



Community and Transportation
Services
Box 2703, Whitehorse, Yukon Y1A 2C6
(403) 667-5811 Telex 036-8-260

Our File: MA 5800-D1
Your File:

18 January 1990

City of Dawson
Box 308
Dawson, Yukon
Y0B 1G0

Attention: Allanah Tunnicliffe, Manager

Dear Ms. Tunnicliffe:

Re: Dawson Water Supply

I would like to address the subject of the apparently diminishing water supply in your community. It has come to my attention that this past fall and winter has seen one of the lowest productivities of water from your 'new well' in recent years. Although this may be a direct result of the unusually dry summer, it comes at a time when your supplementary 'river well' is becoming less reliable due to its age and the fact that there is increasing concern about water quality of the Klondike River.

According to our information, diminishing supply at the new well goes back at least 8 years. During this time solutions such as river rechannelling, well deepening and infiltration ports cleaning have all helped to restore flows sufficiently to meet demands.

Some 2 1/2 years ago, a few months prior to the system being turned over from YTG to City of Dawson ownership, our Department embarked on a search for alternative water sources. It was thought that a field of small-diameter drilled wells within the general area of the existing wells and pumphouse/reservoir could supplement and eventually become the primary source of Dawson's water supply. An 8" exploratory well was therefore drilled near the river well. Subsequent to the system takeover, my Department, in the interest of being helpful, pursued this exploratory well project to the point of developing it and measuring its productivity. We now wish to share the results of our findings with you so that the City of Dawson can continue to resolve its water shortages.

.../2




To bring you up-to-date, the 8" well was drilled just inside the new dyke berm opposite the river well to refusal. Refusal was encountered at a depth of 40'. There is a slight possibility that a boulder or permafrost could have caused the refusal, but it was probably bedrock. Fifteen feet of #40, 8" diameter infiltration screen was installed in the well. It was developed for approximately 14 hours by air-tool methods and the resulting sustained long-term yield was estimated at 57 gal/min (4.3 l/s). Indications are that a larger diameter drilled well with a larger screen area would yield considerably more water. The source of the aquifer was not confirmed. I am attaching a letter from Roger Clissold of Hydrogeological Consultants Ltd. summing up his 'limited' assessment of this well.

We believe that the potential for successfully tapping this aquifer is very promising. Should the City of Dawson choose to pursue this further, it is suggested that you first hire experts to study the aquifer more closely. This well would be most useful in any future aquifer studies.

I discern from having spoken to you and from discussions with my staff that a greater expectation of YTG was presumed by the City of Dawson on this matter. I wish to make clear that YTG has more than fulfilled its obligations to the City. The well we started is completed at a cost of approximately \$25 K - 100% funded by YTG. We are disappointed that it wasn't a better producer, however on the positive side it can probably be put on stream, or at the very least used in future testing to further monitor the aquifer under Dawson.

Thank you. I trust the attached information is helpful.

Yours truly,



Roger Graham
Deputy Minister

/cb

Attach.

cc Dale Kozmenko 900123
cc Bob Gates 900123
cc Ed Shillington 910409

April 3, 1989

AquaTech Supplies and Services Ltd.
123 Copper Road
WHITEHORSE, Yukon
Y1A 2Z7

Attn: Mr. Bert Albisser

Dear Mr. Albisser:

Please find attached a table and semilogarithmic plot of the water-level data from the aquifer test conducted with the new Dawson City water well. I assume that details regarding the lithology and the completion of the water well are not available and were not sent for that reason. Answers to the questions posed in your Fax of March 27, 1989 cannot be answered definitively without some details related to the aquifer. At best, I can make a lot of assumptions and provide guidelines.

The aquifer test data provide three values for transmissivity of the aquifer. The time-drawdown analysis of the data from the pumping interval indicate a transmissivity of 390 m²/day; from the t/t'-residual drawdown analysis, the transmissivity is 780 m²/day. The specific capacity after ten minutes of pumping during the constant pumping rate test is 785 lpm per metre of drawdown which implies a transmissivity of 360 m²/day. Because no observation well data are available, a meaningful storativity cannot be calculated.

Answers to your questions can be attempted, if the following assumptions are made:

- 1) the aquifer satisfies the basic requirements as to isotropicity and homogeneity;
- 2) the top of the aquifer is at a depth of 10 metres;
- 3) the aquifer is two kilometres wide and has an effective infinite longitudinal extent;
- 4) the present water well is located 500 metres from one edge of the aquifer;
- 5) the present water well is completed through the entire thickness of the aquifer;
- 6) the aquifer has a storativity of 0.001 m³/m³;
- 7) the grain size of the aquifer is suitable for the installation of 200 slot water well screens.

Because the reason for the different values of transmissivity cannot be determined due to the absence of other data, the calculated long-term yield for the water well is in the order of 260 lpm.

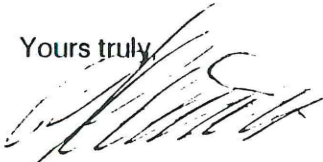
If the conditions are as outlined above, more than three properly-completed water wells spaced 100 metres apart would be necessary to provide 3,000 lpm on a long-term basis. Because there are insufficient data to assess the aquifer parameters, it is obvious from the present data that if the existing water well represents a properly-completed water well, then more than 10 water wells would be required to provide 3,000 lpm.

cc Bob Lorimer 900126
cc Ed Shillinglaw 910409

I would recommend that future water wells have a minimum surface casing of 273 mm and that the water wells be completed with water well screens which have a minimum of 1500 square centimetres of open area, if a pumping rate of 3,000 lpm is to be attempted from one water well.

I hope this information is satisfactory for your present needs. Unfortunately, there is a paucity of data, preventing a meaningful extrapolation of the available data. If you have any questions, or require additional information, please contact me at your convenience.

Yours truly,

A handwritten signature in black ink, appearing to read 'R. J. Clissold', written over the 'Yours truly,' text.

R. J. Clissold, P. Geol.,
President and Senior Hydrogeologist

PARTICLE - SIZE ANALYSIS OF SOILS

Project: New Water Well
Dawson City, Yukon

Project Number: 0201-4655.18

Date Tested: 1987-10-26

Borehole Number: Water Well

Depth: 9.4 - 11.6 m (31 feet - 38 feet combined)

Soil Description: SAND(SP/SM)-some gravel, trace silt

Cu: 12

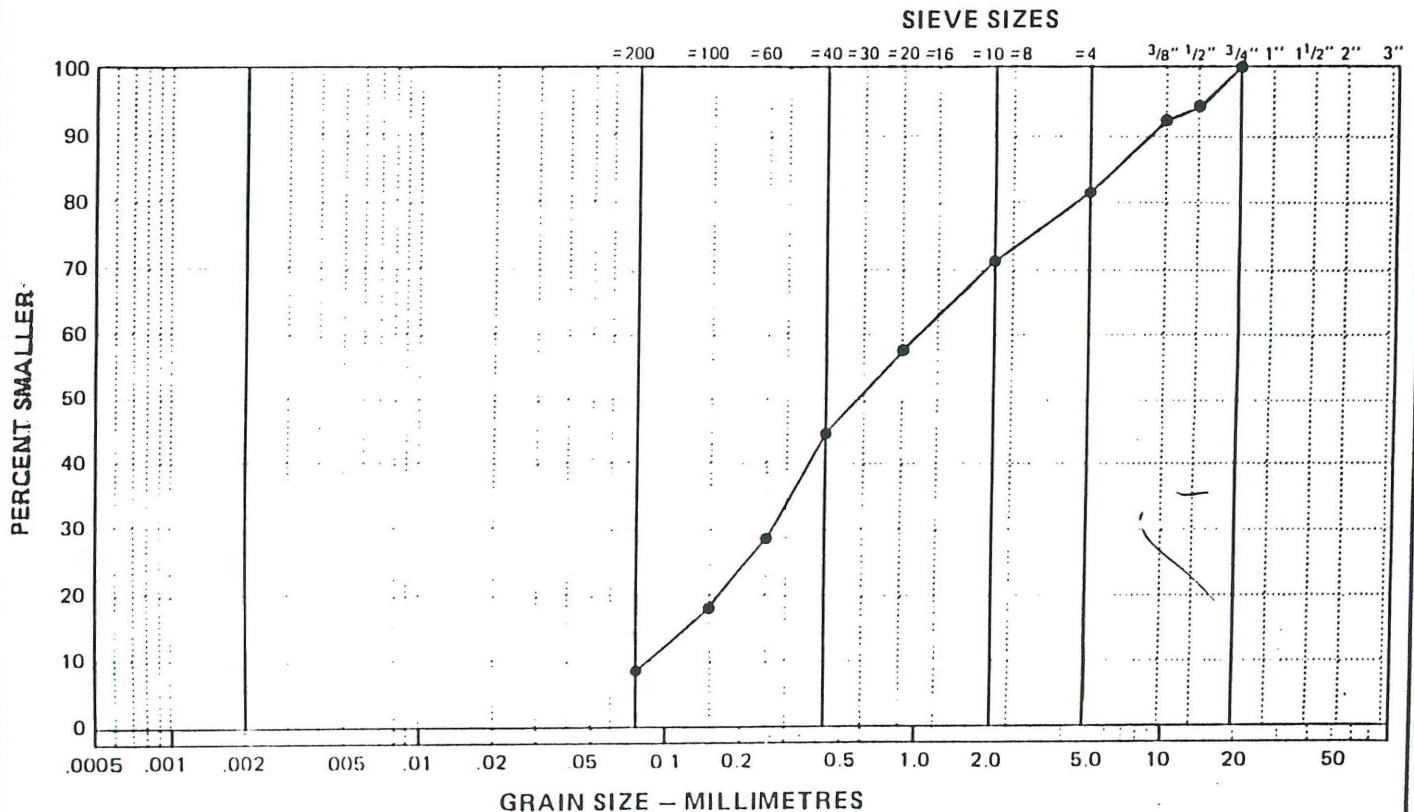
Cc: 0.8

Natural Moisture Content: _____ %

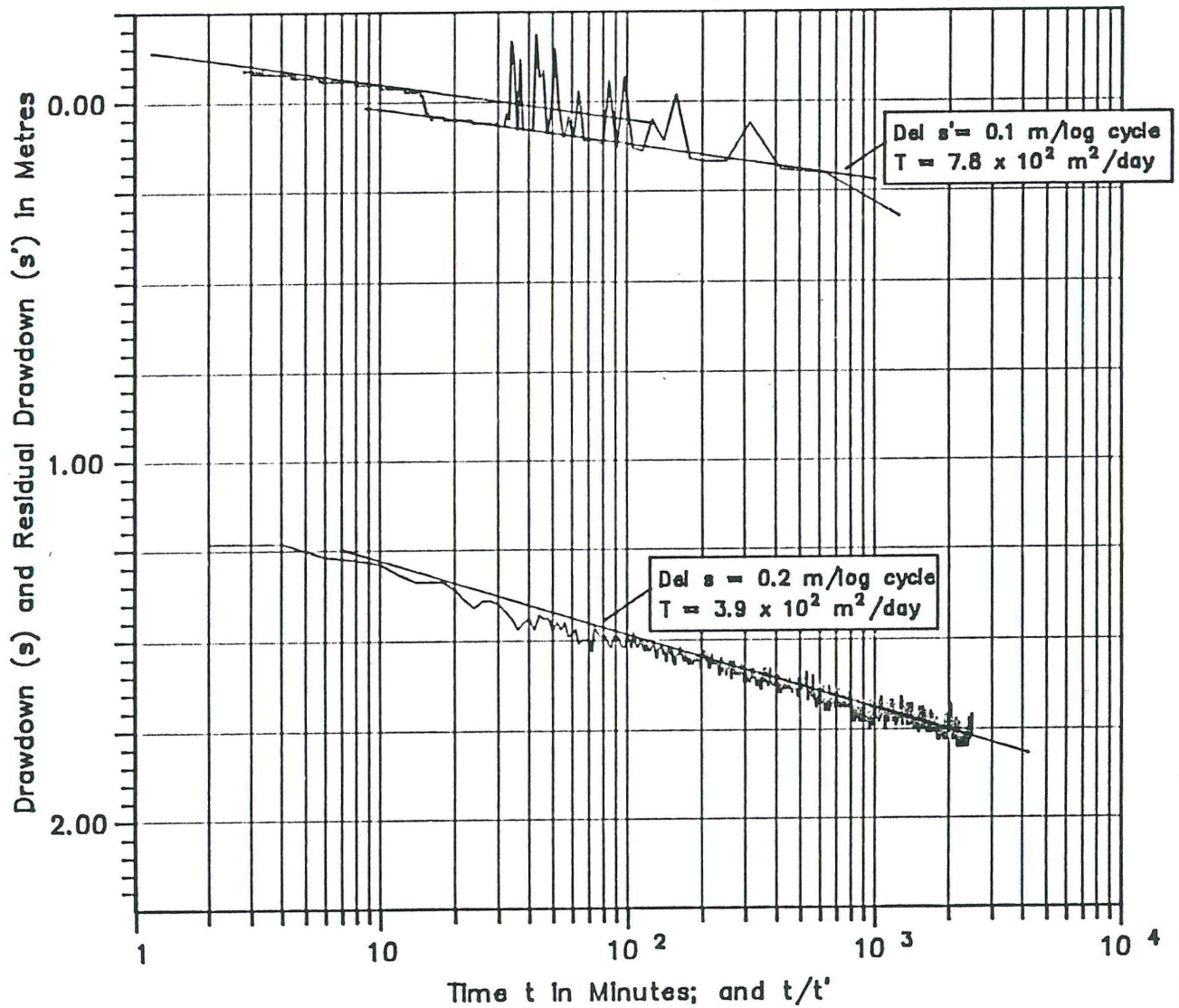
Remarks: Samples submitted by client.

SIEVE	PERCENTAGE PASSING
3"	
1 1/2"	
1"	
3/4"	100
1/2"	94
3/8"	92
No. 4	81
No. 10	71
No. 20	58
No. 40	44
No. 60	29
No. 100	18
No. 200	9

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



Dawson City Water Well
 Aquifer Test I – Pumping 259.2 lpm
 Depth to Top of Main Aquifer ??? m; NPWL: 6.38 m BTOC



Government of the Yukon
 Community and Transportation Services
 Dawson City
 New 219-mm Water Well

Semilog Plot

March, 1989

Figure 1.

SE1000B
Environmental Logger
03/28 14:22

Unit# 00214 Test# 0

INPUT 1: Level (M) TOC

Reference 6.47
Scale factor 49.78
Offset 0.00

Step# 0 03/21 08:00

Elapsed Time Value

03/21/89 17:06 6.47
03/21/89 17:08 6.46
03/21/89 17:10 6.46
03/21/89 17:12 6.46
03/21/89 17:14 6.46
03/21/89 17:16 6.46
03/21/89 17:18 6.46
03/21/89 17:20 6.46
03/21/89 17:22 6.46

Testing pump

03/21/89 17:24 7.25
03/21/89 17:26 6.36
03/21/89 17:28 6.36
03/21/89 17:30 6.36
03/21/89 17:32 6.36
03/21/89 17:34 6.35
03/21/89 17:36 6.36
03/21/89 17:38 6.36
03/21/89 17:40 6.36
03/21/89 17:42 6.36
03/21/89 17:44 6.36
03/21/89 17:46 6.36
03/21/89 17:48 6.36
03/21/89 17:50 6.36
03/21/89 17:52 6.36
03/21/89 17:54 6.36
03/21/89 17:56 6.36
03/21/89 17:58 6.36

Step drawdown test

Pumping 90.9 lpm

03/21/89 18:00 6.63
03/21/89 18:02 6.68
03/21/89 18:04 6.69
03/21/89 18:06 6.70
03/21/89 18:08 6.67

03/21/89 18:10 6.70
03/21/89 18:12 6.68
03/21/89 18:14 6.69

Pumping 136.4 lpm

03/21/89 18:16 6.97
03/21/89 18:18 6.86
03/21/89 18:20 6.85
03/21/89 18:22 6.88
03/21/89 18:24 6.86
03/21/89 18:26 6.85
03/21/89 18:28 6.86

Pumping 225.5 lpm

03/21/89 18:30 7.20
03/21/89 18:32 7.21
03/21/89 18:34 7.24
03/21/89 18:36 7.24
03/21/89 18:38 7.30
03/21/89 18:40 7.31
03/21/89 18:42 7.30
03/21/89 18:44 7.31
03/21/89 18:46 7.30
03/21/89 18:48 7.31
03/21/89 18:50 7.33
03/21/89 18:52 7.33
03/21/89 18:54 7.34
03/21/89 18:56 7.35
03/21/89 18:58 7.34
03/21/89 19:00 7.55

Pumping 363.7 lpm

03/21/89 19:02 8.08
03/21/89 19:04 8.66
03/21/89 19:06 8.86
03/21/89 19:08 8.92
03/21/89 19:10 8.99
03/21/89 19:12 9.00
03/21/89 19:14 8.99
03/21/89 19:16 9.04

Pump off

03/21/89 19:18 6.46
03/21/89 19:20 6.51
03/21/89 19:22 6.48
03/21/89 19:24 6.47
03/21/89 19:26 6.46
03/21/89 19:28 6.45
03/21/89 19:30 6.43
03/21/89 19:32 6.44
03/21/89 19:34 6.43
03/21/89 19:36 6.43
03/21/89 19:38 6.43
03/21/89 19:40 6.43
03/21/89 19:42 6.42
03/21/89 19:44 6.42
03/21/89 19:46 6.41
03/21/89 19:48 6.42

03/21/89 19:50 6.41
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03/21/89 19:54 6.41
03/21/89 19:56 6.41
03/21/89 19:58 6.40
03/21/89 20:00 6.41
03/21/89 20:02 6.40
03/21/89 20:04 6.39
03/21/89 20:06 6.40
03/21/89 20:08 6.40
03/21/89 20:10 6.40
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03/21/89 21:30 6.38
03/21/89 21:32 6.38
03/21/89 21:34 6.38
03/21/89 21:36 6.38

Constant pumping rate test
Pumping 259.2 lpm

03/22/89 02:56 7.95	03/22/89 04:44 8.01	03/22/89 06:32 7.99
03/22/89 02:58 7.93	03/22/89 04:46 8.02	03/22/89 06:34 8.00
03/22/89 03:00 7.97	03/22/89 04:48 7.97	03/22/89 06:36 8.01
03/22/89 03:02 7.95	03/22/89 04:50 8.00	03/22/89 06:38 8.01
03/22/89 03:04 7.95	03/22/89 04:52 8.00	03/22/89 06:40 8.02
03/22/89 03:06 7.95	03/22/89 04:54 7.97	03/22/89 06:42 8.01
03/22/89 03:08 7.95	03/22/89 04:56 7.96	03/22/89 06:44 8.03
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03/22/89 04:28 7.98	03/22/89 06:16 8.00	03/22/89 08:04 8.03
03/22/89 04:30 7.99	03/22/89 06:18 8.01	03/22/89 08:06 8.03
03/22/89 04:32 8.01	03/22/89 06:20 8.01	03/22/89 08:08 8.02
03/22/89 04:34 7.98	03/22/89 06:22 8.02	03/22/89 08:10 8.01
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03/22/89 04:38 7.99	03/22/89 06:26 8.00	03/22/89 08:14 8.01
03/22/89 04:40 7.99	03/22/89 06:28 8.01	03/22/89 08:16 8.04
03/22/89 04:42 7.97	03/22/89 06:30 8.02	03/22/89 08:18 8.00

03/22/89	08:20	8.04	03/22/89	10:08	8.05	03/22/89	11:56	8.07
03/22/89	08:22	7.98	03/22/89	10:10	8.04	03/22/89	11:58	8.06
03/22/89	08:24	8.02	03/22/89	10:12	8.06	03/22/89	12:00	8.07
03/22/89	08:26	8.02	03/22/89	10:14	8.02	03/22/89	12:02	8.05
03/22/89	08:28	8.03	03/22/89	10:16	8.05	03/22/89	12:04	8.04
03/22/89	08:30	8.05	03/22/89	10:18	8.03	03/22/89	12:06	8.03
03/22/89	08:32	8.02	03/22/89	10:20	8.03	03/22/89	12:08	8.04
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03/22/89	08:40	8.03	03/22/89	10:28	8.04	03/22/89	12:16	8.04
03/22/89	08:42	8.01	03/22/89	10:30	8.07	03/22/89	12:18	8.06
03/22/89	08:44	8.03	03/22/89	10:32	8.07	03/22/89	12:20	8.05
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03/22/89	08:50	8.04	03/22/89	10:38	8.03	03/22/89	12:26	8.07
03/22/89	08:52	8.06	03/22/89	10:40	8.05	03/22/89	12:28	8.07
03/22/89	08:54	8.03	03/22/89	10:42	8.06	03/22/89	12:30	8.08
03/22/89	08:56	8.05	03/22/89	10:44	8.06	03/22/89	12:32	8.09
03/22/89	08:58	8.02	03/22/89	10:46	8.03	03/22/89	12:34	8.09
03/22/89	09:00	8.04	03/22/89	10:48	8.03	03/22/89	12:36	8.06
03/22/89	09:02	8.02	03/22/89	10:50	8.06	03/22/89	12:38	8.09
03/22/89	09:04	8.02	03/22/89	10:52	8.05	03/22/89	12:40	8.09
03/22/89	09:06	8.03	03/22/89	10:54	8.04	03/22/89	12:42	8.08
03/22/89	09:08	8.06	03/22/89	10:56	8.02	03/22/89	12:44	8.06
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03/22/89	09:34	8.06	03/22/89	11:22	8.03	03/22/89	13:10	8.08
03/22/89	09:36	8.03	03/22/89	11:24	8.03	03/22/89	13:12	8.08
03/22/89	09:38	8.06	03/22/89	11:26	8.07	03/22/89	13:14	8.05
03/22/89	09:40	8.07	03/22/89	11:28	8.05	03/22/89	13:16	8.07
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03/22/89	09:48	8.07	03/22/89	11:36	8.03	03/22/89	13:24	8.08
03/22/89	09:50	8.08	03/22/89	11:38	8.05	03/22/89	13:26	8.08
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03/22/89	09:58	8.06	03/22/89	11:46	8.05	03/22/89	13:34	8.06
03/22/89	10:00	8.07	03/22/89	11:48	8.06	03/22/89	13:36	8.11
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03/22/89	10:04	8.04	03/22/89	11:52	8.06	03/22/89	13:40	8.09
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03/23/89	07:16	8.10	03/23/89	09:04	8.12	03/23/89	10:52	8.13
03/23/89	07:18	8.09	03/23/89	09:06	8.13	03/23/89	10:54	8.13
03/23/89	07:20	8.11	03/23/89	09:08	8.12	03/23/89	10:56	8.16
03/23/89	07:22	8.16	03/23/89	09:10	8.13	03/23/89	10:58	8.18
03/23/89	07:24	8.11	03/23/89	09:12	8.11	03/23/89	11:00	8.14
03/23/89	07:26	8.10	03/23/89	09:14	8.11	03/23/89	11:02	8.14
03/23/89	07:28	8.13	03/23/89	09:16	8.13	03/23/89	11:04	8.15
03/23/89	07:30	8.10	03/23/89	09:18	8.11	03/23/89	11:06	8.18
03/23/89	07:32	8.12	03/23/89	09:20	8.14	03/23/89	11:08	8.15
03/23/89	07:34	8.13	03/23/89	09:22	8.14	03/23/89	11:10	8.15
03/23/89	07:36	8.13	03/23/89	09:24	8.16	03/23/89	11:12	8.15
03/23/89	07:38	8.14	03/23/89	09:26	8.10	03/23/89	11:14	8.16
03/23/89	07:40	8.12	03/23/89	09:28	8.12	03/23/89	11:16	8.18
03/23/89	07:42	8.13	03/23/89	09:30	8.13	03/23/89	11:18	8.16

03/23/89	11:20	8.18	03/23/89	13:08	8.17	03/23/89	14:56	8.15
03/23/89	11:22	8.14	03/23/89	13:10	8.14	03/23/89	14:58	8.13
03/23/89	11:24	8.13	03/23/89	13:12	8.12	03/23/89	15:00	8.13
03/23/89	11:26	8.15	03/23/89	13:14	8.16	03/23/89	15:02	8.13
03/23/89	11:28	8.16	03/23/89	13:16	8.13	03/23/89	15:04	8.13
03/23/89	11:30	8.12	03/23/89	13:18	8.17	03/23/89	15:06	8.15
03/23/89	11:32	8.17	03/23/89	13:20	8.16	03/23/89	15:08	8.14
03/23/89	11:34	8.18	03/23/89	13:22	8.14	03/23/89	15:10	8.13
03/23/89	11:36	8.14	03/23/89	13:24	8.13	03/23/89	15:12	8.14
03/23/89	11:38	8.15	03/23/89	13:26	8.14	03/23/89	15:14	8.10
03/23/89	11:40	8.12	03/23/89	13:28	8.13	03/23/89	15:16	8.13
03/23/89	11:42	8.14	03/23/89	13:30	8.18	03/23/89	15:18	8.15
03/23/89	11:44	8.13	03/23/89	13:32	8.13	03/23/89	15:20	8.16
03/23/89	11:46	8.11	03/23/89	13:34	8.13	03/23/89	15:22	8.16
03/23/89	11:48	8.13	03/23/89	13:36	8.14	03/23/89	15:24	8.12
03/23/89	11:50	8.13	03/23/89	13:38	8.15	03/23/89	15:26	8.15
03/23/89	11:52	8.14	03/23/89	13:40	8.17	03/23/89	15:28	8.13
03/23/89	11:54	8.13	03/23/89	13:42	8.14	03/23/89	15:30	8.14
03/23/89	11:56	8.16	03/23/89	13:44	8.16	03/23/89	15:32	8.14
03/23/89	11:58	8.13	03/23/89	13:46	8.14	03/23/89	15:34	8.15
03/23/89	12:00	8.18	03/23/89	13:48	8.15	03/23/89	15:36	8.13
03/23/89	12:02	8.15	03/23/89	13:50	8.14	03/23/89	15:38	8.13
03/23/89	12:04	8.13	03/23/89	13:52	8.16	03/23/89	15:40	8.13
03/23/89	12:06	8.14	03/23/89	13:54	8.15	03/23/89	15:42	8.14
03/23/89	12:08	8.16	03/23/89	13:56	8.13	03/23/89	15:44	8.11
03/23/89	12:10	8.15	03/23/89	13:58	8.14	03/23/89	15:46	8.13
03/23/89	12:12	8.16	03/23/89	14:00	8.14	03/23/89	15:48	8.12
03/23/89	12:14	8.14	03/23/89	14:02	8.16	03/23/89	15:50	8.12
03/23/89	12:16	8.14	03/23/89	14:04	8.13	03/23/89	15:52	8.14
03/23/89	12:18	8.16	03/23/89	14:06	8.15	03/23/89	15:54	8.11
03/23/89	12:20	8.14	03/23/89	14:08	8.15	03/23/89	15:56	8.13
03/23/89	12:22	8.15	03/23/89	14:10	8.15	03/23/89	15:58	8.13
03/23/89	12:24	8.14	03/23/89	14:12	8.13	03/23/89	16:00	8.12
03/23/89	12:26	8.15	03/23/89	14:14	8.15	03/23/89	16:02	8.12
03/23/89	12:28	8.18	03/23/89	14:16	8.14	03/23/89	16:04	8.14
03/23/89	12:30	8.17	03/23/89	14:18	8.14	03/23/89	16:06	8.13
03/23/89	12:32	8.16	03/23/89	14:20	8.14	03/23/89	16:08	8.13
03/23/89	12:34	8.16	03/23/89	14:22	8.14	03/23/89	16:10	8.11
03/23/89	12:36	8.17	03/23/89	14:24	8.14	03/23/89	16:12	8.15
03/23/89	12:38	8.16	03/23/89	14:26	8.12	03/23/89	16:14	8.11
03/23/89	12:40	8.14	03/23/89	14:28	8.14	03/23/89	16:16	8.09
03/23/89	12:42	8.13	03/23/89	14:30	8.13	03/23/89	16:18	8.10
03/23/89	12:44	8.17	03/23/89	14:32	8.14			
03/23/89	12:46	8.15	03/23/89	14:34	8.14	Pumping stopped		
03/23/89	12:48	8.14	03/23/89	14:36	8.18	03/23/89	16:20	6.70
03/23/89	12:50	8.14	03/23/89	14:38	8.15	03/23/89	16:22	6.58
03/23/89	12:52	8.12	03/23/89	14:40	8.15	03/23/89	16:24	6.57
03/23/89	12:54	8.16	03/23/89	14:42	8.14	03/23/89	16:26	6.44
03/23/89	12:56	8.14	03/23/89	14:44	8.15	03/23/89	16:28	6.55
03/23/89	12:58	8.18	03/23/89	14:46	8.17	03/23/89	16:30	6.55
03/23/89	13:00	8.14	03/23/89	14:48	8.15	03/23/89	16:32	6.54
03/23/89	13:02	8.14	03/23/89	14:50	8.14	03/23/89	16:34	6.36
03/23/89	13:04	8.16	03/23/89	14:52	8.13	03/23/89	16:36	6.49
03/23/89	13:06	8.15	03/23/89	14:54	8.14	03/23/89	16:38	6.43

03/23/89	16:40	6.52	03/23/89	18:28	6.43	03/23/89	20:08	6.34
03/23/89	16:42	6.51	03/23/89	18:30	6.43	03/23/89	20:10	6.34
03/23/89	16:44	6.31	03/23/89	18:32	6.43	03/23/89	20:12	6.34
03/23/89	16:46	6.51	03/23/89	18:34	6.43	03/23/89	20:14	6.34
03/23/89	16:48	6.32	03/23/89	18:36	6.43	03/23/89	20:16	6.34
03/23/89	16:50	6.50	03/23/89	18:38	6.43	03/23/89	20:18	6.34
03/23/89	16:52	6.49	03/23/89	18:40	6.43	03/23/89	20:20	6.34
03/23/89	16:54	6.49	03/23/89	18:42	6.43	03/23/89	20:22	6.34
03/23/89	16:56	6.49	03/23/89	18:44	6.43	03/23/89	20:24	6.34
03/23/89	16:58	6.35	03/23/89	18:46	6.42	03/23/89	20:26	6.34
03/23/89	17:00	6.48	03/23/89	18:48	6.42	03/23/89	20:28	6.34
03/23/89	17:02	6.42	03/23/89	18:50	6.42	03/23/89	20:30	6.34
03/23/89	17:04	6.48	03/23/89	18:52	6.42	03/23/89	20:32	6.34
03/23/89	17:06	6.40	03/23/89	18:54	6.42	03/23/89	20:34	6.34
03/23/89	17:08	6.23	03/23/89	18:56	6.42	03/23/89	20:36	6.34
03/23/89	17:10	6.40	03/23/89	18:58	6.42	03/23/89	20:38	6.34
03/23/89	17:12	6.47	03/23/89	19:00	6.42	03/23/89	20:40	6.34
03/23/89	17:14	6.29	03/23/89	19:02	6.42	03/23/89	20:42	6.34
03/23/89	17:16	6.31	03/23/89	19:04	6.43	03/23/89	20:44	6.34
03/23/89	17:18	6.19	03/23/89	19:06	6.41	03/23/89	20:46	6.34
03/23/89	17:20	6.46	03/23/89	19:08	6.41	03/23/89	20:48	6.34
03/23/89	17:22	6.46	03/23/89	19:10	6.41	03/23/89	20:50	6.34
03/23/89	17:24	6.46	03/23/89	19:12	6.41	03/23/89	20:52	6.34
03/23/89	17:26	6.46				03/23/89	20:54	6.34
03/23/89	17:28	6.26	Sensor removed			03/23/89	20:56	6.34
03/23/89	17:30	6.46	03/23/89	19:14	10.05	03/23/89	20:58	6.34
03/23/89	17:32	6.27	03/23/89	19:16	10.05	03/23/89	21:00	6.33
03/23/89	17:34	6.21	03/23/89	19:18	10.05	03/23/89	21:02	6.33
03/23/89	17:36	6.43	03/23/89	19:20	10.06	03/23/89	21:04	6.33
03/23/89	17:38	6.41				03/23/89	21:06	6.33
03/23/89	17:40	6.45	Sensor reinstalled			03/23/89	21:08	6.33
03/23/89	17:42	6.45	03/23/89	19:22	6.36	03/23/89	21:10	6.33
03/23/89	17:44	6.45	03/23/89	19:24	6.36	03/23/89	21:12	6.33
03/23/89	17:46	6.44	03/23/89	19:26	6.35	03/23/89	21:14	6.33
03/23/89	17:48	6.44	03/23/89	19:28	6.35	03/23/89	21:16	6.33
03/23/89	17:50	6.44	03/23/89	19:30	6.35	03/23/89	21:18	6.33
03/23/89	17:52	6.44	03/23/89	19:32	6.35	03/23/89	21:20	6.33
03/23/89	17:54	6.44	03/23/89	19:34	6.35	03/23/89	21:22	6.33
03/23/89	17:56	6.44	03/23/89	19:36	6.35	03/23/89	21:24	6.33
03/23/89	17:58	6.44	03/23/89	19:38	6.35	03/23/89	21:26	6.33
03/23/89	18:00	6.44	03/23/89	19:40	6.35	03/23/89	21:28	6.33
03/23/89	18:02	6.44	03/23/89	19:42	6.35	03/23/89	21:30	6.33
03/23/89	18:04	6.44	03/23/89	19:44	6.35	03/23/89	21:32	6.33
03/23/89	18:06	6.44	03/23/89	19:46	6.35	03/23/89	21:34	6.33
03/23/89	18:08	6.44	03/23/89	19:48	6.35	03/23/89	21:36	6.33
03/23/89	18:10	6.43	03/23/89	19:50	6.35	03/23/89	21:38	6.33
03/23/89	18:12	6.43	03/23/89	19:52	6.35	03/23/89	21:40	6.33
03/23/89	18:14	6.43	03/23/89	19:54	6.35	03/23/89	21:42	6.33
03/23/89	18:16	6.43	03/23/89	19:56	6.35	03/23/89	21:44	6.33
03/23/89	18:18	6.43	03/23/89	19:58	6.34	03/23/89	21:46	6.33
03/23/89	18:20	6.43	03/23/89	20:00	6.34	03/23/89	21:48	6.33
03/23/89	18:22	6.43	03/23/89	20:02	6.34	03/23/89	21:50	6.33
03/23/89	18:24	6.43	03/23/89	20:04	6.34	03/23/89	21:52	6.33
03/23/89	18:26	6.43	03/23/89	20:06	6.34	03/23/89	21:54	6.33

03/23/89 21:56 6.33	03/23/89 23:44 6.32	03/24/89 01:32 6.31
03/23/89 21:58 6.33	03/23/89 23:46 6.32	03/24/89 01:34 6.31
03/23/89 22:00 6.33	03/23/89 23:48 6.32	03/24/89 01:36 6.31
03/23/89 22:02 6.33	03/23/89 23:50 6.32	03/24/89 01:38 6.31
03/23/89 22:04 6.33	03/23/89 23:52 6.32	03/24/89 01:40 6.31
03/23/89 22:06 6.33	03/23/89 23:54 6.32	03/24/89 01:42 6.31
03/23/89 22:08 6.33	03/23/89 23:56 6.32	03/24/89 01:44 6.31
03/23/89 22:10 6.33	03/23/89 23:58 6.32	03/24/89 01:46 6.31
03/23/89 22:12 6.33	03/24/89 00:00 6.32	03/24/89 01:48 6.31
03/23/89 22:14 6.32	03/24/89 00:02 6.32	03/24/89 01:50 6.31
03/23/89 22:16 6.33	03/24/89 00:04 6.32	03/24/89 01:52 6.31
03/23/89 22:18 6.32	03/24/89 00:06 6.32	03/24/89 01:54 6.31
03/23/89 22:20 6.33	03/24/89 00:08 6.32	03/24/89 01:56 6.31
03/23/89 22:22 6.32	03/24/89 00:10 6.32	03/24/89 01:58 6.31
03/23/89 22:24 6.32	03/24/89 00:12 6.32	03/24/89 02:00 6.31
03/23/89 22:26 6.32	03/24/89 00:14 6.32	03/24/89 02:02 6.31
03/23/89 22:28 6.32	03/24/89 00:16 6.32	03/24/89 02:04 6.31
03/23/89 22:30 6.32	03/24/89 00:18 6.32	03/24/89 02:06 6.31
03/23/89 22:32 6.32	03/24/89 00:20 6.32	03/24/89 02:08 6.31
03/23/89 22:34 6.32	03/24/89 00:22 6.32	03/24/89 02:10 6.31
03/23/89 22:36 6.32	03/24/89 00:24 6.32	03/24/89 02:12 6.31
03/23/89 22:38 6.32	03/24/89 00:26 6.32	03/24/89 02:14 6.31
03/23/89 22:40 6.32	03/24/89 00:28 6.32	03/24/89 02:16 6.31
03/23/89 22:42 6.32	03/24/89 00:30 6.32	03/24/89 02:18 6.31
03/23/89 22:44 6.32	03/24/89 00:32 6.32	03/24/89 02:20 6.31
03/23/89 22:46 6.32	03/24/89 00:34 6.32	03/24/89 02:22 6.31
03/23/89 22:48 6.32	03/24/89 00:36 6.32	03/24/89 02:24 6.31
03/23/89 22:50 6.32	03/24/89 00:38 6.32	03/24/89 02:26 6.31
03/23/89 22:52 6.32	03/24/89 00:40 6.32	03/24/89 02:28 6.31
03/23/89 22:54 6.32	03/24/89 00:42 6.32	03/24/89 02:30 6.31
03/23/89 22:56 6.32	03/24/89 00:44 6.32	03/24/89 02:32 6.31
03/23/89 22:58 6.32	03/24/89 00:46 6.32	03/24/89 02:34 6.31
03/23/89 23:00 6.32	03/24/89 00:48 6.32	03/24/89 02:36 6.31
03/23/89 23:02 6.32	03/24/89 00:50 6.32	03/24/89 02:38 6.31
03/23/89 23:04 6.32	03/24/89 00:52 6.32	03/24/89 02:40 6.31
03/23/89 23:06 6.32	03/24/89 00:54 6.32	03/24/89 02:42 6.31
03/23/89 23:08 6.32	03/24/89 00:56 6.32	03/24/89 02:44 6.31
03/23/89 23:10 6.32	03/24/89 00:58 6.32	03/24/89 02:46 6.31
03/23/89 23:12 6.32	03/24/89 01:00 6.31	03/24/89 02:48 6.31
03/23/89 23:14 6.32	03/24/89 01:02 6.32	03/24/89 02:50 6.31
03/23/89 23:16 6.32	03/24/89 01:04 6.31	03/24/89 02:52 6.31
03/23/89 23:18 6.32	03/24/89 01:06 6.31	03/24/89 02:54 6.31
03/23/89 23:20 6.32	03/24/89 01:08 6.32	03/24/89 02:56 6.31
03/23/89 23:22 6.32	03/24/89 01:10 6.31	03/24/89 02:58 6.31
03/23/89 23:24 6.32	03/24/89 01:12 6.32	03/24/89 03:00 6.31
03/23/89 23:26 6.32	03/24/89 01:14 6.31	03/24/89 03:02 6.31
03/23/89 23:28 6.32	03/24/89 01:16 6.32	03/24/89 03:04 6.31
03/23/89 23:30 6.32	03/24/89 01:18 6.31	03/24/89 03:06 6.31
03/23/89 23:32 6.32	03/24/89 01:20 6.31	03/24/89 03:08 6.31
03/23/89 23:34 6.32	03/24/89 01:22 6.31	03/24/89 03:10 6.31
03/23/89 23:36 6.32	03/24/89 01:24 6.31	03/24/89 03:12 6.31
03/23/89 23:38 6.32	03/24/89 01:26 6.31	03/24/89 03:14 6.31
03/23/89 23:40 6.32	03/24/89 01:28 6.31	03/24/89 03:16 6.31
03/23/89 23:42 6.32	03/24/89 01:30 6.31	03/24/89 03:18 6.31

03/24/89	03:20	6.31	03/24/89	05:08	6.30	03/24/89	06:56	6.30
03/24/89	03:22	6.31	03/24/89	05:10	6.30	03/24/89	06:58	6.30
03/24/89	03:24	6.31	03/24/89	05:12	6.30	03/24/89	07:00	6.30
03/24/89	03:26	6.31	03/24/89	05:14	6.30	03/24/89	07:02	6.30
03/24/89	03:28	6.31	03/24/89	05:16	6.30	03/24/89	07:04	6.30
03/24/89	03:30	6.31	03/24/89	05:18	6.30	03/24/89	07:06	6.30
03/24/89	03:32	6.31	03/24/89	05:20	6.30	03/24/89	07:08	6.30
03/24/89	03:34	6.31	03/24/89	05:22	6.30	03/24/89	07:10	6.30
03/24/89	03:36	6.31	03/24/89	05:24	6.30	03/24/89	07:12	6.30
03/24/89	03:38	6.31	03/24/89	05:26	6.30	03/24/89	07:14	6.30
03/24/89	03:40	6.31	03/24/89	05:28	6.30	03/24/89	07:16	6.30
03/24/89	03:42	6.31	03/24/89	05:30	6.30	03/24/89	07:18	6.30
03/24/89	03:44	6.31	03/24/89	05:32	6.30	03/24/89	07:20	6.30
03/24/89	03:46	6.31	03/24/89	05:34	6.30	03/24/89	07:22	6.30
03/24/89	03:48	6.31	03/24/89	05:36	6.30	03/24/89	07:24	6.30
03/24/89	03:50	6.31	03/24/89	05:38	6.30	03/24/89	07:26	6.30
03/24/89	03:52	6.31	03/24/89	05:40	6.30	03/24/89	07:28	6.30
03/24/89	03:54	6.31	03/24/89	05:42	6.30	03/24/89	07:30	6.30
03/24/89	03:56	6.31	03/24/89	05:44	6.30	03/24/89	07:32	6.30
03/24/89	03:58	6.31	03/24/89	05:46	6.30	03/24/89	07:34	6.30
03/24/89	04:00	6.31	03/24/89	05:48	6.30	03/24/89	07:36	6.30
03/24/89	04:02	6.31	03/24/89	05:50	6.30	03/24/89	07:38	6.30
03/24/89	04:04	6.31	03/24/89	05:52	6.30	03/24/89	07:40	6.30
03/24/89	04:06	6.31	03/24/89	05:54	6.30	03/24/89	07:42	6.30
03/24/89	04:08	6.31	03/24/89	05:56	6.30	03/24/89	07:44	6.30
03/24/89	04:10	6.31	03/24/89	05:58	6.30	03/24/89	07:46	6.30
03/24/89	04:12	6.31	03/24/89	06:00	6.30	03/24/89	07:48	6.30
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03/24/89	04:16	6.31	03/24/89	06:04	6.30	03/24/89	07:52	6.30
03/24/89	04:18	6.31	03/24/89	06:06	6.30	03/24/89	07:54	6.30
03/24/89	04:20	6.31	03/24/89	06:08	6.30	03/24/89	07:56	6.30
03/24/89	04:22	6.31	03/24/89	06:10	6.30	03/24/89	07:58	6.30
03/24/89	04:24	6.31	03/24/89	06:12	6.30	03/24/89	08:00	6.30
03/24/89	04:26	6.31	03/24/89	06:14	6.30	03/24/89	08:02	6.30
03/24/89	04:28	6.31	03/24/89	06:16	6.30	03/24/89	08:04	6.30
03/24/89	04:30	6.31	03/24/89	06:18	6.30	03/24/89	08:06	6.30
03/24/89	04:32	6.31	03/24/89	06:20	6.30	03/24/89	08:08	6.30
03/24/89	04:34	6.30	03/24/89	06:22	6.30	03/24/89	08:10	6.30
03/24/89	04:36	6.30	03/24/89	06:24	6.30	03/24/89	08:12	6.30
03/24/89	04:38	6.31	03/24/89	06:26	6.30	03/24/89	08:14	6.30
03/24/89	04:40	6.30	03/24/89	06:28	6.30	03/24/89	08:16	6.30
03/24/89	04:42	6.31	03/24/89	06:30	6.30	03/24/89	08:18	6.30
03/24/89	04:44	6.30	03/24/89	06:32	6.30	03/24/89	08:20	6.30
03/24/89	04:46	6.30	03/24/89	06:34	6.30	03/24/89	08:22	6.30
03/24/89	04:48	6.30	03/24/89	06:36	6.30	03/24/89	08:24	6.30
03/24/89	04:50	6.30	03/24/89	06:38	6.30	03/24/89	08:26	6.30
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