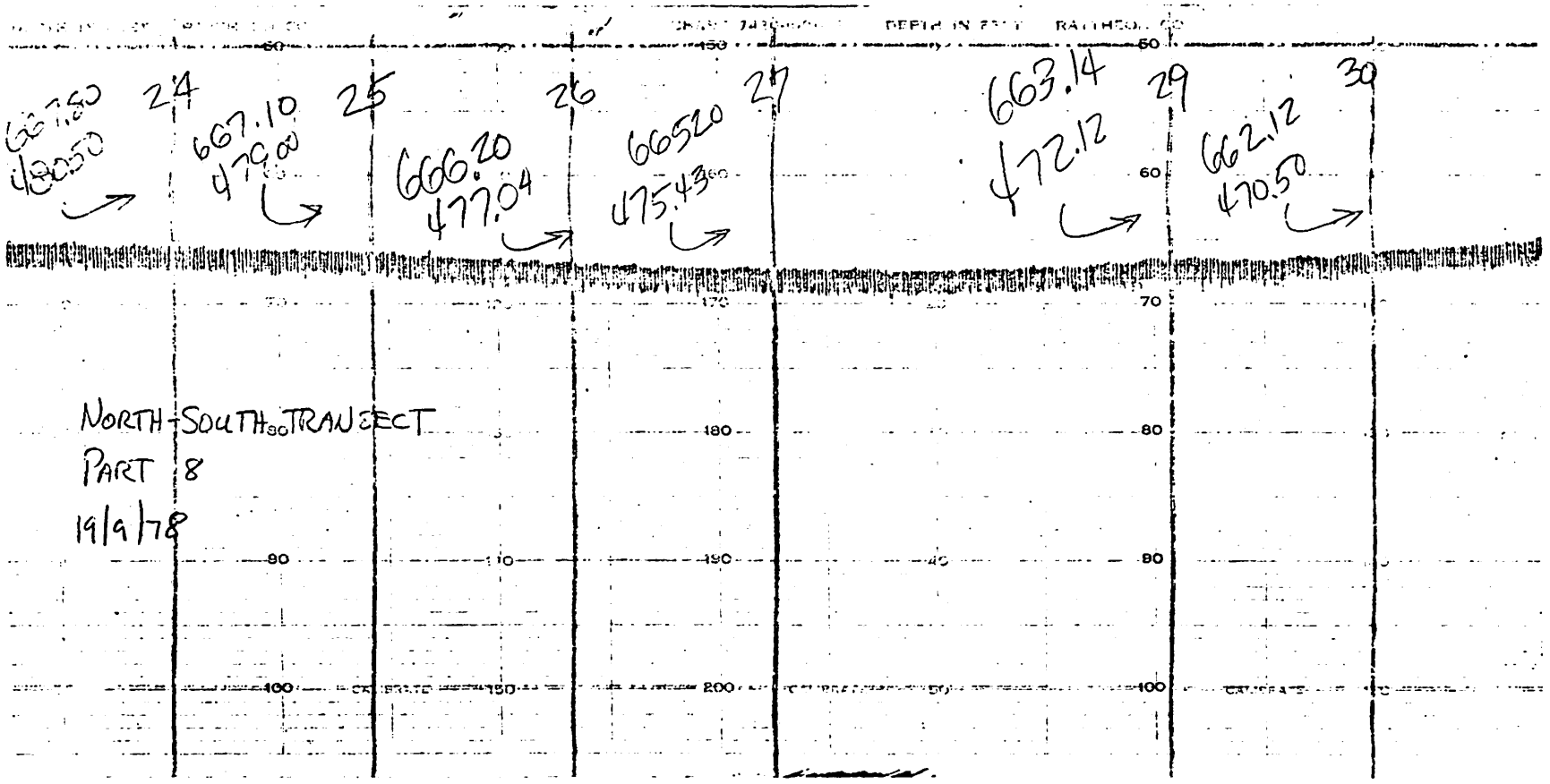
ST(09)

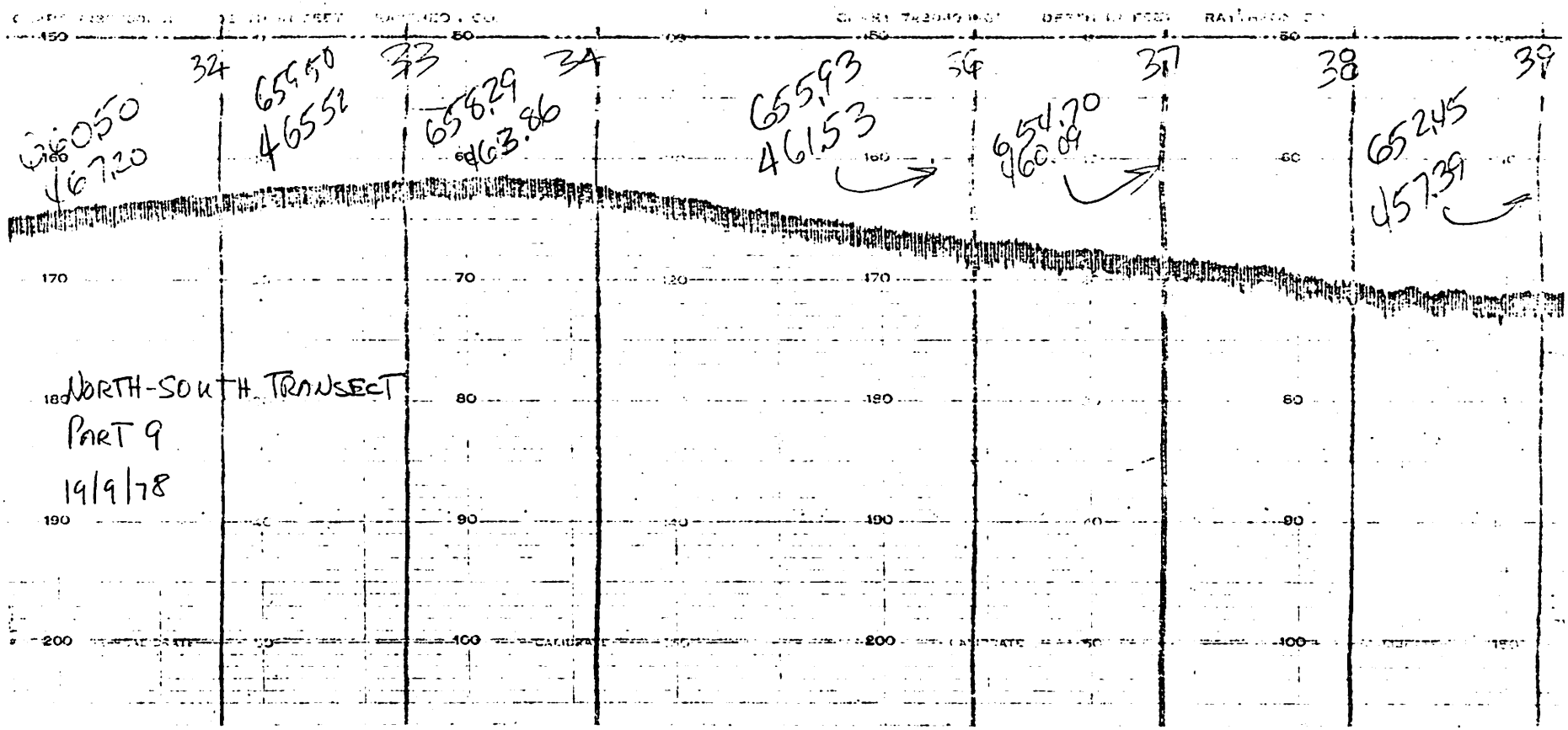

DEPTH IN FEET RAYTHEON CO.
CHART 7430-1900-51
16
17
18
19
20
69464
52273
69361
52233
69578
52337
North-South Transect
Part 4
19/9/78
80
69231
52172
LINE TURNS RIGHT @ 40° HEADING 005°
69110
52040
69015
51896
fathometer needle burnt out LINE BREAKS AGAIN BACK TO 69110 52040
50
100
150
200
250
300
350
400


691.10
520.20
1
689.83
514.65
1
688.72
517.40
2
687.72
515.77
3
686.60
514.44
4
685.52
512.72
5
684.42
511.05
6
683.09
509.29
TIME
1300
EDST
North-South TRANSECT
Part 5
19/9/78

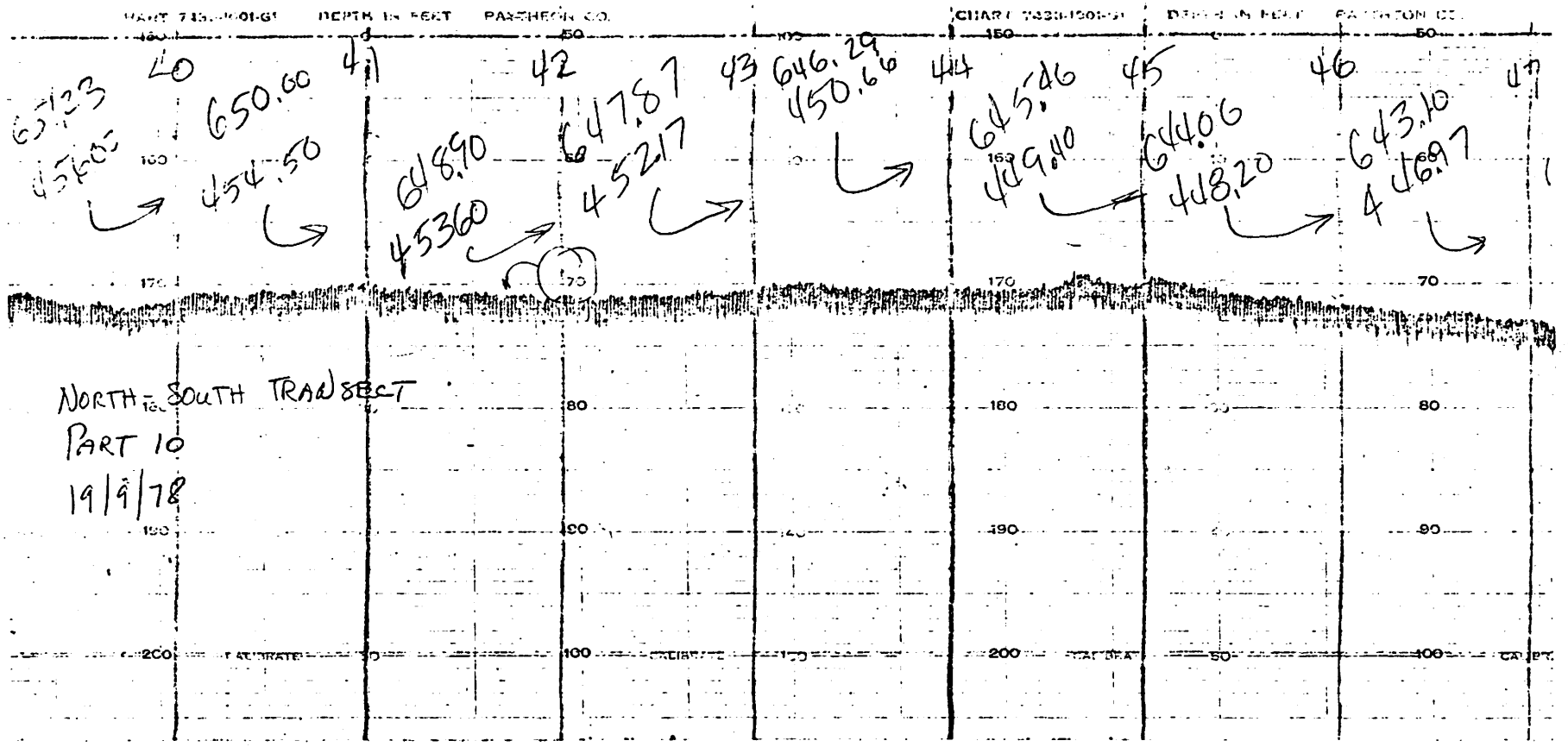



674.66 16
49455
706298
52490.33
18.15
671.60
48740 20
670.93 21
48556
670.00 22
48391
669.10 23
48210
NORTH-SOUTH TRANSECT
PART 7
19/9/78


667.50
480.50
24
667.10
479.00
25
666.20
477.04
26
665.20
475.43
27
663.14
472.12
29
662.12
470.50
30
NORTH-SOUTH TRANSECT
PART 8
19/9/78


34
33
34
56
37
38
39
65650
46552
65629
46386
65593
46153
65451.70
46008
65245
45739
NORTH-SOUTH TRANSECT
PART 9
19/9/78

00021


DEPTH IN FEET
PARTHENON CO.
40
41
42
43
44
45
46
650.00
454.50
648.90
45360
647.87
645.46
644.06
448.20
643.10
446.97
NORTH - SOUTH TRANSECT
PART 10
19/9/78

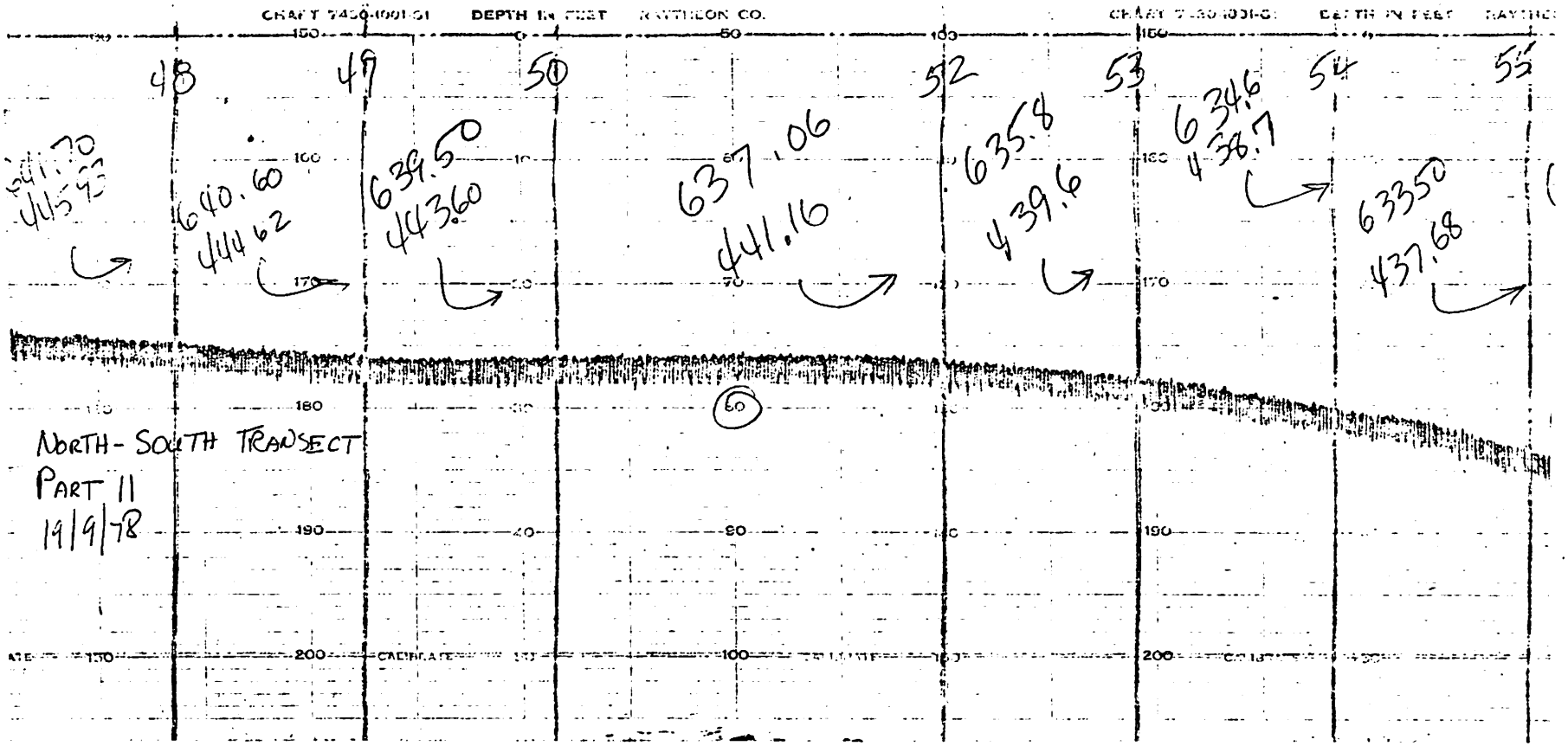
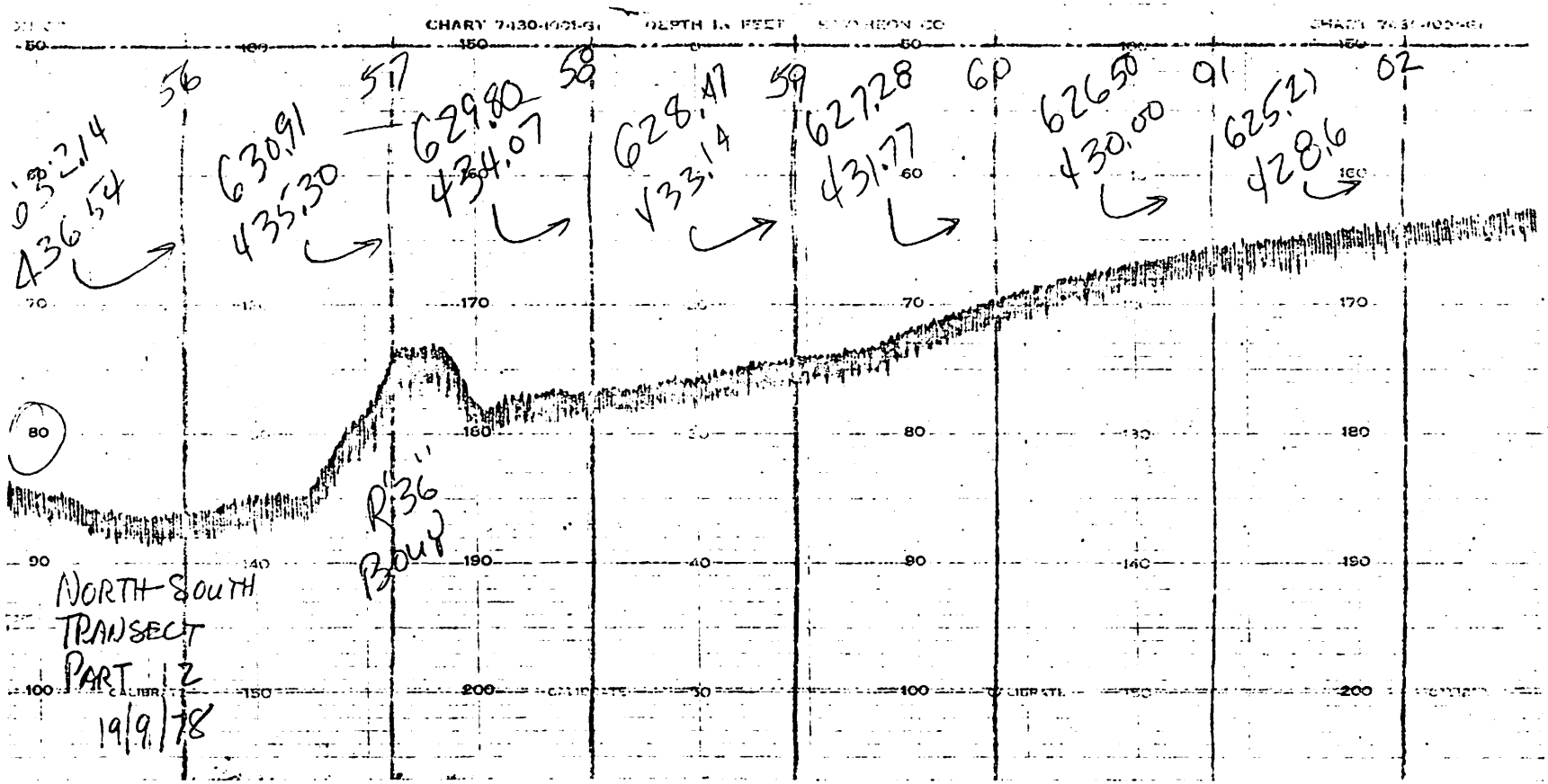


CHART 7450-1001-51 DEPTH IN FEET RAYTHEON CO.
CHART 7450-1001-51 DEPTH IN FEET RAYTHEON CO.
48
49
50
52
53
54
55
641.70
445.45
640.60
444.62
639.50
443.60
637.06
441.16
635.8
439.6
634.6
438.7
633.50
437.68
NORTH-SOUTH TRANSECT
PART II
19/9/78

C0023


56
57
58
59
60
61
62
630.91
435.30
629.80
434.07
628.41
433.14
627.28
431.77
626.50
430.00
625.21
428.6
R 36"
Boup
NORTH-SOUTH
TRANSECT
PART 12
19/9/78

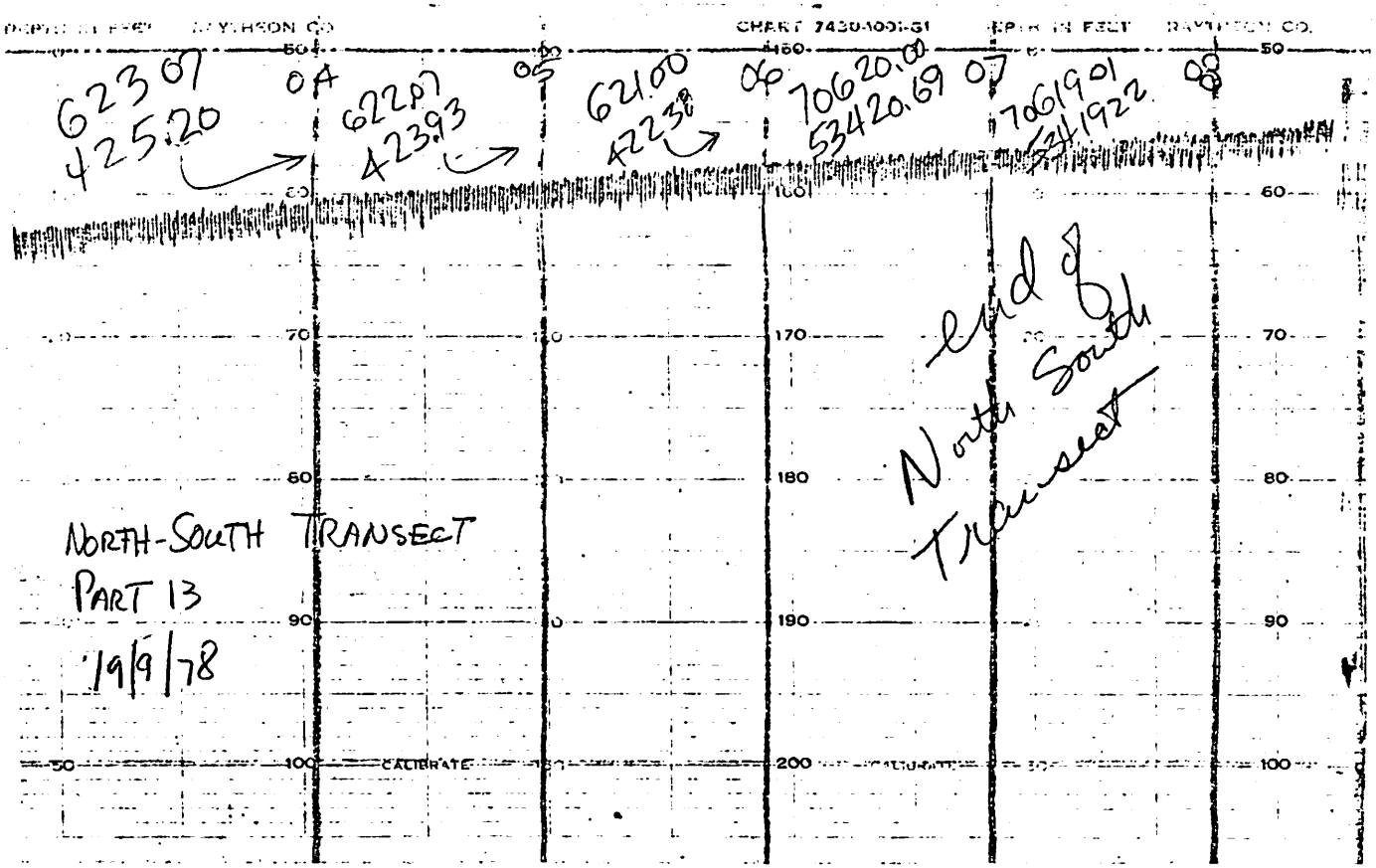
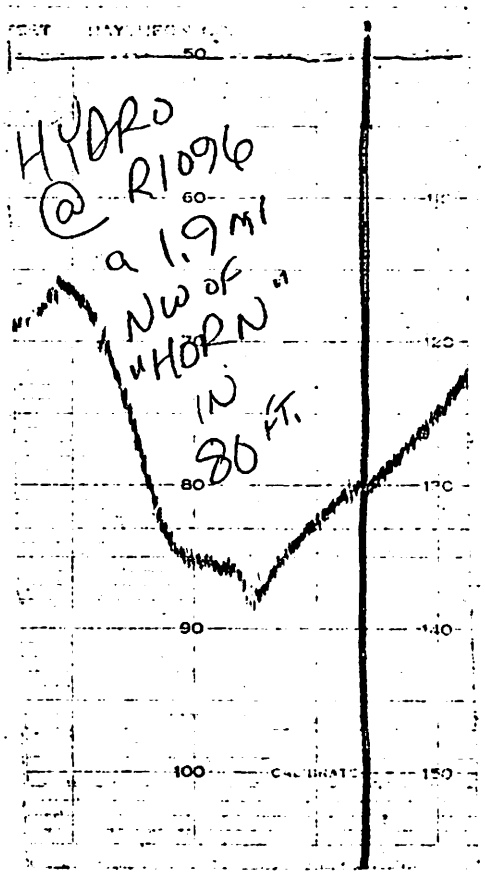
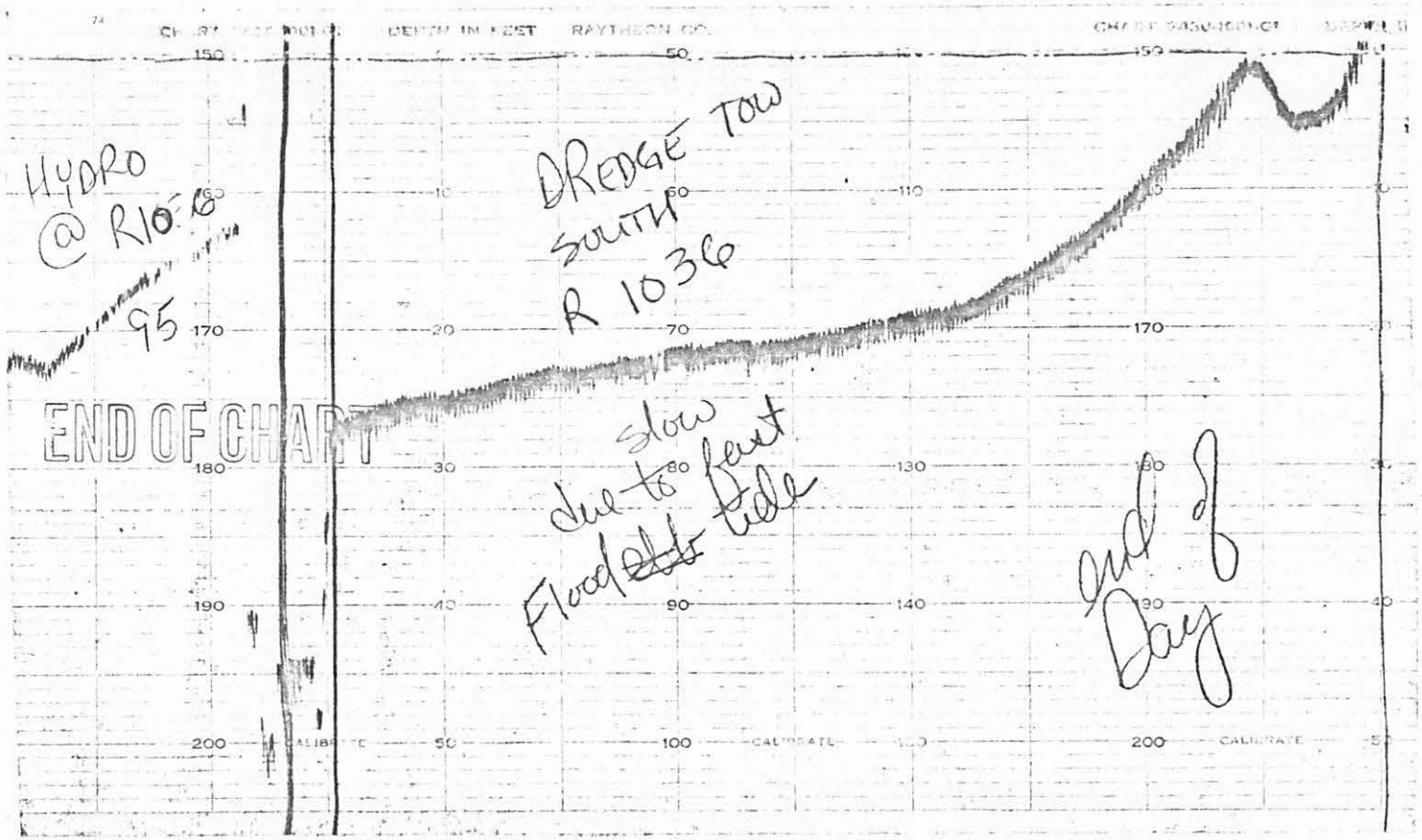
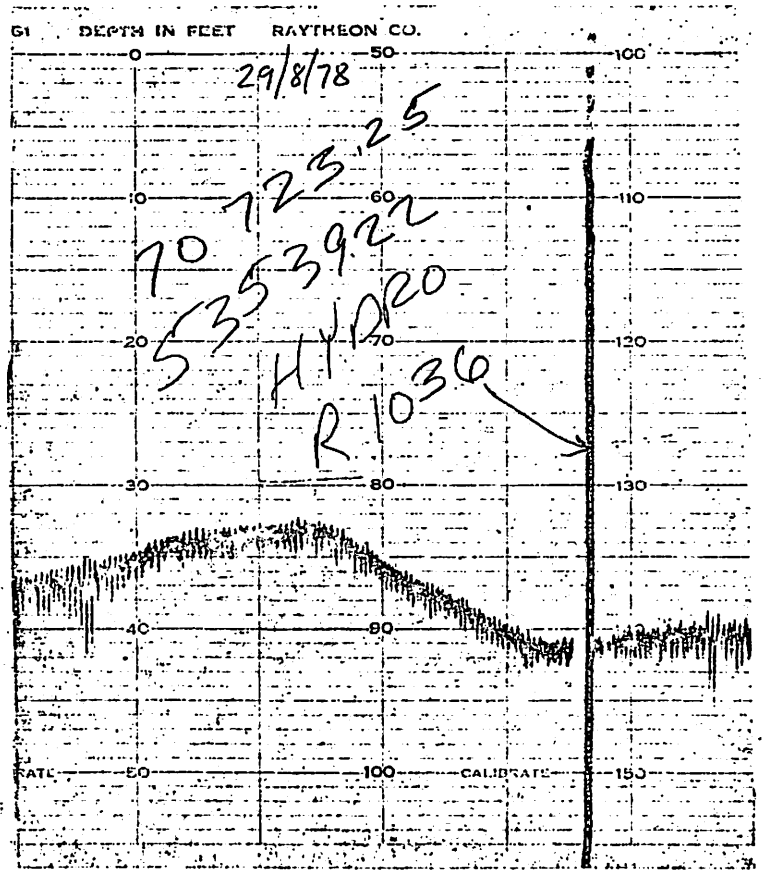


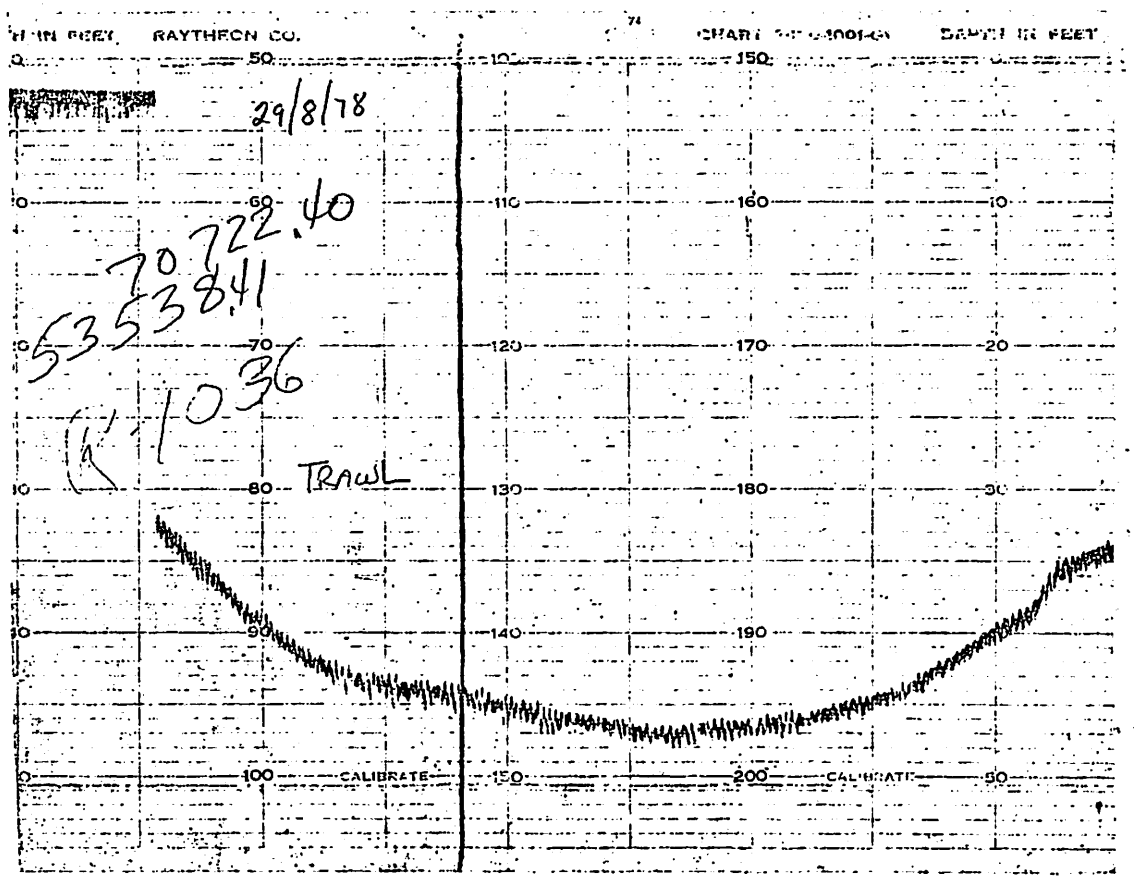
CHART 7430-1001-G1
623.07
425.20
622.07
423.93
624.00
423.00
706.20.00
534.20.69
706.19.01
534.19.22
End of North South Transect
NORTH-SOUTH TRANSECT
PART 13
9/9/78
CALIBRATE


50
60
80
90
100
120
130
140
150
HYDRO
@ R1096
a 1.9 MI
NW of
"HORN"
IN
80 FT.

92000


DEPTH IN FEET RAYTHON CO.
150
50
HYDRO @ R16
95
DREDGE TOW SOUTH R 1036
END OF CHART
slow due to Flood
end of Day
170
70
180
80
190
90
200
100
CALIBRATE


GI DEPTH IN FEET RAYTHEON CO.
0
50
100
29/8/78
10
60
110
20
70
120
30
80
130
40
90
140
RATE
50
100
CALIBRATE
150


RAYTHEON CO.
29/8/78
7072.40
5353.41
1036
TRAWL
CALIBRATE
CALIBRATE

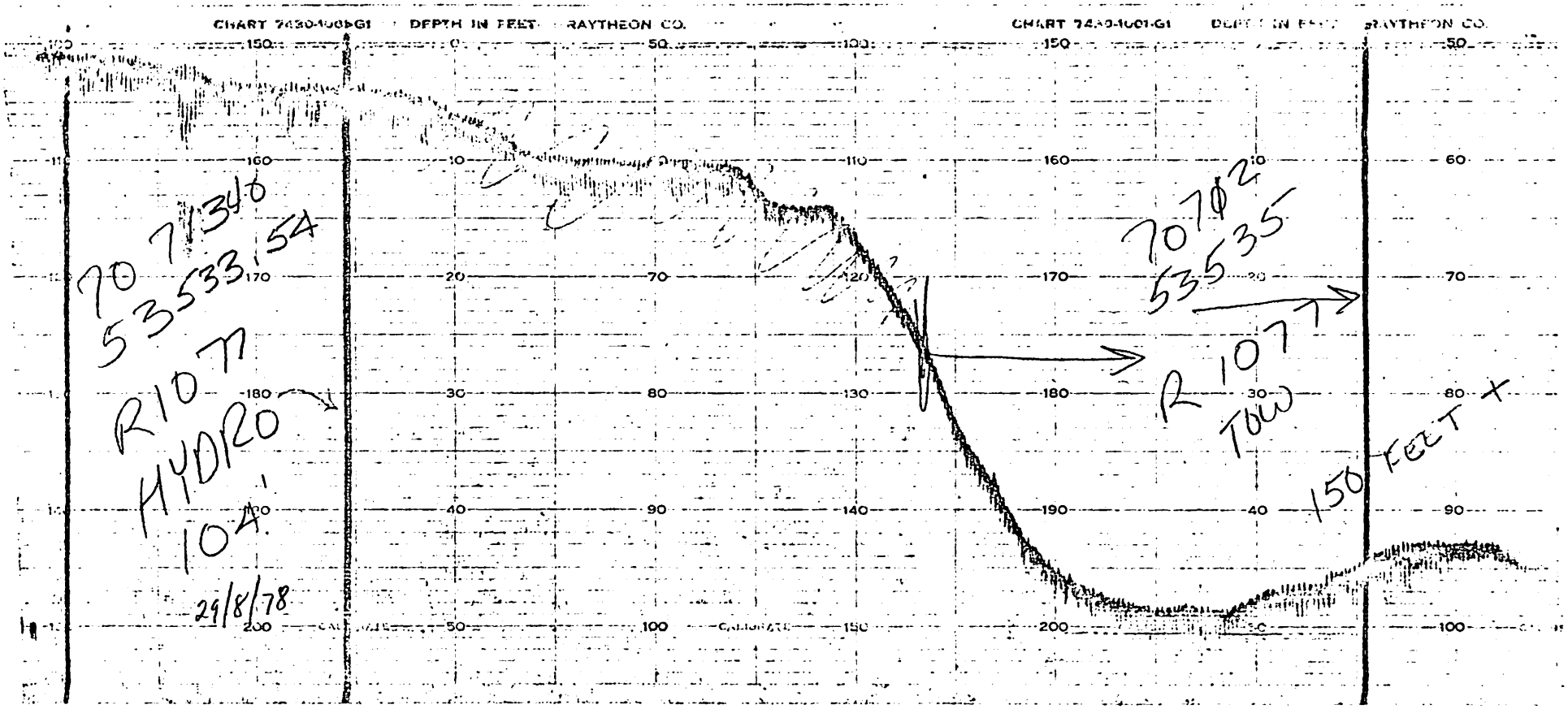


CHART 7430-1001-G1 DEPTH IN FEET RAYTHEON CO.
CHART 7430-1001-G1 DEPTH IN FEET RAYTHEON CO.
70 7 340
53533, 54
R107
HYDRO
10A
29/8/78
7070
535
R107
TOW
150 FEET

62009