DISTRICT LOT 86 - GALIANO ISLAND
RESIDENTIAL DEVELOPMENT
GROUNDWATER SUPPLY EVALUATION

THURBER ENGINEERING
VICTORIA / VANCOUVER / CALGARY / EDMONTON / YELLOWKNIFE / TORONTO

DISTRICT LOT 86 - GALIANO ISLAND
RESIDENTIAL DEVELOPMENT
GROUNDWATER SUPPLY EVALUATION

Report

to

GARY THOMAS

November 1, 1994
File: 19-1994-0

Thurber Engineering Ltd.
Victoria, B.C.

THURBER ENGINEERING LTD.

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THURBER

November 1, 1994 File: 19-1994-0

Gary Thomas, A.Sc.T.
c/o Thomco Supply Ltd.
P.O. Box 58232 Stn. L
Vancouver, B.C.
V6P 6E3

GALIANO ISLAND DL 86 - DEVELOPMENT
GROUNDWATER SUPPLY STUDY
REPORT ON WELL YIELD EVALUATION AND WATER QUALITY

Dear Sir:

We are pleased to present our report on the above project. The use of this report is subject to the Statement of General Conditions attached.

1. INTRODUCTION

Thurber Engineering Ltd. (TEL) was retained by Gary Thomas to provide well yield evaluation and water quality information from 4 wells drilled to supply domestic water for 4 single family lots. The proposed development area is located in DL 86 on Galiano Island. The location of the wells in relation to the lots is shown on Figure 1.

2. WELL DRILLING AND YIELD EVALUATION

The objective of the drilling program was to provide a series of wells capable of a minimum yield of 500 Imperial gallons per day (Igpd) per lot. This minimum requirement is outlined in the Preliminary Layout Approval, Appendix "W", issued by the Ministry of Transportation and Highways (MoTH). The wells numbered 1,2 & 3 were drilled by Red Williams Drilling Ltd. in June 1994 and well number 4 was drilled by Island Well Drilling Ltd. in August 1993. Test pumping and water sampling of all 4 wells was done by Red Williams Drilling Ltd. during October 1994.

The wells were test pumped in excess of the minimum requirement. Each well was test pumped for a minimum period of 8 hrs, during which time regular drawdown readings were taken. During the test pumping period observation readings were taken on the adjacent well(s) to assess the

Continued....

potential for interference between wells. At the termination of pumping, each well was monitored for recovery for a minimum period of 4 hours. The drawdown and recovery data was analyzed by TEL and estimated well yields were calculated. Although the spring and summer of 1994 has received below normal precipitation, a further allowance for potentially lower non-pumping water levels during a severe drought situation was taken into account in the yield evaluation.

Table 1 lists the calculated yield estimate of each well, based upon the information gathered at the time of the test pumping program. A copy of the driller's well log for each of the wells is attached to this report.

3. WATER QUALITY EVALUATION

3.1 Background

Appendix "W" item (b) states that the water must meet or exceed the Canadian Drinking Water Guidelines - 1993 ("Guidelines"). The groundwater quality is to be reviewed by the Medical Health Officer, which in this case is the Capital Regional District - Health Officer (CRD/Health). A list of 17 parameters were tested to assess the water quality. Specific attention was paid to total and faecal coliform bacteria and chloride (as an indicator of potential sea water intrusion). A summary of the Total Coliform and Chloride test results are shown in Table 1. The complete test results are appended to this report.

3.2 Total and Faecal Coliform Bacteria

A Total Coliform sample was taken from each well following chlorination treatment and flushing to remove all traces of chlorine bleach. An additional water sample was taken for further parameters. The samples were analyzed by JB Laboratories Ltd.

The "Guidelines" for coliform bacteria require that:

1.) No sample should contain more than 10 total coliform organisms per 100 mL, none of which should be faecal coliform.
2.) No consecutive sample from the same site should show a presence of total coliform organisms.

Continued....

The test results for Total Coliform for samples from well numbers 1 & 2 showed no total coliform (reported as <1 CFU/100ml) following the initial well disinfection operation. The Total Coliform results for well numbers 3 & 4, showed no total Coliform bacteria following the second well disinfection.

None of the water samples taken showed a faecal coliform presence.

3.3 Noncoliform Bacteria

The "Guidelines" state that not more than 200 CFU/100 mL on a total coliform membrane filter (ie. overgrowth) should be present. Only well #1 showed an overgrowth of noncoliform bacteria on the one and only test taken. The same sample showed no total or faecal coliform bacteria.

3.4 Chloride

The "Guidelines" state that not more than an Aesthetic Objective (AO) of 250 mg/L of Chloride be present in drinking water. Samples from all 4 wells indicated a range of 10 to 21 mg/L, well below the AO. Sea water intrusion did not occur during the test pumping of any of the wells.

3.5 Other Parameters

Several other parameters were determined for the water sampled. The following comments pertain to parameters other than bacteria.

Well #1:

The water tested was within the Maximum Acceptable Concentration (MAC) or AO for the parameters tested.

Well #2

The water tested was above the AO for iron. The AO for iron is 0.30 mg/L, while the test result indicated 0.6 mg/L. The presence of iron is not considered a health hazard. Iron at this level may cause staining and/or encrustation of plumbing fixtures. This situation is readily treatable in-house by the consumer.

Well #3

The water tested was above the AO for manganese. The AO for manganese 0.05 mg/L, while the test result indicated 0.09 mg/L. Like iron, the presence of manganese is not considered a health hazard.

Continued....

Manganese at this level may cause staining and/or encrustation of plumbing fixtures. As with iron, manganese is readily treatable in-house by the consumer.

Well #4

The water tested was above the AO for manganese. The AO for manganese 0.05 mg/L, while the test result indicated 0.12 mg/L. Like iron, the presence of manganese is not considered a health hazard. Manganese at this level may cause staining and/or encrustation of plumbing fixtures.

3.6 Comments

The groundwater from all the wells meets the Guidelines for MAC for all the parameters tested. The slightly elevated levels of iron and manganese in wells # 2, 3 & 4 are a common occurrence in water from bedrock wells on Galiano Island. As noted above these are considered a nuisance and can be easily treated if so desired. It it not uncommon for iron and manganese levels to modify once a well is put into production.

The reason for the count level of non-coliform bacteria in well #1 is unexplainable at this time. As noted above both the faecal and total coliform counts from the same sample were nil. Of the other parameters tested none indicated what may be the cause of the noted overgrowth. It is possible that the count may be due to natural bacteria being carried into the well by the groundwater. The source may be natural soil bacteria or water containing bacteria originating in a swamp or surface pond some distance from the well. It is unlikely that this represents a health hazard, however we recommend that the consumer have regular analysis done for bacteria to see if the level noted persists.

4. IMPACT UPON ADJACENT WELLS AND TIDAL EFFECT

The observation monitoring of the drawdown on the adjacent well(s) during the test pumping indicated only slight, if any occurred in some cases. More commonly noticed was a slight effect of tide on the water levels. The maximum recorded apparent interference was 0.27 m (0.89') on well #2 while pumping well #1, 400 m away. This may have been totally tidal influence since wells much closer together had less or no apparent interference effects.

Continued....

The closest recorded well (Ministry of Environment. Lands and Parks, Groundwater Section) to the DL 86 subdivision wells is on DL 91 over 900 m away. Considering the available drawdown for the subject wells, the slight, if any interference effect between wells within the subdivision and the fact that the DL 86 wells are in a discharge region while the DL 91 well is in a recharge region, the potential for off site interference of any significance at this time is considered insignificant.

5. CONCLUSIONS AND RECOMMENDATIONS

The test results indicate that a minimum supply of 500 lgpd per lot is obtainable from each of the 4 wells for each of the proposed 4 lots, for conditions in evidence at the time of testing. We recommend that the wells not be pumped beyond the estimated yields shown in Table 1.

Sea water intrusion did not occur during the test pumping of the wells. As noted above, the water quality results indicate potable water in each of the wells. The presence of non-coliform bacteria (at the time of sampling) in the water from well #1 is likely due to natural occurring bacteria. As a result of this condition we suggest the water from well #1 be sampled regularly by the consumer to identify if this condition persists. If this does persist, further identification is recommended and possible in-house treatment considered if so warranted.

In our opinion, based upon the testing and well monitoring of October 1994, the pumping of the 4 wells at rates not greater than the yields reported in Table 1, is not expected to cause a detrimental effect upon other known existing wells at the time of this report.

6. CLOSURE

The calculated well yields, the recommended maximum pumping rates and water quality results for the wells should be disclosed to any prospective purchaser planning to withdraw water from the respective wells.

The information provided and conclusions drawn in this report are valid at the time of testing. Use of the subject wells and future wells drilled in the general area may change the conditions from those assessed for this report. Over pumping of the wells increases the risk of well interference problems and sea water intrusion.

Continued....

We trust this meets report your immediate requirements. Should you have any questions please contact us at your convenience.

Yours truly,
Thurber Engineering Ltd.
C.T. Maber, P.Eng.
Review Principal

B.I. Ingimundson, P.Geo.
Hydrogeologist

PROFESSIONAL ENGINEER
PROVINCE OF
B. I. INGIMUNDSON
BRITISH COLUMBIA
GEOSCIENTIST
11/7/94

Attachments

copy to: Ministry of Transportation and Highways

bii/A

STATEMENT OF GENERAL CONDITIONS

1. STANDARD OF CARE

This report has been prepared in accordance with generally accepted geotechnical engineering practices in this area. No other warranty, expressed or implied, is made.

2. BASIS OF THE REPORT

This report has been prepared for the specific site, design objective, development and purpose that was described to Thurber Engineering Ltd. ("TEL") by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the report are only valid to the extent that there has been no material alteration to or variation from any of the said descriptions provided to TEL, unless TEL is specifically requested by the Client to review and revise the report in light of such alteration or variation.

3. USE OF THE REPORT

The information and opinions expressed in this report are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THIS REPORT OR ANY PORTION THEREOF WITHOUT TEL'S EXPRESS WRITTEN CONSENT. TEL WILL CONSENT TO ANY REASONABLE REQUEST BY THE CLIENT TO APPROVE THE USE OF THIS REPORT BY OTHER PARTIE(S) AS APPROVED USERS. The contents of this report remain the copyright property of TEL, who authorizes only the Client and Approved Users to make copies of the report, and only in such quantities as are reasonably necessary for the use of the report by those parties. The Client and Approved Users may not give, lend, sell, or otherwise make available the report or any portion thereof, or any copy of the report or portion thereof, to any other party without the express written permission of TEL.

4. COMPLETE REPORT

The report is of a summary nature and is not intended to stand alone without reference to the instructions given to TEL by the Client, communications between TEL and the Client, and to any other reports prepared by TEL for the Client relative to the specific site described in the report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS, AND OPINIONS EXPRESSED IN THE REPORT, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. TEL CANNOT BE RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

5. INTERPRETATION OF THE REPORT

(a) Nature and Exactness of Soil Description: Classification and identification of soils, rocks, and geologic units have been based upon commonly accepted methods employed in professional geotechnical practice. This report contains descriptions of the systems and methods used. Where deviations from these systems have been used they are specifically mentioned. Classification and identification of the type and condition of soils, rocks and geologic units are judgmental in nature. Accordingly, TEL cannot warrant or guarantee the exactness of the descriptions of insitu ground conditions set forth in the Report.

(b) Logs of Test Holes, Pits, Trenches, etc.: The test hole logs are a record of information obtained from field observations and laboratory testing of selected samples as well as an interpretation of the likely subsurface stratigraphy at the test hole sites. In some instances normal sampling procedures do not recover a complete or any sample. Soil, rock or geologic zones have been interpreted from the available data. The change from one zone to another, indicated on the logs as a distinct line, may be transitional. The same limitations apply to test pit and other logs.

(see over . . .)

(c) Stratigraphic and Geologic Sections: The stratigraphic and geologic sections indicated on drawings contained in this report are interpreted from logs of test holes, test pits or other available information. Stratigraphy is inferred only at the locations of the test holes or pits to the extent indicated by items 5(a) and (b) above. The actual geology and stratigraphy, particularly between these locations, may vary considerably from that shown on the drawings. Since natural variations in geologic conditions are inherent and a function of the historic site environment, TEL does not represent or warrant that the conditions illustrated are exact and the user of the report should recognize that variations may exist.

(d) Groundwater Conditions: Groundwater conditions shown on logs of test holes and test pits, and/or given within the text of this report, record the observed conditions at the time of their measurement. Groundwater conditions may vary between test hole and test pit locations and can be affected by annual, seasonal, and special meteorologic conditions, or by tidal conditions for sites near the sea. Groundwater conditions can also be altered by construction activity. These types of variation need to be considered in design and construction.

(e) Changes of Exposed Ground: Many geologic materials deteriorate rapidly upon exposure to climatic elements. Deterioration may be caused by precipitation and/or the action of frost. Therefore, site conditions may vary considerably from the time of the making of the tests performed for preparation of the report and the time of actual construction.

(f) Influence of Construction Activity: Construction activities can alter and damage the insitu ground conditions. The influence of all anticipated construction activities on the geologic environment should be considered in formulating and implementing the final design and construction techniques.

Wherever changes in the site occur after the preparation of the report or conditions are observed which indicate results clearly incompatible with the test results on which the report is based, the client and any other users of this report should notify TEL as soon as possible so that TEL will be able to provide necessary revisions to its report prior to any commencement of or alteration in design and construction.

6. OBSERVATIONS DURING CONSTRUCTION

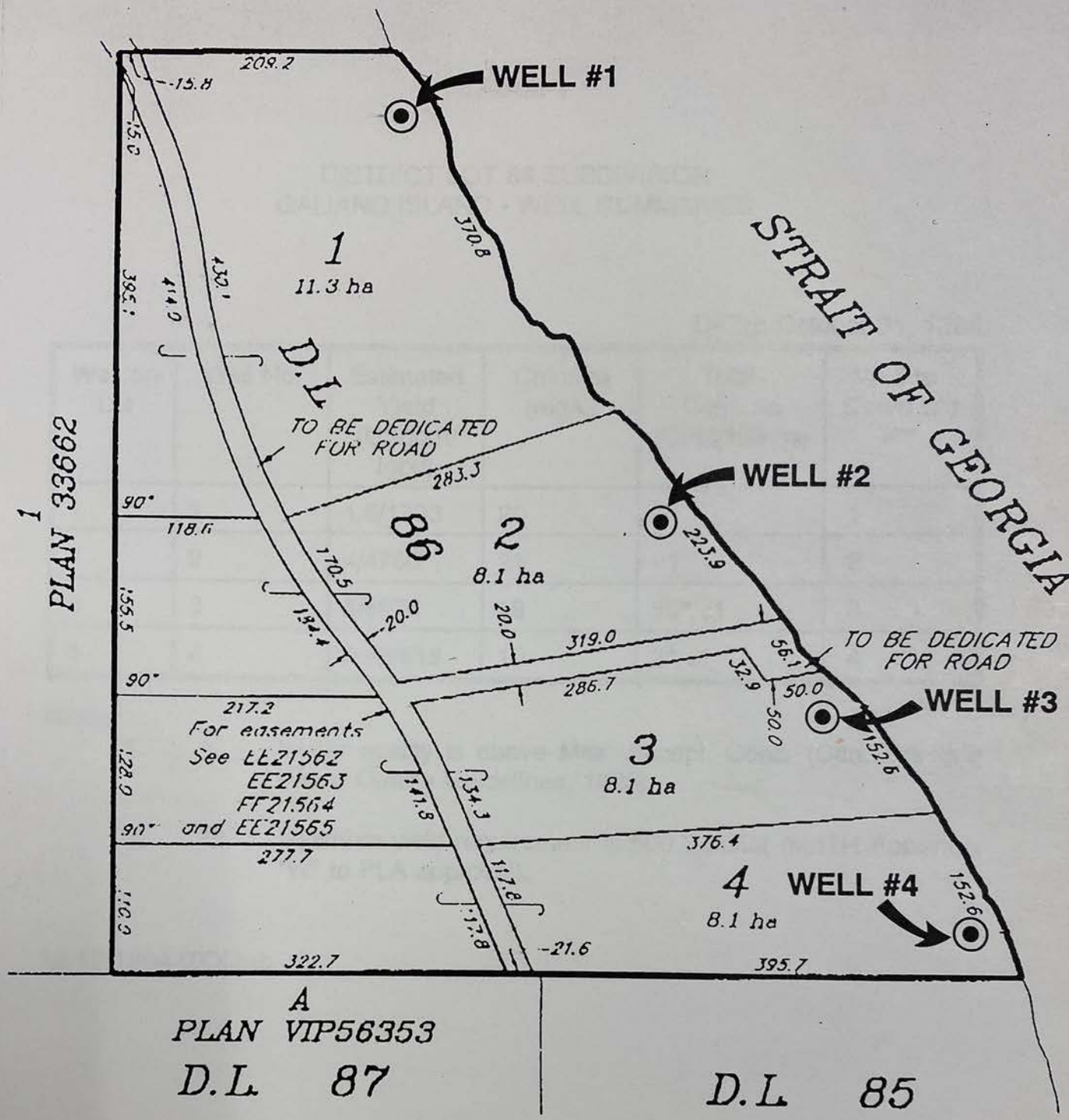
Observations of geologic conditions should be carried out during site preparation, excavation and construction to verify the conditions predicted by the report. Such observations should be communicated to TEL to allow for confirmation and/or alteration of the geotechnical recommendations or design guidelines presented in the report.

Wherever changes in the site occur after the preparation of the report or conditions are observed which indicate results clearly incompatible with the test results on which the report is based, then the client should notify TEL as soon as possible so that TEL will be able to provide necessary revisions to its report prior to any commencement of or alteration in design and construction.

7. SAMPLES

TEL normally disposes of all unused soil and rock samples after 30 days of completing the testing program for which the samples were obtained. Further storage or transfer of samples can be made at the owner's expense upon written request.

OCTOBER 17, 1994



Base provided by client.

WELL LOCATIONS

NOT TO SCALE

FIGURE 1

FILE No.: 19-1994-0

THURBER

TABLE 1

DISTRICT LOT 86 SUBDIVISION
GALIANO ISLAND - WELL SUMMARIES

DATE: October 31, 1994

Well on Lot	Well No.	Estimated Yield (USgpm/ Igpd)	Chloride (mg/L)	Total Coliform (CFU/100 ml)	Well to Serve Lot #**
1	1	1.5/1793	20	<1	1
2	2	4/4780	21	<1	2
3	3	5/5976	18	55*,<1	3
4	4	0.43/518	10	2*,<1	4

Notes:

1. * Water quality is above Max. Accept. Conc. (Can. Drinking Water Quality Guidelines, 1993).

2. ** Minimum yield requirement is 500 Igpd/lot (MoTH Appendix "W" to PLA approval).

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WELL #1

Province of British Columbia — BC Environment — Water Management Division

WATER WELL RECORD

Date 94 06 10 (YR MO DY)

UTM: Z ___ E ___ N ___ | TS MAP ___ | WELL No. ___ | ELEV ___ | Location Accuracy ___ | Date 19__ | Well Type ___

Owners Name & Address: Gary Thomas, P.O. Box 58232, Station L, Vancouver, BC. V6P 6E3

Legal Description & Address: Lot 86 Galiano Island, Cowichan District.

Descriptive Location: Well #1

TYPE OF WORK: 1 [X] New Well 2 [ ] Reconditioned 3 [ ] Deepened 4 [ ] Abandoned

2. WORK METHOD: 1 [ ] Cable tool 2 [ ] Bored 3 [ ] Jetted 4 [X] Rotary a [ ] mud b [X] air c [ ] reverse [ ] Other

3. WATER WELL USE: 1 [X] Domestic 2 [ ] Municipal 3 [ ] Irrigation 4 [ ] Comm. & Ind. [ ] Other

4. DRILLING ADDITIVES

5. MEASUREMENTS from 1 [X] ground level 2 [ ] top of casing; casing height above ground level ___ ft.

FROM ft	TO ft	6. WELL LOG DESCRIPTION	SWL ft
0	5	BROWN SANDY SOIL	
5	12	BROWN GRAY SANDSTONE	
12	60	GRAY SANDSTONE	
60	65	SHALEY SANDSTONE	
65	202	GRAY SANDSTONE	
202	222	SHALEY SANDSTONE	
222	245	GRAY SANDSTONE	
		Water source	
		4 gpm @ 222 ft	

9. CASING: Materials: 1 [X] Steel 2 [ ] Galvanized 3 [ ] Wood 4 [ ] Plastic 5 [ ] Concrete [ ] Other ___

								units
Hole Diameter								ins
Diameter	6							ins
from	+1							ft
to	11							ft
Thickness	.188							inch
Weight								lb/ft

Pitless unit ___ ft. 1 [X] above 2 [ ] below ground level

1 [X] Welded 2 [ ] Cemented 3 [ ] Threaded | 1 [ ] New 2 [ ] Used

Perforations: ___

Shoe(s): No

Open hole, from 11 to 245 ft Diameter 6 ins

Grout: ___

10. SCREEN: 1 [ ] Nominal (Telescope) 2 [ ] Pipe Size

Type 1 [ ] Continuous Slot 2 [ ] Perforated 3 [ ] Louvre [ ] Other ___

Material 1 [ ] Stainless Steel 2 [ ] Plastic [ ] Other ___

Set from ___ to ___ ft below ground level

RISER, SCREEN & BLANKS								units
Length								ft
Diam. I D								ins
Slot Size								ins
from								ft
to								ft

Fittings, top ___ bottom ___

Gravel Pack ___

11. DEVELOPED BY: 1 [ ] Surging 2 [ ] Jetting 3 [ ] Air 4 [ ] Bailing 5 [ ] Pumping [ ] Other ___

12. TEST 1 [ ] Pump 2 [ ] Bail 3 [ ] Air Date (YR MO DY) ___

Rate ___ USgpm Temp ___ °C SWL before test ___ ft

Water Level ___ ft after test of ___ hrs

[ ] DRAWDOWN in ft				[ ] RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13. RECOMMENDED PUMP TYPE | RECOMMENDED PUMP SETTING ft | RECOMMENDED PUMPING RATE USgpm

14. WATER TYPE: 1 [X] fresh 2 [ ] salty 3 [X] clear 4 [ ] cloudy

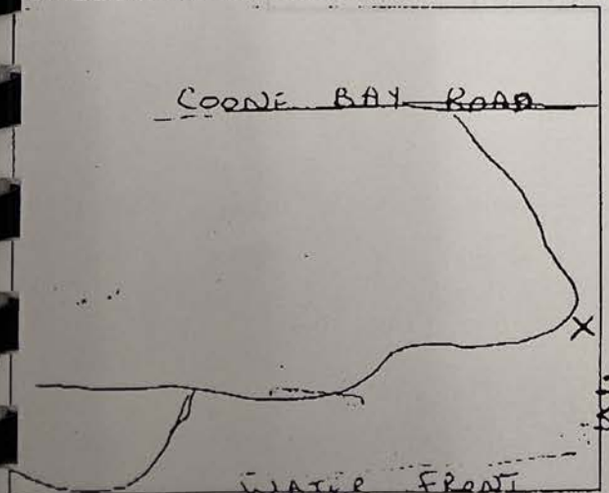
colour ___ smell ___ ; gas 1 [ ] yes 2 [X] no

15. WATER ANALYSIS: 1 Hardness ___ mg/L 2 Iron ___ mg/L 3 Chloride ___ mg/L 4 pH ___ Field Date ___ Lab Date ___

7. CONSULTANT

Address ___

8. WELL LOCATION SKETCH



SITE ID No ___

16. FINAL WELL COMPLETION DATA

Well Depth 245 ft Well Yield 4 US gpm

Static Water Level ___ ft Artesian Flow ___ US gpm Pressure Head ___ ft

Back filled Rock chip slurry

Well Head Completion ___

17. DRILLER (PLEASE PRINT) SURNAME NEGERS FIRST NAME PAUL A.

Signature ___

18. CONTRACTOR

Address: RED WILLIAMS WELL DRILLING LTD
980 PRATT ROAD
QUALICUM BEACH, BC V9K 1W5

248-5552
539-5339.

Member, BCWWDA [X] yes [ ] no ; ___

The Province of British Columbia does not guarantee the correctness or completeness of this record

WELL No. 1

DRAWDOWN DATA

THURBER ENGINEERING LTD.

FILE No.: 19-1994-0

D.L. 86 SUBDIVISION, GALIANO ISLAND

START DATE: OCTOBER 4, 1994

START TIME: 24:00

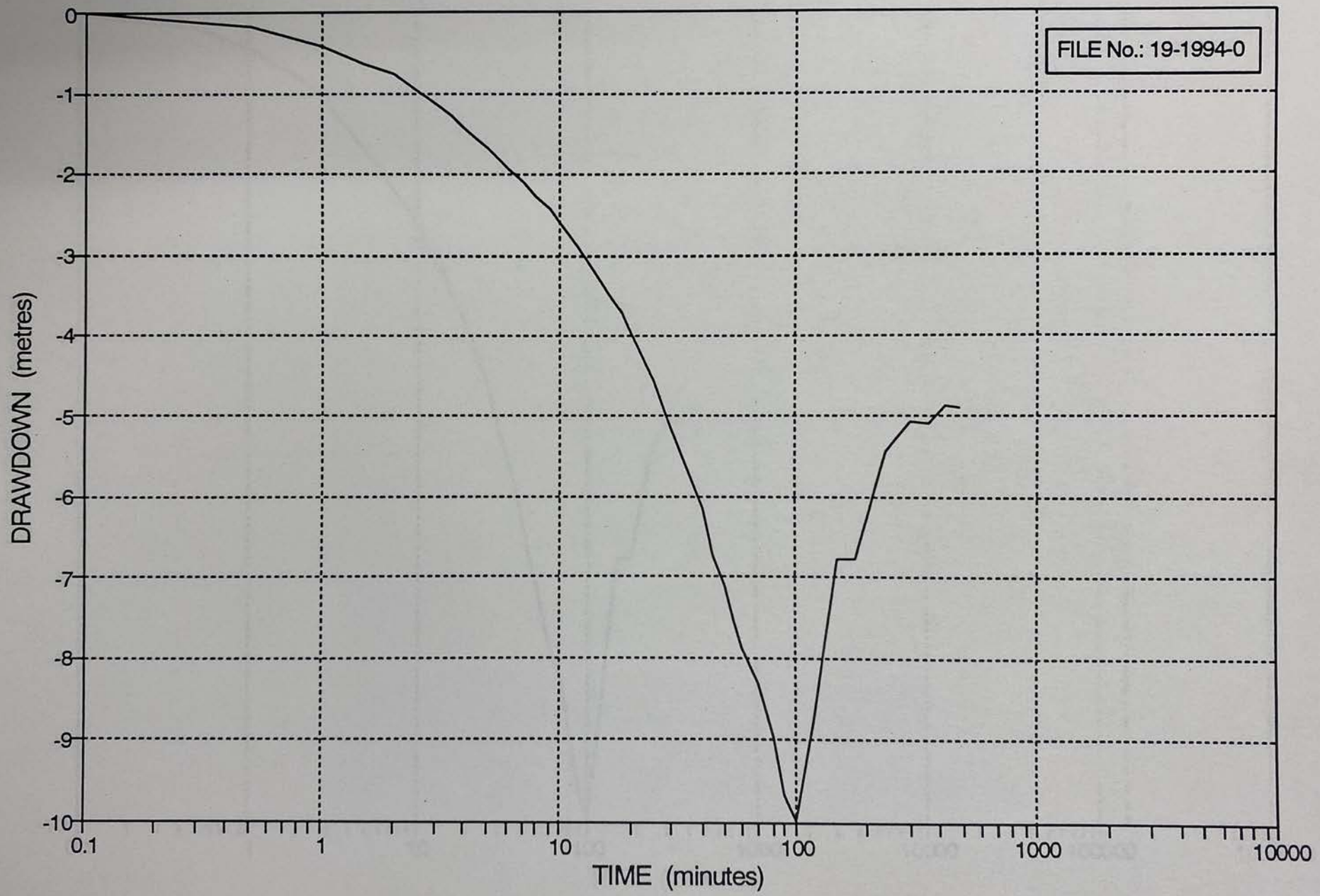
SWL = 0.334 metres

DEPTH FEET	ELAPSED TIME (min.)	WATER DEPTH (metres)	RATE (USGpm)	DRAWDOWN (metres)	NOTES Datum is top of 6" casing
	0	0.344		-0.010	Well flowing prior to riser pipe installation
	0.5	0.510		-0.176	
	1	0.761		-0.427	
	1.5	0.991		-0.657	
	2	1.110		-0.776	
	2.5	1.310		-0.976	
	3	1.474		-1.140	
	3.5	1.634		-1.300	
	4	1.771		-1.437	
	4.5	1.923		-1.589	
	5	2.024		-1.690	
	6	2.261		-1.927	
	7	2.432		-2.098	
	8	2.601		-2.267	
	9	2.761		-2.427	
	10	2.922		-2.588	
	12	3.232		-2.898	
	14	3.520		-3.186	
	16	3.784		-3.450	
	18	4.042		-3.708	
	20	4.293		-3.959	
	25	4.892		-4.558	
	30	5.491	1.5	-5.157	
	35	5.991		-5.657	
	40	6.482		-6.148	
	45	7.070		-6.736	
	50	7.414		-7.080	
	55	7.893		-7.559	
	60	8.223		-7.889	
	70	8.632		-8.298	
	80	9.291	1.5	-8.957	
	90	9.993		-9.659	
	100	10.301	1.2	-9.967	
	120	9.090		-8.756	
	150	7.101	0.9	-6.767	
	180	7.093	0.9	-6.759	
	240	5.784		-5.450	
	300	5.404	0.9	-5.070	
	360	5.423		-5.089	
	420	5.198	0.9	-4.864	
	480	5.221		-4.887	End of drawdown; start recovery

THURBER

WELL No. 1
DRAWDOWN CURVE

D.L. 86 SUBDIVISION, Galiano Island
Mr. Gary Thomas

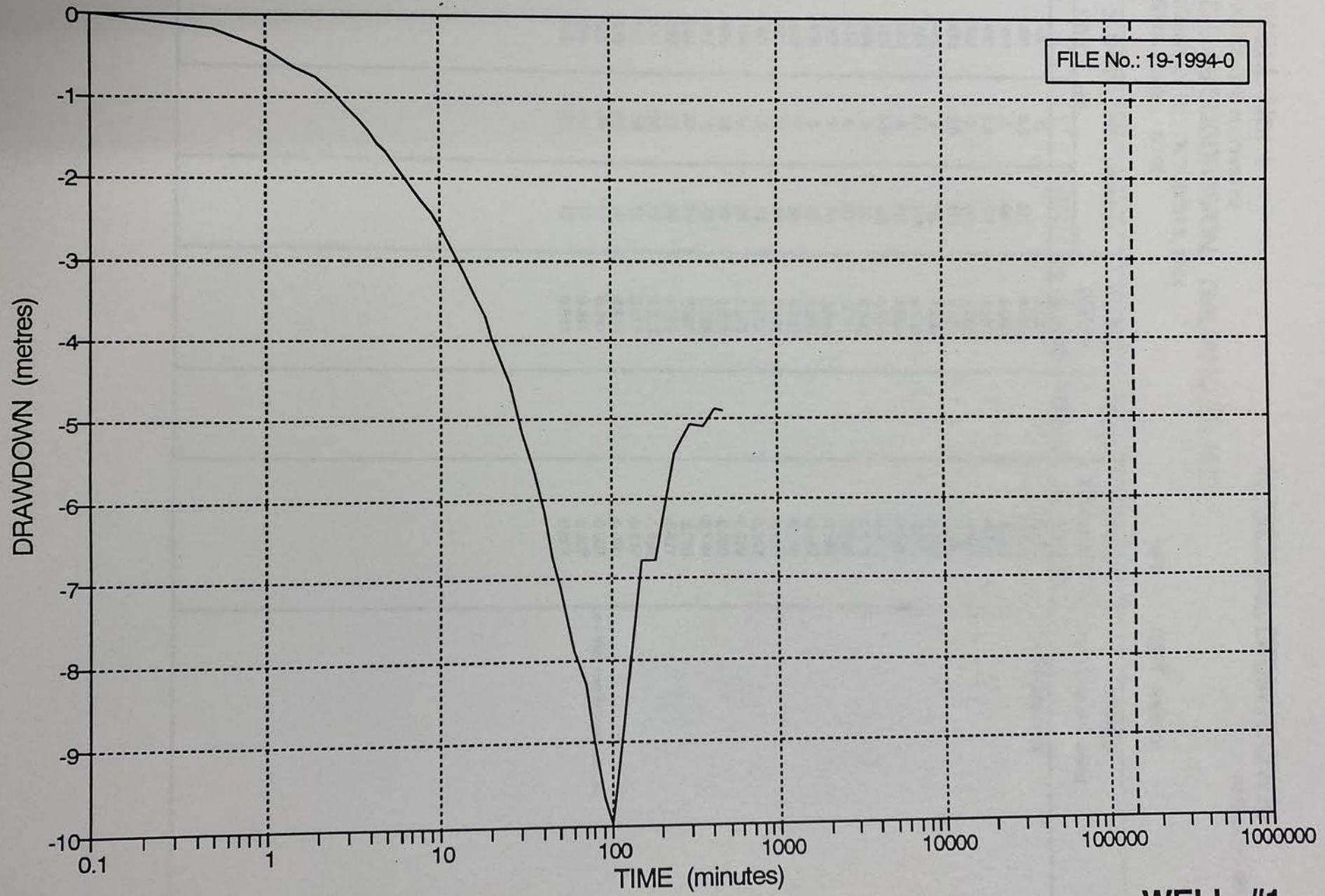


WELL #1

THURBER

WELL No. 1
DRAWDOWN CURVE

D.L. 86 SUBDIVISION, Galiano Island
Mr. Gary Thomas



WELL #1

WELL No. 1

RESIDUAL DRAWDOWN

THURBER ENGINEERING LTD.

FILE No.: 19-1994-0

D.L. 86 SUBDIVISION, GALIANO ISLAND

START DATE: OCTOBER 5, 1994

START TIME: 08:00

SWL = 0.334 metres

DEPTH FEET	ELAPSED TIME (Minutes) t @ t' = 480			WATER DEPTH	RATE	RESIDUAL DRAWDOWN	NOTES Datum is top of 6" casing
	t	t'	t/t'	s (metres)	(USGpm)	s' (metres)	
	480	0		5.221		-4.887	Last reading pumping
	481	0.5	961	5.143		-4.809	
	481	1	481	5.063		-4.729	
	482	1.5	321	4.952		-4.618	
	482	2	241	4.860		-4.526	
	483	2.5	193	4.803		-4.469	
	483	3	161	4.690		-4.356	
	484	3.5	138	4.604		-4.270	
	484	4	121	4.503		-4.169	
	485	4.5	108	4.414		-4.080	
	485	5	97	4.302		-3.968	
	486	6	81	4.151		-3.817	
	487	7	70	3.930		-3.596	
	488	8	61	3.803		-3.469	
	489	9	54	3.612		-3.278	
	490	10	49	3.491		-3.157	
	492	12	41	3.351		-3.017	
	494	14	35	3.213		-2.879	
	496	16	31	3.054		-2.720	
	498	18	28	2.923		-2.589	
	500	20	25	2.562		-2.228	
	505	25	20	1.761		-1.427	
	510	30	17	1.523		-1.189	
	515	35	15	0.811		-0.477	
	520	40	13	0.424		-0.090	
	525	45	12	0.341		-0.007	<-- Well has fully recovered
	530	50	11	0.341		-0.007	
	535	55	10	0.341		-0.007	

THURBER

WELL No. 1

RESIDUAL DRAWDOWN CURVE

D.L. 86 SUBDIVISION, Galiano Island
Mr. Gary Thomas

WELL #1

JB Laboratories Ltd.
water/wastewaters

827 FORT STREET,
VICTORIA, B.C. V8W 1H6
TEL: (604) 385-6112
FAX: (604) 382-6364

DATE: October 8, 1994

JOB NO.: JB 1433
LR NO.: 18760

WELL #1

SAMPLING DATE: See Below

SAMPLING AGENT: Client

The sample[s] submitted by the agent have been tested as requested and we report as follows:

Client:

Thurber Consultants Ltd.
210 - 4475 Viewmont Ave
Victoria, B.C
V8Z 6L8

Attn: Bruce Ingimundson

Sample:

Sample # 1: G. Thomas: Well #1, DL 86, Galiano Is. Oct 5/94
Sample # 2: G. Thomas: Well #3, DL 86, Galiano Is. Oct 4/94
Sample # 3: G. Thomas: Well #3, DL 86, Galiano Is. Oct 7/94

#1

		Sample 1	Sample 2	Sample 3
Tot Dissolved Solids	mg/L	311	258	
Conductivity	umhos/cm	346	353	
pH		8.1	7.3	
Alkalinity, Total	mg/L $CaCO_3$	199	169	
Total Hardness	mg/L $CaCO_3$	15	52	
Calcium	mg/L	5.5	17.0	
Magnesium	mg/L	0.2	2.4	
Iron	mg/L	0.2	0.1	
Manganese	mg/L	< 0.02	0.09*	
Sodium	mg/L	87.0	74.0	
Chloride	mg/L	20	18	
Sulphate	mg/L	6	10	
Fluoride	mg/L	1.4	0.39	
Nitrite	mg/L N	< 0.002	< 0.002	
Nitrate	mg/L N	0.04	< 0.04	
Total Coliform	CFU/100ml	< 1	55*	< 1
Faecal Coliform	CFU/100ml	< 1	< 1	< 1
Noncoliform bacteria	CFU/100ml	> 2000*	20	< 1

* Indicates Outside of Guidelines for Canadian Drinking Water Quality and / or the BC Safe Drinking Water Regulation.
< = less than
> = greater than

Evanoff

John E. Evanoff, M.Sc. **Barbara M. Klassen,** B.Sc.

Analysis performed according to "A Laboratory Manual for the Chemical Analysis of Water, Wastewaters and Biological Tissues", Chemistry Laboratory, Water Resource Service and / or "Standard Methods / Water and Wastewater", American Public Health Association.

JB LABORATORIES

WELL # 2
WELL #2

Province of British Columbia — BC Environment — Water Management Division

WATER WELL RECORD

Date 9 4 10 6 0 3 (YR MO DY)

NTS MAP [ ] WELL No. [ ] ELEV [ ] Location Accuracy ______

UTM Z [ ] E [ ] N [ ] UTM Date 19__ Well Type ___

Owners Name & Address: KEN LYONS / GARY THOMAS, P.O. BOX 58232, STATION L, VANCOUVER, B.C. ~~V9K 1W5~~ V6P 6E3

Legal Description & Address: LOT 86, GALIANO ISLAND, COWICHAN DISTRICT

Descriptive Location: Well #2

1. TYPE OF WORK: 1 ☒ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2. WORK METHOD: 1 ☐ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☒ Rotary a ☐ mud b ☒ air c ☐ reverse ☐ Other

3. WATER WELL USE: 1 ☒ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Comm. & Ind. ☐ Other

4. DRILLING ADDITIVES

5. MEASUREMENTS from 1 ☒ ground level 2 ☐ top of casing; casing height above ground level 1 ft.

FROM ft	TO ft	6. WELL LOG DESCRIPTION	SWL ft
0	9	BROWN SANDY SOIL	
9	30	GRAY SANDSTONE	
30	42	SHALEY SANDSTONE	
42	76	GRAY SANDSTONE	
76	102	SHALEY SANDSTONE	
102	125	SHALEY SANDSTONE	
		WATER SOURCE	
		10 gpm @ 102 ft	
		NOTE: UNSTABLE NEEDS LINER	
		LINER INSTALLED	

7. CONSULTANT ______ Address ______

9. CASING: Materials 1 ☒ Steel 2 ☐ Galvanized 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete ☐ Other

		units
Hole Diameter		ins
Diameter	6	ins
from	+ 1'	ft
to	11' 6"	ft
Thickness	.188	ins
Weight		lb/ft

Pitless unit ___ ft 1 ☐ above 2 ☐ below ground level
1 ☐ Welded 2 ☐ Cemented 3 ☐ Threaded 1 ☐ New 2 ☐ Used
Perforations:
Shoe(s): NO
Open hole, from 11' 6" to 125 ft Diameter ___ ins
Grout:

10. SCREEN: 1 ☐ Nominal (Telescope) 2 ☐ Pipe Size
Type 1 ☐ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other
Material 1 ☐ Stainless Steel 2 ☐ Plastic ☐ Other
Set from ___ to ___ ft below ground level

RISER, SCREEN & BLANKS		units
Length		ft
Diam. I.D.		ins
Slot Size		ins
from		ft
to		ft

Fittings, top ___ bottom ___
Gravel Pack ___

11. DEVELOPED BY: 1 ☐ Surging 2 ☐ Jetting 3 ☐ Air 4 ☐ Bailing 5 ☐ Pumping ☐ Other

12. TEST 1 ☐ Pump 2 ☐ Bail 3 ☐ Air Date ___
Rate ___ USgpm Temp ___ °C SWL before test ___ ft
Water Level ___ ft after test of ___ hrs

DRAWDOWN in ft				RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

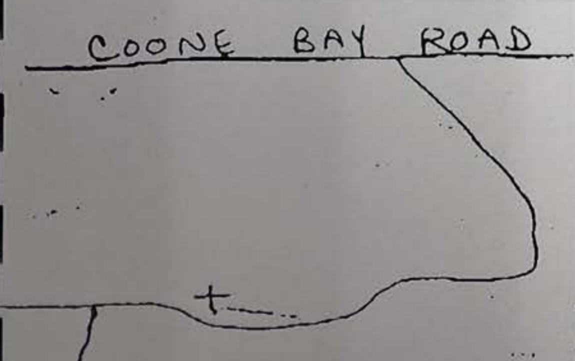
13. RECOMMENDED PUMP TYPE -- | RECOMMENDED PUMP SETTING ft | RECOMMENDED PUMPING RATE USgpm

14. WATER TYPE: 1 ☒ fresh 2 ☐ salty 3 ☒ clear 4 ☐ cloudy
colour ___ smell ___ ; gas 1 ☐ yes 2 ☒ no

15. WATER ANALYSIS: 1 Hardness ___ mg/L 2 Iron ___ mg/L 3 Chloride ___ mg/L 4 pH ___
Field Date ___ Lab Date ___

SITE I.D. No. ___

8. WELL LOCATION SKETCH



16. FINAL WELL COMPLETION DATA
Well Depth 125 ft Well Yield 10 US gpm
Static Water Level 110 ft Artesian Flow ___ US gpm Pressure Head ___ ft
Back filled Rock chip slurry
Well Head Completion ___

17. DRILLER (PLEASE PRINT) NEGGERS (SURNAME) PAUL A (FIRST NAME)
Signature ___

18. CONTRACTOR: RED WILLIAMS WELL DRILLING LTD
Address: 980 PRATT ROAD QUALICUM BEACH, BC V9K 1W5
248-5552
539-5339
Member, BCWWDA ☒ yes ☐ no

WELL No. 2

DRAWDOWN DATA

THURBER ENGINEERING LTD.

FILE No.: 19-1994-0

D.L. 86 SUBDIVISION, GALIANO ISLAND

START DATE: OCTOBER 5, 1994

START TIME: 00:15

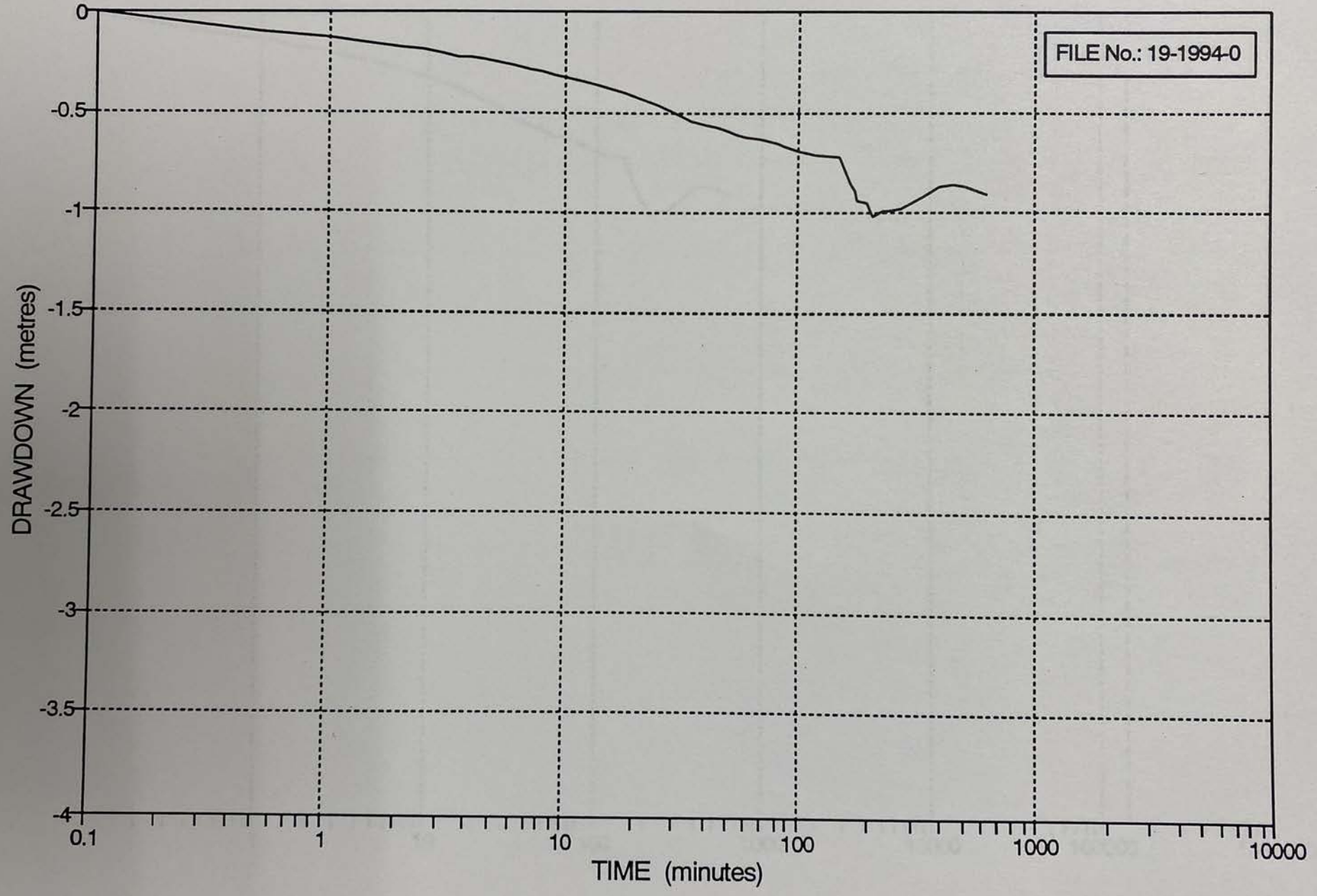
SWL = 3.892 metres

DEPTH FEET	ELAPSED TIME (min.)	WATER DEPTH (metres)	RATE (USGpm)	DRAWDOWN (metres)	NOTES Datum is top of 6" casing (ground level)
12.77	0	3.892		0.000	
13.10	0.5	3.993		-0.101	
13.21	1	4.026		-0.134	
13.30	1.5	4.054		-0.162	
13.35	2	4.069		-0.177	
13.40	2.5	4.084		-0.192	
13.46	3	4.103		-0.210	
13.50	3.5	4.115		-0.223	
13.53	4	4.124		-0.232	
13.56	4.5	4.133		-0.241	
13.60	5	4.145		-0.253	
13.65	6	4.161		-0.268	
13.72	7	4.182		-0.290	
13.75	8	4.191		-0.299	
13.80	9	4.206		-0.314	
13.85	10	4.221		-0.329	
13.90	12	4.237		-0.344	
13.97	14	4.258		-0.366	
14.04	16	4.279		-0.387	
14.11	18	4.301		-0.408	
14.16	20	4.316		-0.424	
14.30	25	4.359		-0.466	
14.43	30	4.398		-0.506	
14.55	35	4.435		-0.543	
14.60	40	4.450		-0.558	
14.66	45	4.468		-0.576	
14.72	50	4.487		-0.594	
14.78	55	4.505		-0.613	
14.82	60	4.517	1.1	-0.625	
14.85	70	4.526		-0.634	
14.92	80	4.548		-0.655	
14.98	90	4.566		-0.674	
15.04	100	4.584		-0.692	
15.10	120	4.602		-0.710	
15.14	150	4.615	1.1	-0.722	
15.58	170	4.749		-0.856	
15.70	175	4.785	0.95	-0.893	
15.85	180	4.831		-0.939	
15.90	200	4.846		-0.954	
16.11	210	4.910		-1.018	
16.01	230	4.880		-0.988	
16.02	245	4.883	0.95	-0.991	
15.99	275	4.874		-0.981	
15.77	335	4.807		-0.914	
15.62	395	4.761	0.95	-0.869	
15.6	450	4.755		-0.863	
15.64	510	4.767		-0.875	
15.75	630	4.801		-0.908	End of drawdown; start recovery

THURBER

WELL No. 2
DRAWDOWN CURVE

D.L. 86 SUBDIVISION, Galiano Island
Mr. Gary Thomas

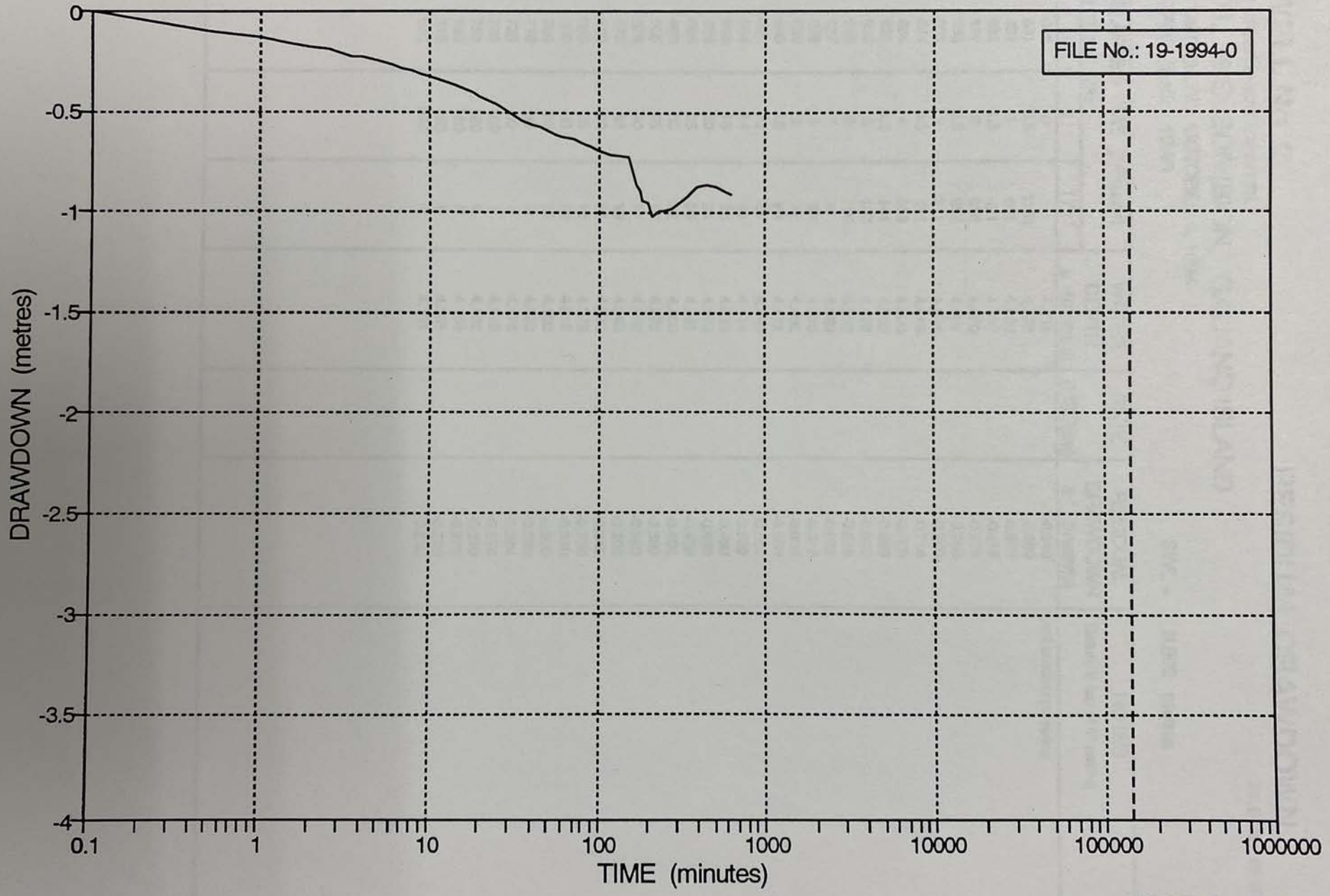


WELL #2

THURBER

WELL No. 2
DRAWDOWN CURVE

D.L. 86 SUBDIVISION, Galiano Island
Mr. Gary Thomas



WELL #2

WELL No. 2

RESIDUAL DRAWDOWN

THURBER ENGINEERING LTD.

FILE No.: 19-1994-0

D.L. 86 SUBDIVISION, GALIANO ISLAND

START DATE: OCTOBER 6, 1994

START TIME: 10:30

SWL = 3.892 metres

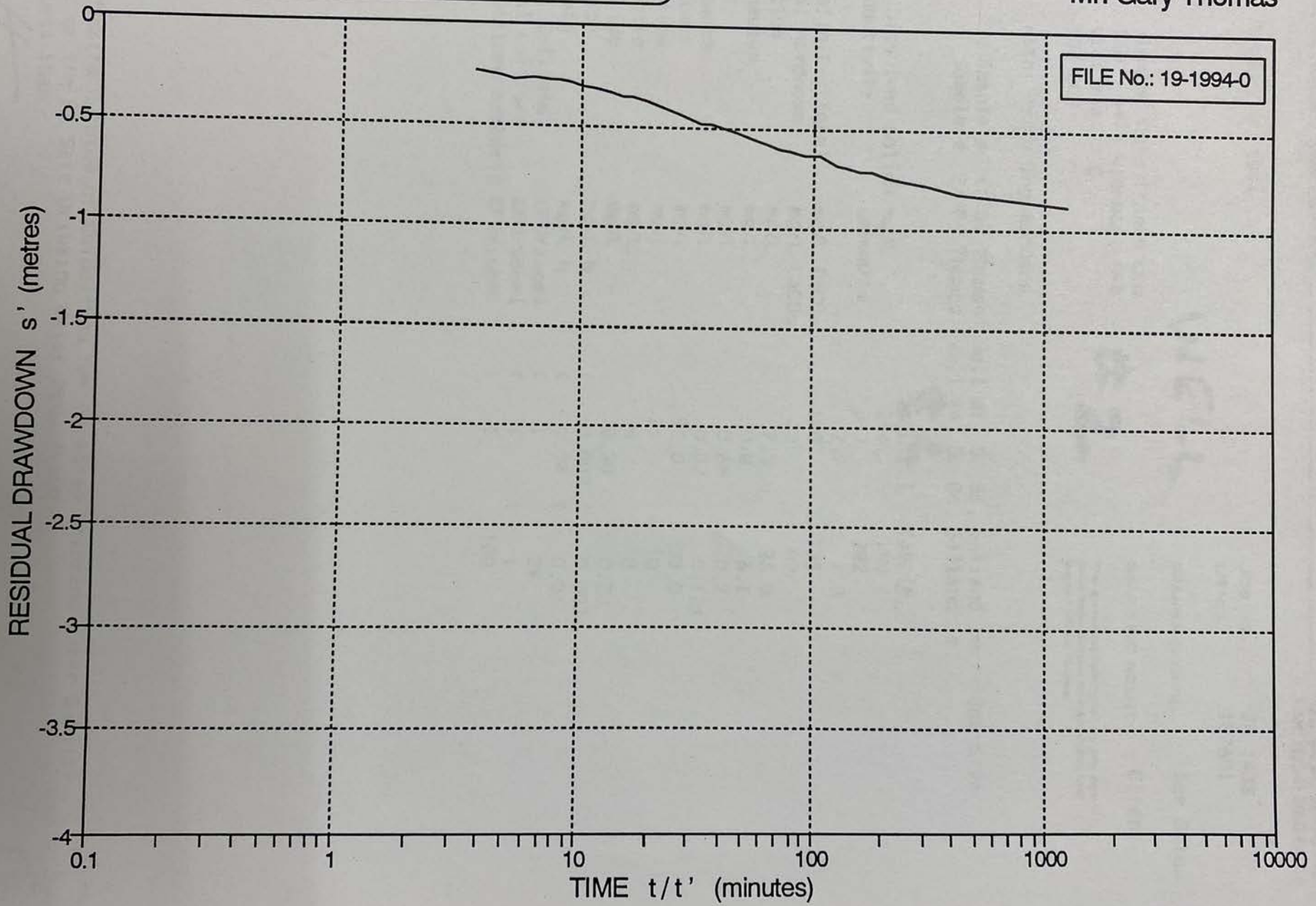
DEPTH FEET	ELAPSED TIME (Minutes) t @ t' = 630			WATER DEPTH	RATE	RESIDUAL DRAWDOWN	NOTES
	t	t'	t/t'	s (metres)	(USGpm)	s' (metres)	Datum is top of 6" casing
	630	0		4.832		-0.940	Last reading pumping
	631	0.5	1261	4.772		-0.880	
	631	1	631	4.730		-0.838	
	632	1.5	421	4.710		-0.818	
	632	2	316	4.670		-0.778	
	633	2.5	253	4.661		-0.769	
	633	3	211	4.632		-0.740	
	634	3.5	181	4.610		-0.718	
	634	4	159	4.600		-0.708	
	635	4.5	141	4.590		-0.698	
	635	5	127	4.572		-0.680	
	636	6	106	4.530		-0.638	
	637	7	91	4.523		-0.631	
	638	8	80	4.510		-0.618	
	639	9	71	4.492		-0.600	
	640	10	64	4.472		-0.580	
	642	12	54	4.442		-0.550	
	644	14	46	4.414		-0.522	
	648	18	36	4.384		-0.492	
	650	20	33	4.372		-0.480	
	655	25	26	4.331		-0.439	
	660	30	22	4.300		-0.408	
	665	35	19	4.272		-0.380	
	670	40	17	4.252		-0.360	
	675	45	15	4.242		-0.350	
	680	50	14	4.232		-0.340	
	685	55	12	4.222		-0.330	
	690	60	12	4.212		-0.320	
	700	70	10	4.192		-0.300	
	710	80	9	4.180		-0.288	
	720	90	8	4.176		-0.284	
	730	100	7	4.170		-0.278	
	750	120	6	4.162		-0.270	
	780	150	5	4.164		-0.272	
	810	180	5	4.151		-0.259	
	870	240	4	4.131		-0.239	

THURBER

WELL No. 2

RESIDUAL DRAWDOWN CURVE

D.L. 86 SUBDIVISION, Galiano Island
Mr. Gary Thomas



WELL #2

JB Laboratories Ltd.
water/wastewaters

827 FORT STREET,
VICTORIA, B.C. V8W 1H6
TEL: (604) 385-6112
FAX: (604) 382-6384

DATE: October 8, 1994

JOB NO.: JB 1433
LR NO.: 187601

WELL #2

SAMPLING DATE: See Below

SAMPLING AGENT: Client

The sample(s) submitted by the agent have been tested as requested and we report as follows:

Client:

Thurber Consultants Ltd.
210 - 4475 Viewmont Ave
Victoria, B.C
V8Z 6L8

Attn: Bruce Ingimundson

Sample: Sample # 1: G. Thomas: Well #2, DL 86, Galiano Is. Oct 6/94
Sample # 2: G. Thomas: Well #4, DL 86, Galiano Is.

#2

		Sample 1	Sample 2
Tot Dissolved Solids	mg/L	294	198
Conductivity	umhos/cm	383	282
pH		7.7	7.3
Alkalinity, Total	mg/L $CaCO_3$	180	135
Total Hardness	mg/L $CaCO_3$	22	89
Calcium	mg/L	7.5	26.0
Magnesium	mg/L	0.8	6.1
Iron	mg/L	0.6*	0.2
Manganese	mg/L	0.02	0.12*
Sodium	mg/L	92.0	32.0
Chloride	mg/L	21	10
Sulphate	mg/L	8	8
Fluoride	mg/L	0.30	0.20
Nitrite	mg/L N	< 0.002	< 0.002
Nitrate	mg/L N	< 0.04	< 0.04
Total Coliform	CFU/100ml	< 1	2*
Faecal Coliform	CFU/100ml	< 1	< 1
Noncoliform bacteria	CFU/100ml	< 1	100

* Indicates Outside of Guidelines for Canadian Drinking Water Quality and / or the BC Safe Drinking Water Regulation.
< = less than

John E. Evanoff, M.Sc. Barbara M. Klassen, B.Sc.

Analysis performed according to "A Laboratory Manual for the Chemical Analysis of Water, Wastewaters and Biological Tissues", Chemistry Laboratory, Water Resource Service and/or "Standard Methods/ Water and Wastewater", American Public Health Association.

JB LABORATORIES

WELL # 3

Province of British Columbia — BC Environment — Water Management Division

WATER WELL RECORD

Date 94 10 6 (YR MO DY)

NTS MAP ____ WELL No. ____ ELEV ____ Location Accuracy ____

UTM Z ____ E ____ N ____ Date 19__ Well Type ____

Owners Name & Address GARY THOMAS, P.O. Box 58232, STATION L, VANCOUVER BC V9K 1W5

Legal Description & Address Lot 86, GALIANO ISLAND, COWICHAN DISTRICT V6P 6E3

Descriptive Location WELL # 3

1. TYPE OF WORK: 1 [X] New Well 2 [ ] Reconditioned 3 [ ] Deepened 4 [ ] Abandoned

2. WORK METHOD: 1 [ ] Cable tool 2 [ ] Bored 3 [ ] Jetted 4 [X] Rotary a [ ] mud b [X] air c [ ] reverse [ ] Other ____

3. WATER WELL USE: 1 [X] Domestic 2 [ ] Municipal 3 [ ] Irrigation 4 [ ] Comm. & Ind [ ] Other ____

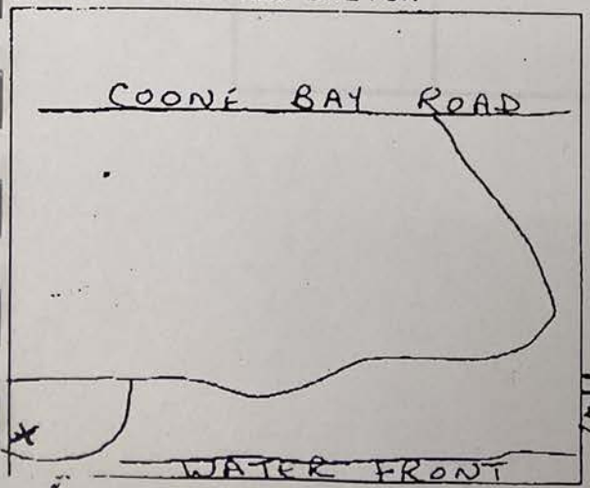
4. DRILLING ADDITIVES ____

5. MEASUREMENTS from 1 [X] ground level 2 [ ] top of casing; casing height above ground level ____ ft

FROM ft	TO ft	6. WELL LOG DESCRIPTION	SWL ft
0	5	BROWN SAND STONE	
5	38	GREY SANDSTONE	
38	42	SHALEY SANDSTONE	
42	55	GRAY SANDSTONE	
55	58	SHALEY SANDSTONE	
58	84	GREY SANDSTONE	
84	140	GREY SANDSTONE	
140	160	SHALEY SANDSTONE	
160	185	GREY SANDSTONE	
		Water Source	
		2 gpm @ 160 ft	
		2 gpm @ between 160-185 ft	
		Total yield 4 gpm	

7. CONSULTANT ____ Address ____

8. WELL LOCATION SKETCH



9. CASING: Materials 1 [X] Steel 2 [ ] Galvanized 3 [ ] Wood 4 [ ] Plastic 5 [ ] Concrete [ ] Other ____

Hole Diameter							units
Diameter	6						ins
from	1						ft
to	8' 2"						ft
Thickness	.188						ins
Weight							lb/ft

Pitless unit ____ ft 1 [X] above 2 [ ] below ground level

1 [X] Welded 2 [ ] Cemented 3 [ ] Threaded | 1 [ ] New 2 [ ] Used

Perforations: ____

Shoe(s): No

Open hole, from 8' 2" to 185 ft Diameter 6 ins

Grout: ____

10. SCREEN: 1 [ ] Nominal (Telescope) 2 [ ] Pipe Size

Type 1 [ ] Continuous Slot 2 [ ] Perforated 3 [ ] Louvre [ ] Other ____

Material 1 [ ] Stainless Steel 2 [ ] Plastic [ ] Other ____

Set from ____ to ____ ft below ground level

RISER, SCREEN & BLANKS							units
Length							ft
Diam. I D							ins
Slot Size							ins
from							ft
to							ft

Fittings, top ____ bottom ____

Gravel Pack ____

11. DEVELOPED BY: 1 [ ] Surging 2 [ ] Jetting 3 [ ] Air 4 [X] Bailing 5 [ ] Pumping [ ] Other ____

12. TEST 1 [ ] Pump 2 [ ] Bail 3 [ ] Air Date (YR MO DY) ____

Rate ____ USgpm Temp ____ °C SWL before test ____ ft

Water Level ____ ft after test of ____ hrs

[ ] DRAWDOWN in ft				[ ] RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13.

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING ft	RECOMMENDED PUMPING RATE USgpm

14. WATER TYPE: 1 [X] fresh 2 [ ] salty 3 [X] clear 4 [ ] cloudy

colour ____ smell ____ ; gas 1 [ ] yes 2 [X] no

15. WATER ANALYSIS: 1 Hardness ____ mg/L 2 Iron ____ mg/L 3 Chloride ____ mg/L 4 pH ____

Field Date ____ Lab Date (YR MO DY) ____

SITE I D No ____

16. FINAL WELL COMPLETION DATA

Well Depth 185 ft Well Yield 4 US gpm

Static Water Level ____ ft Artesian Flow ____ US gpm Pressure Head ____ ft

Back filled Rock chip slurry

Well Head Completion ____

17. DRILLER (PLEASE PRINT) SURNAME NEGGERS FIRST NAME PAUL A

Signature ____

18. CONTRACTOR, RED WILLIAMS WELL DRILLING LTD

Address 980 PRATT ROAD QUALICUM BEACH, BC V9K 1W5

248-5552 539-5339

Member, BCWWDA [X] yes [ ] no ; ____

WELL No. 3

DRAWDOWN DATA

THURBER ENGINEERING LTD.

FILE No.: 19-1994-0

D.L. 86 SUBDIVISION, GALIANO ISLAND

START DATE: OCTOBER 4, 1994

START TIME: 12:30

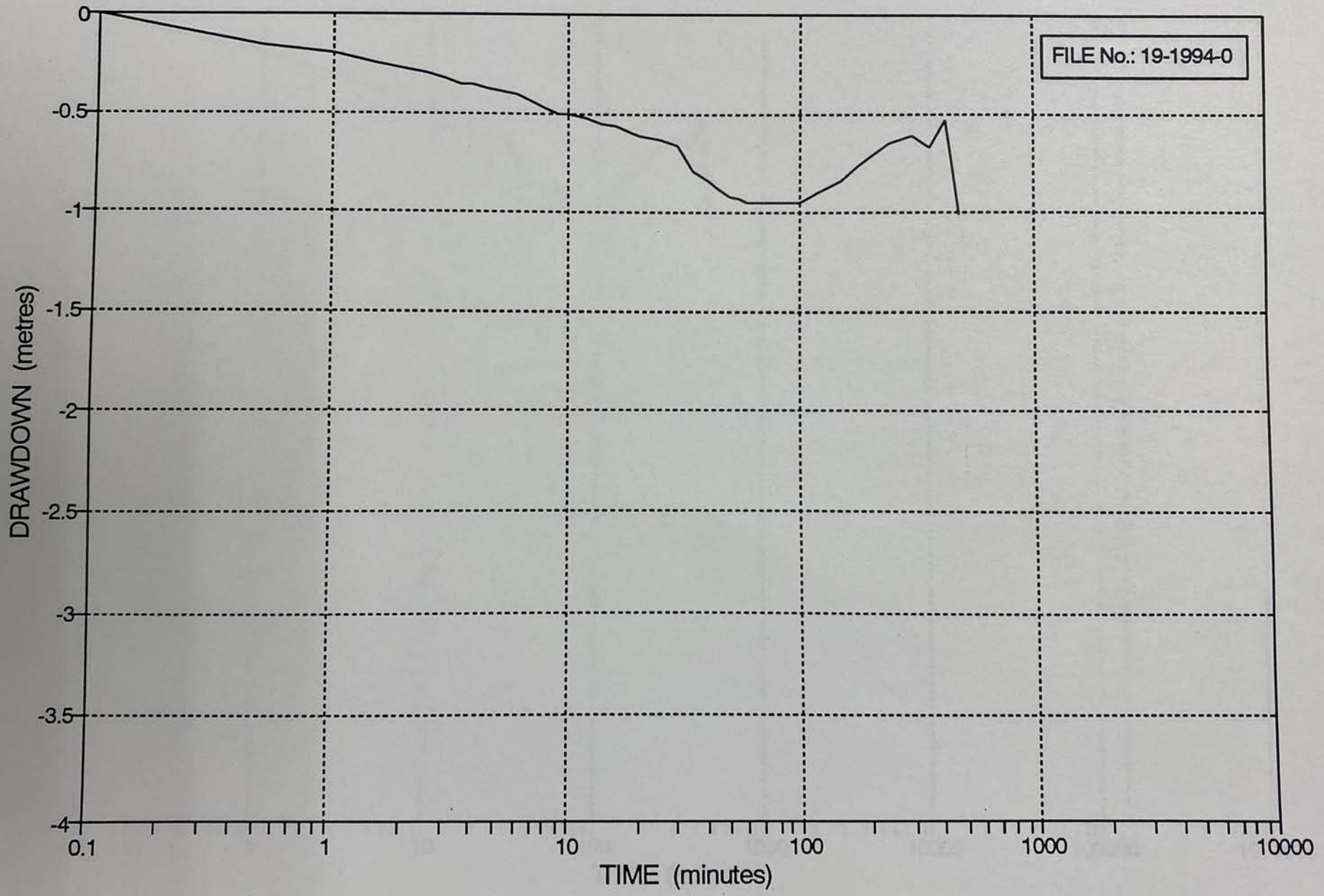
SWL = 2.941 metres

DEPTH FEET	ELAPSED TIME (min.)	WATER DEPTH (metres)	RATE (USGpm)	DRAWDOWN (metres)	NOTES Datum is top of 6" casing (ground level)
9.65	0	2.941		0.000	
10.17	0.5	3.100		-0.158	
10.30	1	3.139		-0.198	
10.45	1.5	3.185		-0.244	
10.55	2	3.216		-0.274	
10.61	2.5	3.234		-0.293	
10.72	3	3.267		-0.326	
10.80	3.5	3.292		-0.351	
10.84	4	3.304		-0.363	
10.89	4.5	3.319		-0.378	
10.93	5	3.331		-0.390	
10.99	6	3.350		-0.408	
11.12	7	3.389		-0.448	
11.21	8	3.417		-0.475	
11.29	9	3.441		-0.500	
11.30	10	3.444		-0.503	
11.38	12	3.469		-0.527	
11.46	14	3.493		-0.552	
11.52	16	3.511		-0.570	
11.60	18	3.536		-0.594	
11.65	20	3.551		-0.610	
11.74	25	3.578		-0.637	
11.83	30	3.606		-0.664	
12.23	35	3.728	0.95	-0.786	
12.42	40	3.786		-0.844	
12.54	45	3.822		-0.881	
12.65	50	3.856		-0.914	
12.70	55	3.871		-0.930	
12.76	60	3.889	0.95	-0.948	
12.77	70	3.892		-0.951	
12.76	80	3.889	0.95	-0.948	
12.75	90	3.886		-0.945	
12.75	100	3.886		-0.945	
12.62	120	3.847	0.95	-0.905	
12.40	150	3.780		-0.838	
12.14	180	3.700		-0.759	
11.80	240	3.597		-0.655	
11.67	300	3.557		-0.616	
11.87	360	3.618		-0.677	
11.42	420	3.481	0.95	-0.539	
12.95	480	3.947		-1.006	End of drawdown; start recovery

THURBER

WELL No. 3
DRAWDOWN CURVE

D.L. 86 SUBDIVISION, Galiano Island
Mr. Gary Thomas

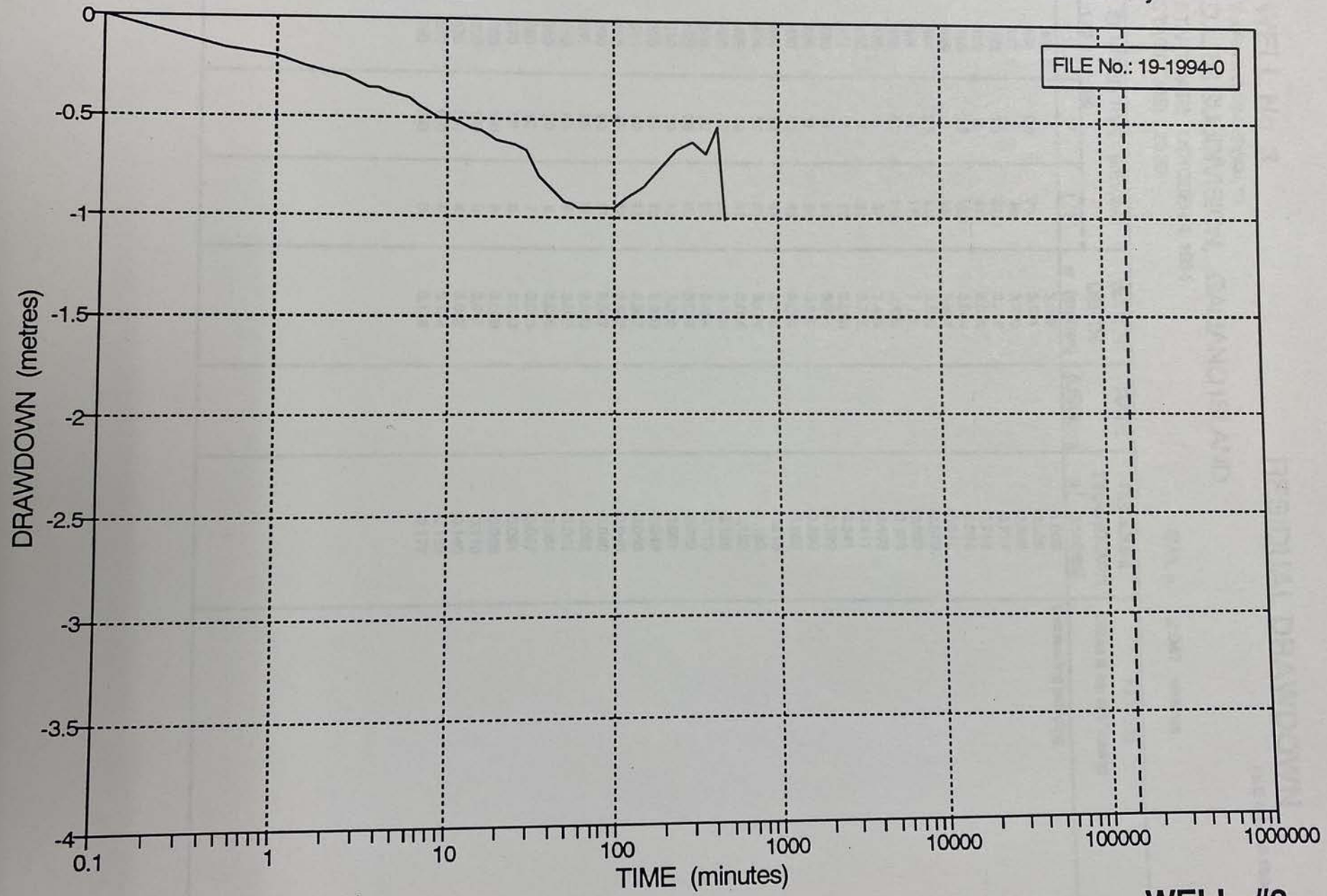


WELL #3

THURBER

WELL No. 3
DRAWDOWN CURVE

D.L. 86 SUBDIVISION, Galiano Island
Mr. Gary Thomas



WELL #3

WELL No. 3

RESIDUAL DRAWDOWN

THURBER ENGINEERING LTD.

FILE No.: 19-1994-0

D.L. 86 SUBDIVISION, GALIANO ISLAND

START DATE: OCTOBER 4, 1994

START TIME: 20:30

SWL = 2.941 metres

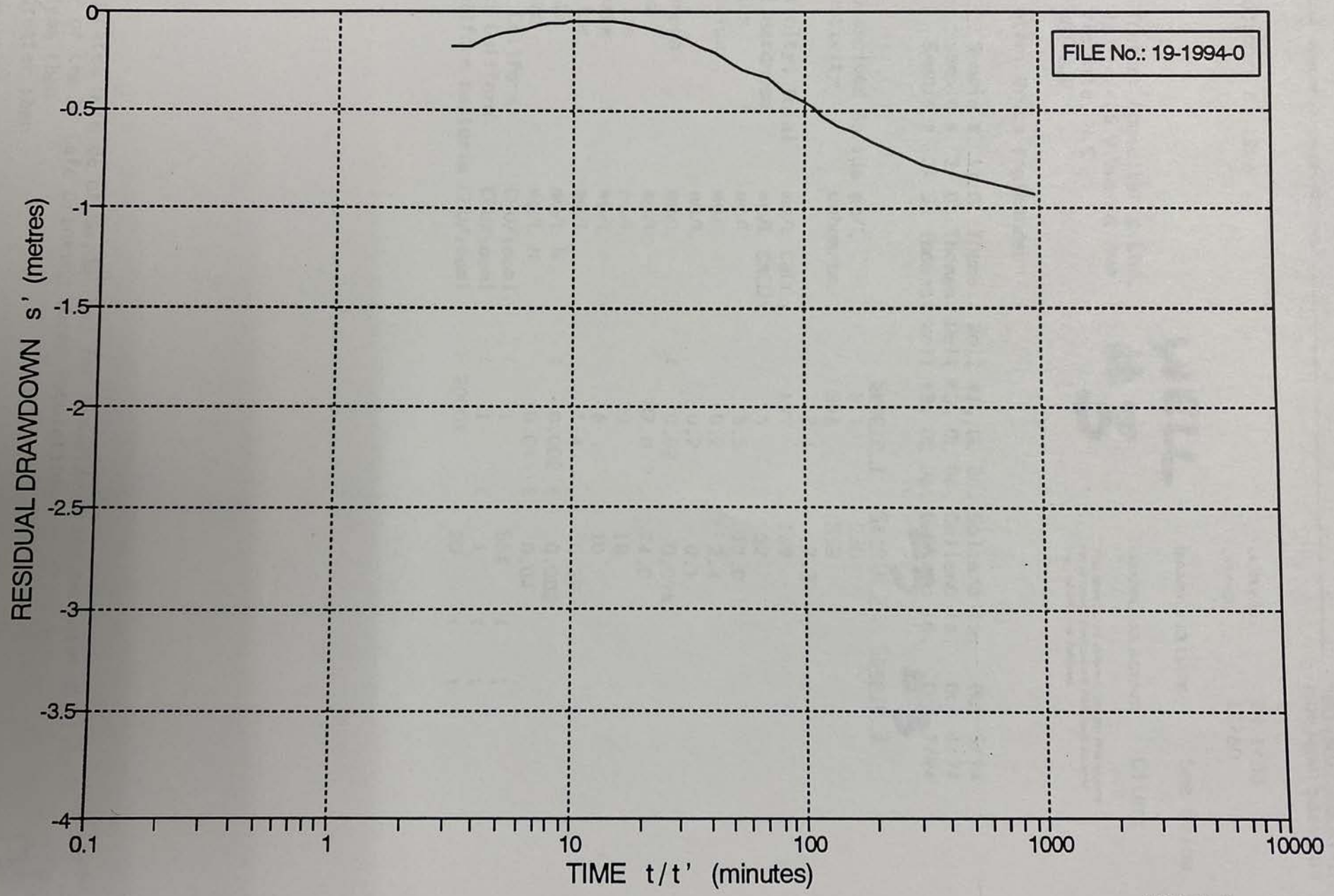
DEPTH FEET	ELAPSED TIME (Minutes) t @ t' = 480 t	t'	t/t'	WATER DEPTH s (metres)	RATE (USGpm)	RESIDUAL DRAWDOWN s' (metres)	NOTES Datum is top of 6" casing
12.95	480	0		3.947		-1.006	Last reading pumping
12.70	481	0.5	961	3.871		-0.930	
12.40	481	1	481	3.780		-0.838	
12.20	482	1.5	321	3.719		-0.777	
12.00	482	2	241	3.658		-0.716	
11.83	483	2.5	193	3.606		-0.664	
11.65	483	3	161	3.551		-0.610	
11.55	484	3.5	138	3.520		-0.579	
11.40	484	4	121	3.475		-0.533	
11.25	485	4.5	108	3.429		-0.488	
11.17	485	5	97	3.405		-0.463	
11.00	486	6	81	3.353		-0.411	
10.77	487	7	70	3.283		-0.341	
10.7	488	8	61	3.261		-0.320	
10.62	489	9	54	3.237		-0.296	
10.52	490	10	49	3.206		-0.265	
10.35	492	12	41	3.155		-0.213	
10.25	494	14	35	3.124		-0.183	
10.15	496	16	31	3.094		-0.152	
10.07	498	18	28	3.069		-0.128	
10.02	500	20	25	3.054		-0.113	
9.92	505	25	20	3.024		-0.082	
9.85	510	30	17	3.002		-0.061	
9.81	515	35	15	2.990		-0.049	
9.80	520	40	13	2.987		-0.046	
9.80	525	45	12	2.987		-0.046	
9.8	530	50	11	2.987		-0.046	
9.82	535	55	10	2.993		-0.052	
9.85	540	60	9	3.002		-0.061	
9.86	550	70	8	3.005		-0.064	
9.87	560	80	7	3.008		-0.067	
9.95	570	90	6	3.033		-0.091	
9.97	580	100	6	3.039		-0.098	
10.01	600	120	5	3.051		-0.110	
10.11	630	150	4	3.082		-0.140	
10.25	660	180	4	3.124		-0.183	
10.23	720	240	3	3.118		-0.177	

THURBER

WELL No. 3

RESIDUAL DRAWDOWN CURVE

D.L. 86 SUBDIVISION, Galiano Island
Mr. Gary Thomas



WELL #3

JB Laboratories Ltd.
water/wastewaters

827 FORT STREET,
VICTORIA, B.C. V8W 1H6
TEL: (604) 385-6112
FAX: (604) 382-6364

DATE: October 8, 1994

JOB NO.: JB 1433
LR NO.: 18760

WELL #3

SAMPLING DATE: See Below

SAMPLING AGENT: Client

Client:

Thurber Consultants Ltd.
210 - 4475 Viewmont Ave
Victoria, B.C
V8Z 6L8

Attn: Bruce Ingimundson

The sample(s) submitted by the agent have been tested as requested and we report as follows:

Sample:

Sample # 1: G. Thomas: Well #1, DL 86, Galiano Is. Oct 5/94
Sample # 2: G. Thomas: Well #3, DL 86, Galiano Is. Oct 4/94
Sample # 3: G. Thomas: Well #3, DL 86, Galiano Is. Oct 7/94

#3 #3

		Sample 1	Sample 2	Sample 3
Tot Dissolved Solids	mg/L	311	258	
Conductivity	umhos/cm	346	353	
pH		8.1	7.3	
Alkalinity, Total	mg/L $CaCO_3$	199	169	
Total Hardness	mg/L $CaCO_3$	15	52	
Calcium	mg/L	5.5	17.0	
Magnesium	mg/L	0.2	2.4	
Iron	mg/L	0.2	0.1	
Manganese	mg/L	< 0.02	0.09*	
Sodium	mg/L	87.0	74.0	
Chloride	mg/L	20	18	
Sulphate	mg/L	6	10	
Fluoride	mg/L	1.4	0.39	
Nitrite	mg/L N	< 0.002	< 0.002	
Nitrate	mg/L N	0.04	< 0.04	
Total Coliform	CFU/100ml	< 1	55*	< 1
Faecal Coliform	CFU/100ml	< 1	< 1	< 1
Noncoliform bacteria	CFU/100ml	> 2000*	20	< 1

* Indicates Outside of Guidelines for Canadian Drinking Water Quality and / or the BC Safe Drinking Water Regulation.
< = less than
> = greater than

Evanoff

John E. Evanoff, M.Sc. **Barbara M. Klassen,** B.Sc.

Analysis performed according to "A Laboratory Manual for the Chemical Analysis of Water, Wastewaters and Biological Tissues", Chemistry Laboratory, Water Resource Service and/or "Standard Methods/ Water and Wastewater", American Public Health Association.

JB LABORATORIES

WELL # 4

Province of British Columbia — BC Environment — Water Management Division

WATER WELL RECORD

Well #4

Date 12 30 96 (YR MO DY)

NTS MAP ____ WELL No. ____ ELEV ____ Location Accuracy ____

UTM Z ____ E ____ N ____ UTM Date 19__ Well Type ____

Owners Name & Address: Mc Gary Thomas P.O. Box 54232 Saturna VANCOUVER B.C.

Legal Description & Address: District lot 86 Galiano Is Cowichan Dist V0R 2E3

Descriptive Location: N. End of Galiano Next To Park

1. TYPE OF WORK: 1 ☒ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2. WORK METHOD: 1 ☐ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☒ Rotary a ☐ mud b ☒ air c ☐ reverse ☒ Other ____

3. WATER WELL USE: 1 ☒ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Comm. & Ind. ☐ Other ____

4. DRILLING ADDITIVES ____

5. MEASUREMENTS from 1 ☒ ground level 2 ☐ top of casing; casing height above ground level ____ ft.

FROM ft	TO ft	6. WELL LOG DESCRIPTION	SWL ft
0	4	Brown Sandy till	
4	6	Brown Sandstone	
6	25	Grey Sandstone	
25	35	Shaley Sandstone	
35	55	Grey Sandstone	
55	73	Shaley Sandstone	
73	75	Grey Sandstone	
75	90	Shaley Sandstone	
90	103	Grey Sandstone	
103	110	Shaley Sandstone	
110	124	Grey Sandstone	
124	148	Shaley Sandstone	
148	180	Grey Sandstone	
180	170	Shaley Sandstone	
170	203	Grey Sandstone	
		WATER Source, LOGM @ 160 FT	

7. CONSULTANT ____ Address ____

8. WELL LOCATION SKETCH

Note: WATER LEVEL stil Rising when Rig Left site.

9. CASING: Materials 1 ☒ Steel 2 ☐ Galvanized 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete ☐ Other ____

		units
Hole Diameter		ins
Diameter	6	ins
from	0	ft
to	10	ft
Thickness	.188	ins
Weight	12	lb/ft

Pitless unit ____ 1 ☒ above 2 ☐ below ground level

1 ☒ Welded 2 ☐ Cemented 3 ☐ Threaded | 1 ☒ New 2 ☐ Used

Perforations: ____

Shoe (s): No

Open hole, from 10 to 203 ft Diameter 6 ins

Grout: ____

10. SCREEN: 1 ☐ Nominal (Telescope) 2 ☐ Pipe Size

Type 1 ☐ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other ____

Material 1 ☐ Stainless Steel 2 ☐ Plastic ☐ Other ____

Set from ____ to ____ ft below ground level

RISER, SCREEN & BLANKS							units
Length							ft
Diam. I D							ins
Slot Size							ins
from							ft
to							ft

Fittings, top ____ bottom ____

Gravel Pack ____

11. DEVELOPED BY: 1 ☐ Surging 2 ☐ Jetting 3 ☐ Air 4 ☐ Bailing 5 ☐ Pumping ☐ Other ____

12. TEST 1 ☐ Pump 2 ☐ Bail 3 ☐ Air Date (YR MO DY) ____

Rate ____ USgpm Temp ____ °C SWL before test ____ ft

Water Level ____ ft after test of ____ hrs

☐ DRAWDOWN in ft				☐ RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13. | RECOMMENDED PUMP TYPE | RECOMMENDED PUMP SETTING ft | RECOMMENDED PUMPING RATE USgpm |
|---|---|---|
| | | |

14. WATER TYPE: 1 ☒ fresh 2 ☐ salty 3 ☒ clear 4 ☐ cloudy

colour ____ smell ____ ; gas 1 ☐ yes 2 ☒ no

15. WATER ANALYSIS: 1 Hardness ____ mg/L 2 Iron ____ mg/L 3 Chloride ____ mg/L 4 pH ____ Field Date ____ Lab Date (YR MO DY) ____

SITE I D No ____

16. FINAL WELL COMPLETION DATA

Well Depth 203 ft Wall Yield 1 US gpm

Static Water Level 150 ft Artesian Flow ____ US gpm Pressure Head ____ ft

Back filled Rock Chip Slurry

Well Head Completion ____

17. DRILLER PLEASE PRINT Surname Baird V. First Name Ron

Signature ____

18. CONTRACTOR, Island Well Drilling Ltd. Address Crouhel RD RR#1 Ladysmith B.C. V0R 2E0

Ph. ~~539-5339~~ 539-5339 248-5552

Member, BCWWDA ☒ yes ☐ no ; ____

WELL No. 4

DRAWDOWN DATA

THURBER ENGINEERING LTD.

FILE No.: 19-1994-0

D.L. 86 SUBDIVISION, GALIANO ISLAND

START DATE: OCTOBER 19, 1994

START TIME: 09:10

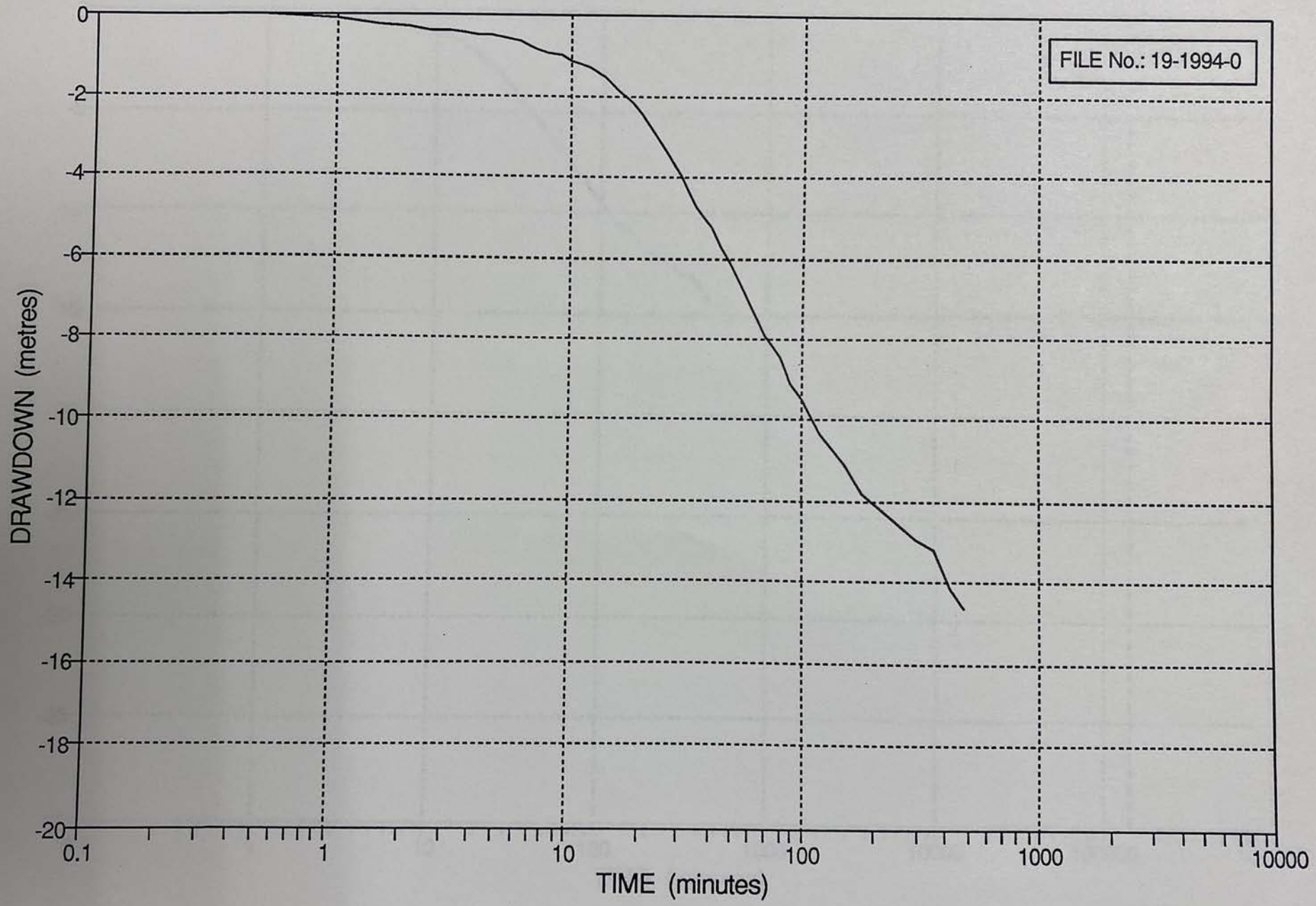
SWL = 12.865 metres

DEPTH FEET	ELAPSED TIME (min.)	WATER DEPTH (metres)	RATE (USGpm)	DRAWDOWN (metres)	NOTES Datum is 0.30m above ground level
	0	12.865		0.000	
	0.5	12.889		-0.024	
	1	12.995		-0.130	
	1.5	13.114		-0.249	
	2	13.162		-0.297	
	2.5	13.290		-0.425	
	3	13.282		-0.417	
	3.5	13.298		-0.433	
	4	13.355		-0.490	
	4.5	13.380		-0.515	
	5	13.410		-0.545	
	6	13.540		-0.675	
	7	13.710		-0.845	
	8	13.800		-0.935	
	9	13.840		-0.975	
	10	13.995		-1.130	
	12	14.155		-1.290	
	14	14.384		-1.519	
	16	14.735		-1.870	
	18	15.023		-2.158	
	20	15.326		-2.461	
	25	16.127		-3.262	
	30	16.847	0.82	-3.982	
	35	17.590		-4.725	
	40	18.072		-5.207	
	45	18.592		-5.727	
	50	19.075	0.81	-6.210	
	55	19.568		-6.703	
	60	19.995		-7.130	
	70	20.753		-7.888	
	80	21.332	0.81	-8.467	
	90	21.935		-9.070	
	100	22.362		-9.497	
	120	23.172		-10.307	
	150	23.932	0.93	-11.067	
	180	24.632	0.93	-11.767	
	265	25.496		-12.631	
	300	25.826		-12.961	
	360	26.036	0.92	-13.171	
	420	27.015		-14.150	
	480	27.500	0.92	-14.635	

THURBER

WELL No. 4
DRAWDOWN CURVE

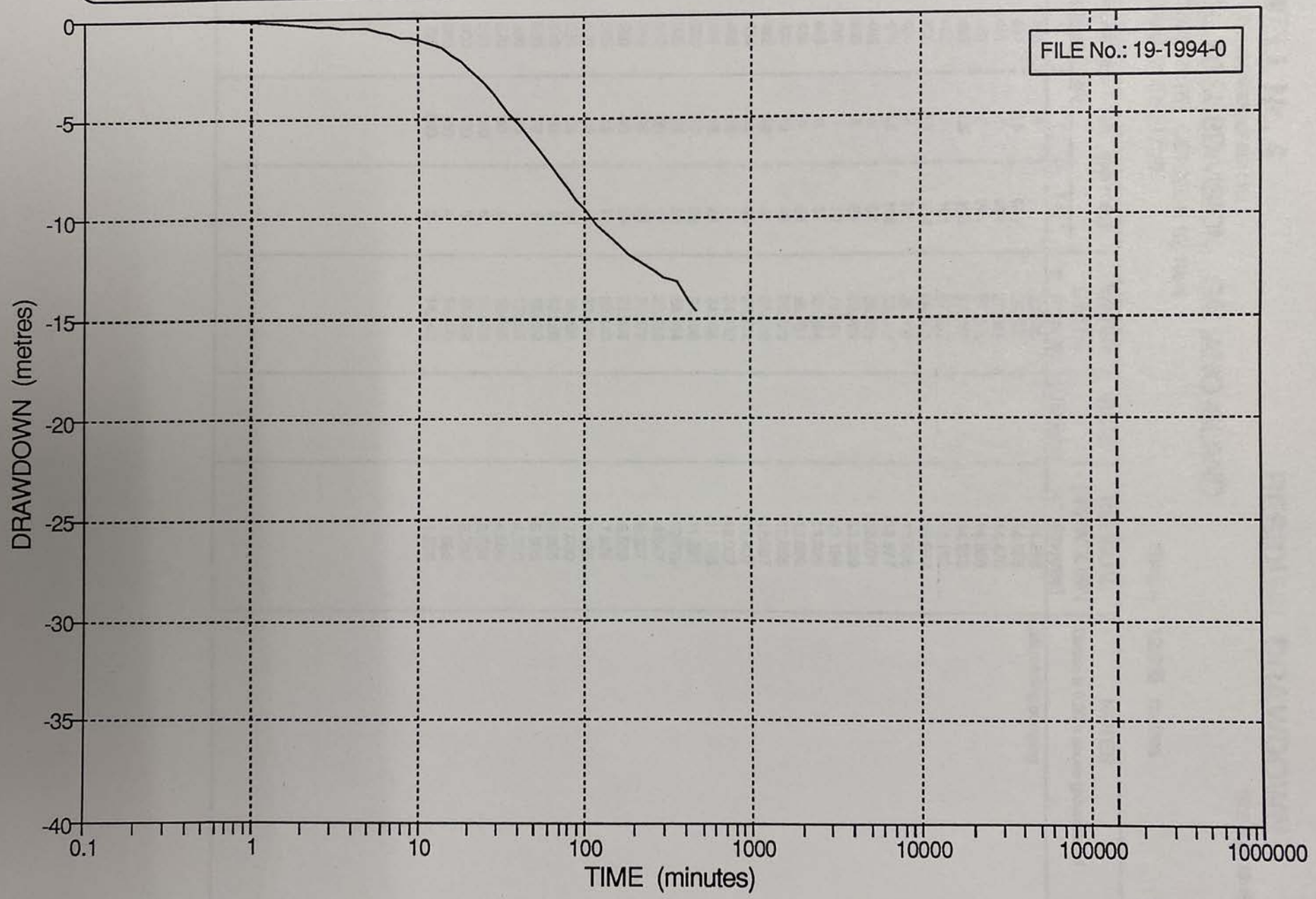
D.L. 86 SUBDIVISION, Galiano Island
Mr. Gary Thomas



WELL #4

WELL No. 4
DRAWDOWN CURVE

D.L. 86 SUBDIVISION, Galiano Island
Mr. Gary Thomas



WELL #4

WELL No. 4

RESIDUAL DRAWDOWN

THURBER ENGINEERING LTD.

FILE No.: 19-1994-0

D.L. 86 SUBDIVISION, GALIANO ISLAND

START DATE: OCTOBER 19, 1994

START TIME: 17:10

SWL = 12.865 metres

DEPTH FEET

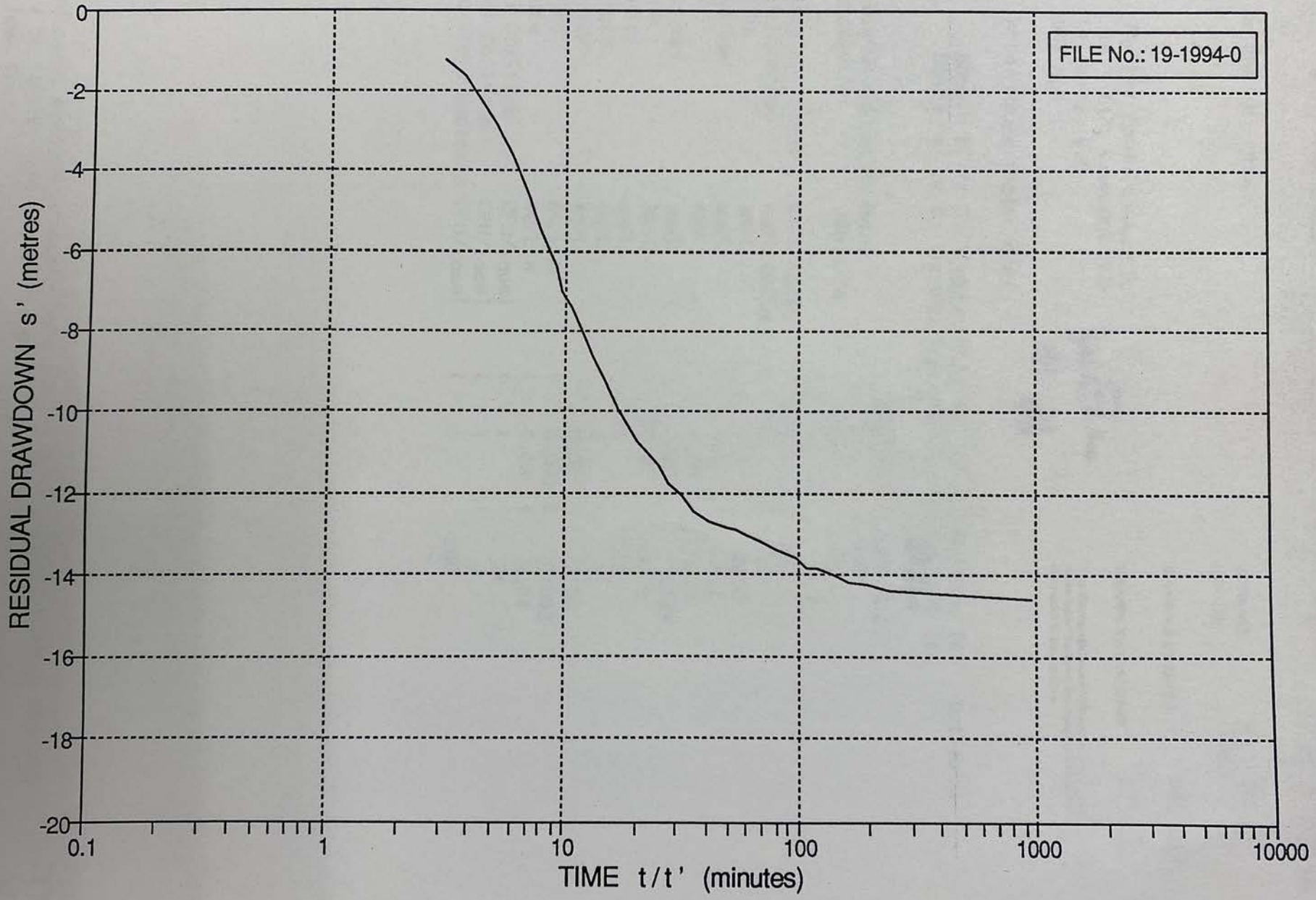
ELAPSED TIME (Minutes) t @ t' = 480			WATER DEPTH	RATE	RESIDUAL DRAWDOWN	NOTES
t	t'	t / t'	s (metres)	(USGpm)	s' (metres)	Datum is 0.30m above ground level
480	0		27.500		-14.635	Last reading pumping
481	0.5	961	27.420		-14.555	
481	1	481	27.335		-14.470	
482	2	241	27.223		-14.358	
483	2.5	193	27.117		-14.252	
483	3	161	27.027		-14.162	
484	3.5	138	26.864		-13.999	
484	4	121	26.700		-13.835	
485	4.5	108	26.692		-13.827	
485	5	97	26.466		-13.601	
486	6	81	26.264		-13.399	
487	7	70	26.064		-13.199	
488	8	61	25.894		-13.029	
489	9	54	25.754		-12.889	
490	10	49	25.720		-12.855	
492	12	41	25.552		-12.687	
494	14	35	25.272		-12.407	
496	16	31	24.932		-12.067	
498	18	28	24.628		-11.763	
500	20	25	24.196		-11.331	
505	25	20	23.584		-10.719	
510	30	17	22.812		-9.947	
515	35	15	22.072		-9.207	
520	40	13	21.395		-8.530	
525	45	12	20.840		-7.975	
530	50	11	20.290		-7.425	
535	55	10	19.895		-7.030	
540	60	9	19.220		-6.355	
550	70	8	18.390		-5.525	
560	80	7	17.625		-4.760	
570	90	6	16.865		-4.000	
580	100	6	16.402		-3.537	
600	120	5	15.662		-2.797	
660	180	4	14.490		-1.625	
720	240	3	14.140		-1.275	

THURBER

WELL No. 4

RESIDUAL DRAWDOWN CURVE

D.L. 86 SUBDIVISION, Galiano Island
Mr. Gary Thomas



WELL #4

JB Laboratories Ltd.
— water/wastewaters

827 FORT STREET,
VICTORIA, B.C. V8W 1H6
TEL: (604) 385-6112
FAX: (604) 382-6364

OCT 21 1994

DATE: October 8, 1994

JOB NO.: JB 1433
LR NO.: 187601

SAMPLING DATE: See Below

SAMPLING AGENT: Client

The sample[s] submitted by the agent have been tested as requested and we report as follows:

Client:

Thurber Consultants Ltd.
210 - 4475 Viewmont Ave
Victoria, B.C
V8Z 6L8

KIELL #4

Attn: Bruce Ingimundson

Sample: Sample # 1: G. Thomas: Well #2, DL 86, Galiano Is. Oct 6/94
Sample # 2: G. Thomas: Well #4, DL 86, Galiano Is.

#4

		Sample 1	Sample 2
Tot Dissolved Solids	mg/L	294	198
Conductivity	umhos/cm	383	282
pH		7.7	7.3
Alkalinity, Total	mg/L $CaCO_3$	180	135
Total Hardness	mg/L $CaCO_3$	22	89
Calcium	mg/L	7.5	26.0
Magnesium	mg/L	0.8	6.1
Iron	mg/L	0.6*	0.2
Manganese	mg/L	0.02	0.12*
Sodium	mg/L	92.0	32.0
Chloride	mg/L	21	10
Sulphate	mg/L	8	8
Fluoride	mg/L	0.30	0.20
Nitrite	mg/L N	< 0.002	< 0.002
Nitrate	mg/L N	< 0.04	< 0.04
Total Coliform	CFU/100ml	< 1	2*
Faecal Coliform	CFU/100ml	< 1	< 1
Noncoliform bacteria	CFU/100ml	< 1	100

* Indicates Outside of Guidelines for Canadian Drinking Water Quality and / or the BC Safe Drinking Water Regulation.
< = less than

John E. Evanoff, M.Sc. Barbara M. Klassen, B.Sc.

Analysis performed according to "A Laboratory Manual for the Chemical Analysis of Water, Wastewaters and Biological Tissues", Chemistry Laboratory, Water Resource Service and / or "Standard Methods / Water and Wastewater", American Public Health Association.

JB LABORATORIES