

AGRICULTURAL MANAGEMENT SERVICES

August 19, 1983

Ms. Gail Murray
South Florida Water Management District
P. O. Box V
West Palm Beach, Florida 33402

RECEIVED
AUG 22 1983
RESOURCE CONTROL DEPARTMENT

Dear Ms. Murray:

Re: Permit Modification No. 11-00094 - S/W, Turner Corporation,
Collier County

Enclosed please find the results of recent step-drawdown tests performed on wells at Turner Corporation. As per our discussion, the production of Well #8 was too low to perform tests at the 85, 65 and 50% rates. Also, we tested Well #6A, Section 12, since Well #9 had a bent column and Wells #10 in Section 17 and #11 in Section 12, have permanent fixtures on them.

If you require additional information, please contact me.

Sincerely,

Nigel Morris
For the Company

jlf

Encls.

1/2

TURNER CORPORATION -- HIGHLAND CITRUS GROVES WELL TEST DATA

Re: Permit Modification No. 11-00094-S/W

Submitted by: Agricultural Management Services - August, 1983

Background Information:

A 6" diameter pipe with a 4-3/4" diameter orifice plate, a vertical piezometer tube and a gate valve were used to determine pumping rates, using the formula:

$$Q = KA \sqrt{2gh}$$

where: Q is flow in gallons per minute
K is discharge factor correcting for velocities in pipe and across orifice
g is acceleration due to gravity in feet per second per second
h is the height of water in the piezometer tube in inches
A is the area of the orifice in square inches

which simplifies to $Q = 8.02 KA \sqrt{h}$, since $\sqrt{2g} = 8.02$.
K was determined to be 0.76 from Figure 52 in Ground Water and Wells published by Johnson Division, UOP Inc., St. Paul, MN 55165

Tests were performed on the following wells:

<u>Well #</u>	<u>Section</u>	<u>Date</u>
8	13	8/5/83
4	23	8/9/83
9	12	8/12/83
6A	12	8/16/83

The test on Well #9 was abandoned on account of the casing being bent, which made it impossible to insert and remove the electronic water surface detector with sufficient speed to obtain the necessary readings. Accordingly, Well 6A was tested in lieu of Well 9, having similar characteristics.

With the pump (Goulds 5" turbine) and column pipe (approximately 64') used, it was not possible to obtain greater pumping rate than 200 gpm on Well #8. This did not provide sufficient height in the piezometer tube with the pipe and orifice size used, to permit tests at 85%, 65% and 50% of maximum rate to be performed.

The results of testing are presented in Tables 1-6, which consist of the raw data and time versus drawdown for each well.

Water samples were taken at the beginning and end of each test to determine chloride concentration. Results will be sent to the District as soon as they are received.

TABLE 1

TURNER WELL TESTS - RAW DATA - August 5, 1983

Well #8, Section 13 - Piezo Tube @ 100% Pump Rate: 3.25" = 194.7 gpm

<u>Time</u>	<u>Depth</u>	<u>Time</u>	<u>Depth</u>	<u>Time</u>	<u>Depth</u>
9:01:57	9.00	9:45:10	9.35	10:03:10	9.25
9:07:40	58.85	9:48:00	61.00	10:04:10	57.60
9:09:10	59.90	9:48:15	cut	10:04:27	59.15
9:12:20	58.40	9:49:00	25.60	10:09:00	60.15
9:15:00	58.50	9:50:00	18.60	10:09:58	60.10
9:18:00	57.60	9:51:00	12.60	10:10:10	cut
9:21:00	57.15	9:52:00	11.60	10:10:43	22.60
9:24:00	57.25	9:53:00	10.60	10:11:11	14.90
9:24:15	cut	9:55:00	10.10	10:11:40	13.15
9:40:00	9.60	9:57:00	9.90	10:12:24	11.65
9:45:00	9.35	9:58:00	9.65	10:13:11	11.25
		10:00:00	9.60	10:14:10	10.75
Trouble with		10:01:00	9.50	10:15:13	10.50
tester after pump		10:03:00	9.25	10:16:12	10.35
cut				10:17:53	10.15
		Bowls lowered		10:19:15	9.90
		to increase pumping		10:20:38	9.85
		rate--resulted in		10:22:48	9.60
		surging			

NOTE: Drawdown tests for 85%, 65% and 50% were not possible because the piezometer tube could not be read below 3 inches.

TABLE 2

TURNER CORPORATION - HIGHLAND CITRUS GROVE WELL TESTS - DRAWDOWN DATA

Well #8, Section 13 -- Date of Test: August 5, 1983 -- Static Level 9.0 feet

Pumping Rate	194.7 gpm				202.0 gpm	
	Time (min)	Drawdown (ft)	Time (min)	Drawdown (ft)	Time (min)	Drawdown (ft)
	0.00	0.00	0.00	0.35	0.00	0.25
	5.72	49.85	2.83	52.00	1.00	48.60
	7.22	50.90	3.08	cut	1.28	50.15
	10.38	49.40	3.83	16.60	5.83	51.15
	13.05	49.50	4.83	9.60	6.80	51.10
	16.05	48.60	5.83	3.60	7.00	cut
	19.05	48.15	6.83	2.60	7.55	13.60
	22.05	48.25	7.83	1.60	8.02	5.90
	22.30	cut	9.83	1.10	8.50	4.15
	38.05	0.60	11.83	0.90	9.23	2.65
	43.05	0.35	12.83	0.65	10.02	2.25
			14.83	0.60	11.00	1.75
			15.83	0.50	12.05	1.50
			17.83	0.25	13.03	1.35
					14.72	1.15
					16.08	0.90
					17.47	0.85
					19.63	0.50

1.14
48.25
44.03

2478

202
50.85
3.97
2517

Q_{pm}	244.5	317.9	415.7	459
S_i	14.15	19.0	25.55	30.1
$\frac{S_i}{Q_i}$.0578	.0598	.0615	.0616
	17.3	16.7	16.2	

#6A

at $Q = 489$

#6A

$$S_w = B Q T C Q^2$$

$$S_w = .0525(489) + .000021(489)^2$$

$$S_w = 30.69$$

25.7'
↓
avg. dpt.

5.02
will
loss

$$\frac{489}{25.7} = 19.03$$

$$\times 2160$$

T = 41,098 GPD/FT

.062
.061
.060
.059
.058
.057
.056
.055
.054
.053

150 200 300 400 500

$B = .0525$

$$\frac{.0602 - .0580}{.0022}$$

$$C = \frac{.0022}{105}$$

$C = .000021$

#6A

STATE OF FLORIDA
WATER WELL CONTRACTOR'S NOTIFICATION
OF CONSTRUCTION OR REPAIR OF A WATER WELL
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF INTERIOR RESOURCES
505 Larson Building, Tallahassee, Florida 32304
Telephone: (904) 488-8476

Permit No. 65-451 F

Owner's Well Identification #6A

N^o 11846

Sec. 12, Twp 46S, Rge 28E

State Well Number
For Department Use
ONLY

1. OWNER: TURNER Corp
Name
RT 1 Box 6B Immokalee, Fla
Address City State

2. LOCATION OF WELL: Highlands Grove
Street Address/Road
Immokalee Collier
City County
Subdivision Lot No.
Section Township Range

3. PURPOSE OF WELL:
☐ Domestic ☒ Irrigation ☐ Public Supply
☐ Industrial ☐ Stock ☐ Other

4. TYPE OF WORK:
☒ New Well ☐ Plugging ☐ Other
☐ Deepening ☐ Reconditioning

5. QUALITY:
☐ Clear ☐ Colored ☐ Sulfur ☐ Salty ☐ Other
CHECK TEST MADE
☐ None ☐ Bacteria ☐ Chemical
Chloride _____ PPM
(Check ☐ if test was for sodium chloride)
Temperature _____ °F
Well Disinfected ☐ Yes ☐ No
Test By:
☐ County Health Dept.
☐ State Health Dept.
☐ U.S.G.S.
☐ Other
Name
Address

6. EQUIPMENT:
☒ Rotary ☐ Cable Tool ☐ Other
☐ Jet ☐ Reverse Rotary

7. GROUT: ☐ None ☒ Cement ☐ Other
Describe and give number of bags (94)lb.) From (ft) To (ft)
Portland 10 0 19

8. CASING AND LINER PIPE:
Diameter (inches) Kind From (ft) To (ft)
16" Steel 0 19
8" P.V.C. 0 200
(Check One) ☐ Threaded & Coupled ☐ Welded Only
☐ T & C & Welded ☐ Other

9. WATER LEVEL:
Water level after well completed _____ feet
☐ Above ☐ below land surface
Well Flowing: ☐ Yes ☐ No Flow _____ gal/min

10. SCREENS: Location (ft) Below Surface
Make Materials Diameter (in) Slot Size From (ft) To (ft)
P.V.C. 8" 5000 140 200

11. UPPER END OF WELL:
☐ Pump Installed ☐ Valve ☐ Cap ☐ Other

12. PUMPING TEST:
Date _____ ☐ Test Pump ☐ Permanent Pump
Measure point is _____
which is _____ feet ☐ above ☐ below land surface
Static water level _____ feet ☐ above ☐ below measure point
Maximum Drawdown _____ feet below measure point
Discharge at maximum drawdown _____ gal/min
After _____ hours

13. PUMP INSTALLED:
Type _____ Make _____ Model No. _____
Motor Power _____ Make _____ H.P. _____
Capacity _____ Gal/min at _____ ft. of total dynamic head
No. of bowls or stages _____
Pump setting _____ feet

14. WELL LOG:			
Well bore (in)	Depth (feet)		Note each type of material, producing zones, & cavi- ties if any. Give description at not less than 20 foot intervals and at changes.
	From	To	
17 1/2	0	6	Brown Sand
17 1/2	6	14	Tan / WHITE MARL
17 1/2	14	19	Blue / Green Sandy Clay
12 1/4	19	22	Blue / Green Sandy Clay
12 1/4	22	24	WHITE MARL
12 1/4	24	29	WHITE Limestone
12 1/4	29	118	Fine To Med. Sand - Shell
12 1/4	118	163	Med. To Course Sand
12 1/4	163	184	Gray / WHITE Sandstone
12 1/4	184	187	WHITE MARL
12 1/4	187	200	Gray To Black Limestone
7 1/8	200	260	Gray To WHITE Limestone With Fractures

15. CONTRACTOR'S CERTIFICATION:

This work was done under my jurisdiction and this report is true to the best of my knowledge and belief. The work commenced on 1-29-82 and was completed on 2-2-82

Hodges Well Drilling 1118
Contractor License Number
P.O. Box 1086
Signature of Representative P.O. Box or Street
Immokalee Collier FLA
City County State
657-2685 James L. Hodges
Phone Number Driller

STATE OF FLORIDA
WATER WELL CONTRACTOR'S NOTIFICATION
OF CONSTRUCTION OR REPAIR OF A WATER WELL
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF INTERIOR RESOURCES
505 Larson Building, Tallahassee, Florida 32304
Telephone: (904) 488-8476

Permit No. 65-457 B

Owner's Well Identification # 4

N# 11842
Sec. 23, Twp 46S, Rge 28E

1. OWNER: Turner Corp
RT 1 Box 65 Immokalee, FLA
Name _____
Address _____ City _____ State _____

2. LOCATION OF WELL: Hobland Grove
Immokalee Collier
Street Address/Road _____
City _____ County _____
Subdivision _____ Lot No. _____
Section _____ Township _____ Range _____

3. PURPOSE OF WELL:
☐ Domestic ☒ Irrigation ☐ Public Supply
☐ Industrial ☐ Stock ☐ Other _____

4. TYPE OF WORK:
☒ New Well ☐ Plugging ☐ Other _____
☐ Deepening ☐ Reconditioning

5. QUALITY:
☐ Clear ☐ Colored ☐ Sulfur ☐ Salty ☐ Other _____
CHECK TEST MADE
☐ None ☐ Bacteria ☐ Chemical
Chloride _____ PPM
(Check ☐ if test was for sodium chloride)
Temperature _____ °F
Well Disinfected ☐ Yes ☐ No
Test By: ☐ County Health Dept. ☐ State Health Dept. ☐ U.S.G.S. ☐ Other _____
Name _____
Address _____

6. EQUIPMENT:
☒ Rotary ☐ Cable Tool ☐ Other _____
☐ Jet ☐ Reverse Rotary

7. GROUT: ☐ None ☒ Cement ☐ Other _____
Describe and give number of bags (94)lb. From (ft) To (ft)
Port Land 10 0 18

8. CASING AND LINER PIPE:
Diameter (inches) Kind From (ft) To (ft)
20" Steel 0 18
8" PVC 0 174
(Check One) ☐ Threaded & Coupled ☐ Welded Only
☐ T & C & Welded ☐ Other _____

9. WATER LEVEL:
Water level after well completed _____ feet
☐ Above ☐ below land surface
Well Flowing: ☐ Yes ☐ No Flow _____ gal/min

10. SCREENS: Location (ft) Below Surface 174'
Make Materials Diameter (in) Slot Size From (ft) To (ft)
PVC 8" 50,000 174 236

11. UPPER END OF WELL:
☐ Pump Installed ☐ Valve ☐ Cap ☐ Other _____

12. PUMPING TEST:
Date _____ ☐ Test Pump ☐ Permanent Pump
Measure point is _____
which is _____ feet ☐ above ☐ below land surface
Static water level _____ feet ☐ above ☐ below measure point
Maximum Drawdown _____ feet below measure point
Discharge at maximum drawdown _____ gal/min
After _____ hours

13. PUMP INSTALLED:
Type _____ Make _____ Model No. _____
Motor Power _____ Make _____ H.P. _____
Capacity _____ Gal/min at _____ ft. of total dynamic head
No. of bowls or stages _____
Setting _____ feet

14. WELL LOG:
Well bore (in) Depth (feet) Note each type of material, producing zones, & cavities if any. Give description at not less than 20 foot intervals and at changes.

Well bore (in)	From	To	
22	0	7	BROWN SAND
22	7	18	CRIMMY TAN SANDY CLAY
17 1/2	18	22	CRIMMY LIMESTONE / Shell
22	22	26	WHITE LIMESTONE
26	26	45	GRAY/GREEN SANDY CLAY
45	45	69	WHITE SANDSTONE - shell stringers
69	69	80	GREEN SANDY CLAY - Med. SAND.
80	80	236	GREEN SANDY CLAY - Med. COARSE SAND

15. CONTRACTOR'S CERTIFICATION:
This work was done under my jurisdiction and this report is true to the best of my knowledge and belief. The work commenced on 10-1-81 and was completed on 10-7-81

Hodges Well Drilling 1118
Contractor License Number
P.O. Box 1086
Signature of Representative P.O. Box or Street
Immokalee Collier FLA
City County State
657-2685 James J. Hodges
Phone Number Driller

TABLE 3

TURNER WELL TESTS - RAW DATA - August 9, 1983

Well #4, Section 23 - Piezo Tube 26½ rate = 556 gpm

@ 85% = 472.6 gpm = 19"
 @ 65% = 361.4 gpm = 11"
 @ 50% = 278.0 gpm = 6-5/8"

3 1/2 69
 3 01 39
 15.30

Time	Depth	Time	Depth	Time	Depth	Time	Depth
Static	6.50	3:42:00	6.70	4:47:50	6.60	5:22:00	6.55
3:01:39	6.50	3:43:00	33.80	4:48:50	28.40	5:22:35	22.60
3:02:13	37.10	3:44:00	37.80	4:49:50	28.85	5:23:22	23.45
3:03:04	41.80	3:45:00	37.80	4:51:00	29.90	5:24:00	23.70
3:04:00	43.00	3:46:05	38.45	4:52:00	29.90	5:25:00	24.15
3:05:00	43.95	3:47:00	38.70	4:53:04	30.40	5:26:00	24.60
3:06:00	44.45	3:48:00	38.85	4:54:00	30.60	5:27:00	24.60
3:07:00	45.00	3:49:03	38.95	4:55:05	30.70	5:28:05	25.00
3:08:00	45.10	3:50:02	39.40	4:56:00	30.80	5:29:05	25.15
3:09:00	45.50	3:51:03	39.35	4:57:00	30.95	5:30:00	25.20
3:10:11	45.95	3:52:00	39.45	4:58:00	31.00	5:33:00	25.30
3:11:00	45.95	3:53:00	39.60	4:59:07	31.10	5:36:00	25.35
3:12:00	45.75	3:54:00	39.45	5:00:00	31.15	5:41:08	25.50
3:13:05	46.20	3:54:30	cut	5:00:30	cut	5:45:00	25.65
3:14:18	46.45	3:55:10	13.00	5:01:00	10.00	5:50:00	25.65
3:15:00	46.30	3:55:50	10.00	5:01:35	9.45	5:50:30	cut
3:16:00	46.55	3:56:05	9.65	5:02:00	8.75	5:50:50	10.00
3:17:09	46.55	3:56:43	9.00	5:03:00	8.20	5:51:15	9.45
3:18:39	cut	3:58:00	8.65	5:04:00	7.70	5:51:45	8.65
3:22:55	8.65	3:59:00	8.10	5:07:00	7.25	5:52:08	8.35
3:24:10	7.95	4:24:35	6.60	5:10:00	6.90	5:52:35	8.15
3:25:17	7.80			5:13:00	6.80	5:55:05	8.00
3:26:50	7.60			5:16:30	6.75	5:54:00	7.85
3:29:30	7.30			5:20:15	6.55	5:57:00	7.30
3:34:43	7.00					6:02:20	7.00
3:38:00	6.90					6:10:00	6.75
3:40:21	6.80					6:15:00	6.60

TURNER CORPORATION - HIGHLAND CITRUS GROVE WELL TESTS - DRAWDOWN DATA
Well #4, Section 23 -- Date of Test: August 9, 1983 -- Static Level 6.3 feet

[illegible]

TABLE 5

TURNER WELL TESTS - RAW DATA - August 16, 1983

Well #6A, Section 12 - Piezo Tube @ 100% Pump Rate: 20.5" = 489.0 gpm

@ 85% = 415.7 gpm = 14.8"

@ 65% = 317.9 gpm = 8.7"

@ 50% = 244.5 gpm = 5.1"

Time	Depth	Time	Depth	Time	Depth	Time	Depth
3:49:00	3.90	4:35:00	3.95	5:27:00	4.00	6:09:15	4.00
3:49:39	28.40	4:36:00	26.25	5:28:02	19.60	6:09:50	15.65
3:30:30	30.00	4:37:10	27.05	5:32:47	22.15	6:10:55	16.35
3:51:05	30.90	4:38:05	27.45	5:33:41	22.15	6:11:57	16.80
3:57:55	31.25	4:39:06	27.75	5:34:43	22.45	6:13:05	17.25
3:53:00	32.00	4:40:15	28.20	5:35:49	22.90	6:14:17	17.40
3:54:00	32.60	4:41:16	28.40	5:36:50	22.90	6:15:12	17.55
3:55:14	33.00	4:42:09	28.55	5:38:07	22.90	6:16:09	17.60
3:56:16	33.40	4:43:07	28.55	5:39:04	22.90	6:17:12	17.65
3:57:11	33.45	4:44:06	28.70	5:39:30	cut	6:18:12	17.65
3:58:12	33.65	4:45:08	28.95	5:39:44	10.00	6:19:16	17.80
3:59:02	33.80	4:46:04	29.05	5:40:21	7.40	6:20:25	17.85
4:00:00	33.80	4:47:04	29.10	5:40:47	6.60	6:21:26	17.85
4:01:00	33.95	4:48:07	29.30	5:41:06	6.35	6:22:22	18.00
4:02:05	34.00	4:49:07	29.40	5:41:27	6.00	6:23:24	18.00
4:02:50	cut	4:50:04	29.45	5:41:54	5.75	6:24:10	18.00
4:04:10	7.70	4:50:40	cut	5:42:32	5.60	6:25:17	18.05
4:05:24	6.70	4:51:29	8.45	5:46:41	4.80	6:26:30	cut
4:06:11	6.15	4:52:45	6.70	5:52:01	4.60	6:26:46	8.45
4:06:50	5.90	4:54:27	6.00	5:57:51	4.35	6:27:09	6.95
4:11:40	4.85	4:58:12	5.15	6:04:24	4.05	6:27:28	6.30
4:14:52	4.55	5:02:46	4.65	6:07:38	4.00	6:27:40	6.15
4:20:30	4.20	5:11:26	4.25			6:28:31	5.55
4:24:37	4.15	5:17:57	4.10			6:29:31	5.25
4:32:33	3.95	5:24:45	4.00			6:36:35	4.45
						6:41:17	4.25
						6:48:56	4.10
						6:52:43	4.00

625.17
 309.15
 16.00

537.07
 227.00
 12.00

450.04
 435.00
 15.04

1434.00
 1300.00
 134.00

TURNER CORPORATION - HIGHLAND CITRUS GROVE WELL TESTS - DRAWDOWN DATA
Well #6A, Section 12 -- Date of Test: August 16, 1983 -- Static Level 3.9 feet

Pumping Rate	100%(489.0gpm)	85%(415.7gpm)	65%(317.9gpm)	50%(244.5gpm)
	Time (min) Drawdown (ft)	Time (min) Drawdown (ft)	Time (min) Drawdown (ft)	Time (min) Drawdown (ft)
	0.00 0.00	0.00 0.05	0.00 0.10	0.00 0.10
	0.65 24.50	1.00 22.35	1.03 15.70	0.58 11.75
	1.50 26.10	2.17 23.15	5.78 18.25	1.67 12.45
	8.92 27.35	4.10 23.85	7.72 18.55	3.83 13.35
	4.00 28.10	5.25 24.30	8.82 19.00	5.03 13.50
	5.00 28.70	6.27 24.50	9.82 19.00	5.95 13.65
	6.23 29.10	7.15 24.65	11.12 19.00	6.90 13.70
	7.27 29.50	8.12 24.65	12.07 19.00	7.95 13.75
	8.18 29.55	9.10 24.80	12.50 cut	8.95 13.75
	9.20 29.75	10.13 25.05	12.70 6.10	10.02 13.90
	10.03 29.90	11.07 25.15	13.35 3.50	11.17 13.95
	11.00 29.90	12.07 25.20	13.78 2.70	12.18 13.95
	12.00 30.05	13.12 25.40	14.10 2.45	13.12 14.10
	13.08 30.10	14.12 25.50	14.45 2.10	14.15 14.10
	13.83 cut	15.07 25.55	14.90 1.85	14.92 14.10
	15.17 3.80	15.67 cut	15.53 1.70	16.03 14.15
	16.40 2.80	16.48 4.55	19.68 0.90	17.25 cut
	17.18 2.25	17.75 2.80	25.02 0.70	17.52 4.55
	17.83 2.00	19.45 2.10	30.85 0.45	17.90 3.05
	22.67 0.95	23.20 1.25	37.40 0.15	18.22 2.40
	25.87 0.65	27.77 0.75	40.63 0.10	18.42 2.25
	31.63 0.30	36.43 0.35		19.27 1.65
	35.62 0.25	42.95 0.20		20.27 1.35
	43.55 0.05	49.75 0.10		27.33 0.55
				32.03 0.35
				39.68 0.20
				43.47 0.10

Q _{gpm}	244.5	317.9	415.7	489
S _i	14.15	9.0	25.55	30.1
f _i /a _i	.0578	.0598	.0615	.0616
	17.3	16.7	16.2	

AUA

$$Q + Q = 489$$

$$S_w = 0.000021 Q^2$$

$$S_w = .0525(489) + .000021(489)^2$$

$$S_w = 30.69$$

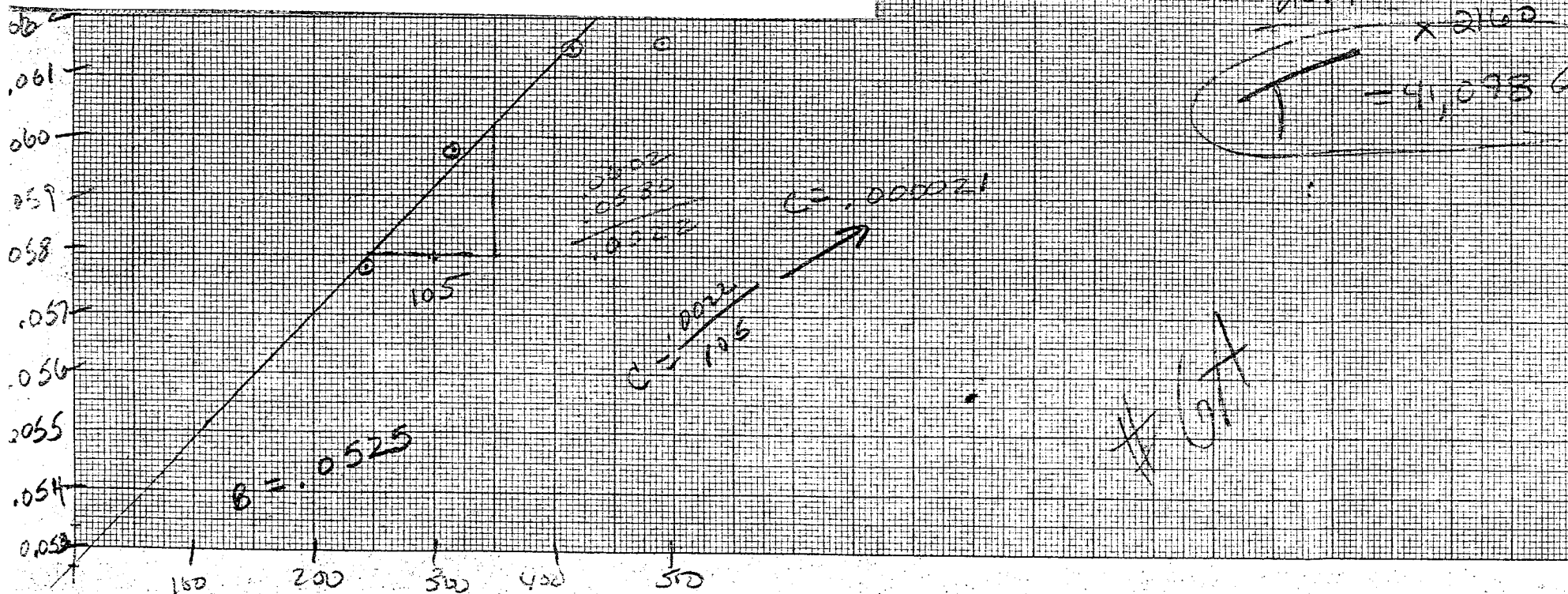
5.1
10.1
15.1
20.1
25.1
30.1
35.1
40.1
45.1
50.1
55.1
60.1
65.1
70.1
75.1
80.1
85.1
90.1
95.1
100.1

5.1
10.1
15.1
20.1
25.1
30.1
35.1
40.1
45.1
50.1
55.1
60.1
65.1
70.1
75.1
80.1
85.1
90.1
95.1
100.1

$$\frac{489}{25.7} = 19.03$$

$$\times 2160$$

$$= 41,098 \text{ GPD}$$



let $Q = 556 \text{ GPM}$

$$s_w = \underbrace{BQ}_{\text{aquifer drawdown}} + \underbrace{CQ^2}_{\text{well loss}}$$

$$\begin{aligned} &= (.0008)(556) + (.0000187)(556)^2 \\ &= 33.8 + 5.78 \\ &= 39.58 \end{aligned}$$

well loss = 5.78'

aquifer drawdown = 33.8

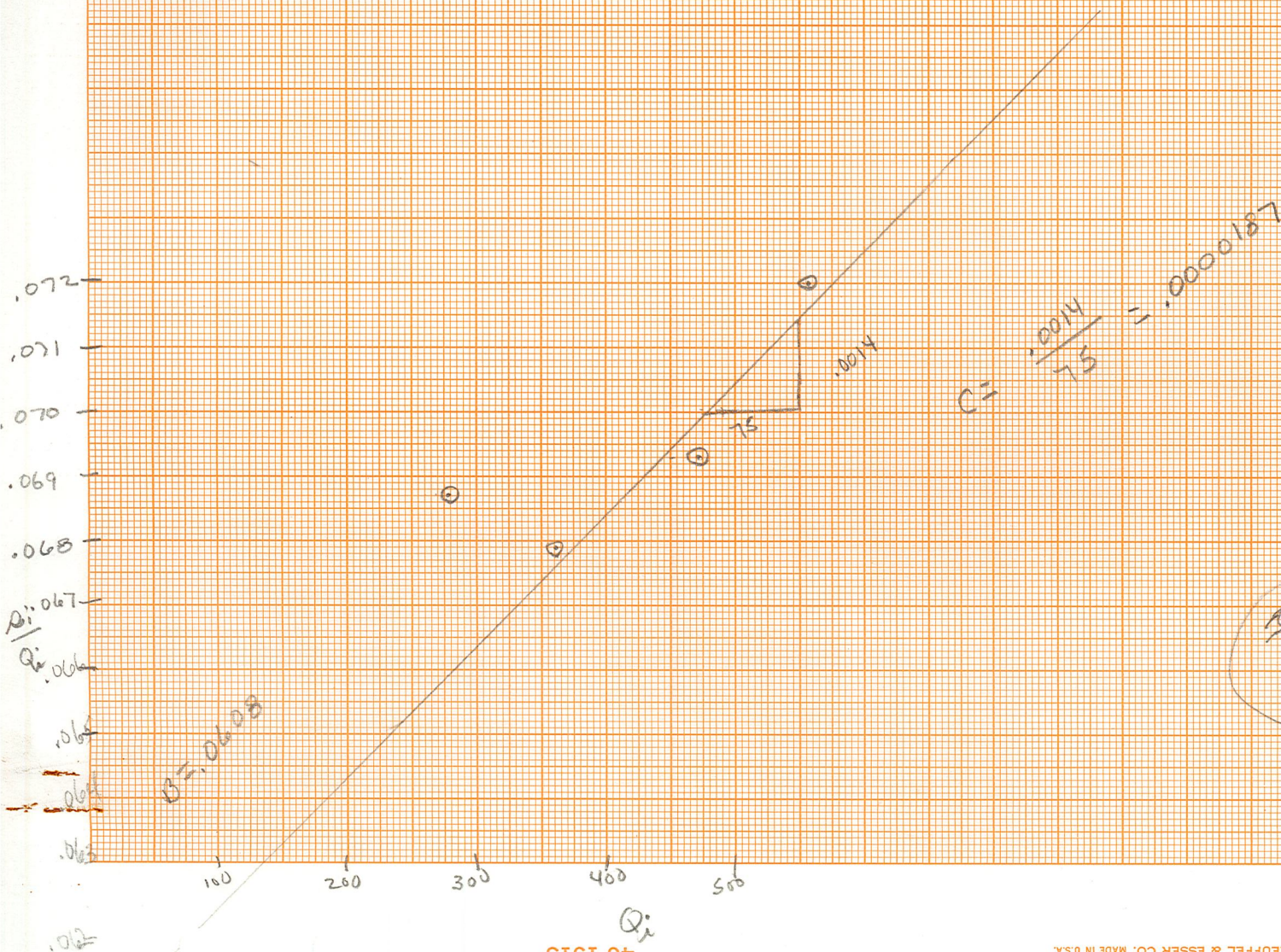
specific capacity

$$= \frac{556}{33.8} = 16.45$$

$$K T = 16.45 \times 2160$$

$$= 35,532 \text{ GPD/FT}$$

Q_i	278.0	361.4	472.6	556.0
S_i	19.1	24.55	32.75	40.05
$\frac{S_i}{Q_i}$.0687	.0679	.0693	.0720



46 1513

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