DRILLING, CONSTRUCTION & TESTING OF OBSERVATION WELL WR235-79 CONTRACT NO. 65 QUALICUM BEACH, B.C.

INTRODUCTION

The following is a report on the drilling, construction and aquifer testing of Observation Well WR235-79, located halfway between the villages of Parksville and Qualicum Beach, (Figures 1, 2). The drilling and testing program began February 27, 1979 and was completed on March 14, 1979. The purpose of the well is to monitor the long-term water level fluctuations in an area where increasing development is occurring; to provide information on the amount of recharge to the aquifer, and the effects of groundwater withdrawals upon the aquifer.

WELL DRILLING

Island Well Drilling was retained by the Groundwater Section to carry out the drilling and construction of the observation well. The well was drilled by the cable-tool method. A 10-ft. length of 8-inch diameter surface casing was first installed, utilizing the drive and bail method. Drilling with 6-inch diameter casing ensued, to a depth of 175 feet.

The lithologic log, driller's log of the well, results of grain-size analysis, details of well screen design and final well completion are shown in Appendix A. Samples for grain-size analysis were taken at one to two ft. intervals in the water-bearing zones.

Essentially two water-bearing sand and gravel zones were encountered during drilling. The upper zone occurs between a depth of 122 and 133 ft. below ground level, and the lower zone occurs between a depth of 144 and 155 ft. below ground level. As is depicted in Figure 3, these confined aquifers appear to be hydraulically connected to each other and to the main aquifer located within 1000 ft. north of the well site. Similar water levels in both confined aquifers suggest hydraulic continuity. Only the lower aquifer was screened and tested.

WELL COMPLETION

Construction details of the screen are shown in Appendix A. A 4-ft. length of 30-slot, 6-inch nominal diameter screen, together with a 4-ft. length of 50-slot, 6-inch diameter screen were used for the aquifer interval 144 to 155 ft. below ground level. The design of the screen was based upon grain size analyses (Appendix A) and upon available selection from "off-the-shelf" sources to minimize standby delays.

The well was developed for approximately 20 hours by the conventional up-surging, back-surging and bailing method. Following the well development a one-hour bail test at a rate of 25 Igpm (30 USgpm) was carried out. A draw-down of 6 ft. was measured, thus indicating the well had an estimated specific

capacity of 5.0 USgpm/ft. of drawdown.

PUMPING TESTS

Three step tests and a 25-hour constant rate test were conducted between March 12 - March 14, 1979 by B.C. Aquifer Testing and Equipment. A 20-horsepower submersible pump was set at an intake depth of 133 ft. from ground level. Utilizing a 2-inch diameter discharge hose, the discharge was conveyed 100 ft. away from the well to a nearby ditch. Pumping rates were measured by the use of a timer and a 45-Imp. gallon barrel.

The Three step-tests were conducted at rates of 50 Igpm, 100 Igpm and 130 Igpm. Drawdown and recovery data is tabulated in Appendix B, and the results are graphically illustrated in Figures 4, 5, 6, 7, 8 and 9. The transmissivity values have been calculated from both the time-drawdown curve and time-recovery curve and are also shown in Figures 4 to 9.

The 25-hour pumping test was conducted on March 13, 1979, at a constant rate of 162 USgpm. After pumping for 1500 minutes (25 hours) at this rate, the water level appeared to be stabilizing. Recovery measurements for 1400 minutes were recorded after pump shut-down. Drawdown and recovery data are tabulated in Appendix B, while semi-log plots of drawdown and recovery are shown in Figures 10 and 11, respectively.

The drawdown and recovery data was analyzed by the Cooper and Jacob (1946) straight line method and a summary of the analyses is as follows:

Test	Time Interval, min.	Pumping Rate, USgpm	Drawdown, ft.	Specific Capacity, USgpm/ft.	Tranmissivity USgpd/ft.
Step-test 1	30	60	12.23	4.9	7,700
Recovery 1	60	-	-	-	5,100
Step-test 2	14	120	23.20	5.2	5,400
Step-test 2	60	120	25.78	4.7	8,300
Recovery 2	60	-	-	-	6,000
Step-test 3	5	180	26.10	6.9	5,500
Step-test 3	40	159	31.80	5.0	6,500
Recovery 3	95	-	-	-	6,900
25-hour	90	162	32.30	5.0	8,500
25-hour	1500	162	36.21	4.5	12,500
25-hr. Recov.	1400	-	-	-	7,800
25-hr. Recov.	1400	-	-	-	11,100

An existing well (Bunker Development well) approximately 1300 ft. north of the pumped well was used as an observation well to monitor the drawdown effects of the pumped well and to determine the coefficient of storage, S. After 24 hours of pumping at a constant rate of 162 USgpm, the water level in the Bunker Development well (which had been idle for a week previous to the testing) dropped 7 feet. From this drawdown figure, the storage coefficient has been calculated as 2×10^{-5} (see Calculations, Appendix C).

WELL EFFICIENCY

The efficiency of the pumped observation well has been estimated by computing the ratio of the theoretical drawdown for a 100% efficient well (see Calculations, Appendix C) to the actual drawdown measured in the well. A well efficiency of 90% was calculated; indicating a very efficient well.

HYDROCHEMISTRY

The well was sampled for laboratory analysis during the start of the 25-hour pumping test and just before the end of the test. The results of the laboratory analyses are found in Appendix D.

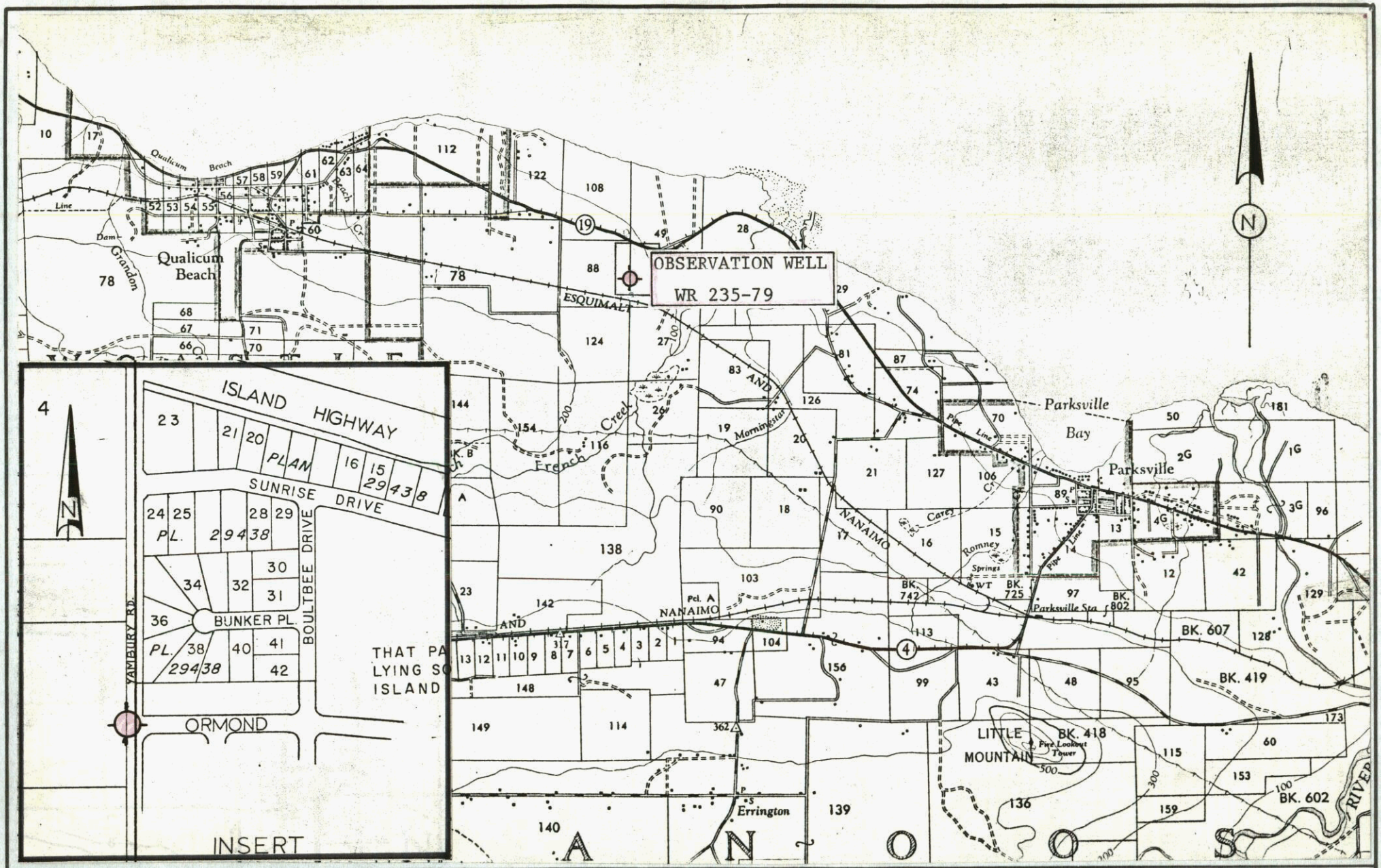
Marc Zubel.

M. Zubel
Geological Engineer
Groundwater Section
Water Investigations Branch

REFERENCES

Cooper, H.H. Jr., & Jacob, C.E. 1946. A generalized Graphical Method of Evaluating Formation Constants and Summarizing Well Field History. Trans Am. Geophys. Union, Vol. 27 (4), August.

LIST OF FIGURES



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TO ACCOMPANY REPORT ON
QUALICUM BEACH OBSERVATION WELL WR 235-79 CONTRACT 65

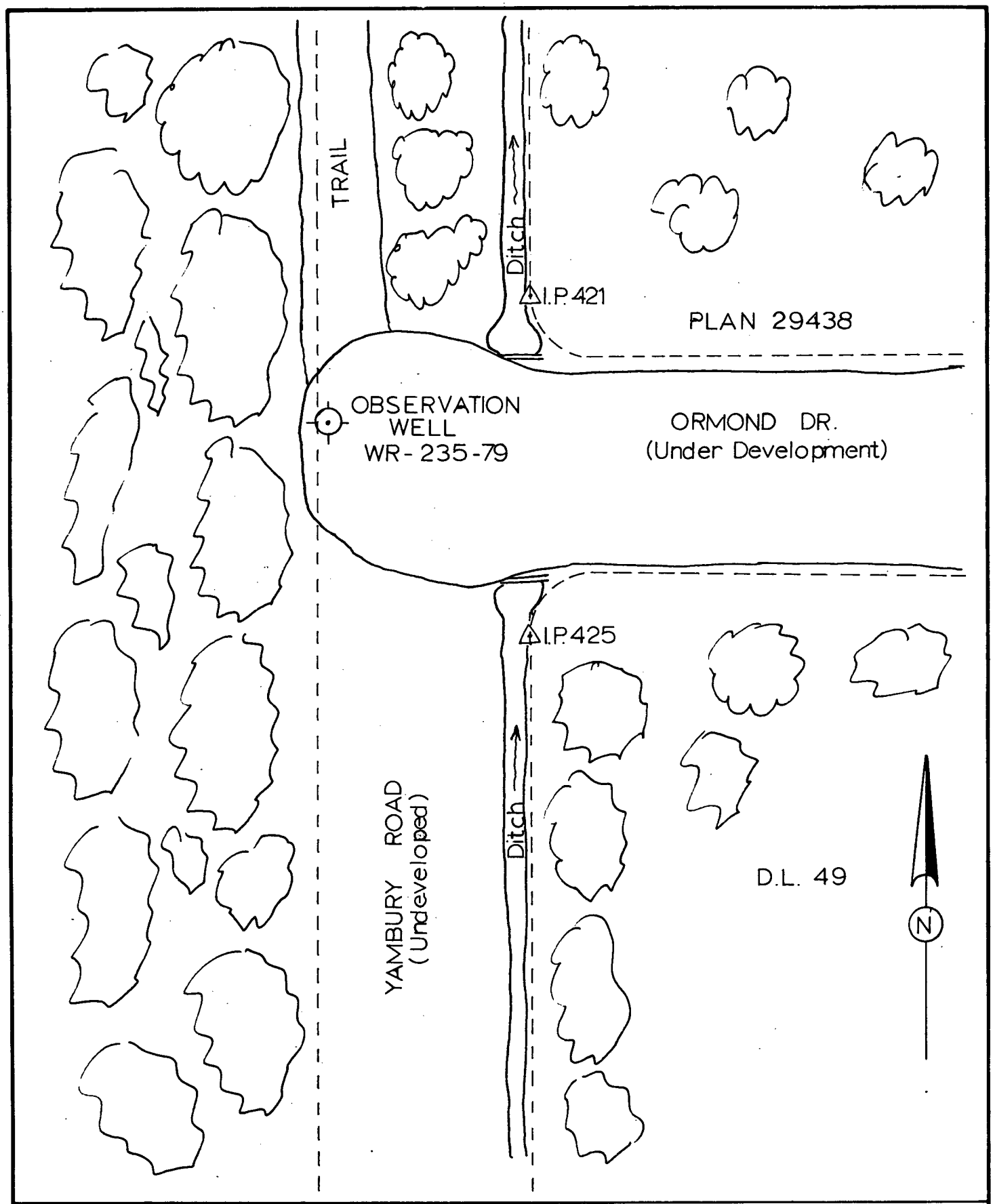
SCALE: VERT. N/A
HOR. 1"=5000'

DATE
MAY, 1979

M. Zubel ENGINEER

FILE No. 92 F/8 DWG. No. FIG. 1

bcil 6661 wrs



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CONTRACT 65

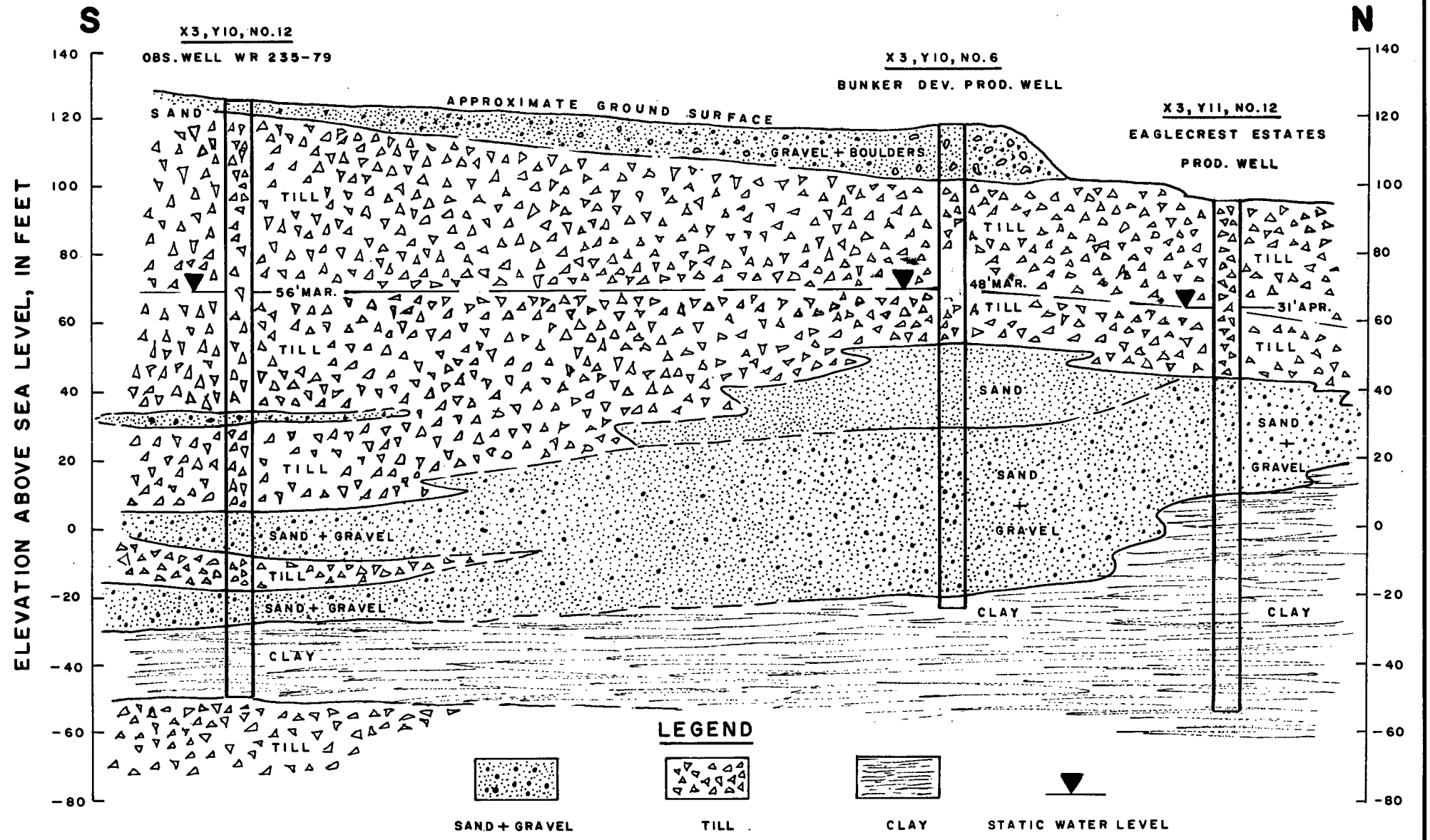
SCALE: VERT. N/A
HOR. 1" = 40'

DATE
MAY, 1979

M. Zubel ENGINEER

FILE No. 92 F/8 DWG. No. FIG. 2

bcil 6660 wrs



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CONTRACT 65

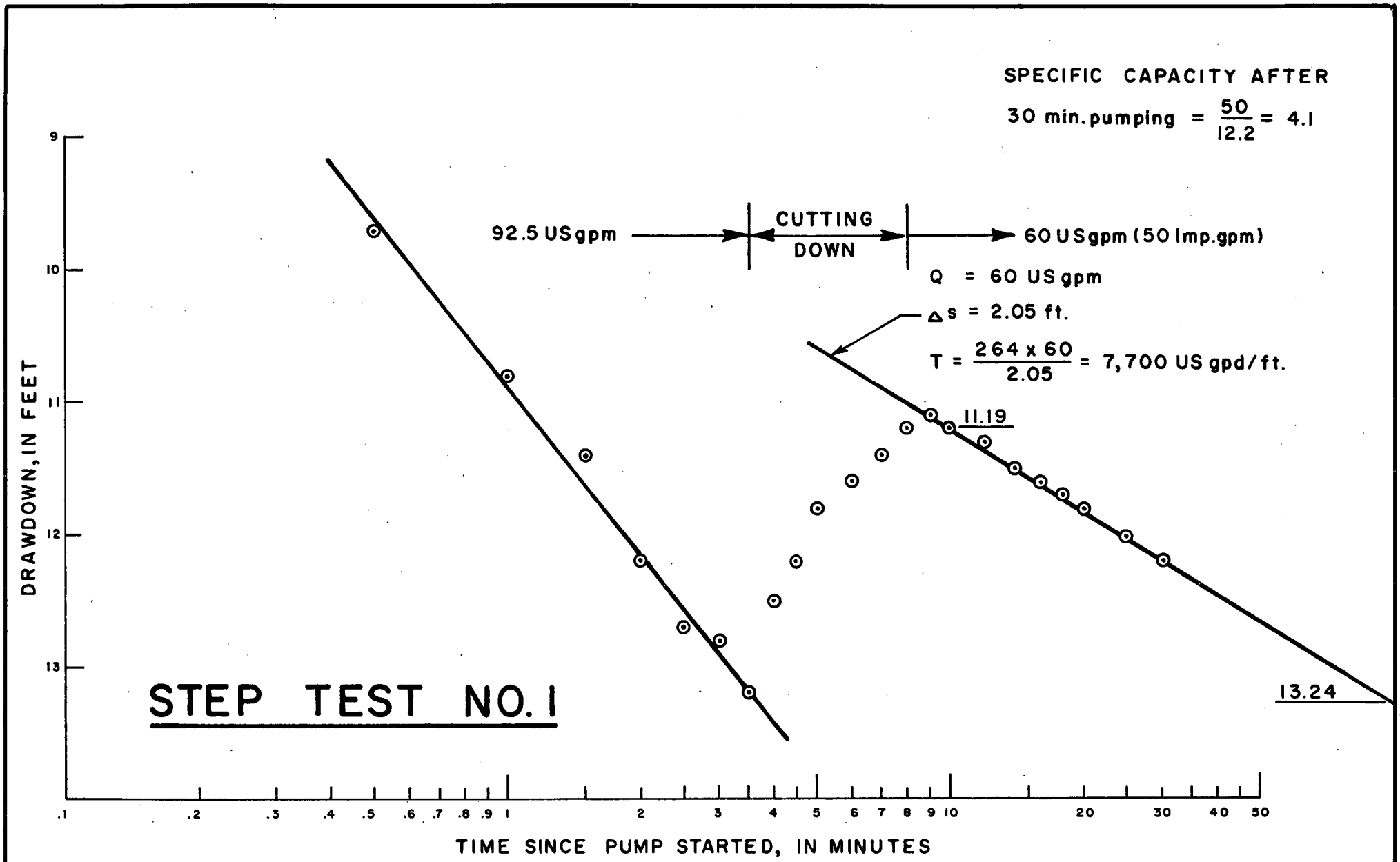
SCALE: VERT. 1" = 40'
HOR. 1" = 250'

DATE: MAY 1979

M. ZUBEL ENGINEER

FILE No. N.T.S. 92 F/8 DWG. No. FIG. 3

bcil 6661 wrs



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CONTRACT 65

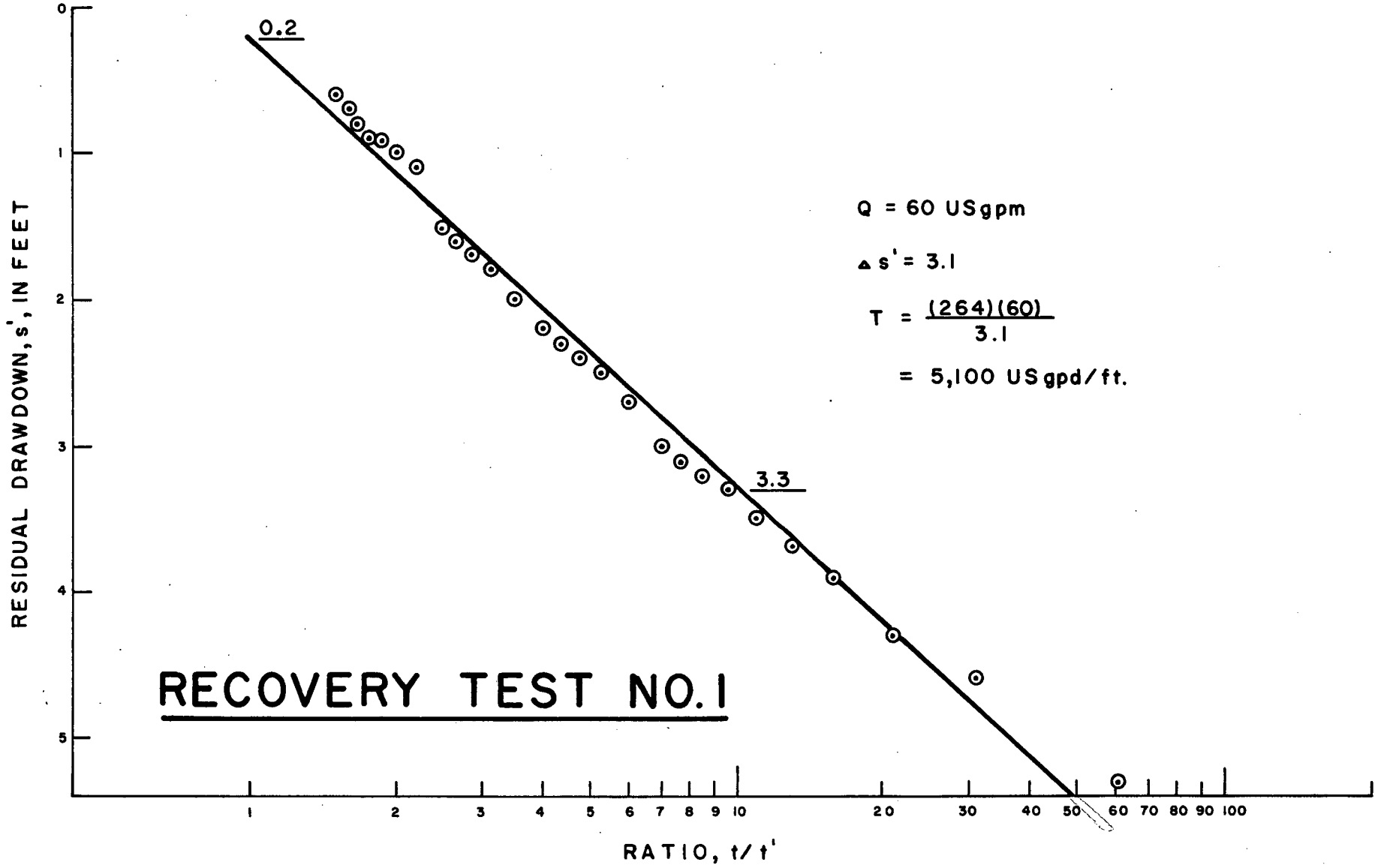
SCALE: VERT. 1" = 1'
HOR. LOG SCALE

DATE
APRIL 1979

M. ZUBEL ENGINEER

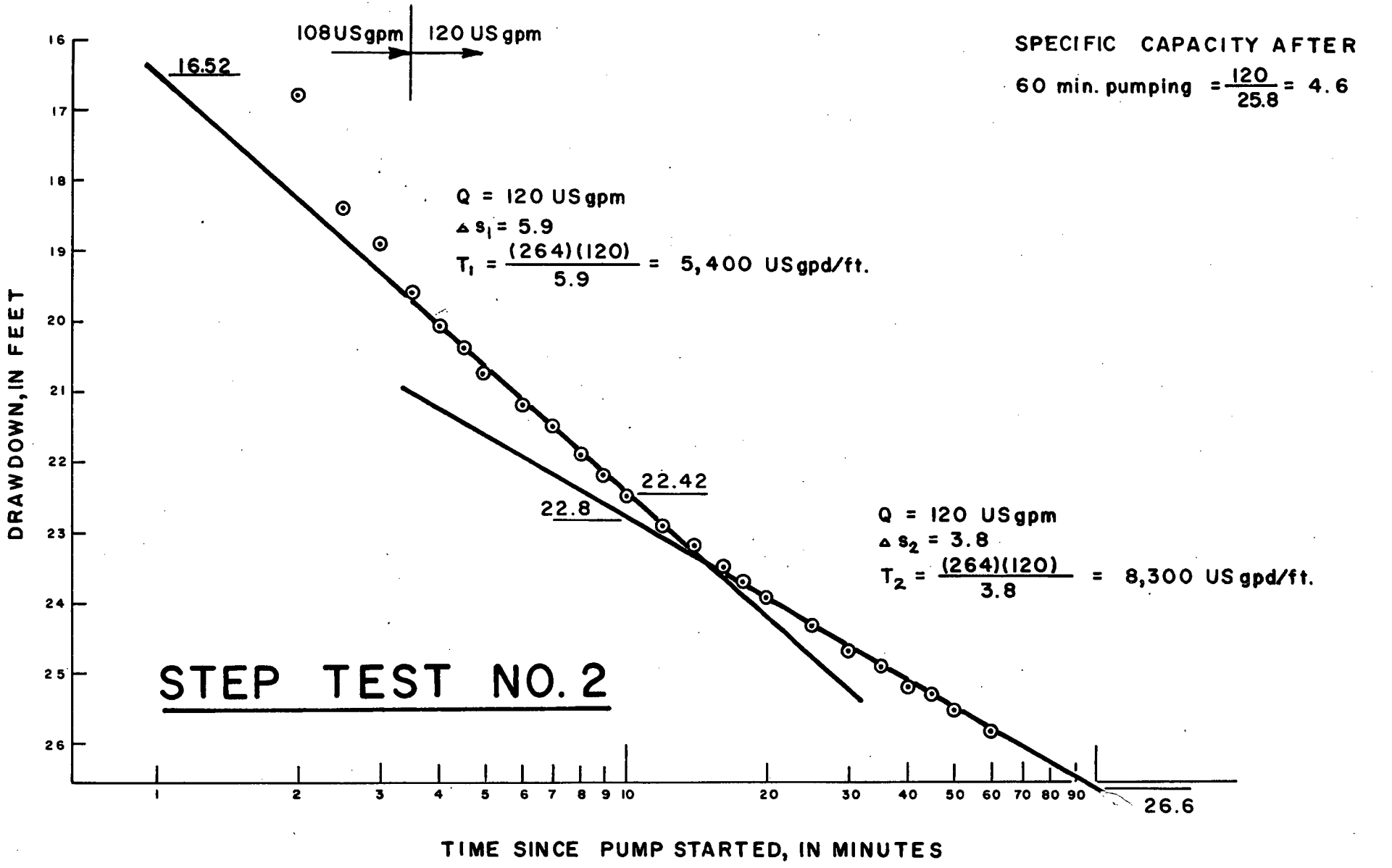
FILE No. N.T.S. 92 F/8 DWG. No. FIG. 4

bcil 6661 wrs



BRITISH COLUMBIA MINISTRY OF THE ENVIRONMENT ENVIRONMENTAL AND ENGINEERING SERVICES WATER INVESTIGATIONS BRANCH	TO ACCOMPANY REPORT ON QUALICUM BEACH OBSERVATION WELL WR 235–79 CONTRACT 65	SCALE: VERT. 1" = 1' HOR. LOG SCALE DATE APRIL 1979 M. ZUBEL ENGINEER FILE No. N.T.S. 92F/8 DWG. No. FIG. 5

bcil 6314-wrs



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OBSERVATION WELL WR 235-79
CONTRACT 65

SCALE: VERT. 1"= 2'
HOR. LOG SCALE

DATE
APRIL 1979

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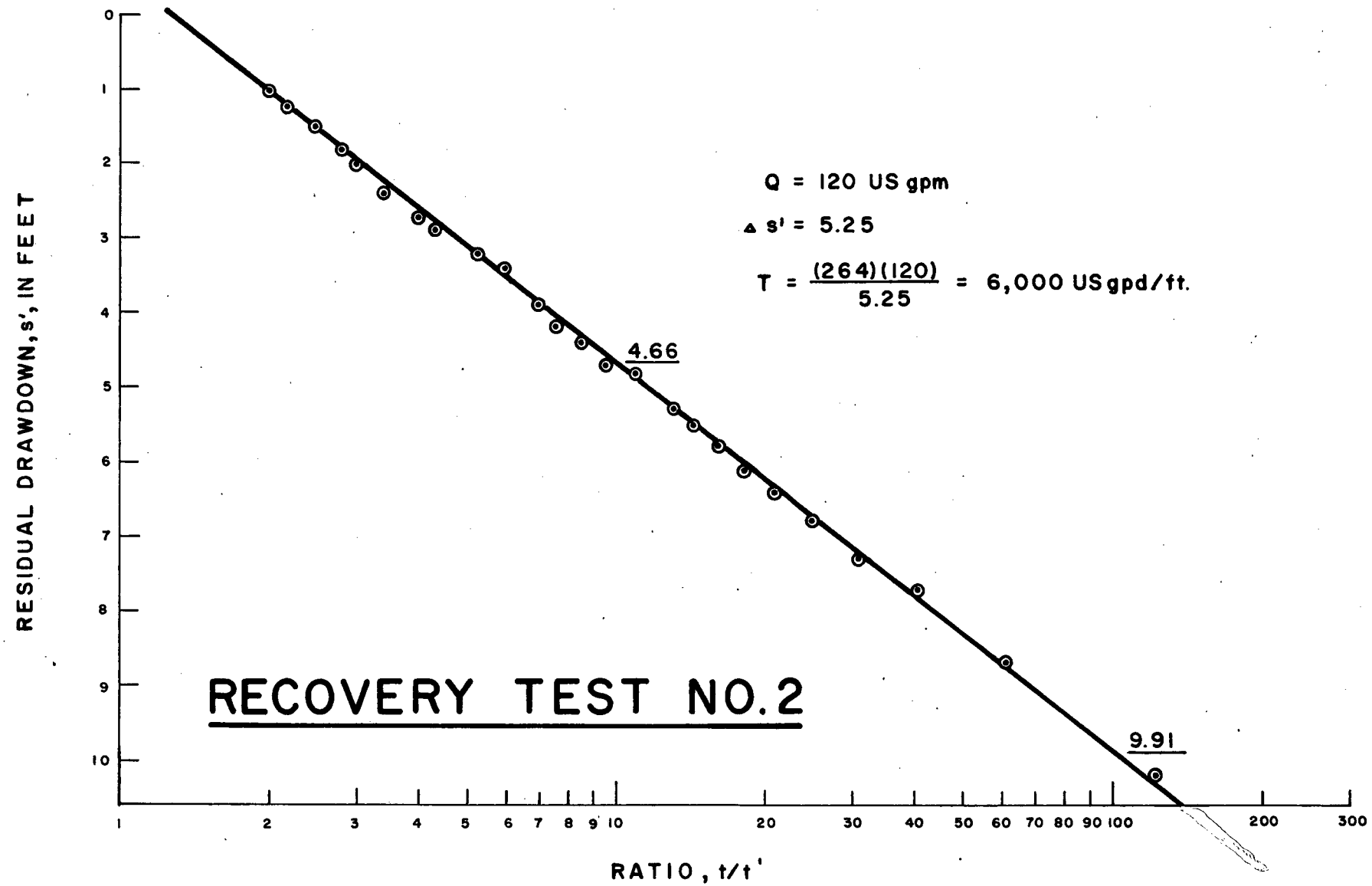
FILE No. N.T.S. 92 F/8 DWG. No. FIG. 6

bcil 6661 wrs



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CONTRACT 65

SCALE: VERT. 1" = 2'
HOR. LOG SCALE

DATE
MAY 1979

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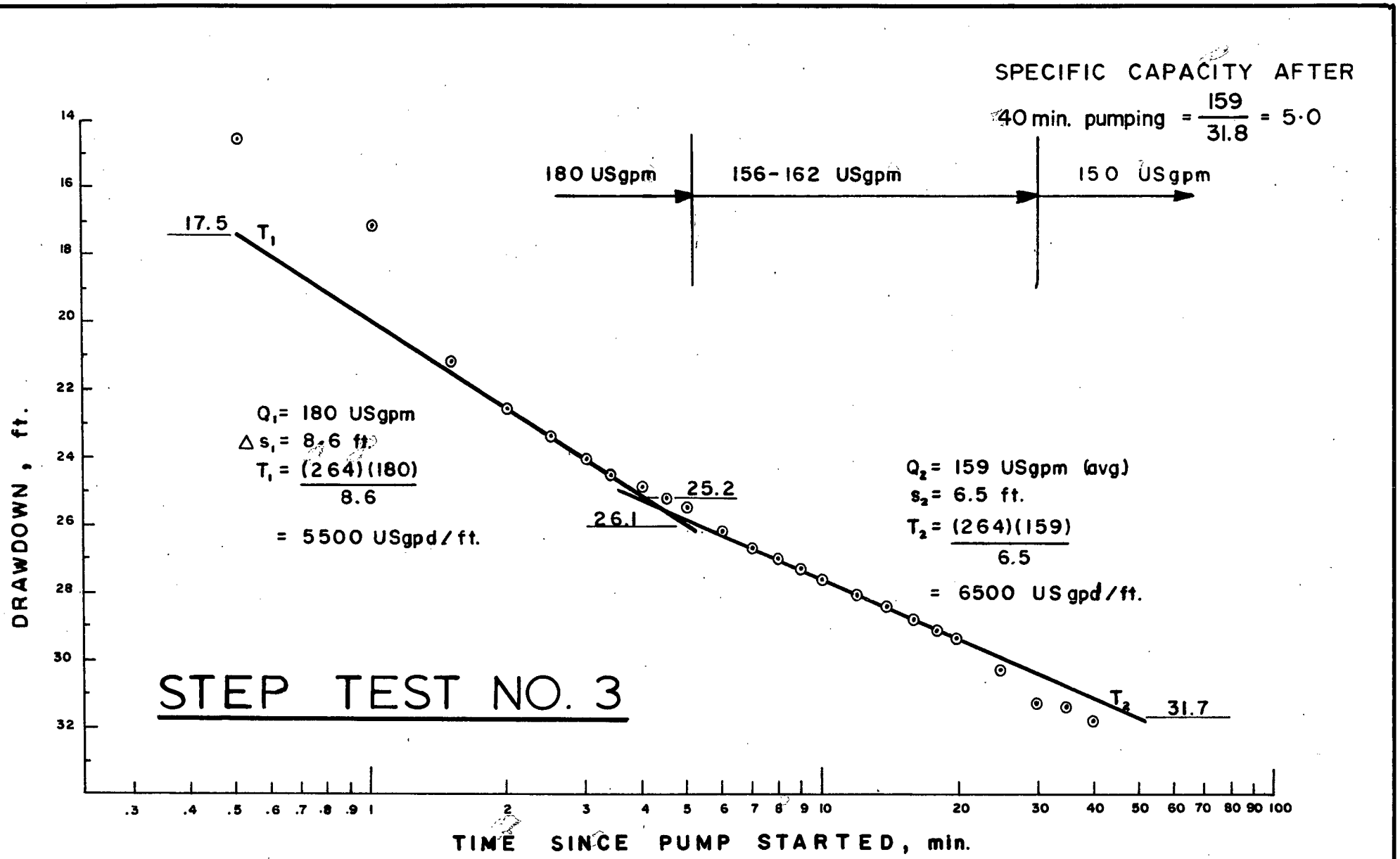
FILE No. N.T.S. 92F/8 DWG. No. FIG. 7

bcil 6661 wrs



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CONTRACT 65

SCALE: VERT. 1"= 4'
HOR. LOG SCALE

DATE
MAY, 1979

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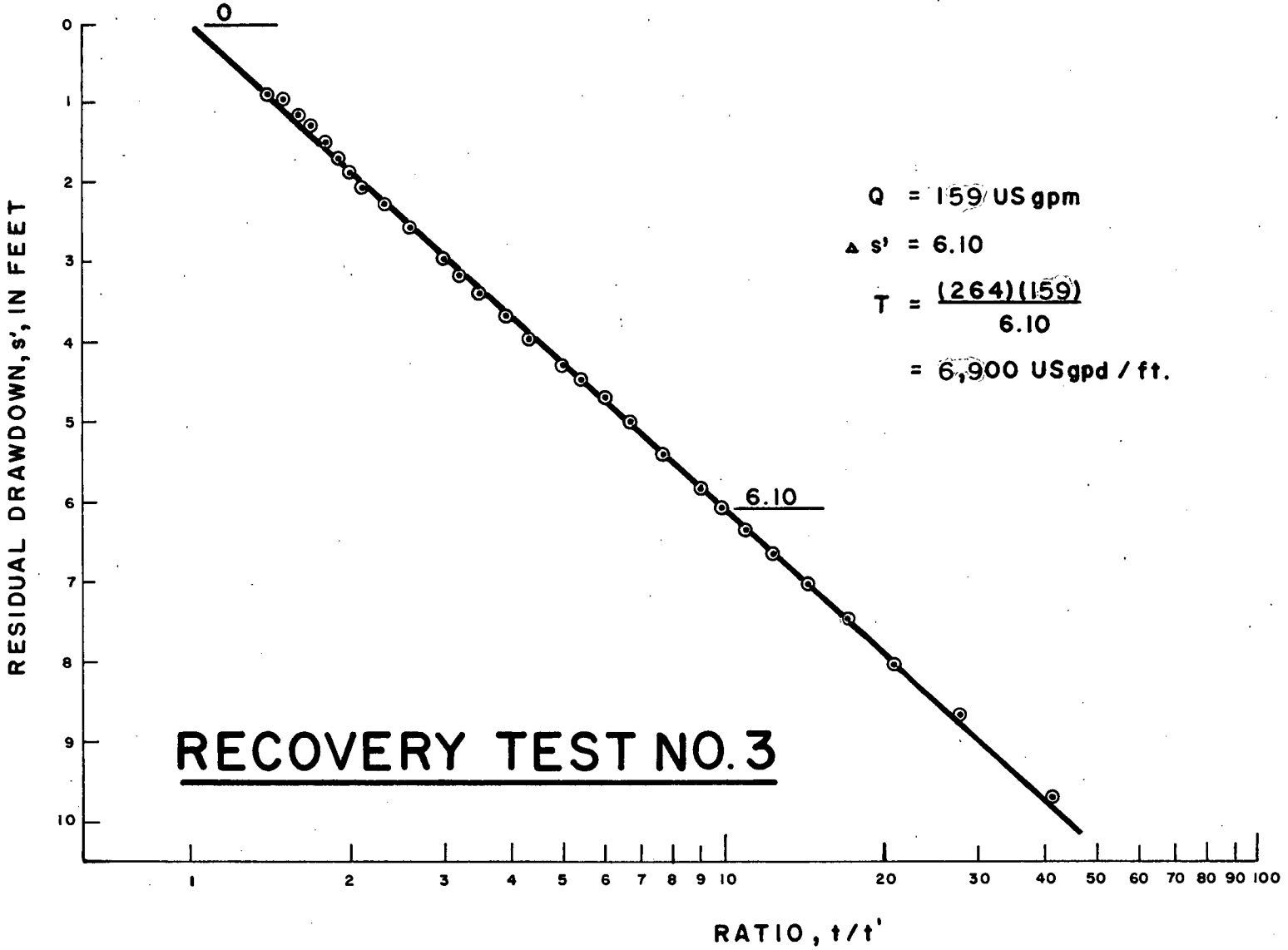
FILE No. 92 F/8 DWG. No. FIG. 8

bcil 6661 wrs



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SCALE: VERT. 1" = 2'
HOR. LOG SCALE

DATE
MAY 1979

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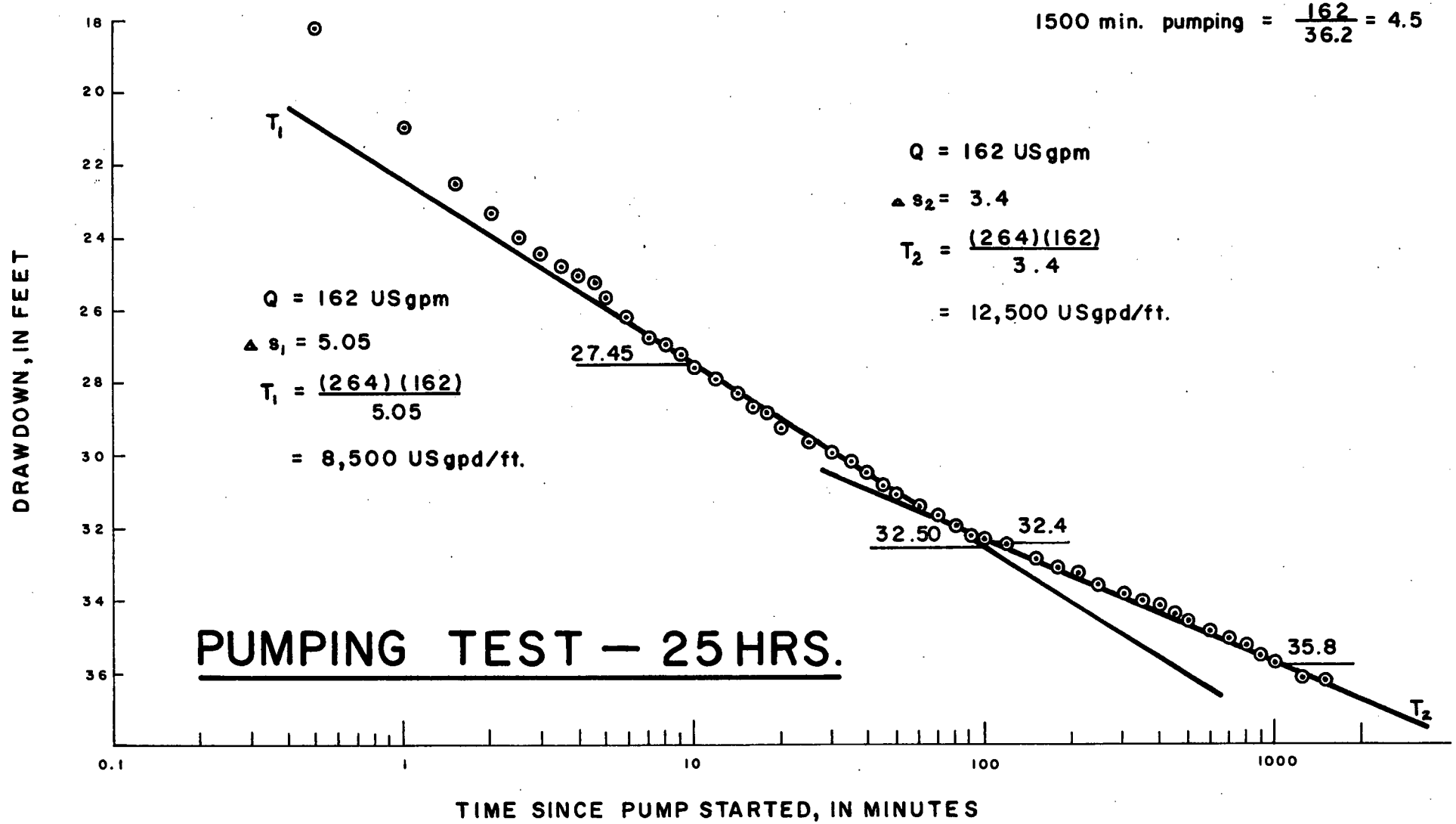
FILE No. N.T.S. 92 F/8 DWG. No. FIG. 9

bcil 6661 wrs

SPECIFIC CAPACITY AFTER
1500 min. pumping = $\frac{162}{36.2}$ = 4.5



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OBSERVATION WELL WR 235-79
CONTRACT 65

SCALE: VERT. 1" = 4'
HOR. LOG SCALE

DATE
MAY 1979

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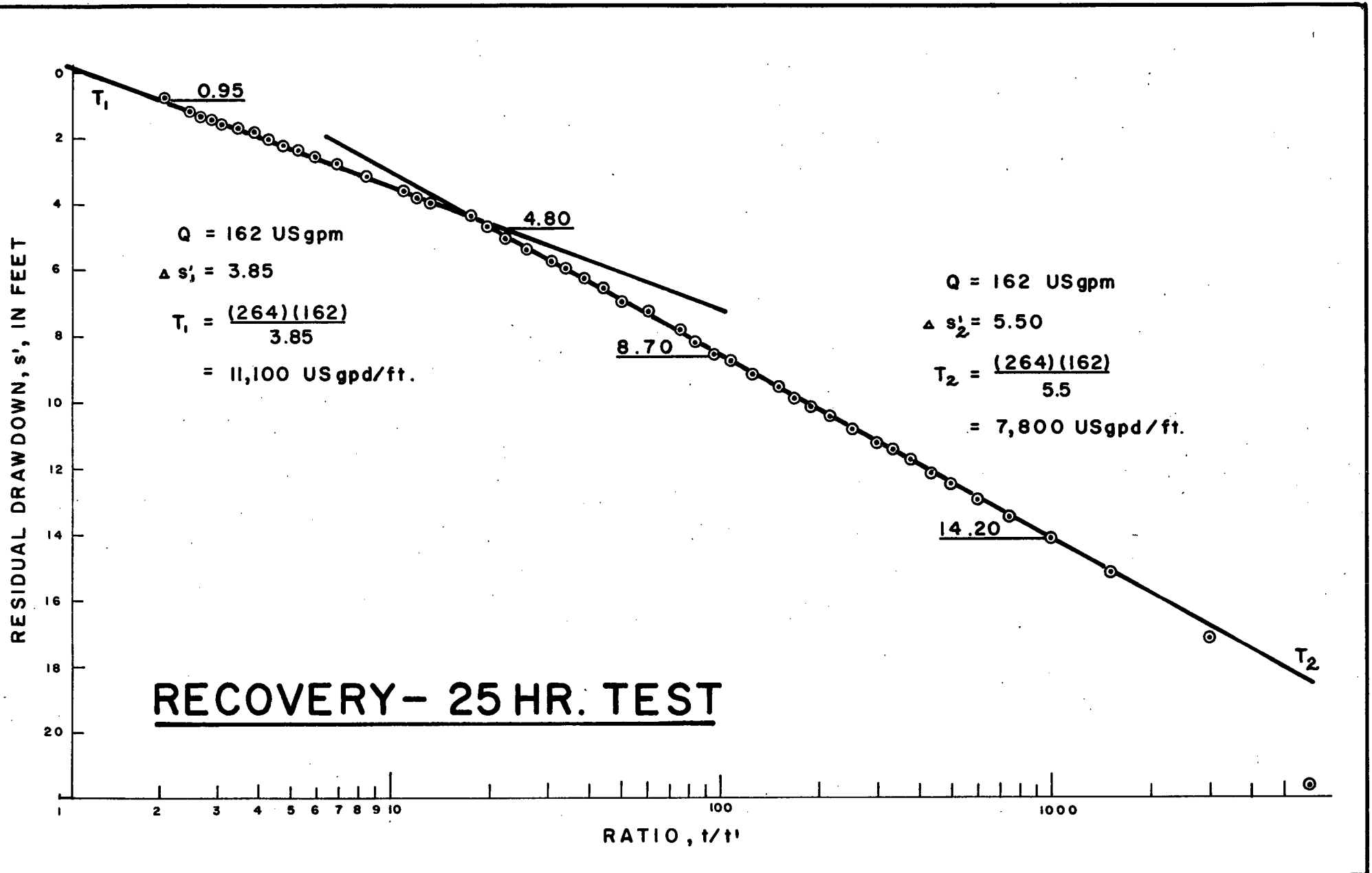
FILE No. N.T.S. 92 F/8 DWG. No. FIG. 10

bcil 6661 wrs



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TO ACCOMPANY REPORT ON
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OBSERVATION WELL WR 235-79
CONTRACT 65

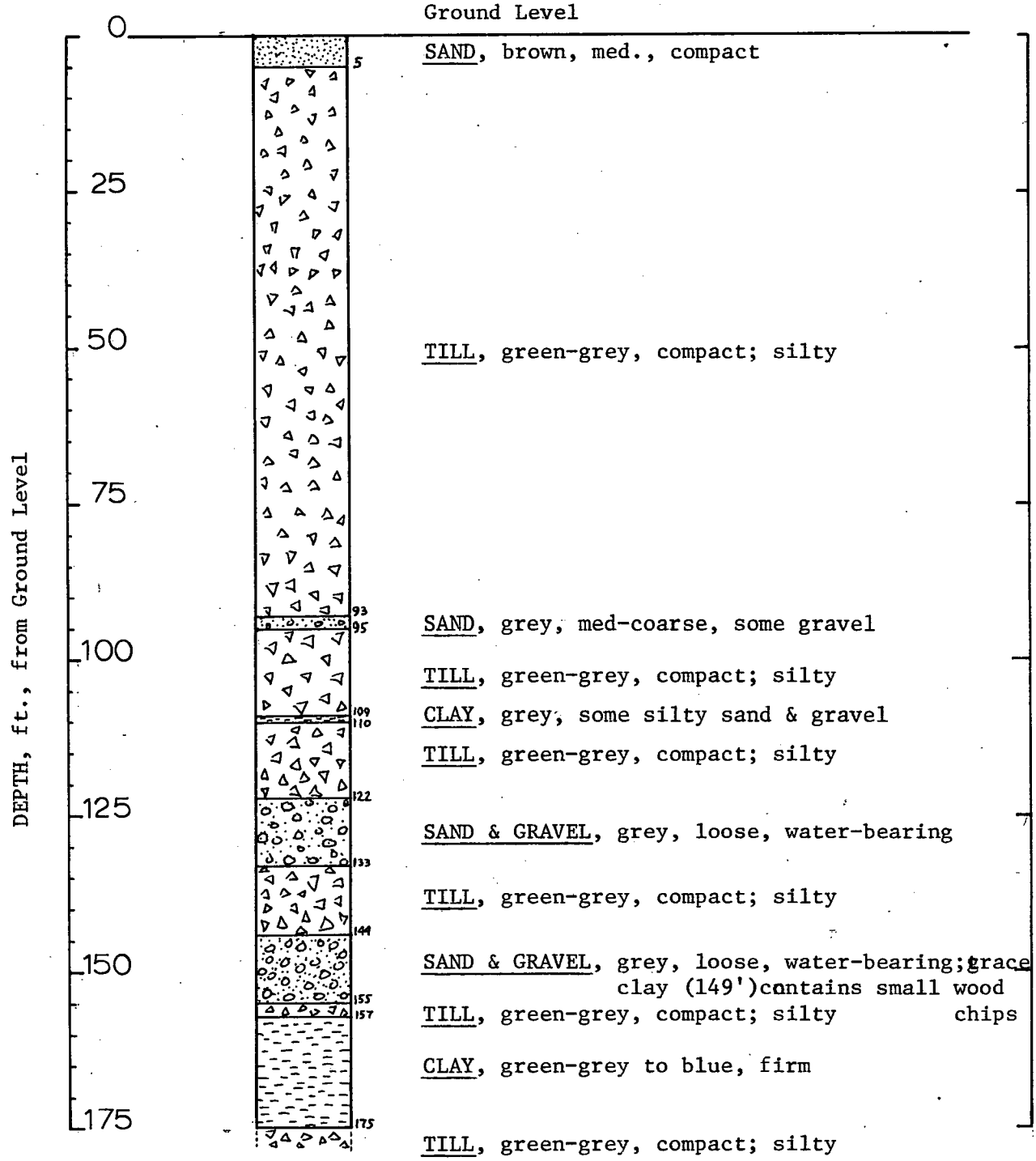
SCALE: VERT. 1" = 4'
HOR. LOG SCALE
DATE MAY 1979
M. ZUBEL ENGINEER
FILE No. N.T.S. 92 F/8 DWG. No. FIG. 11

bcil 6661 wrs

APPENDIX A

1. Lithological Log
2. Driller's Log
3. Grain Size Analysis
4. Well Screen Design
   & Well Head Completion Details

LITHOLOGICAL LOG



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TO ACCOMPANY REPORT ON
QUALICUM BEACH
OBSERVATION WELL WR 235 – 79
CONTRACT 65

SCALE: VERT. 1" = 25'
HOR. N/A

DATE
MAY, 1979

M. ZUBEL ENGINEER

FILE No. 92 F/8 DWG. No. APPENDIX A

bcil 6660 wrs

WELL LOG CONSTRUCTION RECORD

OWNER GOV. OF B.C. WATER INVESTIGATION BRANCH.
Address PARLIAMENT BUILDINGS, VICTORIA B.C.
Well Location QUALICUM B.C.
Date Started ~~MAR.~~ FEB 27, 1979 Date Completed MAR. 10, 1979

ISLAND WELL DRILLING LTD,
GROUHEL RD.,
R.R. #1, LADYSMITH B.C.
PH. 245-2078

Drilling Method CABLE TOOL
Driller W. J. WILLIAMS Helper B. WILLIAMS
File — Folio
Signed By W. J. Williams

LOG OF FORMATIONS

Depth		Descriptions
0'	to 2'	PACKED, BROWN SAND.
	to	
2'	to 5'	LIGHT, BROWN, STONEY
	to	CLAY.
5'	to 93'	GREY, GRAVELY CLAY.
	to	
93'	to 93-6"	LEASE WATER-BEARING
	to	SAND & GRAVEL S.L. 53'
93-6"	to 101'	SAND & GRAVEL CEMENTED
	to	IN CLAY
101'	to 103'	LEASE OF WATER-BEARING
	to	CLAY SAND & GRAVEL
103'	to 123'	SAND & GRAVEL CEMENTED
	to	IN CLAY.
123'	to 134'	LOOSE, W. B. COARSE
	to	SAND & GRAVEL S.L. 56
134'	to 148'	VERY GRAVELY CLAY
148'	to 154'-6"	FAIRLY LOOSE, VERY
	to	COARSE W.B. SAND & GRAVEL
154-6"	to 157'	VERY GRAVELY CLAY.
157'	to 175'	BLUE CLAY
	to 178'	GRAVELY CLAY.
	to	
	to	
	to	
	to	
	to	

GENERAL REMARKS

CASING RECORD

Dia. ~~6~~ 6 ins. Wt. 16 #/ft. From 0 to 146'-6"
Dia. 8 ins. Wt. 24 #/ft. From 0 to 10'
Dia. ___ ins. Wt. ___ #/ft. From ___ to ___
Shoe ✓ Welded ✓ Cemented ✓
1'-6" STICK-UP ON 6" CASING.

SCREEN RECORD TOTAL LEN. 147'-6"

Make JOHNSON Material STAINLESS
Slot opening Top #30 Bot #50 Length 9'-0"
Top 144 ft. Bottom 154-8" ft.
Fittings Top K-PACKER Fittings Bottom BAIL
Gravel Pack — Natural ✓
Development Method SURGE BLOCK.
SCREEN WITH RISER 10'-8"

ROCK WELL DATA

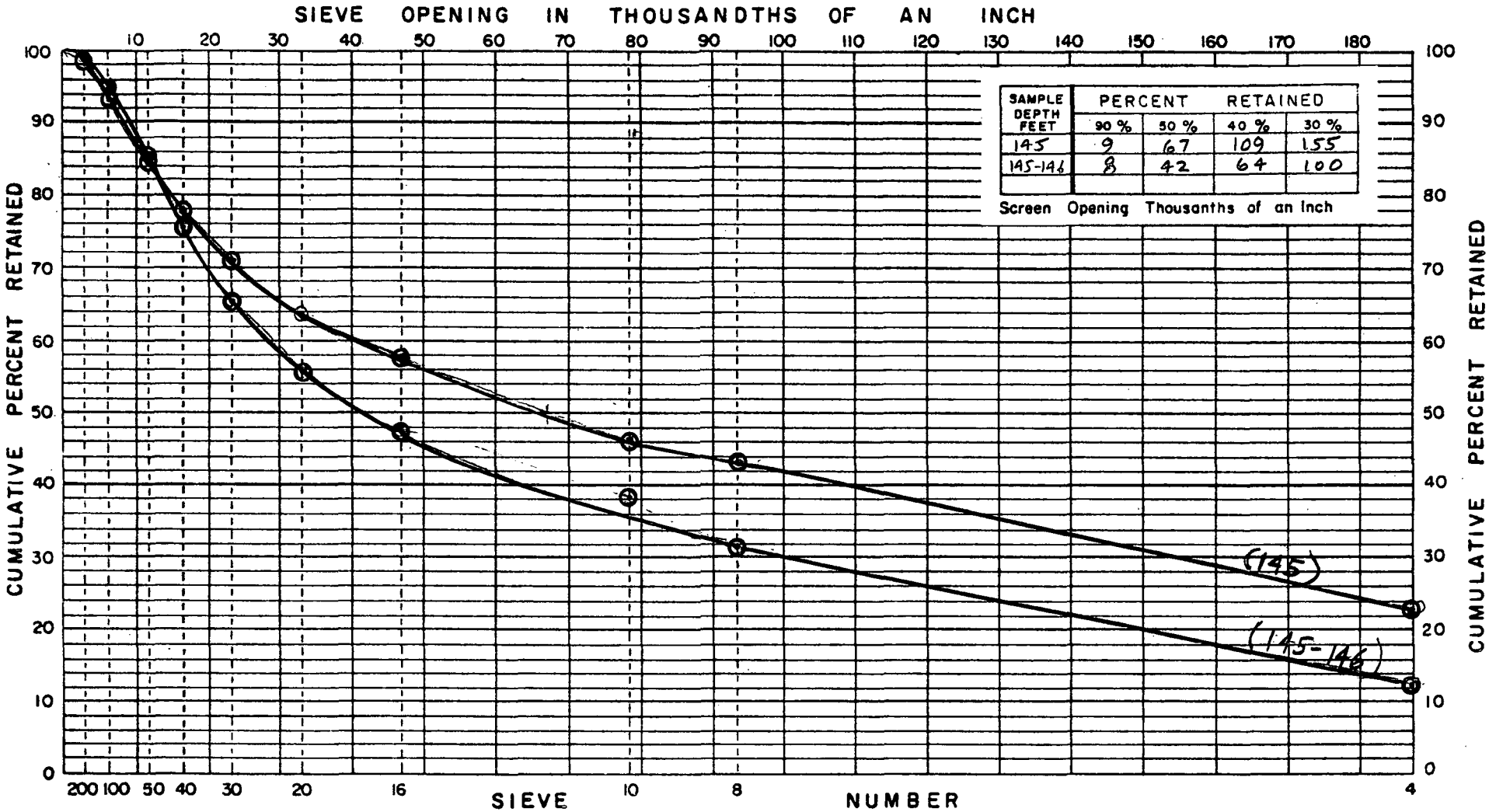
Open Bore Hole ___ Dia. ___ ins.
From ___ ft. to ___ ft.

PRODUCTION DATA

Static Level 56 ft.
Measured from GROUND LEVEL
Pumping Level 94 ft. at 135 GPM
___ ft. at ___ GPM
Bail Test ___ ft. at ___ GPH
___ ft. at ___ GPH
Recommended Pump Setting ___ ft.
Recommended Max. Pump Output ___ GPM GPH
Duration of Test 25 Hrs.

PUMP DATA

Make ___ Type ___
Model ___ Serial No. ___
Size ___ HP ___ Drop Pipe ___ ins.
GPM ___ Head ___ ft. ___ RPM
Motor ___ Volts ___ PH ___
Well Seal ___
Water Analysis — Hardness ___ PPM
PH ___ Iron ___ PPM



SAMPLE DEPTH FEET	PERCENT RETAINED			
	90 %	50 %	40 %	30 %
145	9	67	109	155
145-146	8	42	64	100

Screen Opening Thousanths of an Inch

TOTAL WT. 673.2

SAMPLE DEPTH 145 FEET			
OPENING	RET. ON	WT. RET.	CUM. % RET.
	4	152.8	22.8
	8	291.2	43.4
	10	309.5	46.2
	16	387.8	57.8
	20	427.3	63.7
	30	475.4	70.9
	40	522.2	77.9
	50	565.9	84.4
	100	627.3	93.6
	200	660.5	98.5
	PAN	670.5	

Percent of sample not sieved 1/2" or over ≈ 50 %

TOTAL WT. 1266.3

SAMPLE DEPTH 145-146 FEET			
OPENING	RET. ON	WT. RET.	CUM. % RET.
	4	154.9	12.3
	8	396.4	31.5
	10	483.1	38.3
	16	597.2	47.4
	20	702.4	55.7
	30	823.1	65.3
	40	950.7	75.4
	50	1078.3	85.6
	100	1197.1	95.0
	200	1246.9	98.0
	PAN	1260.1	

Percent of sample not sieved 1/2" or over ≈ 50 %

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WATER RESOURCES SERVICE
WATER INVESTIGATIONS BRANCH
GROUNDWATER DIVISION

SIEVE ANALYSIS

PROJECT: CONTRACT #65

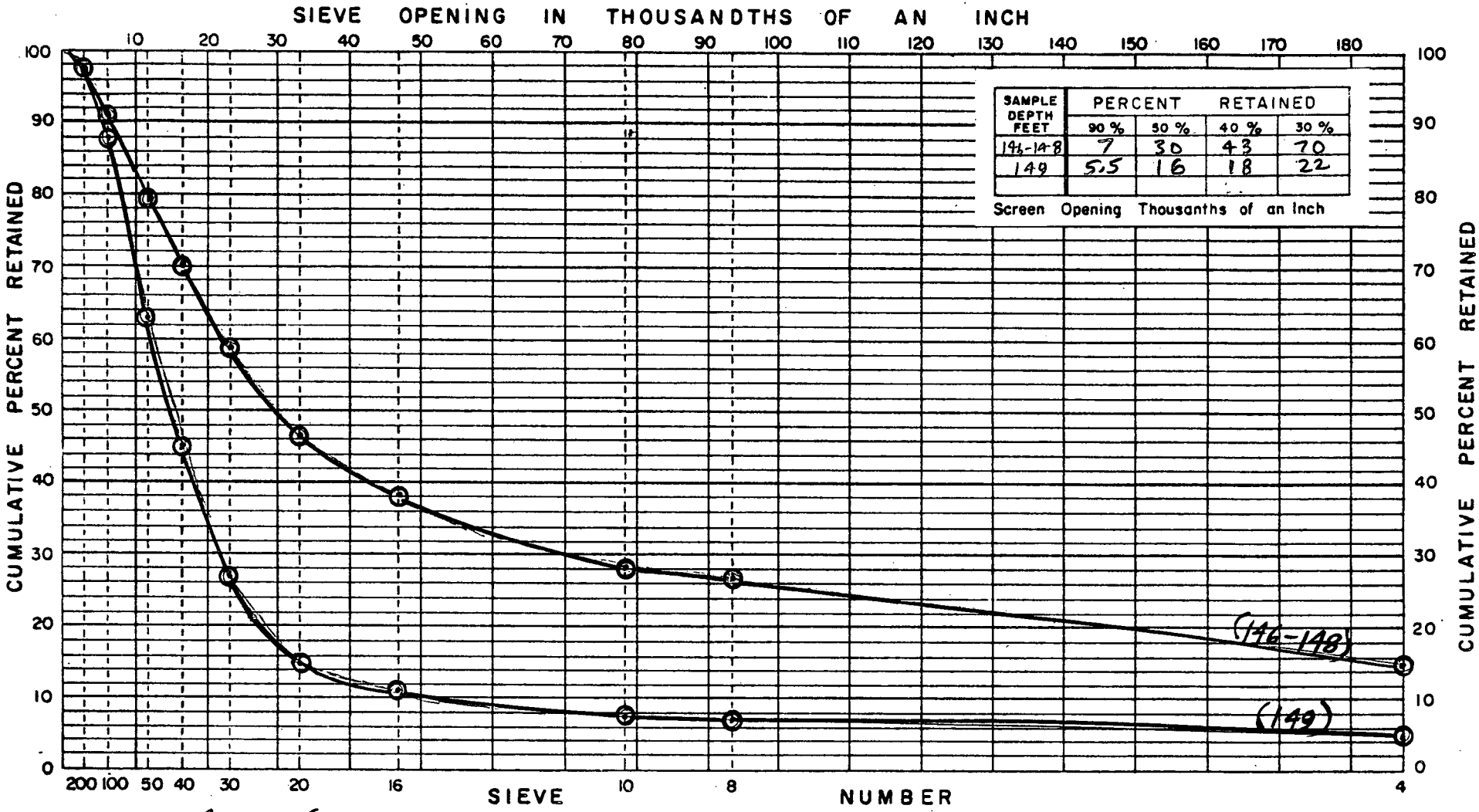
LOCATION: QUALICUM BEACH

WELL No. WR. 235-79

SAMPLED BY: M. ZUBEL

SIEVE ANALYSIS BY: F. CHWOTKA

DATE: MARCH 6, 1979



Total wt. 1016.9

SAMPLE DEPTH 146-148 FEET			
OPENING	RET. ON	WT. RET.	CUM. % RET.
	4	153.0	15.0
	8	270.0	26.5
	10	286.3	28.1
	16	389.3	38.2
	20	472.3	46.3
	30	597.2	58.6
	40	714.2	70.1
	50	811.6	79.6
	100	930.0	91.2
	200	996.7	97.8
	PAN	1019.4	

Percent of sample not sieved 1/2" or over

≈ 50 %

TOTAL WT. 474.1

SAMPLE DEPTH 149 FEET			
OPENING	RET. ON	WT. RET.	CUM. % RET.
	4	21.9	4.6
	8	33.6	7.1
	10	35.5	7.5
	16	52.3	11.1
	20	71.8	15.2
	30	125.7	26.6
	40	211.4	44.8
	50	296.8	62.9
	100	415.4	88.0
	200	460.2	97.5
	PAN	472.0	

Percent of sample not sieved 1/2" or over

≈ 50 %

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GROUNDWATER DIVISION

SIEVE ANALYSIS

PROJECT: CONTRACT # 65

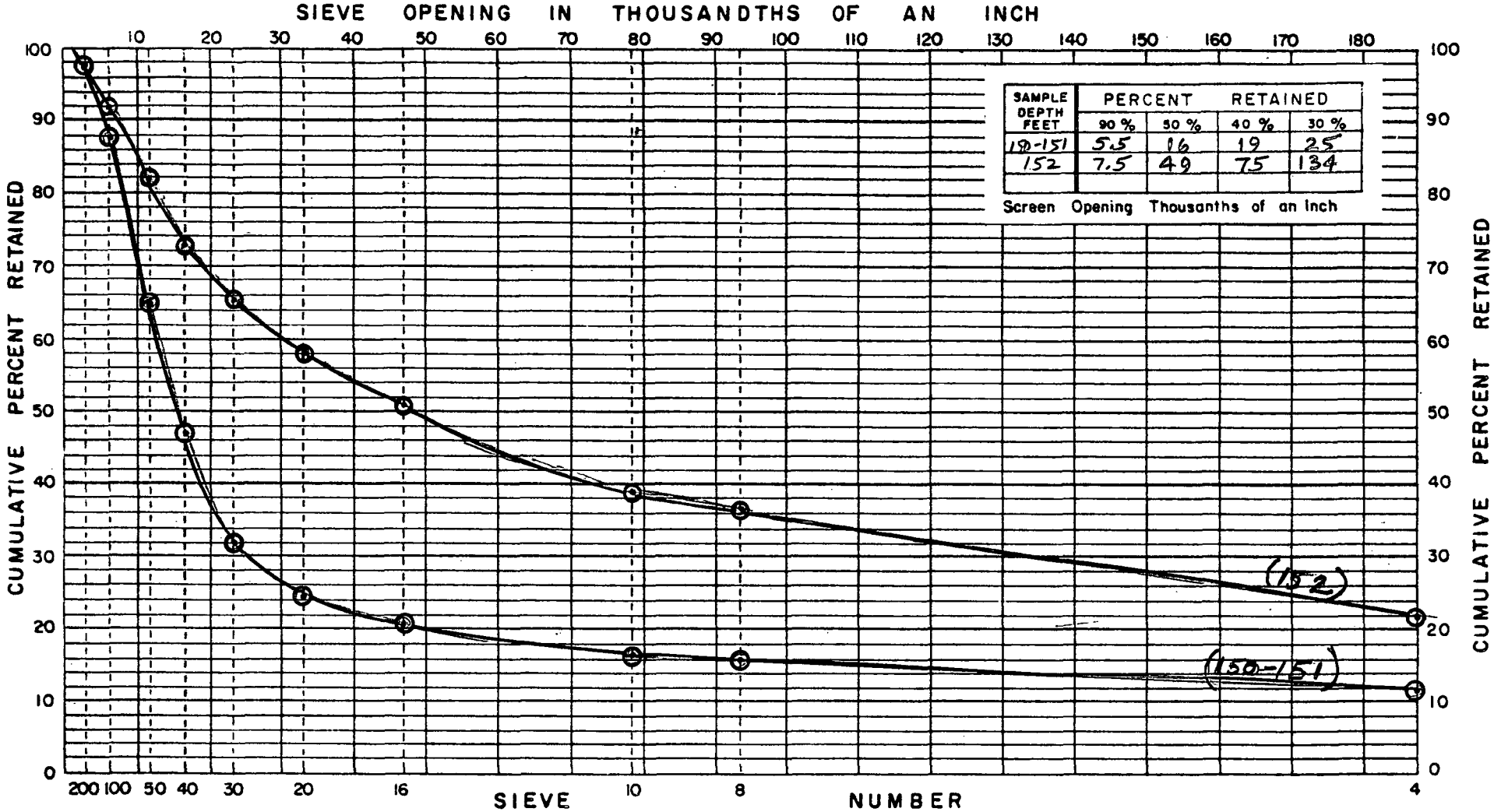
LOCATION: QUALICUM BEACH

WELL No. WR.235-79

SAMPLED BY: M. ZUBEL

SIEVE ANALYSIS BY: F. CHWOJKA

DATE: MARCH 6, 1979



SAMPLE DEPTH FEET	PERCENT RETAINED			
	90 %	50 %	40 %	30 %
150-151	5.5	16	19	25
152	7.5	49	75	134

Screen Opening Thousanths of an Inch

TOTAL WT. 1137.4

SAMPLE DEPTH 150-151 FEET			
OPENING	RET. ON	WT. RET.	CUM. % RET.
	4	133.7	11.8
	8	181.8	16.0
	10	188.2	16.6
	16	234.5	20.7
	20	277.4	24.5
	30	365.4	32.2
	40	532.2	46.9
	50	738.3	65.1
	100	994.0	87.7
	200	1105.0	97.5
	PAN	1133.9	

Percent of sample not sieved 1/2" or over ≈ 50 %

TOTAL WT. 444.7

SAMPLE DEPTH 152 FEET			
OPENING	RET. ON	WT. RET.	CUM. % RET.
	4	97.0	21.9
	8	162.6	36.7
	10	172.6	39.0
	16	225.3	50.8
	20	257.0	58.0
	30	289.8	65.4
	40	321.9	72.6
	50	362.9	81.9
	100	407.6	92.0
	200	432.0	97.5
	PAN	443.1	

Percent of sample not sieved 1/2" or over ≈ 50 %

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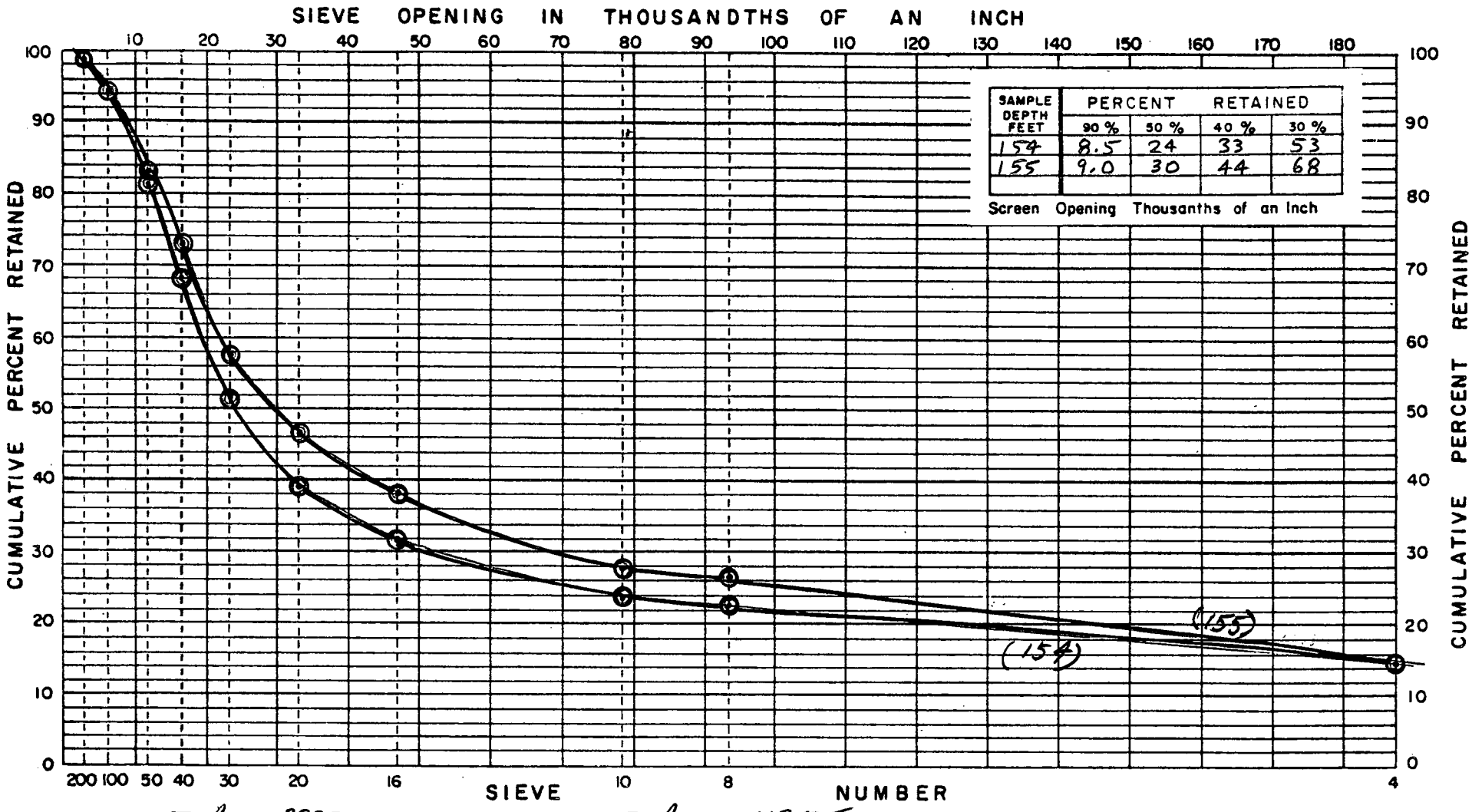
WATER RESOURCES SERVICE
WATER INVESTIGATIONS BRANCH
GROUNDWATER DIVISION

SIEVE ANALYSIS

PROJECT: CONTRACT #65
LOCATION: QUALICUM BEACH
WELL No. WR. 235-79
SAMPLED BY: M. ZUBEL
SIEVE ANALYSIS BY: F. CHWOJKA
DATE: MARCH 6, 1979



SAMPLE DEPTH FEET	PERCENT RETAINED			
	90 %	50 %	40 %	30 %
154	8.5	24	33	53
155	9.0	30	44	68

Screen Opening Thousanths of an Inch

TOTAL WT. 887.7

SAMPLE DEPTH 154 FEET			
OPENING	RET. ON	WT. RET.	CUM. % RET.
	4	129.6	14.7
	8	200.6	22.8
	10	210.5	23.9
	16	282.0	32.0
	20	343.9	39.0
	30	455.3	51.7
	40	600.8	68.2
	50	715.8	81.2
	100	831.6	94.4
	200	869.2	98.7
	PAN	881.1	

Percent of sample not sieved 1/2" or over ≈50 %

TOTAL WT. 1135.5

SAMPLE DEPTH 155 FEET			
OPENING	RET. ON	WT. RET.	CUM. % RET.
	4	163.7	14.4
	8	300.5	26.5
	10	313.4	27.7
	16	431.7	38.1
	20	524.8	46.3
	30	650.5	57.4
	40	824.3	72.8
	50	940.4	83.0
	100	1069.0	94.4
	200	1118.1	98.7
	PAN	1133.0	

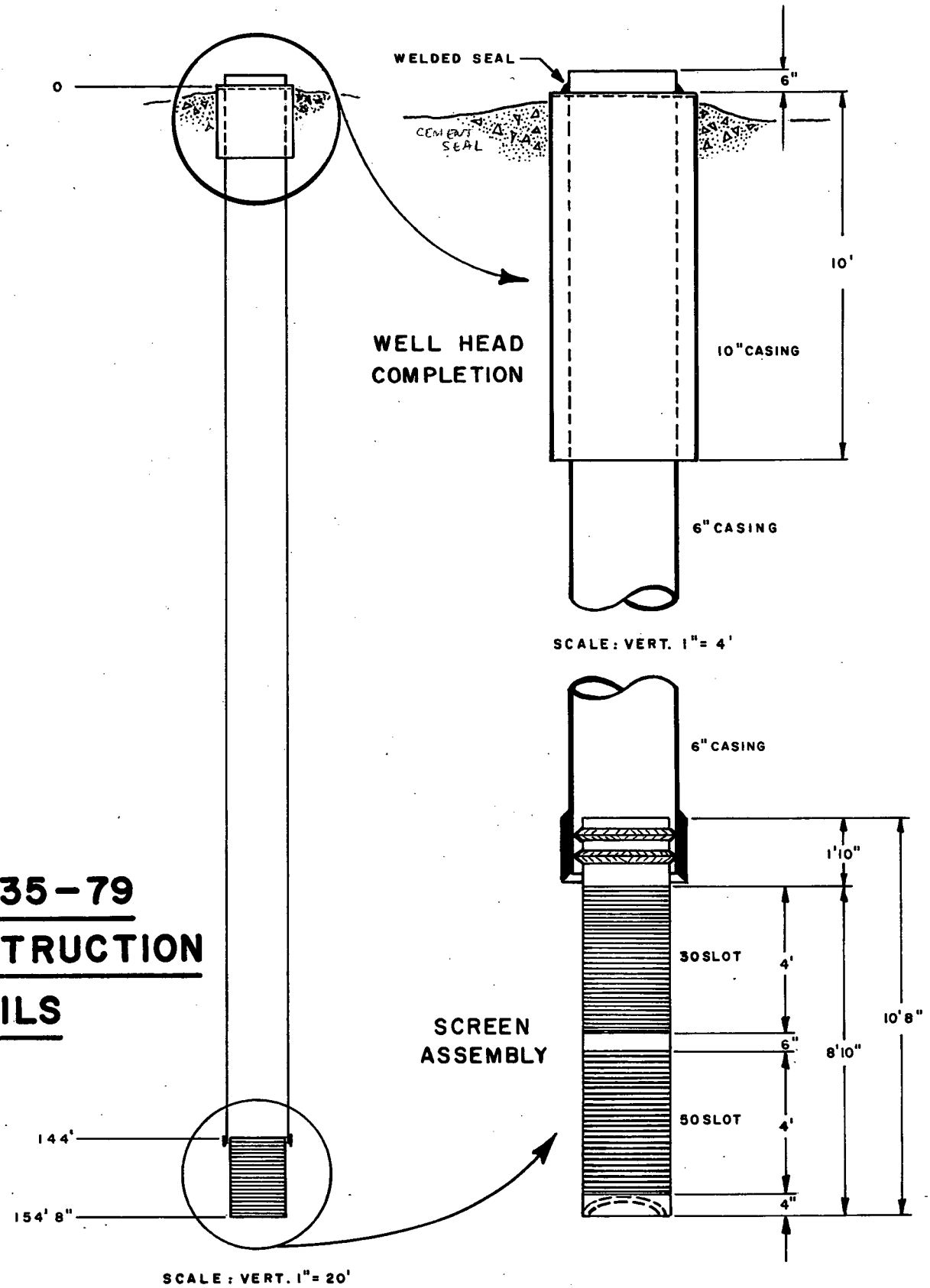
Percent of sample not sieved 1/2" or over ≈50 %

BRITISH COLUMBIA
DEPARTMENT OF LANDS, FORESTS, AND WATER RESOURCES
WATER RESOURCES SERVICE
WATER INVESTIGATIONS BRANCH
GROUNDWATER DIVISION

SIEVE ANALYSIS

PROJECT: CONTRACT #65
LOCATION: QUALICUM BEACH
WELL No. WR.-235-79
SAMPLED BY: M. ZUBEL
SIEVE ANALYSIS BY: F. CHWOJKA
DATE: MARCH 6, 1979

WR 235-79 CONSTRUCTION DETAILS



Province of British Columbia
Ministry of the Environment
ENVIRONMENTAL AND ENGINEERING SERVICE
WATER INVESTIGATIONS BRANCH

TO ACCOMPANY REPORT ON
QUALICUM BEACH
OBSERVATION WELL WR 235-79
CONTRACT 65

SCALE: VERT. AS SHOWN

DATE MAY 1979

M.ZUBEL ENGINEER

FILE No. N.T.S. 92F/8 DWG. No. APPENDIX A

bcil 6660 wrs

APPENDIX B

1. Drawdown Data Step-Test #1
2. Recovery Data Step-Test #1
3. Drawdown Data Step-Test #2
4. Recovery Data Step-Test #2
5. Drawdown Data Step-Test #3
6. Recovery Data Step-Test #3
7. Drawdown Data 25-Hr. Constant Rate
8. Recovery Data 25-Hr. Constant Rate
9. Pumping Test Field Sheets

B.C. Aquifer Testing & Equipment

PH. 479-4732

588 Melba Plc.
VICTORIA, B.C. V8Z 6C5

"Complete Water Well Services"

PUMP TEST DATA

LOCATION STEP TEST 1
DRILLER Island Well Drilling
DEPTH OF WELL 155' 146'-top of sc.
DIA. OF WELL 6"
ENGINEER(if any) Marc Zubel
PUMP USED 20 H.P.

PUMP SETTING 133' top of pump 40.55 m
PUMPING RATE(S) 50 Imp. g.p.m.
TOTAL TIME PUMPED 30 mins.
ORIGINAL STATIC LEVEL 17.41 m
TOTAL GALS. PUMPED n/a
TOTAL DRAWDOWN 3.73 m

TOTAL PRECIPITATION nil

100' of 2" discharge to ditch

DATE	TIME	ELAPSED TIME	WATER LEVEL (m)	G.P.M.	REMARKS
March 12/79	12:00:00	0	17.46		
	:30	.5	20.43		
	1:00	1	20.76		
	:30	1.5	20.95		..water clear
	2:00	2	21.20		..sulpher smell
	:30	2.5	21.35		
	3:00	3	21.38		
	:30	3.5	21.49	77 Imp.	
	4:00	4	21.29		
	:30	4.5	21.19		
	5:00	5	21.08	60 Imp.	
	6:00	6	21.01		
	7:00	7	20.94		
	8:00	8	20.88	50 Imp.	
	9:00	9	20.86		
	10:00	10	20.89		
	12:00	12	20.92		
	14:00	14	20.98		
	16:00	16	21.02		
	18:00	18	21.05		
	20:00	20	21.07	50 Imp.	
	25:00	25	21.14		
	30:00	30	21.19		Pump shut down

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VICTORIA, B.C. V8Z 6C5

"Complete Water Well Services"

RECOVERY DATA

LOCATION Step Test #1 TOTAL PUMPING TIME 30 min.

TOTAL DRAWDOWN 3.73 metres TOTAL RECOVERY 3.53 m in 60 mins.

TOTAL PRECIPITATION nil

DATE	TIME	WATER LEVEL	TIME(t) (mins.)	t/t'	REMARKS
Mar 12	12:30:00	21.19	0		
	:30	19.09	.5		
	1:00	18.88	1		
	:30	18.77	1.5		
	2:00	18.67	2		
	:30	18.60	2.5		
	3:00	18.54	3		
	:30	18.48	3.5		
	4:00	18.46	4		
	:30	18.43	4.5		
	5:00	18.37	5		
	6:00	18.31	6		
	7:00	18.24	7		
	8:00	18.20	8		
	9:00	18.17	9		
	40:00	18.14	10		
	42:00	18.07	12		
	44:00	18.02	14		
	46:00	17.98	16		
	48:00	17.95	18		
	50:00	17.92	20		
	13:00:00	17.82	30		
	:05	17.78	35		
	:10	17.76	40		
	:15	17.74	45		
	:20	17.73	50		
	:30	17.70	60		

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VICTORIA, B.C. V8Z 6C5

"Complete Water Well Services"

PUMP TEST DATA

LOCATION Step Test #2
DRILLER Island Well Drilling
DEPTH OF WELL 155'
DIA. OF WELL 6"
ENGINEER(if any) Marc Zubel
PUMP USED 20 H.P.

PUMP SETTING 133' to top of pump 40.55 m
PUMPING RATE(S) 100 Imp. g.p.m.
TOTAL TIME PUMPED 60 mins.
ORIGINAL STATIC LEVEL 17.46 m
TOTAL GALS. PUMPED n/a
TOTAL DRAWDOWN 7.86 m

TOTAL PRECIPITATION nil

DATE	TIME	ELAPSED TIME	WATER LEVEL m	G.P.M. Imp	REMARKS
March 12	13:30:00	0	17.66 m		
	:30	.5	20.72		
	1:00	1	21.37		
	:30	1.5	21.83	90	
	2:00	2	22.76		
	:30	2.5	23.27		
	3:00	3	23.42		
	:30	3.5	23.62	100	
	4:00	4	23.79		
	:30	4.5	23.86		
	5:00	5	23.98		
	6:00	6	24.11		
	7:00	7	24.20	100	
	8:00	8	24.33		
	9:00	9	24.43		
	40:00	10	24.50		
	42:00	12	24.62		
	44:00	14	24.73	100	
	46:00	16	24.82		
	48:00	18	24.89		
	50:00	20	24.94		
	55:00	25	25.07		
	14:00:00	30	25.17	100	
	:05	35	25.25		
	:10	40	25.33		
	:15	45	25.38		
	:20	50	25.44		
	:30	60	25.52	100	Pump shut down

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"Complete Water Well Services"

RECOVERY DATA

LOCATION Step Test # 2 TOTAL PUMPING TIME 60 mins.

TOTAL DRAWDOWN 7.86 m TOTAL RECOVERY 7.57 m in 60 mins.

TOTAL PRECIPITATION nil

DATE	TIME	WATER LEVEL m	TIME(t) (mins.)	t/t'	REMARKS
March 12, 1979	14:30:00	25.52	0		
	:30	20.75	.5		
	1:00	20.30	1		
	:30	20.01	1.5		
	2:00	19.87	2		
	:30	19.72	2.5		
	3:00	19.61	3		
	:30	19.52	3.5		
	4:00	19.42	4		
	:30	19.34	4.5		
	5:00	19.28	5		
	6:00	19.13	6		
	7:00	19.10	7		
	8:00	18.98	8		
	9:00	18.92	9		
	40:00	18.85	10		
	42:00	18.76	12		
	44:00	18.68	14		
	46:00		16		
	48:00	18.53	18		
	50:00	18.47	20		
	55:00	18.37	25		
	15:00	18.27	30		
	:05	18.19	35		
	:10	18.12	40		
	:20	18.02	50		
	:30	17.95	60		

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"Complete Water Well Services"

RECOVERY DATA

LOCATION Step Test #3 TOTAL PUMPING TIME 40 mins.

TOTAL DRAWDOWN 9.70 m TOTAL RECOVERY 9.42 m in 90 mins.

TOTAL PRECIPITATION nil

m x 3.2808 = FEET

DATE	TIME	WATER LEVEL (m)	TIME(t') (mins.)	t/t'	W.L. (FEET)	~~REMARKS~~ s' (Ft)
						57.15' STATIC
March 13/79	08:40:00	27.12	0	∞	88.98	31.83
	:15	22.28	.25	161	73.10	15.95
	:30	21.14	.5	81	69.36	12.21
	08:41:00	20.37	1	41	66.83	9.68
	:30	20.06	1.5	27.7	65.81	8.66
	42:00	19.89	2	21	65.26	8.11
	:30	19.71	2.5	17	64.66	7.51
	43:00	19.58	3	14.3	64.24	7.09
	:30	19.46	3.5	12.4	63.84	6.69
	44:00	19.36	4	11	63.52	6.37
	:30	19.28	4.5	9.9	63.25	6.10
	45:00	19.20	5	9	62.99	5.84
	46:00	19.07	6	7.7	62.56	5.41
	47:00	18.96	7	6.7	62.20	5.05
	48:00	18.87	8	6	61.91	4.76
	49:00	18.79	9	5.4	61.65	4.50
	50:00	18.73	10	5	61.45	4.3
	52:00	18.63	12	4.3	61.12	3.97
	54:00	18.53	14	3.9	60.79	3.64
	56:00	18.45	16	3.5	60.53	3.38
	58:00	18.39	18	3.2	60.33	3.18
	09:00 60	18.33	20	3	60.14	2.99
	:05 65	18.22	25	2.6	59.78	2.63
	:10 70	18.12	30	2.3	59.45	2.30
	:15 75	18.06	35	2.1	59.25	2.10
	:20 80	18.00	40	2.0	59.05	1.90
	:25 85	17.95	45	1.9	58.89	1.74
	:30 90	17.89	50	1.8	58.69	1.54
	:35 95		55	(1.7)	—	
	:40 100	17.81	60	1.7	58.43	1.28
	:50 110	17.78	70	1.6	58.33	1.18
	10:00 120	17.72	80	1.5	58.14	.99
	:10 130	17.70	90	1.4	58.07	.92
	:15 135	17.68	95	1.4	58.00	.85

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"Complete Water Well Services"

PUMP TEST DATA

LOCATION Step Test #3
DRILLER Island Well Drilling
DEPTH OF WELL 155'
DIA. OF WELL 6"
ENGINEER(if any) Marc Zubel
PUMP USED 20 h.p.

PUMP SETTING 133' top of pump
PUMPING RATE(S) varied
TOTAL TIME PUMPED 40 mins.
ORIGINAL STATIC LEVEL 17.42 m
TOTAL GALS. PUMPED n/a
TOTAL DRAWDOWN 9.70 m

TOTAL PRECIPITATION nil

DATE	TIME	ELAPSED TIME	WATER LEVEL	G.P.M. Imp	REMARKS
March 13/79	08:00:00	0	17.42		(57.15')
	:30	.5	21.87		
	1:00	1	22.65		
	:30	1.5	23.88	150	
	2:00	2	24.32		
	:30	2.5	24.55		
	3:00	3	24.76		
	:30	3.5	24.91		
	4:00	4	25.02	150	
	:30	4.5	25.11		
	5:00	5	25.20	150	
	6:00	6	25.41		
	7:00	7	25.56		
	8:00	8	25.65		
	9:00	9	25.75	130	
	10:00	10	25.84		
	12:00	12	25.98		
	14:00	14	26.09		
	16:00	16	26.20		
	18:00	18	26.28		
	20:00	20	26.37		
	25:00	25	26.66	135	
	31:00	30	26.96		
	35:00	35	26.98	125	
	40:00	40	27.12		Pump shut down

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PH. 479-4732

588 Melba Plc.
VICTORIA, B.C.

V8Z 6C5

"Complete Water Well Services"

PUMP TEST DATA

LOCATION #235-79 MAIN TEST
DRILLER Island well Drilling
DEPTH OF WELL 155'
DIA. OF WELL 6"
ENGINEER(if any) Marc Zubel
PUMP USED 20 h.p.

PUMP SETTING 133' to top of pump
PUMPING RATE(S) 135 Imp.
TOTAL TIME PUMPED 1500 mins.
ORIGINAL STATIC LEVEL 17.42 m
TOTAL GALS. PUMPED n/a
TOTAL DRAWDOWN 11.04m

TOTAL PRECIPITATION nil

DATE	TIME	ELAPSED TIME	WATER LEVEL m	G.P.M.	REMARKS
March 13/79					measuring pt.-
	10:15:00	0	17.68		.5 m above ground
	:30	.5	23.27		level
	16:00	1	24.10		
	:30	1.5	24.56		
	17:00	2	24.78	135	slight sulpher smell
	:30	2.5	24.99		
	18:00	3	25.12		100' -2" discharge
	:30	3.5	25.23	135	pipe into ditch
	19:00	4	25.32		
	:30	4.5	25.40		
	20:00	5	25.52		
	21:00	6	25.71		
	22:00	7	25.84		
	23:00	8	25.90		
	24:00	9	26.00	135	
	25:00	10	26.09		
	26:00	11	26.19		
	27:00	12	26.32		
	29:00	14	26.32		
	31:00	16	26.42		
	33:00	18	26.50		
	35:00	20	26.62	135	
	10:40	25	26.72		
	:45	30	26.81		
	:50	35	26.89		
	:55	40	26.98	135	
	11:00	45	27.08		
	:05	50	27.16		
	:15	60	27.27		
	:25	70	27.35		
	:35	80	27.43	135	

DATE	TIME	ELAPSED TIME	WATER LEVEL	G.P.M.	REMARKS
			27.50		
	11:45	90	27.53		
	:55	100	27.60		
	12:15	120	27.70		
	12:45	150	27.78		
	13:15	180	~~27.85~~		
	13:45	210	27.85		
	14:25	250	27.93		
	15:15	300	28.00		
	16:05	350	28.04		
	16:55	400	28.10		
	17:45	450	28.16		
	18:35	500	28.22		
	20:15	600	28.31		
	21:55	700	28.39		
	23:35	800	28.45		
	01:15	900	28.51		
	02:55	1000	28.57		
	07:05	1250	28.69		Water sample taken @ 10.15
	11:15	1500	28.72		Pump shut off @ 11:15

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"Complete Water Well Services"

RECOVERY DATA

LOCATION Main Test 235-79 TOTAL PUMPING TIME 1500 mins.

TOTAL DRAWDOWN 11.04 m TOTAL RECOVERY 11.03 m in 1400 mins.

TOTAL PRECIPITATION nil

DATE	TIME	WATER LEVEL	TIME(t) (mins.)	t/t'	REMARKS
March 14/79	11:15:00	28.72	0		
	:15	24.01	.25		
	15:30	22.66	.5		
	16:00	22.05	1		
	:30	21.73	1.5		
	17:00	21.53	2		
	:30	21.38	2.5		
	18:00	21.25	3		
	:30	21.12	3.5		
	19:00	21.02	4		
	:30	20.92	4.5		
	20:00	20.86	5		
	21:00	20.72	6		
	22:00	20.60	7		
	23:00	20.51	8		
	24:00	20.42	9		
	25:00	20.35	10		
	27:00	20.20	12		
	29:00	20.10	14		
	31:00	20.02	16		
	33:00	19.92	18		
	35:00	19.83	20		
	40:00	19.63	25		
	45:00	19.54	30		
	50:00	19.43	35		
	55:00	19.33	40		
	12:00	19.25	45		
	:05	19.19	50		
	:15	19.07	60		
	:25	18.98	70		
	:35	18.86	80		
	:45	18.76	90		Pulling pump
	13:15	18.66	120		
	:30	18.59	135		
	13:45	18.53	150		
	14:35	18.38	200		

Date	Time	Water Level	Time t' (in mins.)	t/t'	Remarks
	15:25	18.28	250		
	16:15	18.20	300		
	17:05	18.15	350		
	17:55	18.10	400		
	18:45	18.06	450		
	19:35	18.01	500		
	21:15	17.96	600		
	22:55	17.92	700		
	00:35	17.88	800		
	02:15	17.84	900		
	03:55	17.80	1000		
	10:35	17.69	1400		

B.C. Aquifer Testing & Equipment

"Complete Water Well Services"

588 Melba Place, Victoria, B.C. V8Z 6C5 - Ph. 479-4732
5275 S. Island Hwy., Box 171, Duncan, B.C. V9L 1N8 - Ph. 748-4041

F I E L D S H E E T S...

B.C. Aquifer Testing & Equipment

588 Melba Plc.
VICTORIA, B.C. V8Z 6C5
PH. 479-4732

B.C. Aquifer Testing & Equipment
5275 S. ISLAND HWY., BOX 171, DUNCAN, B.C. V9L 1N8
PH. 748-4041

"Complete Water Well Services"

PUMP TEST DATA (STEP TEST #1)

LOCATION NAMBURY RD (OBS WELL WR235-79)
DRILLER ISLAND WELL DRILLING
DEPTH OF WELL 155 - 146 TOP SCREENS
DIA. OF WELL 6"
ENGINEER(if any) MARC ZUBEL
PUMP USED 20HP

PUMP SETTING 133' TOP OF PUMP (40.55m)
PUMPING RATE(S) 50 IMP GPM
TOTAL TIME PUMPED 30 MINS
ORIGINAL STATIC LEVEL 17.41m TOP OF CASING, 17.46 m. top of 3/4" pvc pipe
TOTAL GALS. PUMPED N/A
TOTAL DRAWDOWN 3.73 METERS

TOTAL PRECIPITATION NIL

DATE	TIME	ELAPSED TIME	WATER LEVEL (MET)	I. G.P.M.	REMARKS
MARCH 12/79	1200	0	17.46		17.41 metre ORIGINAL STATIC
	30	0.5	20.43		MEASURING Pt = 1.65' A.G.L.
	1201	1	20.76		1ST 2-45 gals. sandy -
	30	1.5	20.95		cleaned more -
	1202	2	21.20		Small of sediment in tank
	30	2.5	21.35		100'-2" DISCHARGE INTO
	1203	3	21.38		DITCH.
	30	3.5	21.49	77	35 sec. FOR 45 IMP GALS.
	1204	4	21.29		cut back
	30	4.5	21.19		cut back.
	1205	5	21.08	60	45 sec.
	1206	6	21.01		
	1207	7	20.94		
	1208	8	20.88	50	54 sec.
	1209	9	20.86		
	1210	10	20.89		
	1212	12	20.92		
	1214	14	20.98		
	1216	16	21.02		
	1218	18	21.05		
	1220	20	21.07	50 IMP	54 SEC FOR 45 IMP GALS.
	1225	25	21.14		
	1230	30	21.19		SHUT DOWN TEST.

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B.C. Aquifer Testing & Equipment
5275 S. ISLAND HWY., BOX 171, DUNCAN, B.C.
PH. 748-4041 V9L 1N8

"Complete Water Well Services"

RECOVERY DATA (STEP TEST #1)

LOCATION YAMBURY RD (OBS WELL WR 236-R) TOTAL PUMPING TIME 30 MINS.

TOTAL DRAWDOWN 3.73 METERS TOTAL RECOVERY 3.53 M. IN 60 MINS

TOTAL PRECIPITATION NIL

DATE	TIME	WATER LEVEL	TIME(t) (mins.)	t/t'	REMARKS
MARCH 12/79	1230'	21.19	0		
	30"	19.09	0.5		
	1231	18.88	1		
	30	18.77	1.5		
	1232	18.67	2		
	30	18.60	2.5		
	1233	18.54	3		
	30	18.48	3.5		
	1234	18.46	4		
	30	18.43	4.5		
	1235	18.37	5		
	1236	18.31	6		
	1237	18.24	7		
	1238	18.20	8		
	1239	18.17	9		
	1240	18.14	10		
	1242	18.07	12		
	1244	18.02	14		
	1246	17.98	16		
	1248	17.95	18		
	1250	17.92	20		
	1255	17.82	25		
	1300	17.78	30		
	1305	17.76	35		
	1310	17.74	40		
	1315	17.73	45		
	1320	17.70	50		
	1330	17.66	60		

B.C. Aquifer Testing & Equipment

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B.C. Aquifer Testing & Equipment "Complete Water Well Services"
5275 S. ISLAND HWY., BOX 171, DUNCAN, B.C.
PH. 748-4041 V9L 1N8

PUMP TEST DATA (STEP TEST #2)

LOCATION YAMBURY RD (OBS WELL 235-79)
DRILLER ISLAND WELL DRILLING.
DEPTH OF WELL 155-146' TOP SCREEN
DIA. OF WELL 6"
ENGINEER(if any) MARC ZUPEL
PUMP USED 20 HP

PUMP SETTING 133' TOP OF PUMP. (40.55 M.)
PUMPING RATE(S) 100 IMP GPM.
TOTAL TIME PUMPED 60 MINS.
ORIGINAL STATIC LEVEL 11.46 (11.66 2nd STATIC)
TOTAL GALS. PUMPED N/A.
TOTAL DRAWDOWN 1.86 METERS.

TOTAL PRECIPITATION NIL

DATE	TIME	ELAPSED TIME	WATER LEVEL	I.G.P.M.	REMARKS
MARCH 12/91	1330	0	11.66		MEASURING PT. 0.5 METERS
	30	0.5	20.72		
	1331	1	21.37		
	30	1.5	21.83	90 IMP.	30 SEC + INCREASING
	1332	2	22.16		
	30	2.5	23.27		
	1333	3	23.42		
	30	3.5	23.62	100 IMP.	27 SEC FOR 4.5 IMP GALS
	1334	4	23.79		
	30	4.5	23.86		
	1335	5	23.98		
	1336	6	24.11		
	1337	7	24.20		
	1338	8	24.33	100 IMP.	RATE OK.
	1339	9	24.43		
	1340	10	24.50		
	1342	12	24.62		
	1344	14	24.73		
	1346	16	24.82		
	1348	18	24.89		
	1350	20	24.94	100 IMP.	27 SEC FOR 4.5 IMP GALS
	1355	25	25.07		
	1400	30	25.17		
	1405	35	25.25		
	1410	40	25.33		
	1415	45	25.38		
	1420	50	25.44		
	1430	60	25.52		SHUT DOWN TEST.

B.C. Aquifer Testing & Equipment

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PH. 479-4732 VICTORIA, B.C. V8Z 6C5

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PH. 748-4041 V9L 1N8

"Complete Water Well Services"

RECOVERY DATA (STEP TEST #2)

LOCATION YAMBURY RD (OBS WELL 235-79) TOTAL PUMPING TIME 60 MINS.

TOTAL DRAWDOWN 1.86 METERS TOTAL RECOVERY 1.57 METERS IN 60 MINS.

TOTAL PRECIPITATION NIL.

DATE	TIME	WATER LEVEL	TIME(t) (mins.)	t/t'	REMARKS
MARCH 12/79	1430	25.52	0		
	30	20.75	0.5		
	1431	20.30	1.0		
	30	20.01	1.5		
	1432	19.87	2.0		
	30	19.72	2.5		
	1433	19.61	3.0		
	30	19.52	3.5		
	1434	19.42	4.0		
	30	19.34	4.5		
	1435	19.28	5.0		
	1436	19.13	6.		
	1437	19.10	7		
	1438	18.98	8		
	1439	18.92	9		
	1440	18.85	10		
	1442	18.76	12		
	1444	18.68	14		
	1446	—	—		
	1448	18.53	18		
	1450	18.47	20		
	1455	18.37	25		
	1500	18.27	30		
	1505	18.19	35		
	1510	18.12	40		
	1520	18.02	50		
	1530	17.95	60		

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"Complete Water Well Services"

(QUALICUM.)

PUMP TEST DATA (STEP TEST #3)

LOCATION YAMBURY RD. (OBS. WELL #235-79)
DRILLER ISLAND WELL DRILLING
DEPTH OF WELL 155' - 146' TOP SCREEN
DIA. OF WELL 6"
ENGINEER(if any) MARC ZUBER
PUMP USED 20 HP

PUMP SETTING 133' TOP OF PUMP
PUMPING RATE(S) VARIED
TOTAL TIME PUMPED 40 MINS.
ORIGINAL STATIC LEVEL 17.42 METERS.
TOTAL GALS. PUMPED N/A
TOTAL DRAWDOWN 9.70 METERS

TOTAL PRECIPITATION NIL

DATE	TIME	ELAPSED TIME	WATER LEVEL	G.P.M.	REMARKS
MARCH 13/79	0800	0	17.42		MEASURING PT. 0.5 MTS AGL.
	30	0.5	21.87		100'-2" DISCHARGE INTO
	0801	1	22.65		DRAINAGE DITCH.
	30	1.5	23.88	150 Imp	18 sec. → 45 gals
	0802	2	24.32		1ST 45 gal - slightly sandy
	30	2.5	24.55		
	0803	3	24.76		SULPHUR SMELL
	30	3.5	24.91		
	0804	4	25.02	150 IMP.	18 SEC FOR 45 IMP GALS.
	30	4.5	25.11		
	0805	5	25.20	150 Imp.	18 sec.
	0806	6	25.41		
	0807	7	25.56		
	0808	8	25.65		
	0809	9	25.75	130 IMP.	RATE SLIGHTLY SLOW
	0810	10	25.84		
	0812	12	25.98		
	0814	14	26.09		
	0816	16	26.20		
	0818	18	26.28		
	0820	20	26.37		
	0825	25	26.66	135 IMP.	20 SEC FOR 45 IMP GALS
	0831	31	26.96		
	0835	35	26.98	125	22 sec,
	0840	40	27.12		SHUT DOWN TEST
	0845	45			
	0850	50			
	0900	60			
	0910	70			
	0920	80			
	0930	90			
	0940	100			
	1035	125			

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5275 S. ISLAND HWY., BOX 171, DUNCAN, B.C.
PH. 748-4041 V9L 1N8

RECOVERY DATA (STEP TEST #3)

LOCATION YAMBURY RD (OBS W. #235-79) TOTAL PUMPING TIME 40 MINS.

TOTAL DRAWDOWN 9.70 METERS. TOTAL RECOVERY 9.42 METERS IN 90 MINS.

TOTAL PRECIPITATION NIL.

DATE	TIME	WATER LEVEL	TIME(t) (mins.)	t/t'	REMARKS
MARCH 13/79	0840	27.12	0		
	15	22.28	0.25		
	30	21.14	0.5		
	0841	20.37	1		
	30	20.06	1.5		
	0842	19.89	2		
	30	19.71	2.5		
	0843	19.58	3		
	30	19.46	3.5		
	0844	19.36	4		
	30	19.28	4.5		
	0845	19.20	5		
	0846	19.07	6		
	0847	18.96	7		
	0848	18.87	8		
	0849	18.79	9		
	0850	18.73	10		
	0852	18.63	12		
	0854	18.53	14		
	0856	18.45	16		
	0858	18.39	18		
	0900	18.33	20		
	0905	18.22	25		
	0910	18.12	30		
	0915	18.06	35		
	0920	18.00	40		
	0925	17.95	45		
	0930	17.89	50		
	0940	17.81	60		
	0950	17.78	70		
	1000	17.72	80		
	1010	17.70	90		
	1015	17.68	95		

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PH. 748-4041
"Complete Water Well Services"

(QUALICUM.) PUMP TEST DATA (MAIN TEST.)

LOCATION YAMBURY RD. (OBS.W. 235-79)
DRILLER 'ISLAND' WELL DRILLING.
DEPTH OF WELL 150' - 146' TOP SCREEN.
DIA. OF WELL 6"
ENGINEER(if any) MARC ZUBEL
PUMP USED 20HP

PUMP SETTING 133' TOP OF PUMP. (40.55M.)
PUMPING RATE(S) 135 IMP GPM.
TOTAL TIME PUMPED 1500 MINS.
ORIGINAL STATIC LEVEL 17.42 (17.68 AFTER STEP TEST.)
TOTAL GALS. PUMPED N/A
TOTAL DRAWDOWN 11.04 METERS

TOTAL PRECIPITATION NIL

DATE	TIME	ELAPSED TIME	WATER LEVEL	G.P.M.	REMARKS
MARCH 13/79	1015	0	17.68		MEASURING PT = 0.50M
	30	0.5	23.27		ABOVE GROUND LEVEL.
	1016	1	24.10		100' - 2" DISCHARGE PIPE
	30	1.5	24.56		INTO DRAINAGE DITCH.
	1017	2	24.78	135 IMP	20 SEC FOR 45 IMP GALS
	30	2.5	24.99		
	1018	3	25.12		
	30	3.5	25.23	135 IGPM	20 SEC.
	1019	4	25.32		
	30	4.5	25.40		
	1020	5	25.52		SLIGHT SULPHER SMELL
	1021	6	25.71		
	1022	7	25.84		
	1023	8	25.90		
	1024	9	26.00		
	1025	10	26.09	135 IMP	20 SEC FOR 45 IMP GALS
	1027	12	26.19		
	1029	14	26.32		
	1031	16	26.42		
	1033	18	26.50		
	1035	20	26.62	135 IMP	RATE OK
	1040	25	26.72		
	1045	30	26.81		
	1050	35	26.89		
	1055	40	26.98	135 IMP	RATE OK
	1100	45	27.08		
	1105	50	27.16		
	1115	60	27.27		
	1125	70	27.36	135 IMP	20 SEC FOR 45 IMP GALS
	1135	80	27.43		
	1145	90	27.50		
	1155	100	27.53		

Page 2.

DATE	TIME	ELAPSED TIME min.	WATER LEVEL (METERS)	G.P.M.	REMARKS
March 13/79	11:55	100	27.53	135. IMP	20 sec FOR 45 IMP GALS
	12:15	120	27.60		
	12:45	150	27.70		
	13:15	180	27.78		
	13:45	210	27.85	135 IMP	RATE OK
	14:25	250	27.93		
	15:15	300	28.00		
	16:05	350	28.04	135 IMP	20 sec FOR 45 IMP GALS
	16:55	400	28.10		
	17:45	450	28.16		
	18:35	500	28.22	135 IMP	20 sec FOR 45 IMP GAL
	20:15	600	28.31		RATE OK
	21:55	700	28.39		
	23:35	800	28.45	135 IMP	
March 14/79	01:15	900	28.51	135 IMP	NEW OBSERVER (RATE OK)
	02:55	1000	28.57		
	07:05	1250	28.69	135 IMP	20 sec FOR 45 IMP GALS.
	11:15	1500	28.72		STOP PUMP TEST.
				NOTE	WATER SAMPLE TAKEN AT 1015

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PH. 479-4732

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PH. 748-4041 V9L 1N8

"Complete Water Well Services"

RECOVERY DATA (MAIN TEST) PAGE #1

(QUALICUM)

LOCATION YAMBURY RD. (OBS. W. #235-79) TOTAL PUMPING TIME 1500 MINS.

TOTAL DRAWDOWN 11.04 METERS TOTAL RECOVERY 11.03 METERS IN 1460 MINS.

TOTAL PRECIPITATION NIL.

DATE	TIME	WATER LEVEL	TIME(t) (mins.)	t/t'	REMARKS
MARCH 14/79	1115	28.72	0		
	15	24.01	0.25		
	30	22.66	0.5		
	1116	22.05	1		
	30	21.73	1.5		
	1117	21.53	2		
	30	21.38	2.5		
	1118	21.25	3		
	30	21.12	3.5		
	1119	21.02	4		
	30	20.92	4.5		
	1120	20.86	5		
	1121	20.72	6		
	1122	20.60	7		
	1123	20.51	8		
	1124	20.42	9		
	1125	20.35	10		
	1127	20.20	12		
	1129	20.10	14		
	1131	20.02	16		
	1133	19.92	18		
	1135	19.83	20		
	1140	19.63	25		
	1145	19.54	30		
	1150	19.43	35		
	1155	19.33	40		
	1200	19.25	45		
	1205	19.19	50		
	1215	19.07	60		
	1225	18.98	70		
	1235	18.86	80		
	1245	18.76	90		PULLING PUMP
	1315	18.66	120		ADD 0.06M FOR CONDUIT
	1330	18.59	135		STICK UP.
	1345	18.53	150		
	1435	18.38	200		

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"Complete Water Well Services"

PAGE #2

RECOVERY DATA (MAIN TEST PAGE #2)

LOCATION YAMBURY RD. (OBS. W. #235-79) TOTAL PUMPING TIME 1500 MINS.

TOTAL DRAWDOWN 11.04 METERS. TOTAL RECOVERY 11.03 METERS IN 1400 MINS

TOTAL PRECIPITATION NIL

DATE	TIME	WATER LEVEL	TIME(t) (mins.)	t/t'	REMARKS
MARCH 14/79	1525	(18.28)	250		
	1615	18.20	300		
	1705	18.15	350		
	1755	18.10	400		
	1845	18.06	450		
	1935	18.01	500		
	2115	17.96	600		
	2255	17.92	700		
	0035	17.88	800		
	0215	17.84	900		
	03:55	17.80	1000		
	10:35	17.69	1400		

APPENDIX C

CALCULATIONS

1. Storage Coefficient, S.
2. Well Efficiency, E.

CALCULATIONS

1. Storage Coefficient, S.

According to Cooper & Jacob (1946):

$$s = \frac{264\ Q}{T} \log\left[\frac{0.3\ Tt}{r^2 S}\right]$$

Where:

s = drawdown, in ft.
Q = pumping rate, in USgpm
T = coefficient of transmissibility, in USgpd/ft.
t = time since pumping started, in days
r = distance, in ft., from center of pumped well to point where drawdown is measured

Given that:

Q = 162 USgpm
T = 12,500 USgpd/ft.
t = 1 day
r = 1300 ft.
s = 7 ft.

Then:

$$7 = \frac{(264)(162)}{(12{,}500)} \log\left[\frac{(0.3)(12500)(1)}{(1300)^2\ S}\right]$$

Or:

$$\log\left[\frac{0.00222}{S}\right] = 2.046$$

$$\frac{0.00222}{S} = 111.1$$

$$S = 2 \times 10^{-5}$$

CALCULATIONS

2. Well Efficiency, E %

Using:

$$s = \frac{264\ Q}{T}\left[\log \frac{0.3\ Tt}{r^2 S}\right]$$

Where:

Q = 162 USgpm
T = 12500 USgpd/ft.
t = 1 day
r = 3-inches (0.25 ft.)
S = 2×10^{-5}

Then:

$$s_{theor.} = \frac{(264)(162)}{12{,}500} \log \left[\frac{(0.3)(12500)(1)}{(0.25)^2(2\times10^{-5})}\right]$$

$$= 32.42 \text{ ft.}$$

$s_{act.}$ = 36.17 ft. (from drawdown data)

$$E = \frac{S_{theor.}}{S_{act.}} \times 100\%$$

$$E = \frac{32.42}{36.17} \times 100$$

$$E = 90\%$$

APPENDIX D

1. Water Quality Analysis
   - Start of 25-Hr. Pumping Test

2. Water Quality Analysis
   - End of 25-Hr. Pumping Test

WATER QUALITY REPORT FOR SAMPLE 903382W

TO: W.I.B.- HYDROLOGY
SUITE 1-345 QUEBEC ST
VICTORIA BC V8V 1X5

FOR SITE: 1400098 OBSERVATION WELL WR235-79

SAMPLING DATE(S): MAR 13/79 1100 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 155
SAMPLED BY: W.I.B. - HYDROLOGY
DATE RECEIVED BY LABORATORY: MAR 16/79

0040101	PH	8.2 REL UNIT	0071701	RES:FILT.105C	172. MG/L
0110101	SPECIFIC CONDUC	274. UMHO/CM	0300101	COMP.DIL.COND.	302. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	147.* MG/L
1041702	CHLORIDE:DISSOL	4.4 MG/L	1061701	FLUORIDE:DISSOL	0.13 MG/L
1070002	HARDNES.T:CACO3	111.* MG/L	1091703	NITROGN:NO2 NO3	L 0.02 MG/L
1130101	NITROGN:KJELDAH	0.56 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.447 MG/L
1201702	SILICA:REACTIVE	24.8 MG/L	1211701	SULPHATE:DISSOL	L 5.0 MG/L
2541702	CALCIUM DISSOLVED	26.8* MG/L	2570204	IRON TOTAL	0.3 MG/L
2571402	IRON DISSOLVED	0.1 MG/L	2591701	MAGNESIUM DISSOLVED	10.7* MG/L
2600201	MANGANESE TOTAL	0.14 MG/L	2601401	MANGANESE DISSOLVED	0.14 MG/L
2641703	POTASSIUM DISSOLVED	2.6* MG/L	2651703	SODIUM DISSOLVED	14.6* MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 65.90

SAMPLE NO. 903382W CONTINUED ON NEXT PAGE.

WATER QUALITY REPORT FOR SAMPLE 903382W

REMARKS:

FOR ENVIRONMENTAL LABORATORY

FIELD TEST RESULTS

0040102	PH	8.5 REL UNIT	0110102	SPECIFIC CONDUC	250. UMHO/CM
0130101	TEMP. SAMPLING	9. DEG.C			

MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 903383W

TO: W.I.B. - HYDROLOGY
SUITE 1-345 QUEBEC ST
VICTORIA BC V8V 1X5

FOR SITE: 1400098 OBSERVATION WELL WR235-79

SAMPLING DATE(S): MAR 14/79 1100 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 155
SAMPLED BY: W.I.B. - HYDROLOGY
DATE RECEIVED BY LABORATORY: MAR 16/79

0040101	PH	8.2 REL UNIT	0071701	RES:FILT.105C	174. MG/L
0110101	SPECIFIC CONDUC	276. UMHO/CM	0300101	COMP.DIL.COND.	302. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	145.* MG/L
1041702	CHLORIDE:DISSOL	4.3 MG/L	1061701	FLUORIDE:DISSOL	0.13 MG/L
1070002	HARDNES.T:CACO3	112.* MG/L	1091703	NITROGN:NO2 NO3	L 0.02 MG/L
1130101	NITROGN:KJELDAH	0.54 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.463 MG/L
1201702	SILICA:REACTIVE	24.8 MG/L	1211701	SULPHATE:DISSOL	L 5.0 MG/L
2541702	CALCIUM DISSOLVED	26.9* MG/L	2570204	IRON TOTAL	0.2 MG/L
2571402	IRON DISSOLVED	0.1 MG/L	2591701	MAGNESIUM DISSOLVED	10.8* MG/L
2600201	MANGANESE TOTAL	0.14 MG/L	2601401	MANGANESE DISSOLVED	0.14 MG/L
2641703	POTASSIUM DISSOLVED	2.6* MG/L	2651703	SODIUM DISSOLVED	14.8* MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 65.90

SAMPLE NO. 903383W CONTINUED ON NEXT PAGE.

WATER QUALITY REPORT FOR SAMPLE 903383W

REMARKS:

FOR ENVIRONMENTAL LABORATORY

FIELD TEST RESULTS

0040102	PH	9. REL UNIT	0110102	SPECIFIC CONDUC	260. UMHO/CM
0130101	TEMP. SAMPLING	9.5 DEG.C			