

Appendix C-3
IWS Groundwater Investigation (1978)

Appendix C-3a
IWS Groundwater Investigation Report (1978)

R E P O R T

1978 GROUNDWATER INVESTIGATION

PUBLIC UTILITIES COMMISSION

SAULT STE. MARIE

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1 Capacities of developed wells and predicted undeveloped wells	3
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DRAWINGS

A-78286	Logs of Test Well 1/78
A-78304	Aquifer Performance Test-1/78
A-78305	Logs of Test Well 2/78
A-79016	Logs of Test Well 3/78
A-78338	Aquifer Performance Test-2/78
A-78340	Aquifer Performance Test-2/78
A-79017	Logs of Test Well 4/78
A-78341	Aquifer Performance Test-4/78
A-78343	Aquifer Performance Test-4/78
A-79087	Chemical Analysis
D-78011	East Half Location Map
D-78012	West Half Location Map

1978 TEST DRILLING (Cont'd)

- a) At TW 1/78, the overburden was mainly clay and silt extending down to the bedrock at 279 ft. Several zones of fine to medium sand were logged, however, the hydraulic connection between surface and bedrock is poor. The bedrock from 279 to 320 ft. was permeable with a static level of about 28 ft. below grade. A test was conducted at 210 IGM and the results are shown on Drawing A-78304.

The Transmissibility between TW 1/78 and the Burmaster Well about 1,100 ft. north is 69,000 IGD/Day/ft. However, strong boundaries are indicated, which reduce the Transmissibility to the range of 13,900 IG/Day/ft. to 18,800 IG/Day/ft. The calculated storage coefficient of 2.9×10^{-6} ft.³/ft.²/ft. confirms the artesian character of the aquifer.

The Transmissive sandstone encountered at the Dacey Road Well extends laterally to TW 1/78, however, there is no evidence of a strong vertical connection with the St. Mary's River in the immediate vicinity of TW 1/78. Since the aquifer at Dacey Road Well and the Queen Street Well exhibit superior hydrologic characteristics, development of permanent wells is not justified at the sites of TW 1/78. A 1 1/4" screen was set for use as an observation well.

- b) TW 2/78 and TW 3/78

Two test wells were drilled at this location to provide a large diameter pumping well and a small diameter observation well. Clay and silt was logged from surface to about 130 ft., underlain by fine sand to the top of the sandstone at about 190 ft. The sandstone drilled from 190 ft. to 232 ft. was permeable with a static level about 3 ft. above ground (approximate elevation 632 ft.)

A 6 hour aquifer test was conducted by pumping TW 2/78 at 224 IGM for six hours and observing the effect at TW 2/78 and TW 3/78 as shown on Drawings A-78338 and

A-78340. Prior to pumping, TW 2/78 flowed at 50 IGM therefore the net pumping rate for the test is 174 IGM. Calculations of Transmissibility are in the range of 39,900 to 41,800 IGD/Day/Ft. with a Storage Coefficient of 3.2×10^{-4} ft.³/ft.²/ft.

If the apparent bore hole losses at TW 2/78 are taken into consideration, the theoretical specific capacity after 360 minutes at 224 IGM is about 22 IGM/ft.

Well losses evident at TW 2/78 would dictate special care in well construction, however, the bedrock is sufficiently permeable to justify construction of high capacity bedrock wells.

c) TW 4/78

This site is north of Second Line on Allen Sideroad with the ground level elevation about 685, approximately 50 ft. higher than TW 2/78. Silt and clay extended from surface to 316 ft. with a zone of fine sand and clay logged from 135 ft. to 210 ft. A thin layer of sand gravel and clay from 316 to 320 ft. overlies the sandstone, which was penetrated to 340 ft. The sandstone was permeable and the static level was about 48 ft. below grade (approximate elevation 637').

An aquifer test conducted on November 28, 1978 for 8 hours at 200 IGM resulted in the data as shown on Drawing A-78341 and A-78343. Analysis of the data results in an unusually high local Transmissibility, but boundaries reduce it to a range of 40,600 to 52,800 IG/Day/ft. at TW 4/78 with 44,000 IG/Day/ft. at TW 2/78. The storage coefficient is 1.03×10^{-4} ft.³/ft.²/ft. as expected for this aquifer.

The specific capacity of 18 IGM/ft. after 8 hours at the test rate and the high local Transmissibility indicate the adjacent area is suitable for construction of high capacity bedrock wells.

5. CHEMICAL QUALITY

Preliminary chemical samples were collected and analyzed at TW 1/78, TW 2/78 and TW 4/78 with the results as reported

CHEMICAL QUALITY (Cont'd)

on Drawing A-79087.

At the site of TW 2/78 and TW 4/78, which are being considered for permanent wells, the chemical quality is typical for the aquifer. The iron content reported for the TW 4/78 is higher than experienced at other sites, but more extensive testing is required before a conclusion of real iron content can be made.

6. PREDICTED WELL YIELDS - CENTRAL BASIN

In predicting the yields of the two new sites at TW 2/78 and TW 4/78, it was recognized that little additional drawdown is available at the Steelton Well and keeping this well in operation will not permit optimum development of the ground-water supply in the Central Basin.

The well yields and predicted yields of well sites are as follows considering natural recharge only:

Goulais Wells	2 MIGD
TW 2/78 Site	1.5-2 MIGD
TW 4/78 Site	<u>2.5-3</u> MIGD
Total	<u>6-7</u> MIGD

The total is a net gain of 2-3 MIGD with the Steelton Well out of service and is in the same range as the 6.6 MIGD of available natural recharge estimated in the Central Basin.

The two new sites examined contemplate a minimum of two permanent wells per site with possibly a third well required if well losses are considerable or if higher capacities are required.

When artificial recharge is undertaken and the total recharge to the basin is increased, additional well sites may be required and a site near TW 3/75 would be considered.

7. CONCLUSIONS

1. Table 1 summarizes the capacities of wells and the predicted capacities of well sites following the 1978 test drilling. The net total of 10.5 to 11.5 MIGD falls

CONCLUSIONS (Cont'd)

2.5 to 3.5 MIGD short of the 14 MIGD to be established by 1979.

2. The total capacities of wells and undeveloped well sites agrees with the natural recharge estimates for the East and Central Basins. Any further development in these basins will be dependent on artificial recharge or should await an appraisal of long-term operation records. This does not preclude the development of permanent wells to meet peak or standby requirements.
3. Exploration will be required to establish the additional 2.5 to 3.5 MIGD required by 1979. The most attractive target is the West Basin where, in addition to exploiting the natural recharge potential of the basin, induced infiltration from Lake Superior or the St. Mary's River may be possible.
4. The recharge area of the Central Basin is attractive for artificially recharging the aquifer using the available surface water. Reconnaissance surveys followed by detailed investigations will be required to establish suitable sites.
5. Preliminary analysis of the chemical quality at TW 2/78 and TW 4/78 indicates the quality is similar to quality at Goulais and Steelton Wells. However, a higher than normal iron value at TW 4/78 should be further checked under more intensive pumping conditions.

8. RECOMMENDATIONS

Eastern Basin

1. The Queen Street and Dacey Road Wells should be pumped continuously at capacity and detailed records of withdrawals and water levels in the wells and observation wells should be kept as a basis to assess future development of the basin.

RECOMMENDATIONS (Cont'd)Western Basin

2. Exploratory test drilling should be undertaken in the shoreline areas to determine whether suitable formation exists to induce water from the St. Mary's River or Lake Superior by means of wells or collectors.

The exploration would be generally to depths of up to 100 ft. using auger or rotary equipment to determine whether coarse grained sand or sand and gravel 50 to 100 ft. thick is to be found near the river or lake. Up to 20 test holes are envisaged at this stage with small diameter casing left only where positive conditions are indicated.

Whereas almost the entire coast line is a target for such exploration, the following primary target areas are recommended:

Carpin Beach Area
Gros Cap and Southeast
East of the Airport at Pointe aux Pins Bay

If these areas prove to be negative, more distant locations should be explored between Pointe des Chenes and Pointe aux Pins.

3. At locations where the exploration described above is positive a test well or wells and offset observation wells should be constructed and aquifer tests run to assess the water supply prospects.
4. Deep test drilling should be undertaken at selected locations to explore deep overburden aquifers and the upper bedrock. At positive locations, this will involve drilling offset observation wells and aquifer testing to assess the water supply potential of the sites.

The following areas are recommended for testing:

- 1) Carpin Beach Area where sand and gravel has been logged from 325 ft. to 354 ft. and may continue deeper (Well 1543-Section C-C, Drawing C-78015 in the 1978 report) and may rest on the sandstone rock.

RECOMMENDATIONS (Cont'd)

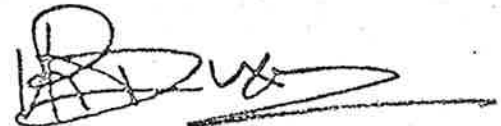
- 2) Gros Cap and southeast where local well logs indicate the presence of overburden aquifers and where inducing infiltration from the St. Mary's River may be possible. (West end Sections L and M, Drawing D-78019, in the 1978 Report).
- 3) Pointe aux Pins where gravel and sand above the rock at depths of about 190 ft. has been logged by some wells.
- 4) West of Town Line Road and north of the Second Line to explore the overburden (Well 826, Section B, Drawing C-78015 in the 1978 Report) and bedrock in the general area where a tributary stream of the Carp River enters the Basin from the uplands.

Central Basin

5. A reconnaissance study of the recharge area should be undertaken to select sites, which appear feasible for artificially recharging the aquifer using water from the creeks. This should be followed by detailed investigations of the most attractive sites involving drilling and pilot testing.



D. R. TURNBULL, P. Eng.
Barrie, Ontario.
March 7, 1979.



V. R. DIXON, P. Eng.

DRILLERS LOG

ELECTRIC LOG

DRILLER: J. Gray

RESISTIVITY IN OHM-Feet

HOLE DIAM: 10" 8" 7"

0 100 200 300 400 500 600 700 800 900 1000

ELEV. 590 TOPO

Clay - Brown

SAND - Medium

SL. 28 05 Oct 16/78

Clay - Red

10" CASING (PULLED)

SAND, Clay Strata

Red

3" 9/16" CASING (PULLED)

Clay - Red - Gray

Silt - Clay

Oct 16/78 SL. 28-05 (G.L.)
 @ 210 FC
 E = 12.19 ft. Str.
 @ 7, 8, 15 Casing Str. var.
 @ 275 Casing Str. 313'

Clay - Red

Clay - Red - Gray

Clay - Red - Gray

Clay - Red - Gray

Clay - Red - Gray

Clay - Red - Gray

Clay - Red - Gray

Clay - Red - Gray

Clay - Red - Gray

Clay - Red - Gray

Clay - Red - Gray

Clay - Red - Gray

Clay - Red - Gray

Clay - Red - Gray

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Clay - Red - Gray

Clay - Red - Gray

Clay - Red - Gray

Clay - Red - Gray

Clay - Red - Gray

Clay - Red - Gray

Clay - Red - Gray

Clay - Red - Gray

Clay - Red - Gray

7" 9/16" CASING (PULLED)

2" Observation Well

6 1/2" Observation Well

Clay - Red - Firm

SAND - Fine

SANDSTONE

SANDSTONE

SANDSTONE

SANDSTONE

SANDSTONE

SANDSTONE

SANDSTONE

SANDSTONE

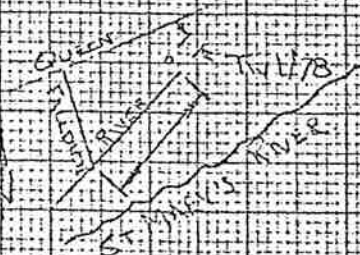
SANDSTONE

SANDSTONE

SANDSTONE

SANDSTONE

SANDSTONE



INTERNATIONAL WATER SUPPLY LTD.

LOGS OF TEST WELL 1/78

SAULT STE MARIE

1-2-12-1903-20

River Road Site

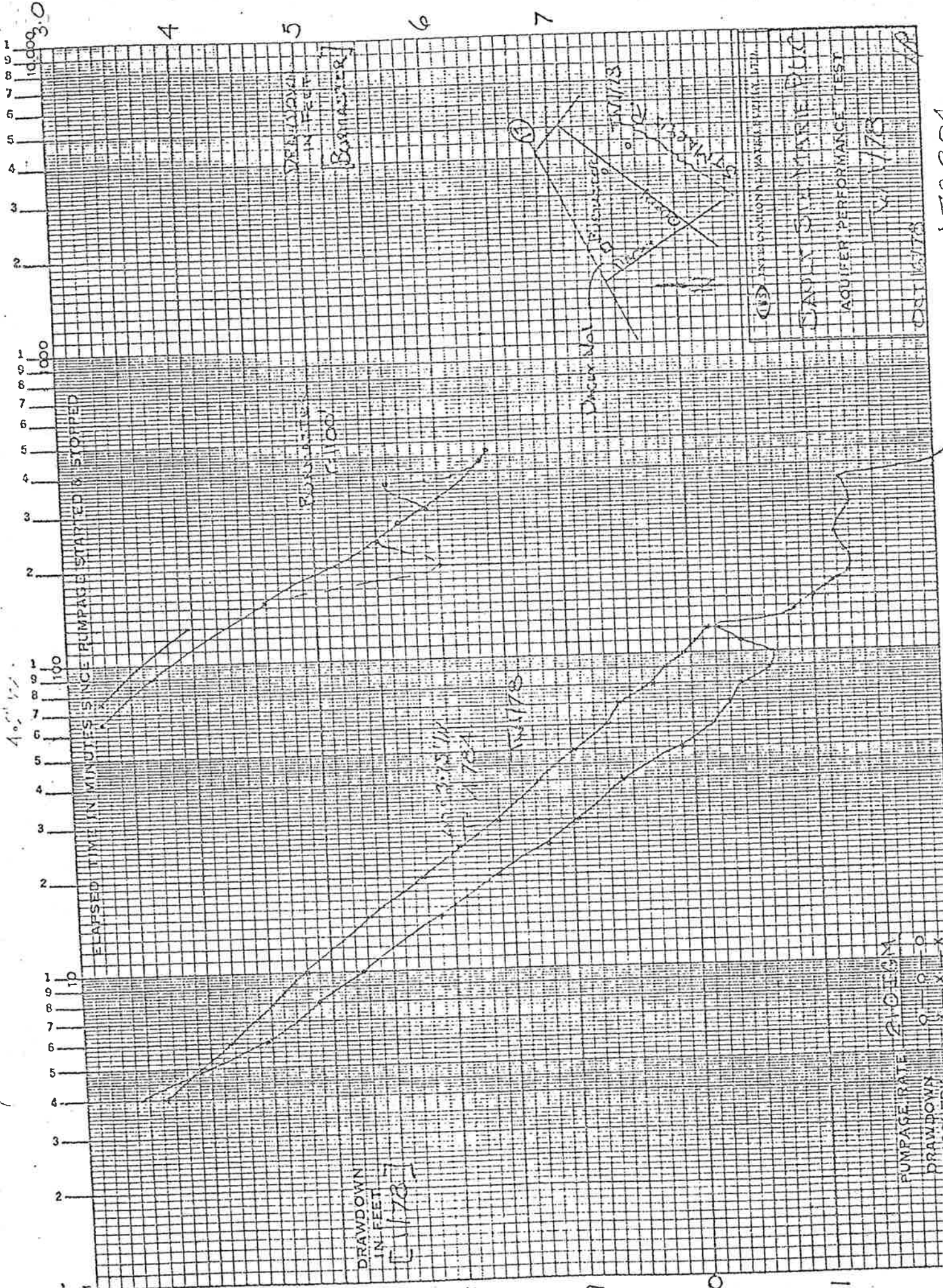
Oct 178

1/8

MADE IN CANADA

SPECIALTY TRAINING OR DRAWING PAPER

51 SEMI-LOGARITHMIC, 4 CYCLES X 10 TO THE INCH



INTEGRATION WATER DIVISION
SANDY CRYSTALINE PUC
AQUIFER PERFORMANCE TEST
TEST 11/17/78
DST 11/17/78

PUMPAGE RATE 210 GPM
DRAWDOWN 0.8 - 0.9 - 1.0

DRILLERS LOG

ELECTRIC LOG

DRILLER: J. Gen.

RESISTIVITY IN OHM-Feet

HOLEDIAM: 8 1/2"

ELEV.: 630 (Top)

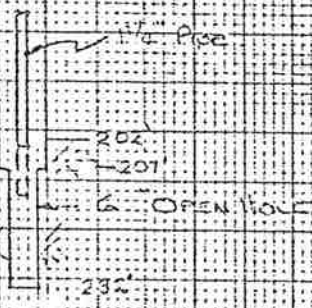
0 100 200 300 400 500 600 700 800 900 1000

Clay S.T.

Sand Fine

SAND Fine - Med

SANDSTONE



Oct 24/78
 ① Static Level - 16.83 (7115)
 Pumping Level - 16.83 (7115)
 Capacity - 224 GPM
 ② Piled 8" x 10" Casing
 Set 1 1/4" Splice 2035-213

1/2 MILE
 1/2 MILE

INTERNATIONAL WATER SUPPLY LTD.

LOGS OF TESTWELL 2/78
 SAULT STE MARIE D.C.
 1-2-12-1903-20
 Oct 24/78

MADE IN CANADA

SPURR TRADING OR DRAWING PAPER

DRILLERS LOG

ELECTRIC LOG

DRILLER: Gray

RESISTIVITY IN OHM-Feet

HOLE DIAM: 6 1/4"

0 100 200 300 400 500 600 700 800 900 1000

ELEV: 630 (Topo)

TOPSOIL

0

20

40

CLAY SILT

60

80

100

120

140

SAND-Fine
Red

160

180

SANDSTONE
Reddish

200

220

PULLED

1 1/4" Pipe

-179'

-187'

① Nov 178

S. 1/4 333' AC (21805000)

② Screen pulled & hole grouted

TW 3/78

0.3 MILE

119

SECOND LINE

ALLEN

COLEMAN

INTERNATIONAL WATER SUPPLY LTD.

LOGS OF TESTWELL

3/78

SAULT STE MARIE P.L.C.

1-2-12-1903-20

WALKER SITE

Nov 178

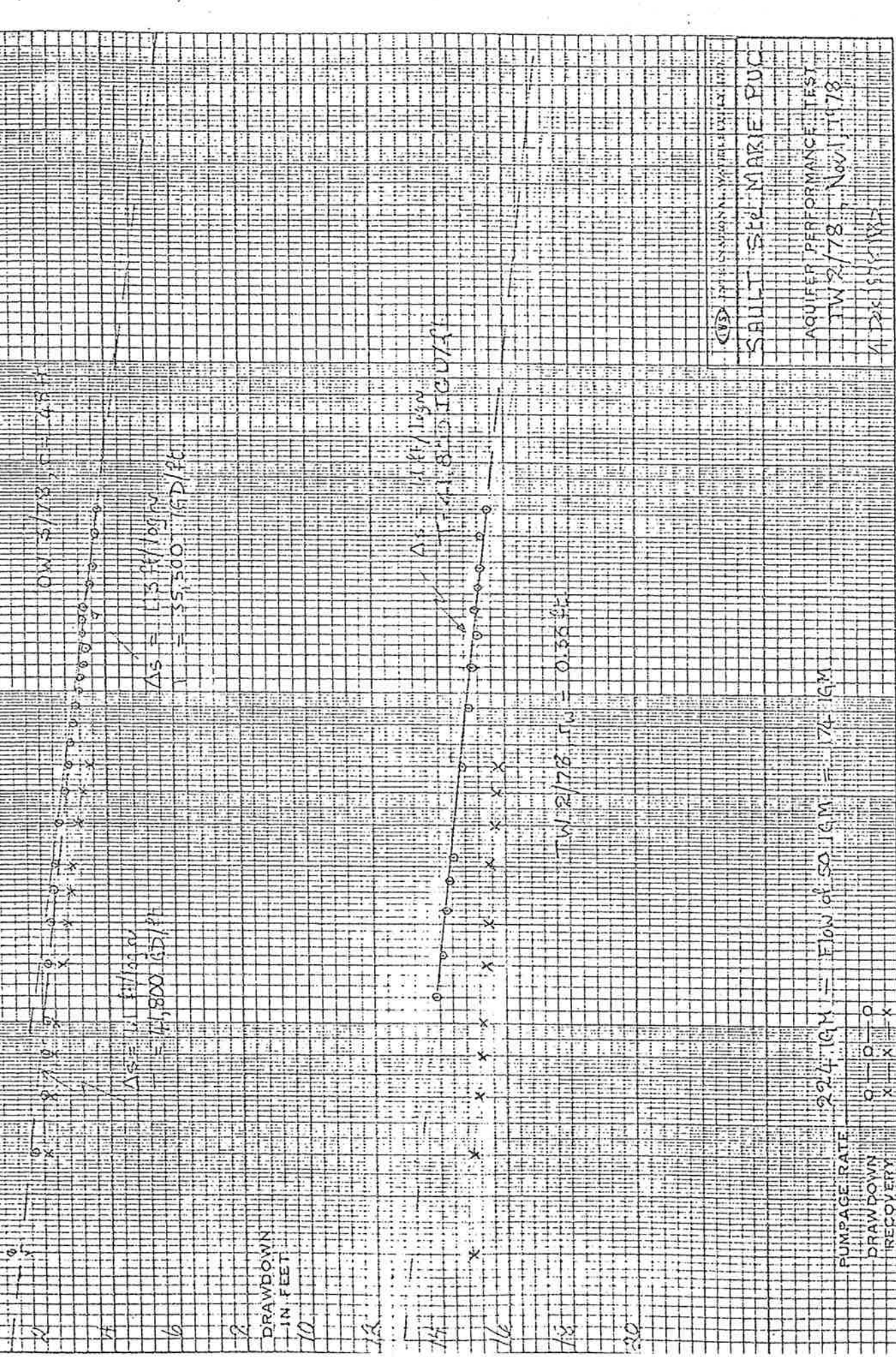
17

MADE IN CANADA

STYLIFY TRACING OR DRAWING PAPER

MADE IN CANADA W3713

ELAPSED TIME IN MINUTES SINCE PUMPAGE STARTED & STOPPED




 CANADIAN WATER SUPPLY SYSTEMS
SALT SUE MARIE PUC
 AQUIFER PERFORMANCE TEST
 TW 2/78, Nov 1, 1978
 A 206154 1/87

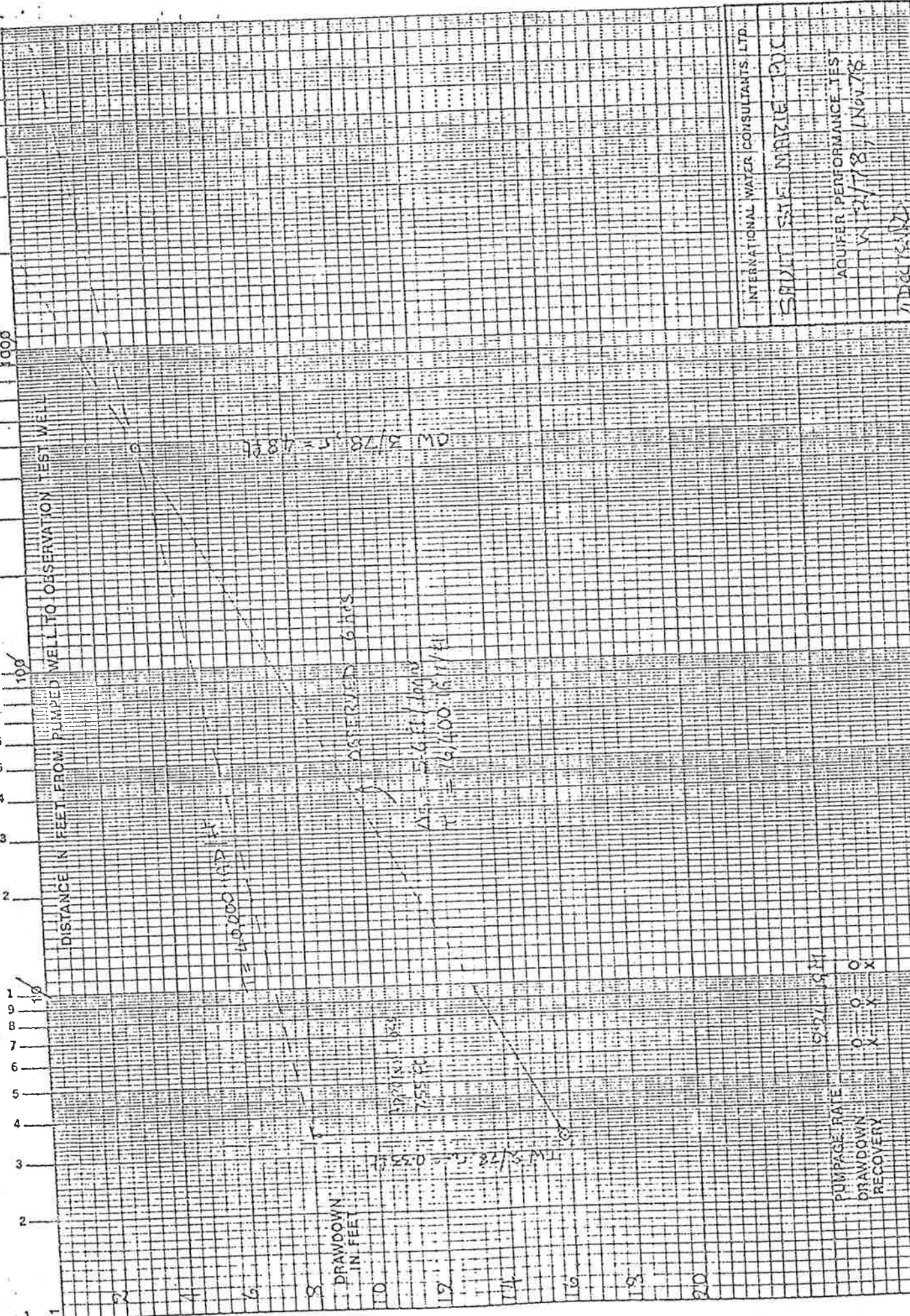
224.1 GM = Flow @ 50.1 GM = 174.1 GM

PUMPAGE RATE x
 DRAWDOWN o
 RECOVERY o

A78 338

G-10210 SEMI-LOGARITHMIC, 4 CYCLES X 10 TO THE INCH

BY GRAPHING CORPORATION
MADE IN CANADA



INTERNATIONAL WATER CONSULTANTS, LTD.
 SAULT STE MARIE, ONT.
 AQUIFER PERFORMANCE TEST
 W 2/78 / 1 NOV 78
 4 DEC 1978

PUMPAGE RATE	9.27 GPM
DRAWDOWN	0 - 0 - 0
RECOVERY	X - X - X

DRILLERS LOG

ELECTRIC - LOG

DRILLER: J. GRAY

RESISTIVITY IN OHM-Feet

HOLE DIAM: 10 3/4"

0 100 200 300 400 500 600 700 800 900 1000

ELEV: 685 (Top)

0

20

40

10' of soft

Soft Red

60

80

100

120

140

Red Sand Fine

Clay streaks soft

160

180

200

220

240

Red Clay

Upper Strata

Soft

260

280

300

Red Sand Clay (Silt) zone

320

SANDSTONE

Red

340

330

340

10" O CASING

5" O CASING

1/2" NATRIC TUBING
ROCKING

- ① STATIC LEVEL 43.24 (B.L.)
NON 281/6
PUMPING LEVEL 57.20 (400 min)
CAPACITY 200 GPM
- ② 10" 3/4" CASING PIPES
1/4" WIRE MESH SCREEN 320-330

RESISTIVITY

A
N

SECONDRY

INTERNATIONAL WATER SUPPLY LTD.

LOGS OF TEST WELL 4/73

SAULT STEPHEN PULP

1-2-2-1903-20

ALLEN SIDE ROAD SITE

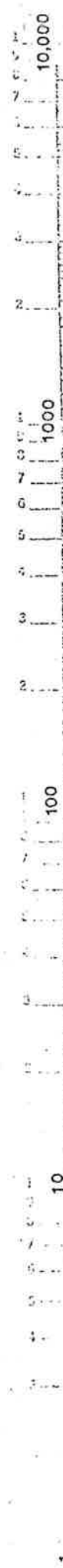
Nov 25/73

1

MADE IN CANADA

SPECIFY FRACS OR DRAWING PAPER

ELAPSED TIME IN MINUTES SINCE PUMPAGE STARTED OR STOPPED



SWL BEFORE TEST
TW 4/78 - 51.54 (MP+32')

OW 2/78 - 4.07' (MP+2')

AFTER 6 HOURS PUMPING
FIELD KIT

Hardness 86 mg/l
Chloride (Cl) 15 mg/l
Iron 0.5 mg/l
PH 8.0
Temp 47°F

0.16 ft correction

OW 2/78
 $r = \pm 3500$ ft

$\Delta s = 1.2' / \log 2$

$T = 44,000$ 19D/ft

CORRECTION FOR VELOCITY AT 180 MIN
0.16 ft

TW 4/78

$\Delta s = 1.3$ ft / $\log 2$

$T = 40,600$ 19D/ft

$Q = \frac{200}{5} = 40$ 18.5 19M/ft

$\Delta s = 1.0$ ft / $\log 2$

$T = 52,800$ 19D/ft

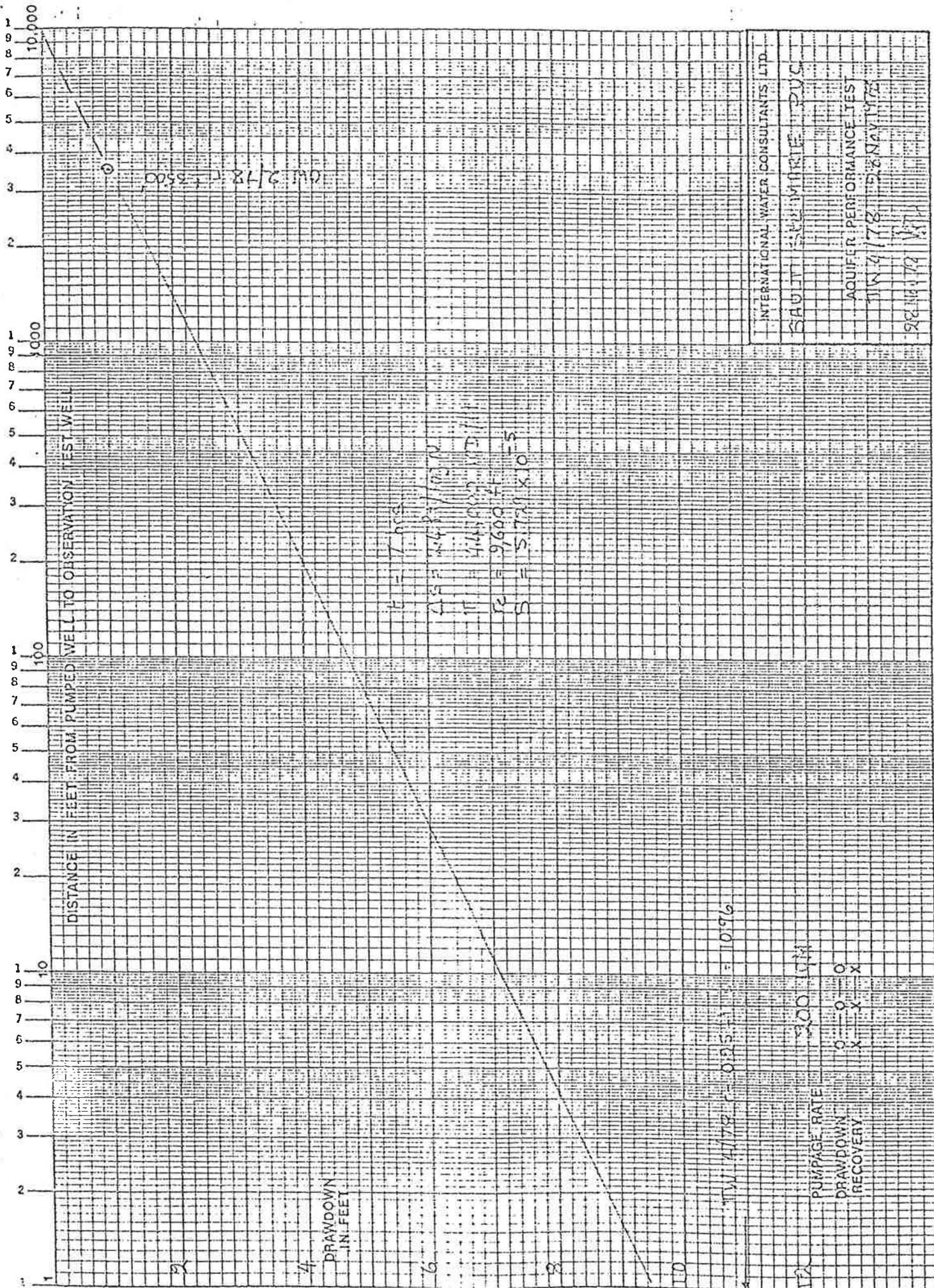
PUMPAGE RATE 200 19M

DRAWDOWN 0 - 0 - 0

RECOVERY X - X - X

INTERNATIONAL WATER CONSULTANTS LTD.
SAULT STE MARIE POC.
AQUIFER PERFORMANCE TEST
TW 4/78, 28 Nov 78
28 Nov 78 M.P.

INTERNATIONAL WATER CONSULTANTS LTD.
MADE IN CANADA



INTERNATIONAL WATER CONSULTANTS LTD.
SAULT STEPHENIE DUC
AQUIFER PERFORMANCE TEST
TW 4178 - 3500
21/11/78

TW 4178 - 0.25 ft = 1096
PUMPAGE RATE 300 LPM
DRAWDOWN 0 - 0 - 0
RECOVERY X - X - X

21/11/78

Appendix C-3b
IWS Groundwater Investigation Letter (1978)

INTERNATIONAL WATER SUPPLY, LTD.

file # 1000000000
1978
production sheet
Ground Water Exploration and Development

Member ACEG

BARRIE MONTREAL SASKATOON

543 Bayview Dr., Post Office Box 310
Barrie, Ontario L4M 4T5

Tel. 705-726-7411 - 416-889-3689 - Telex 06-875534

August 24, 1978.

M. Wallenius, P. Eng.,
Assistant Manager of Engineering,
Public Utilities Commission,
765 Queen Street East,
Sault Ste. Marie, Ontario.

EX-1000000000

AUG 23 1978

g3300690000

1978 GROUNDWATER INVESTIGATION

- (1) Review of our files showed we had not submitted a water taking permit for 1.5 MGD from Queen Street No. 3 Well. This was done on August 18, and a copy of our submission was forwarded to you.
- (2) During my visit with Ron, I agreed to forward the water level contours of the lower aquifer in the east end. Enclosed are sketches showing the approximate contours in 1970, 1972, and in 1977 after Dacey Road was in operation.

The static levels in the lower aquifer were about 40 feet below ground in 1970 along Highway 17 East. If the connection between the shallow water aquifer and the lower aquifer was good, the upper aquifer would drain into the lower aquifer and static levels would be approximately the same.

The facts are most shallow wells along Highway 17 East have static levels in the range of 5 to 10 feet below ground, therefore, the connection is poor.

- (3) For your interest, also enclosed are copies of the hydrographs for:

- Station Well and Observation Well
- Goulais Ave. Wells 1 & 2 and TW 1/65
- Allen's Side Road TW 1/66
- Dacey Road Well and TW 2/72

file well
good records

1000000000

K. Wallenius, P. Eng.

August 24, 1978

Page 2

(4) Your monitoring programme should be expanded to include regular readings of the following:

- TW 3/70 (Sewage Plant)
- TW 4/70 (Dacey Road) - This test well was to be repaired.
- Queen Street No. 3
- TW 2/75

Each test well reference point should be surveyed to establish measuring point elevation.

(5) If your relations with the Rankin Reserve are friendly, it would be useful to monitor one of their observation wells, probably their TW 4/74.

(6) I plan on being in the Sault on August 29, and will drop in for a visit to review the results of your well inventory.

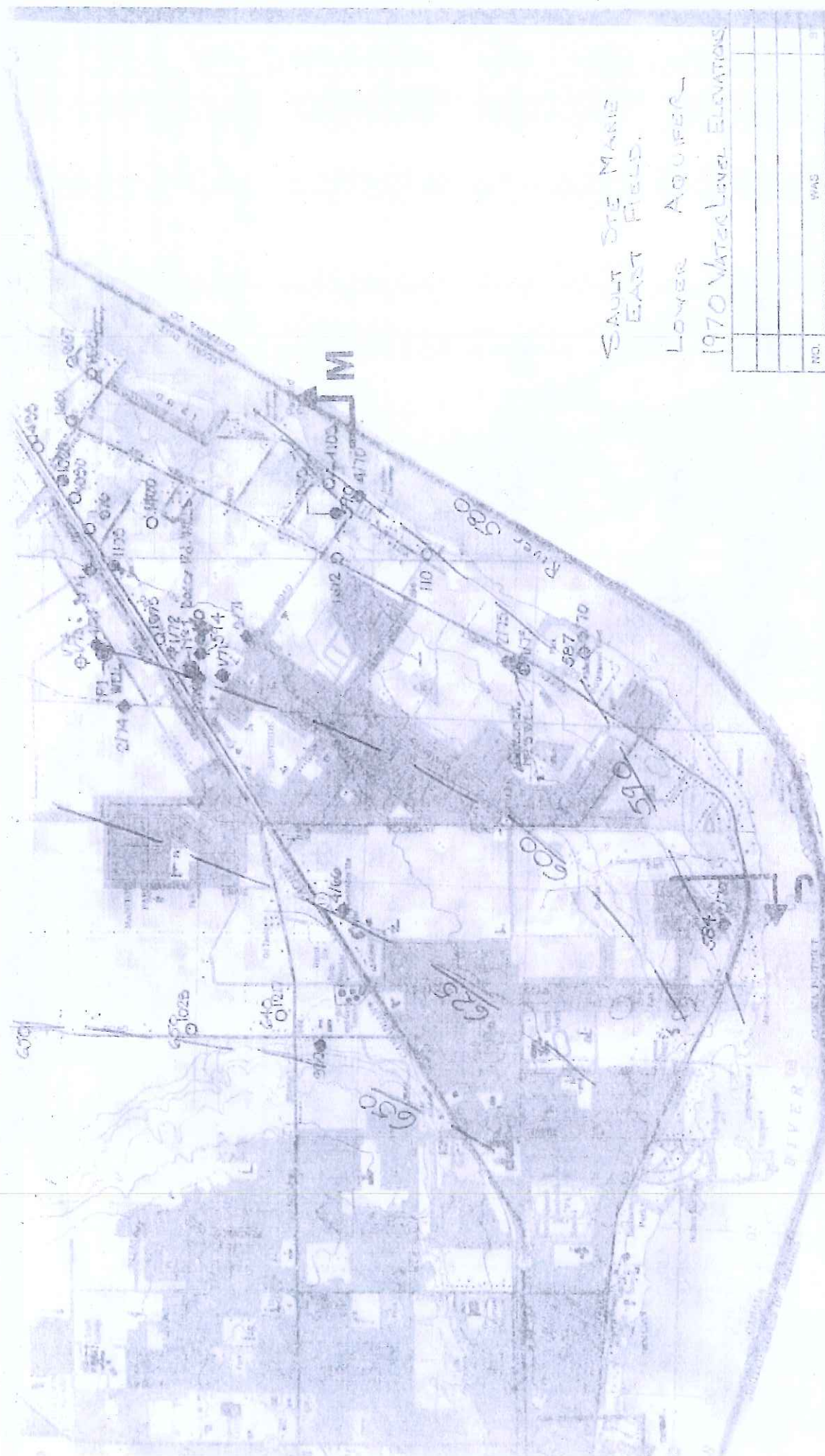
Best regards,



D. R. TURNBULL, P. Eng.

DRT/ti

Encl.

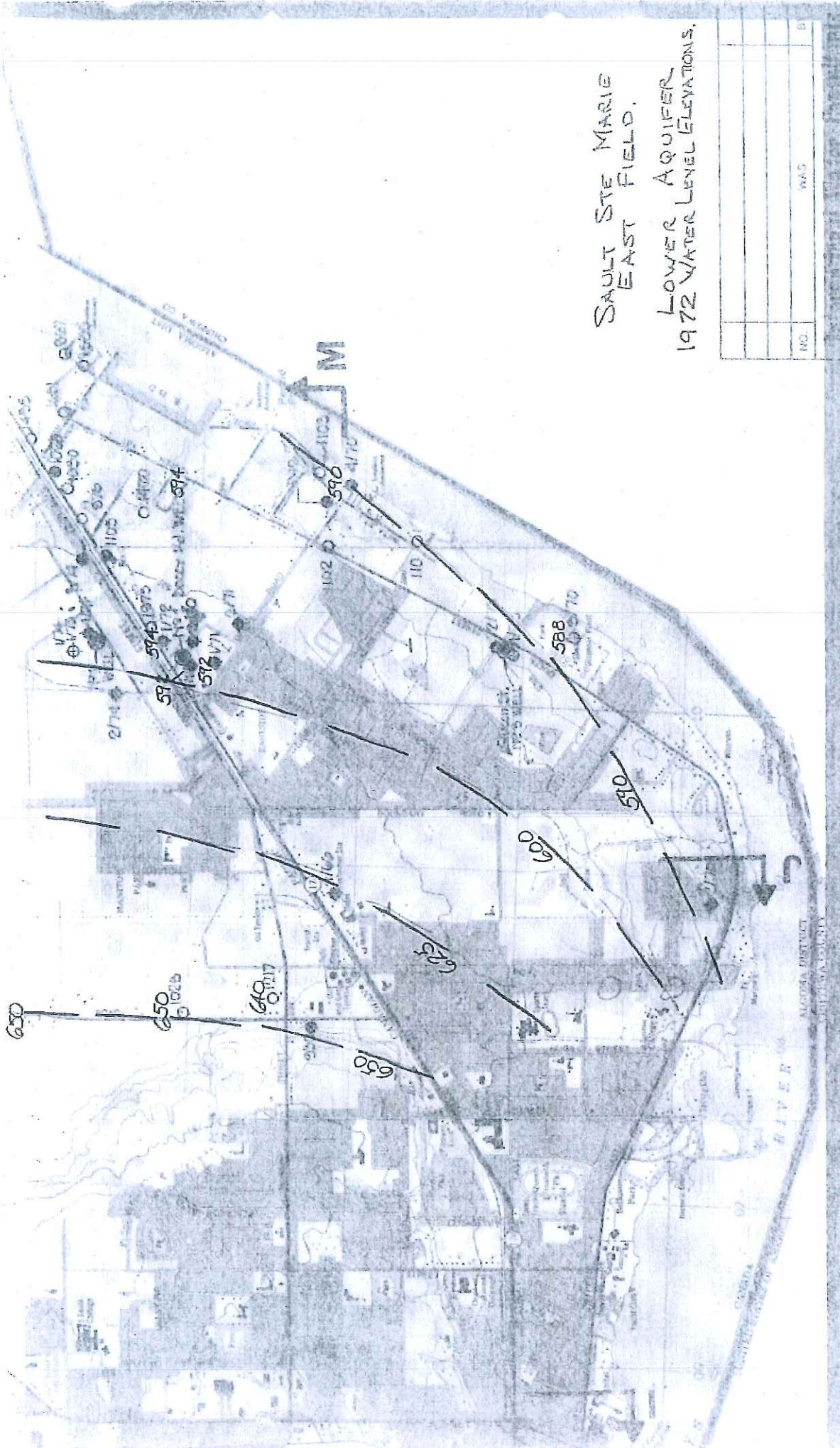


SAULT STE MARIE
EAST FIELD.

LOWER AQUIFER

1970 WATER LEVEL ELEVATIONS

NO.	WAS	BT

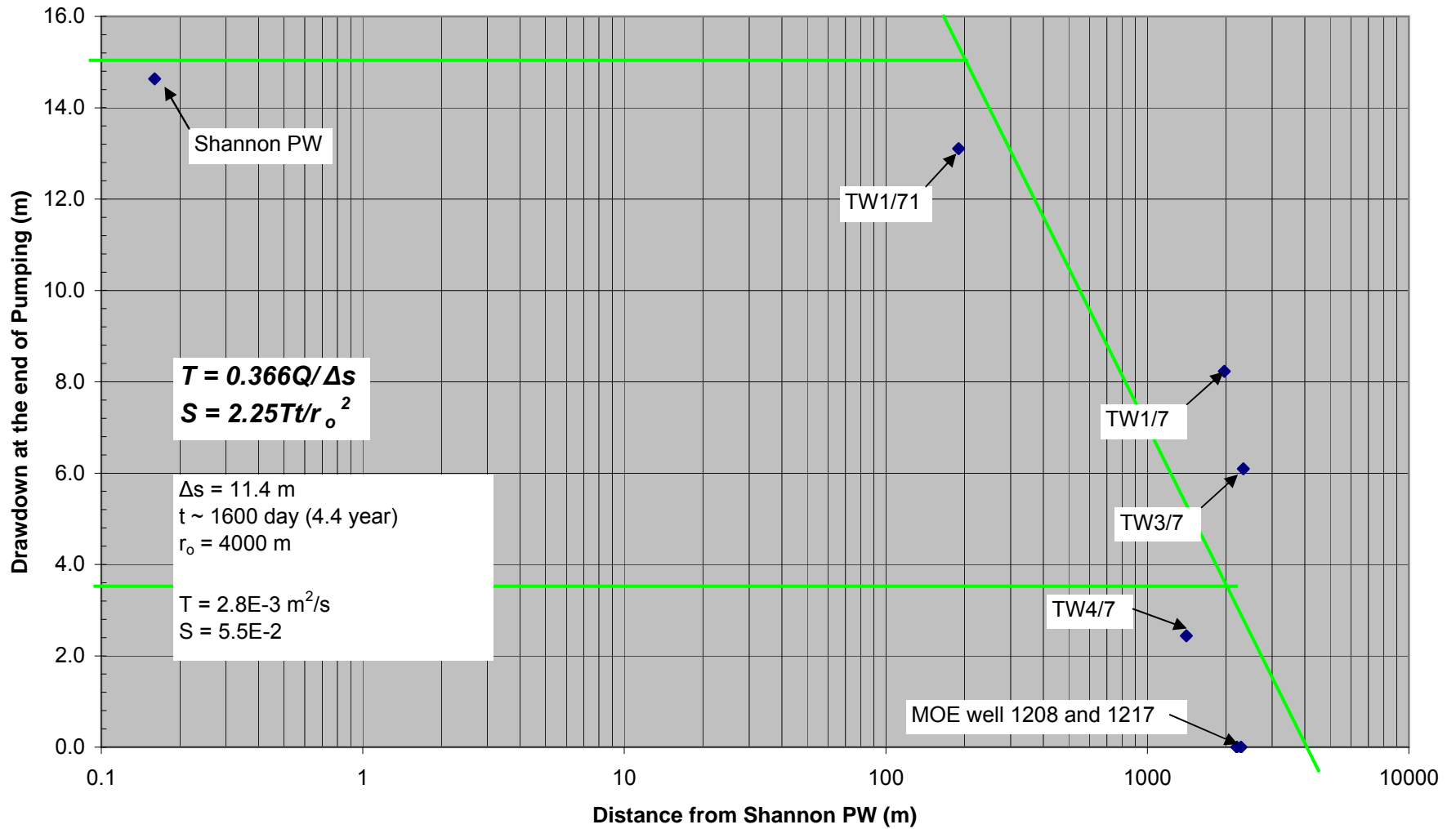


SAULT STE MARIE
EAST FIELD.
LOWER AQUIFER
1972 WATER LEVEL ELEVATIONS.

NO.	WAS

Analysis

Semi-Log Distance-Drawdown Analysis, Pumping of Shannon Well 1972 to 1977



Appendix C-3c

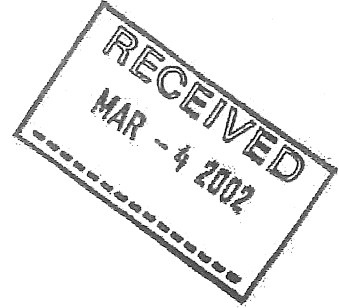
IWS Lorna Well 1 (Queen St No 3) Pumping Test (1977)

INTERNATIONAL WATER SUPPLY LTD.

Ground Water Development - Drilling Services
Pumps - Water Treatment - Service & Maintenance
BARRIE ST. JULIE, QC SASKATOON
342 Bayview Dr., Post Office Box 310
Barrie, Ontario, Canada L4M 4T5
Tel. 705-733-0111 • 800-461-9636 • Fax 705-721-0138
email iws@iws.ca

February 26, 2002

PUC Services Inc.
Sault Ste. Marie
765 Queen Street East
P. O. Box 9000
Sault Ste. Marie, Ontario
P6A 2P2



Attention: Mr. Tom Godfrey

Reference: **Queen Street and Shannon Wells**
GUDI Opinion

Dear Sir;

As requested, we have reviewed the hydrogeologic setting and pump test data from the Queen Street (Lorna Drive) and the Shannon Avenue (Dacey Road) Wells in order to provide an opinion on whether these wells may be considered "Groundwater Under the Direct Influence of Surface Water" (GUDI). We have enclosed the well logs from these sites and pump test results from the Queen Street No. 3 test.

From our review of this information, it is our opinion there is sufficient evidence to conclude that these wells are not under the Direct Influence of Surface Water.

This is based on the following;

- (1) The Queen Street (Lorna Drive) and Shannon Avenue (Dacey Road) wells are both confined by 36.6 to 70.1 m (120 to 230 ft.) of low permeability lacustrine clays. The resistivity log of TW 2/72 confirms this low permeability confining unit.
- (2) The pumping test data reviewed from testing of Queen Street Well No. 3 indicates confined artesian conditions.

INTERNATIONAL WATER SUPPLY LTD.

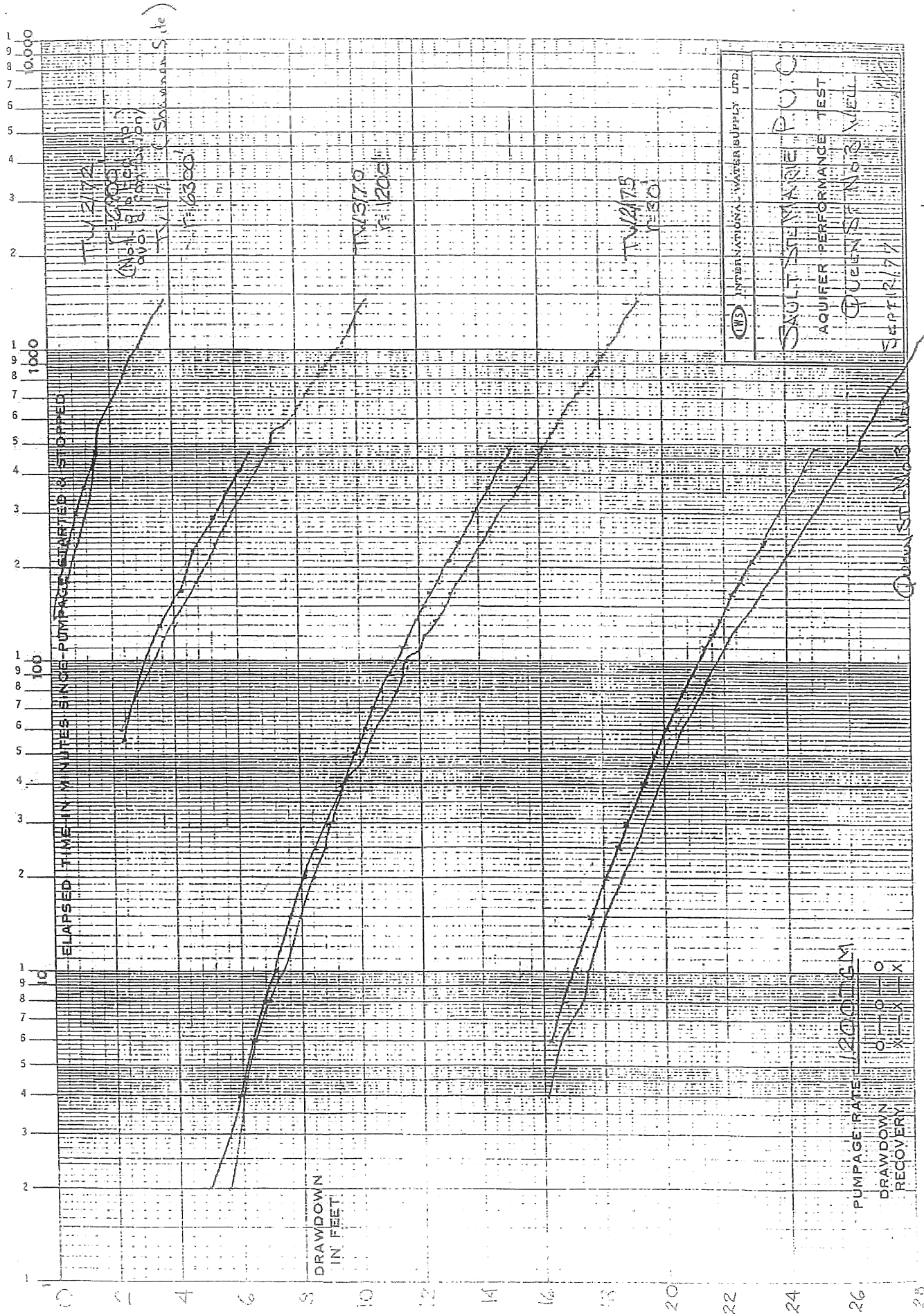
- (3) Assuming a confining unit permeability of 1×10^{-6} cm/sec, a confining unit thickness of only 20 m, and unit hydraulic gradient, leakage through this unit would require years to decades.
- (4) The closet wells to the St. Marys River are located some 300 m from the river. Even if one assumed that there was some leakage to the aquifer from the river, the horizontal flow component alone would require well in excess of 50 days to reach the wells. (likely in the order of ½ year).
- (5) We understand that historic microbiological quality has been excellent at both well sites.

Therefore based on our review of the hydrogeologic setting, pump test results, and using reasonable and conservative estimates, we conclude that the Queen Street (Loma Drive) and Shannon Avenue (Dacey Road) wells are not GUDI.

Yours truly,



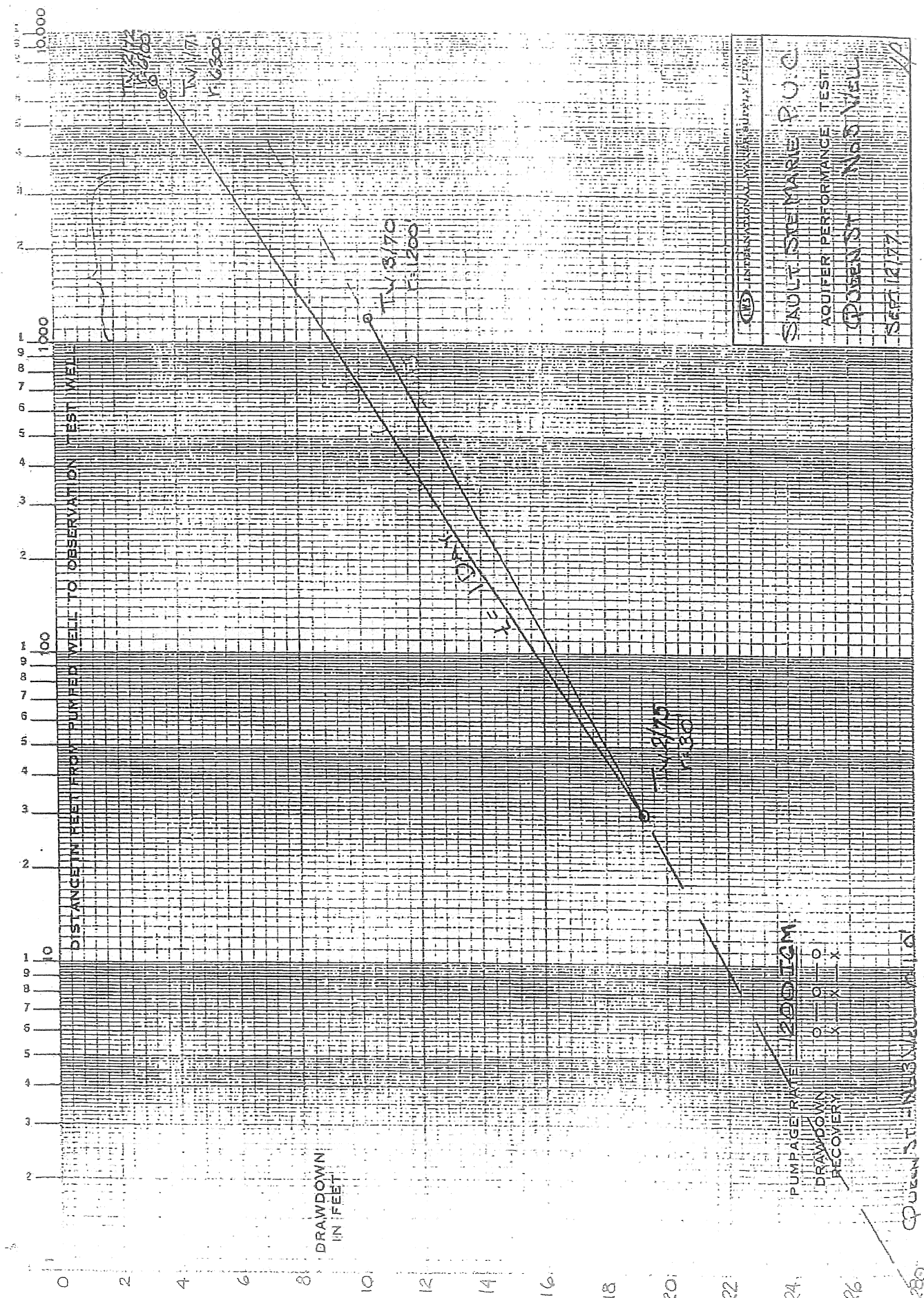
for Gary A. Kuehl, P. Geo. (Sask.)
GAK/lw



87717

~81 SEMI-LOGARITHMIC, 4 CYCLES γ^2 TO THE INCH

HIC CONTROLS CO. INC. MADE IN CANADA



INTERNATIONAL WATER SUPPLY CORP.

SAULT STEMARIE P.O.C.

AQUIFER PERFORMANCE TEST

QUEEN ST. N. 3/4 W. 20

SEPT. 12, 77

A-77-111

DRILLERS LOG

ELECTRIC LOG

DRILLER: A. Ormister

RESISTIVITY IN OHM-FeET

HOLE DIAM: 5 7/8"

0 100 200 300 400 500 600 700 800 900 1000

topsoil: ELEY 596

silty red clay str. of sand & gravel

Sand - m.; silty clay str.

soft silty red clay

soft silty gray clay

soft silty red clay

soft silty red & gray clay

soft silty red & gray clay & gravel

soft silty red & gray clay

fine to med. angular sand

fine to med. angular sand

fine to med. angular sand & gravel

fine to med. angular sand

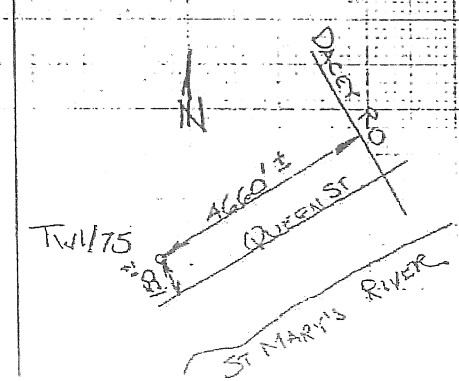
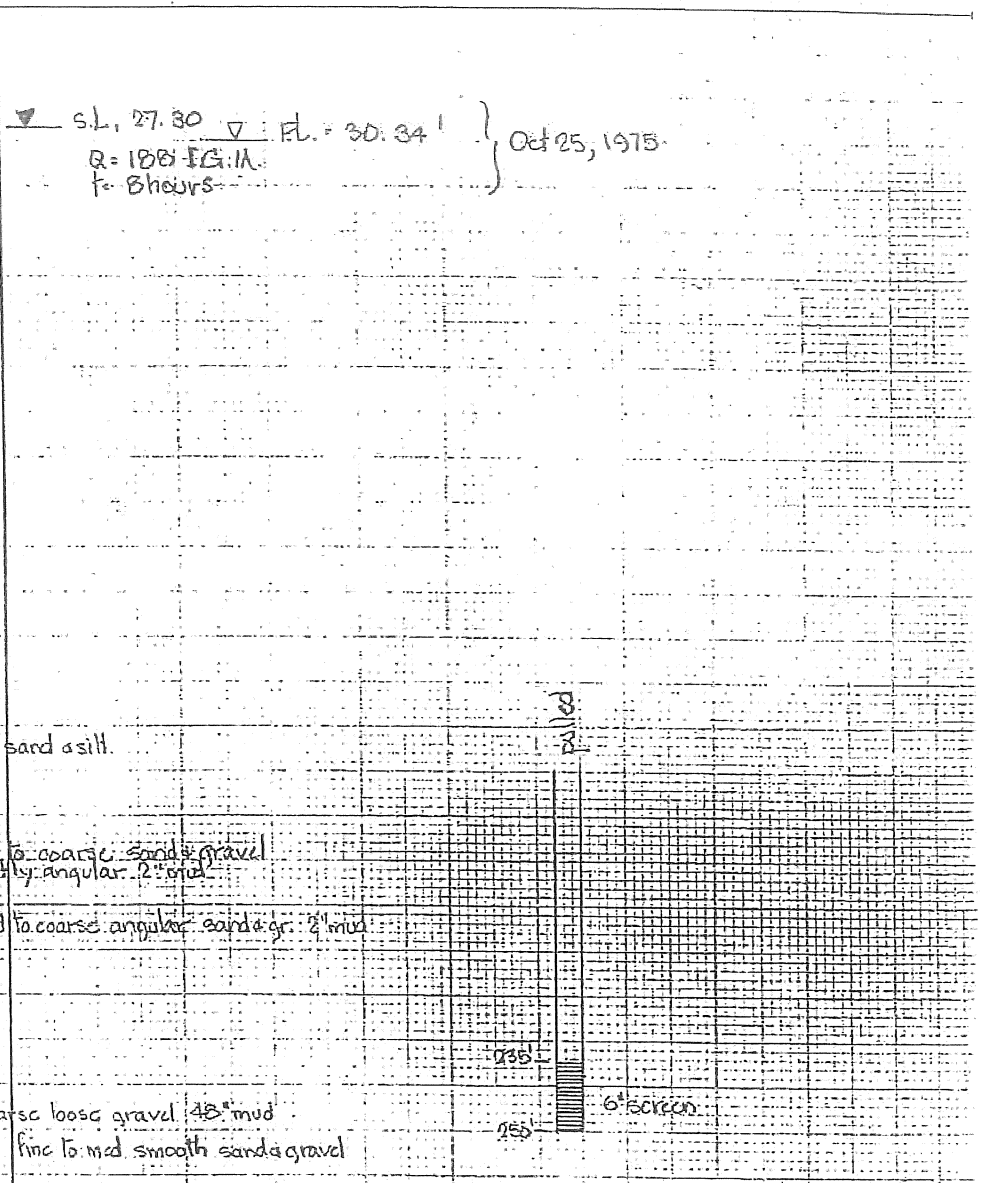
med. gravel & sand

fine to coarse angular gravel & sand

fine to med. angular sand & gravel

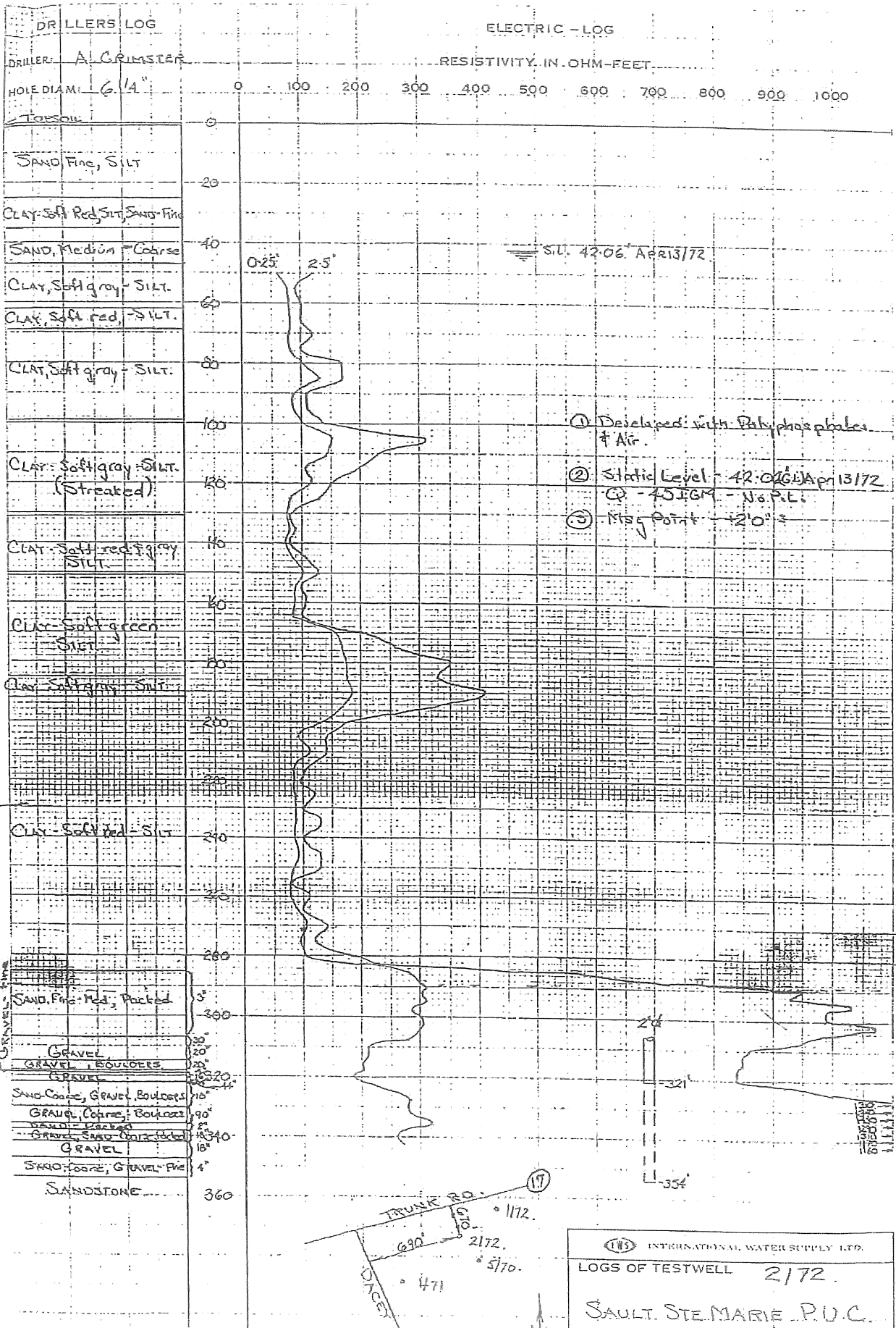
fine to coarse angular sand

sand stone



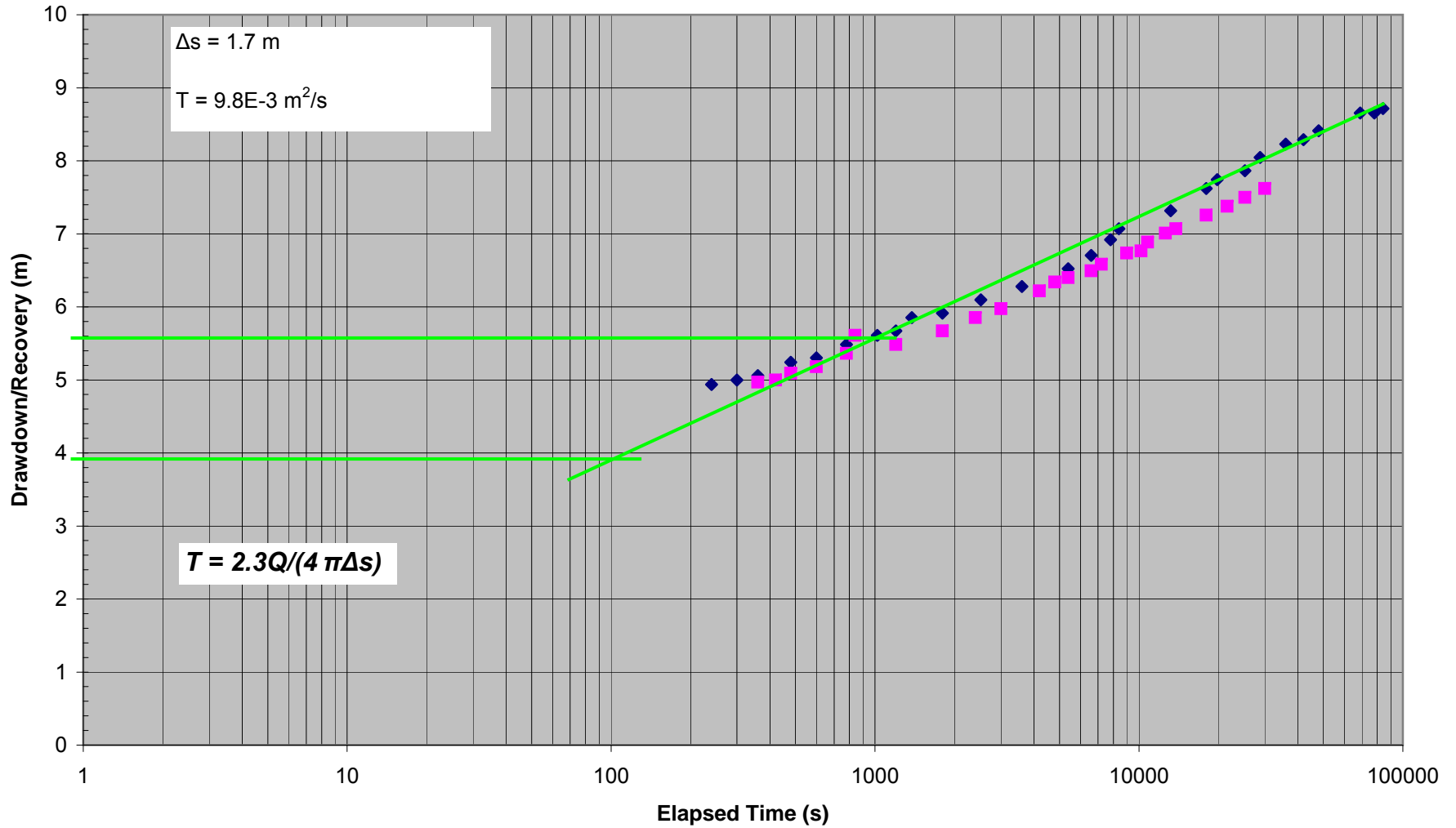
IWS INTERNATIONAL WATER SUPPLY LTD.
 LOGS OF TESTWELL 1/75
 SAULT STE MARIE PUC
 1-2-12-1903-20
 J. Wall Oct 15/75

G9-12G IWS #3
10 X 10 TO THE 1/2 INCH
MADE IN CANADA



Analysis

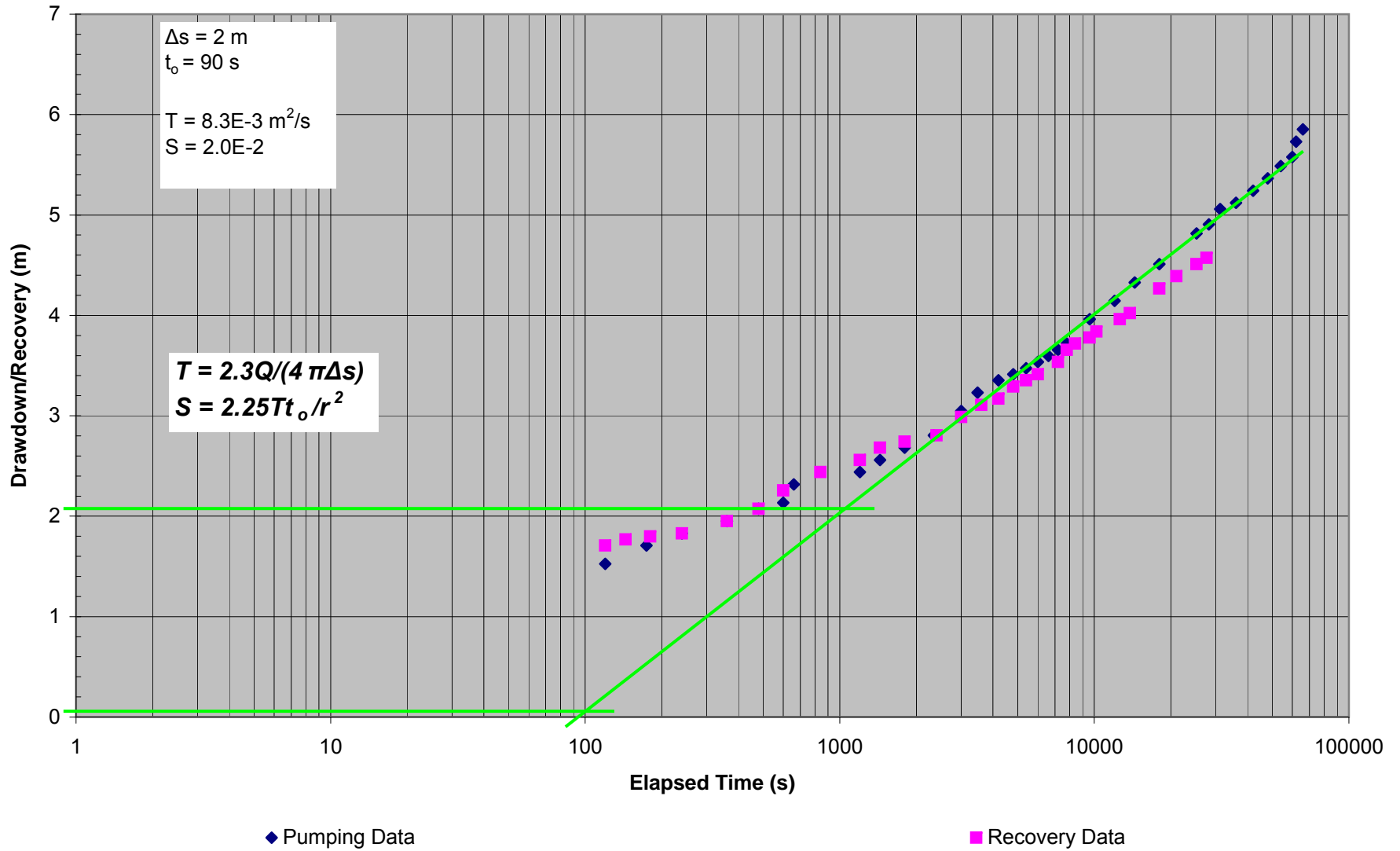
Semi-Log Time-Drawdown Analysis, Lorna Production Well 1



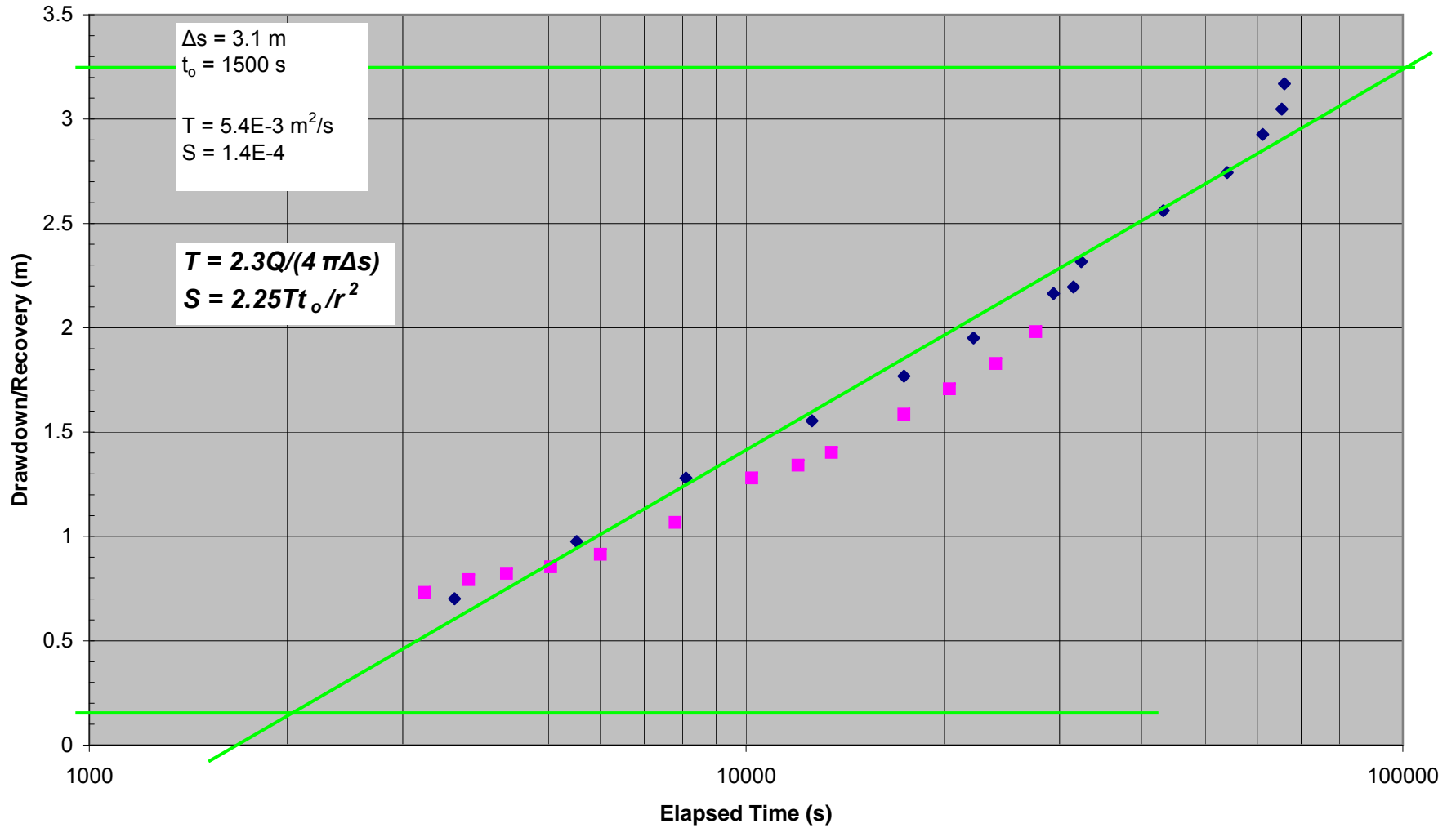
◆ Pumping Data

■ Recovery Data

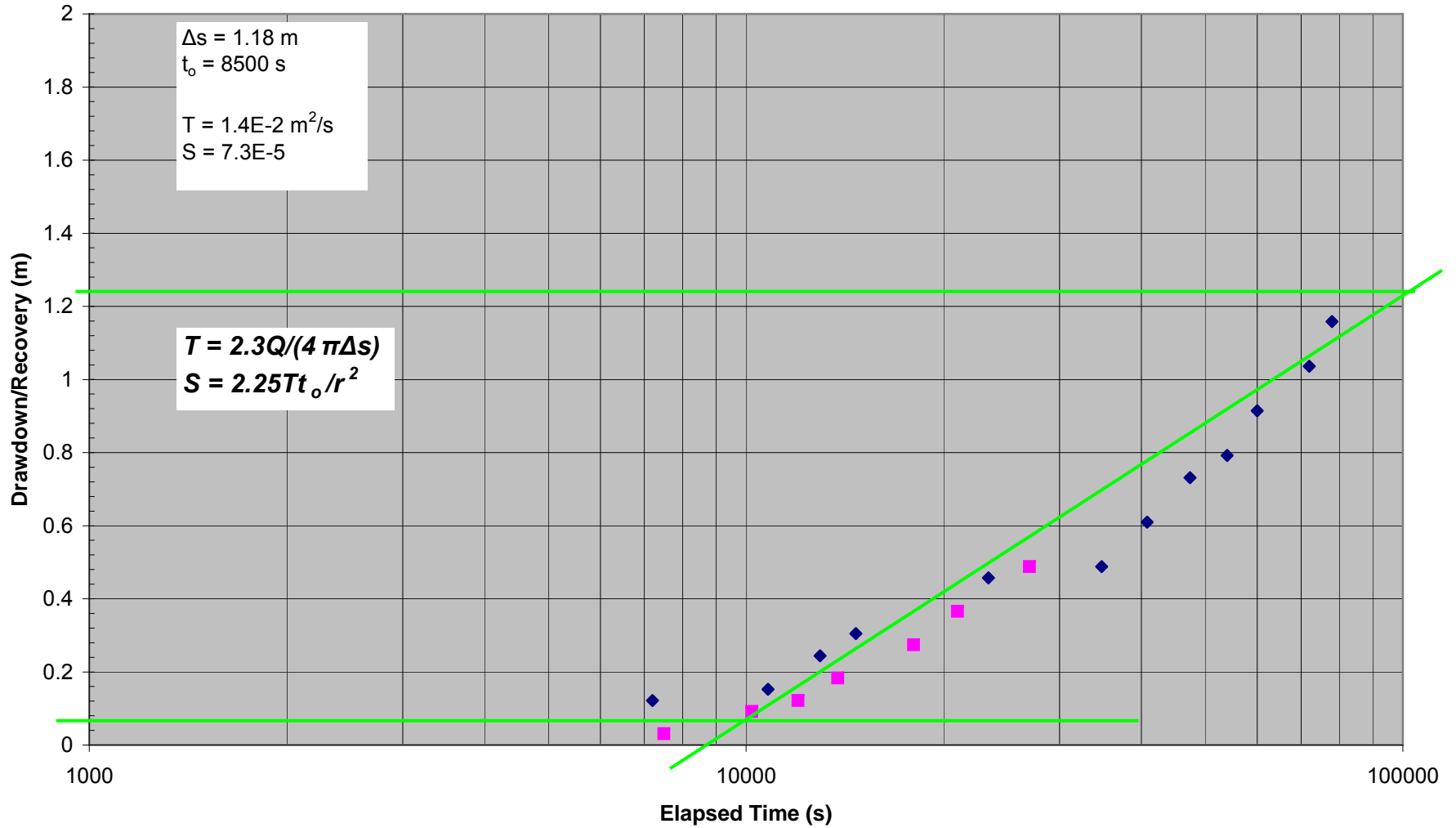
Semi-Log Time-Drawdown Analysis, TW2/75



Semi-Log Time-Drawdown Analysis, TW3/70



Semi-Log Time-Drawdown Analysis, TW1/71



◆ Pumping Data

■ Recovery Data

Semi-Log Distance-Drawdown Analysis, IWS 1977 Pumping Test

