APPENDIX 7-54

RESULTS OF IN-MINE SLUG TESTS

INCORPORATED
APR 15 2005
DIV OF OIL GAS & MINING

1/23/95 revised 4/97

SEP 16 2003

Results of In-Mine Slug Tests on the Star Point Sandstone, Genwal Resources, Crandall Canyon Mine

---

Genwal Resources, Inc., Huntington, Utah

07 November 1997

INCORPORATED
APR 15 2005
DIV OF OIL GAS & MINING

Mayo and Associates, LC
Consultants in Hydrogeology

Results of In-Mine Slug Tests on the Star Point Sandstone, Genwal Resources, Crandall Canyon Mine

---

Genwal Resources, Inc., Huntington, Utah

07 November 1997

Prepared by:

Erik C. Petersen,
Senior Hydrogeologist

Alan L. Mayo, Ph.D.
California Registered Geologist #3265

Mayo and Associates, LC
710 East 100 North
Lindon, Utah 84042

INCORPORATED
APR 15 2005
DIV OF OIL GAS & MINING

Mayo and Associates, LC
Consultants in Hydrogeology

Results of In-Mine Slug Tests On the Star Point Sandstone

Genwal Resources
Crandall Canyon Mine

Conducted August and September, 1997

7 November 1997

Introduction

During August and September 1997, Mayo and Associates personnel conducted slug and recovery tests on four monitoring wells in the Crandall Canyon Mine. The wells tested included MW-2, MW-7, and MW-6a completed in the Spring Canyon member of the Star Point Sandstone and Well MW-6 completed in the Panther member of the Star Point Sandstone. The locations of these wells are shown on Figure 1.

Methodology

Each of the wells tested, with the exception of MW-2, were constructed in early 1997. The wells were cased with 1.25" I.D. PVC pipe. The screened intervals were packed with silica sand. The annulus of each well was plugged with Bentonite and back-filled to the surface with concrete. Well MW-2 was constructed at an earlier time and is not cased. Well logs for these wells are included as an attachment to this report.

The tests on wells MW-2, MW-6a, and MW-6 were performed by rapidly removing a volume of water from the well casing. A slug of water was rapidly removed from wells MW-2 and MW-6a using a nitrogen gas driven air lift system. Water from well MW-6 was removed by rapidly removing a long plastic bailer. Well test recoveries were logged using automated electronic pressure transducers and data loggers obtained from In-Situ Incorporated of Laramie, Wyoming. The hydraulic head at well MW-7 is above ground surface and a shut-in recovery test was required. Well recovery measurements were made on this well using a pressure gage and a stop watch. The time-recovery data for each of the slug tests are included as an attachment to this report.

The time-recovery data for each well were plotted electronically. Values of hydraulic conductivity were calculated for each well using both computer methods and conventional manual calculations. The results of the slug tests are given in Table 1 below.

Table 1 Slug test results

Well	Formation	Type of test	Hydraulic Conductivity (feet/second)
MW-2	Spring Canyon	Slug recovery	4.8×10^{-8} to 4.9×10^{-8}
MW-6A	Spring Canyon	Slug recovery	4.4×10^{-8} to 5.9×10^{-8}
MW-7	Spring Canyon	Shut-in recovery	7.4×10^{-8}
MW-6	Panther	Slug recovery	6.2×10^{-8} to 7.4×10^{-8}

Interpretation

The values of hydraulic conductivity calculated for the Star Point Sandstone are low. These values are consistent with the antiquity of the groundwater contained in the sandstone.

Mayo and Associates
Genbase.cdr 11 March 1997

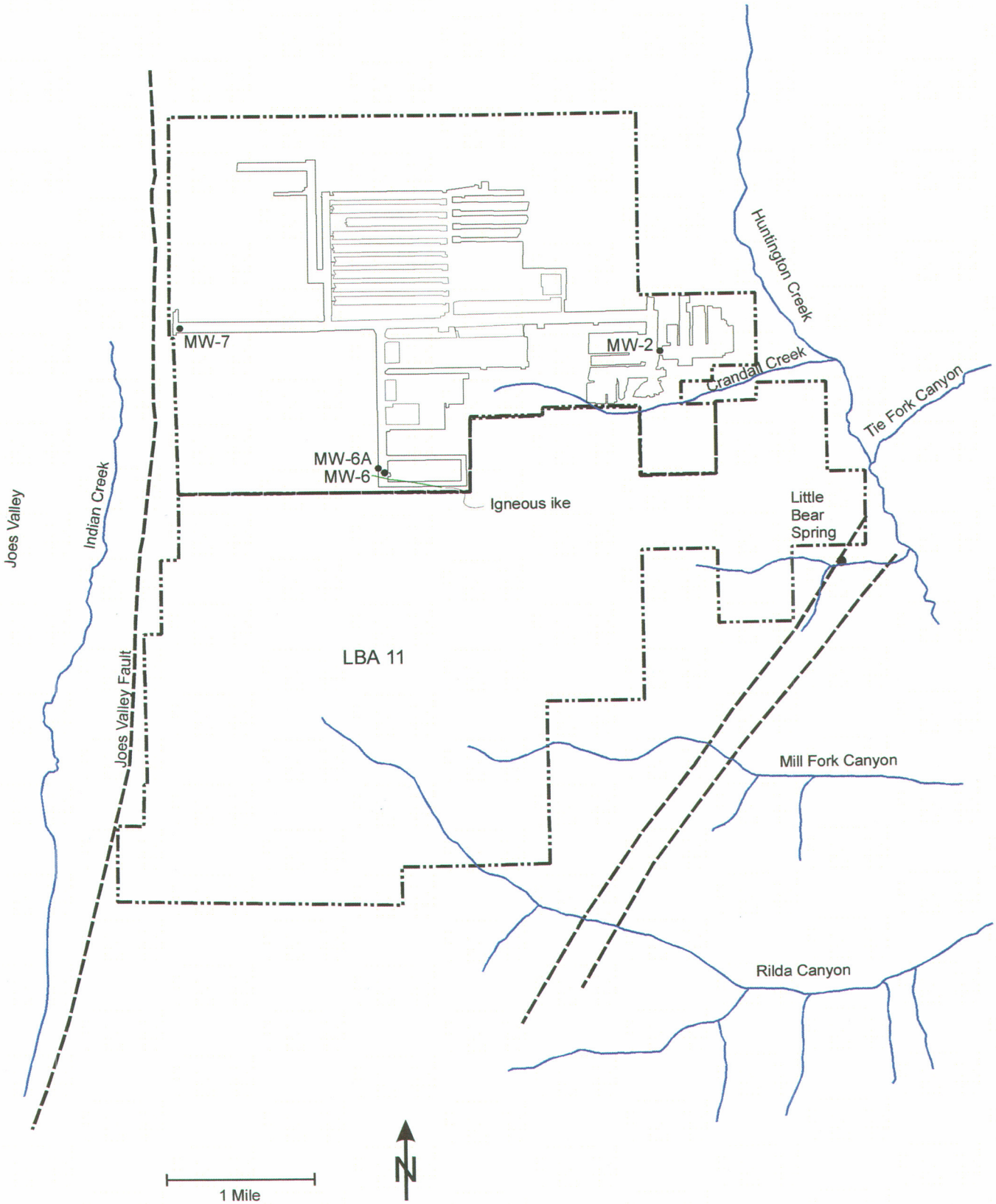


Figure 1 Map showing location of wells slug tested in the Crandall Canyon Mine.

MW-2 slug test

Time (minutes)	Depth to water
0	13.109
0.2	13.093
0.4	13.093
0.6	13.078
0.8	13.062
1	13.062
1.2	13.062
1.4	13.046
1.6	13.062
1.8	13.03
2	13.03
2.2	13.014
2.4	13.014
2.6	12.998
2.8	12.998
3	12.998
3.2	12.982
3.4	12.982
3.6	12.967
3.8	12.967
4	12.967
4.2	12.951
4.4	12.951
6.4	12.903
8.4	12.856
10.4	12.792
12.4	12.745
14.4	12.681
16.4	12.618
18.4	12.57
20.4	12.523
22.4	12.475
24.4	12.428
26.4	12.364
28.4	12.317
30.4	12.269
32.4	12.222
34.4	12.174
36.4	12.127
38.4	12.079
40.4	12.047
42.4	11.984
44.4	11.936
46.4	11.905
48.4	11.841
50.4	11.81
52.4	11.746
54.4	11.699

MW-2 slug test

Time (minutes)	Depth to water
56.4	11.651
58.4	11.604
60.4	11.556
62.4	11.509
64.4	11.477
66.4	11.429
68.4	11.382
70.4	11.334
72.4	11.287
74.4	11.255
76.4	11.207
78.4	11.16
80.4	11.112
82.4	11.081
84.4	11.033
86.4	10.986
88.4	10.954
90.4	10.906
92.4	10.843
94.4	10.827
114.4	10.383
134.4	10.003
154.4	9.623
174.4	9.242
194.4	8.893
214.4	8.561
234.4	8.275
254.4	7.974
274.4	7.705
294.4	7.467
314.4	7.198
334.4	6.96
354.4	6.738
374.4	6.516
394.4	6.31
414.4	6.088
434.4	5.898
454.4	5.708
474.4	5.533
494.4	5.327
514.4	5.153
534.4	4.995
554.4	4.852
574.4	4.662
594.4	4.535
614.4	4.392
634.4	4.234
654.4	4.107

MW-2 slug test

Time (minutes)	Depth to water
674.4	3.948
694.4	3.853
714.4	3.711
734.4	3.584
754.4	3.489
774.4	3.346
794.4	3.235
814.4	3.14
834.4	3.061
854.4	2.95
874.4	2.855
894.4	2.775
914.4	2.664
934.4	2.601
954.4	2.49
974.4	2.427
994.4	2.348

MW-6 slug test

Time (minutes)	Depth to water
0	6.02
0.2	5.973
0.4	5.926
0.6	5.895
0.8	5.847
1	5.832
1.2	5.8
1.4	5.785
1.6	5.769
1.8	5.737
2	5.706
2.2	5.69
2.4	5.659
2.6	5.643
2.8	5.612
3	5.596
3.2	5.565
3.4	5.549
3.6	5.533
3.8	5.502
4	5.486
4.2	5.47
4.4	5.439
4.6	5.423
4.8	5.392
5	5.376
5.2	5.36
5.4	5.345
5.6	5.313
5.8	5.298
6	5.266
6.2	5.25
6.4	5.235
6.6	5.203
6.8	5.188
7	5.172
7.2	5.156
7.4	5.14
7.6	5.109
7.8	5.093
8	5.077
8.2	5.062
8.4	5.03
8.6	5.015
8.8	4.999
10.8	4.81
12.8	4.637
14.8	4.464

MW-6 slug test

Time (minutes)	Depth to water
16.8	4.292
18.8	4.135
20.8	3.977
22.8	3.836
24.8	3.71
26.8	3.569
28.8	3.443
30.8	3.317
32.8	3.207
34.8	3.082
36.8	2.956
38.8	2.877
40.8	2.783
42.8	2.688
44.8	2.579
46.8	2.5
48.8	2.406
50.8	2.327
52.8	2.249
54.8	2.186
56.8	2.107
58.8	2.029
60.8	1.966
62.8	1.903
64.8	1.856
66.8	1.777
68.8	1.73
70.8	1.667
72.8	1.636
74.8	1.589
76.8	1.526
78.8	1.494
80.8	1.432
82.8	1.4
84.8	1.368
86.8	1.321
88.8	1.29
90.8	1.243
92.8	1.211
94.8	1.18
96.8	1.164
98.8	1.133
118.8	0.897
138.8	0.724
158.8	0.63
178.8	0.551

MW-6A slug test

Time (minutes)	Depth to water
0	67.575
0	68.534
0	68.581
0	67.921
0.1	66.962
0.1	66.443
0.1	65.798
0.1	65.39
0.1	64.525
0.2	64.478
0.2	64.226
0.2	63.754
0.2	63.298
0.2	63.361
0.2	63.377
0.3	63.267
0.3	63.125
0.3	62.999
0.3	62.78
0.3	62.544
0.3	62.229
0.4	61.93
0.4	61.632
0.4	61.38
0.6	58.911
0.8	57.59
1	56.615
1.2	55.845
1.4	55.231
1.6	54.728
1.8	54.304
2	53.942
2.2	53.628
2.4	53.345
2.6	53.109
2.8	52.889
3	52.684
3.2	52.511
3.4	52.338
3.6	52.165
3.8	52.008
4	51.851
4.2	51.709
4.4	51.568
4.6	51.426
4.8	51.285
5	51.143
5.2	51.017

MW-6A slug test

Time (minutes)	Depth to water
5.4	50.891
5.6	50.766
5.8	50.64
6	50.514
6.2	50.388
6.4	50.262
6.6	50.152
6.8	50.026
7	49.916
7.2	49.791
7.4	49.681
7.6	49.555
7.8	49.445
8	49.319
8.2	49.209
8.4	49.083
8.6	48.973
8.8	48.847
9	48.737
9.2	48.627
9.4	48.501
11.4	47.416
13.4	46.394
15.4	45.387
17.4	44.412
19.4	43.453
21.4	42.525
23.4	41.613
25.4	40.716
27.4	39.835
29.4	38.986
31.4	38.137
33.4	37.319
35.4	36.517
37.4	35.715
39.4	34.944
41.4	34.189
43.4	33.45
45.4	32.726
47.4	32.019
49.4	31.327
51.4	30.635
53.4	29.974
55.4	29.329
57.4	28.7
59.4	28.071
61.4	27.473
63.4	26.875

MW-6A slug test

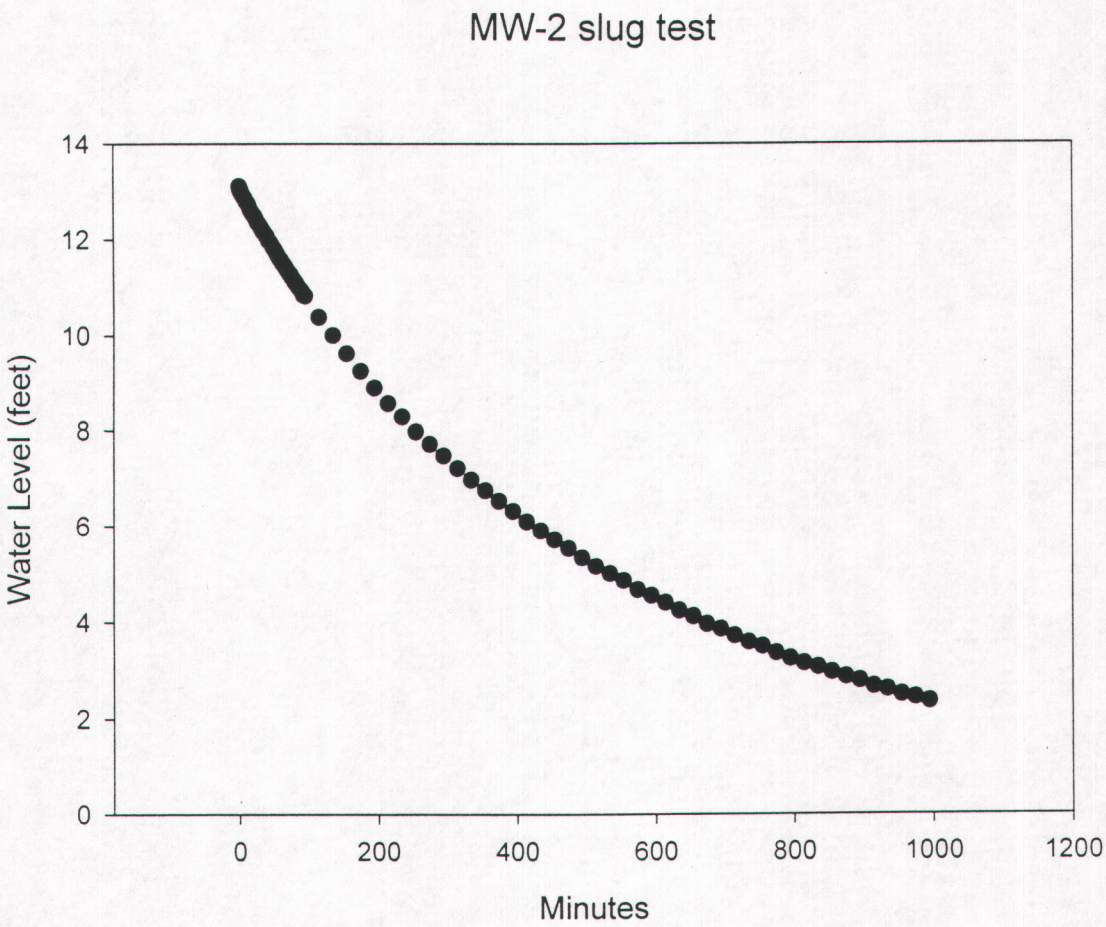
Time (minutes)	Depth to water
65.4	26.293
67.4	25.726
69.4	25.177
71.4	24.626
73.4	24.106
75.4	23.588
77.4	23.084
79.4	22.597
81.4	22.109
83.4	21.637
85.4	21.181
87.4	20.724
89.4	20.284
91.4	19.86
93.4	19.435
95.4	19.01
97.4	18.617
99.4	18.224
119.4	14.731
139.4	11.742
159.4	9.382
179.4	7.557
199.4	6.125
219.4	4.993
239.4	4.096
259.4	3.372
279.4	2.774
299.4	2.286
319.4	1.893
339.4	1.562
359.4	1.279
379.4	1.059
399.4	0.886
419.4	0.729
439.4	0.603
459.4	0.509
479.4	0.414
499.4	0.351
519.4	0.304
539.4	0.257
559.4	0.226
579.4	0.194
599.4	0.178
619.4	0.162
639.4	0.131
659.4	0.131
679.4	0.131
699.4	0.115

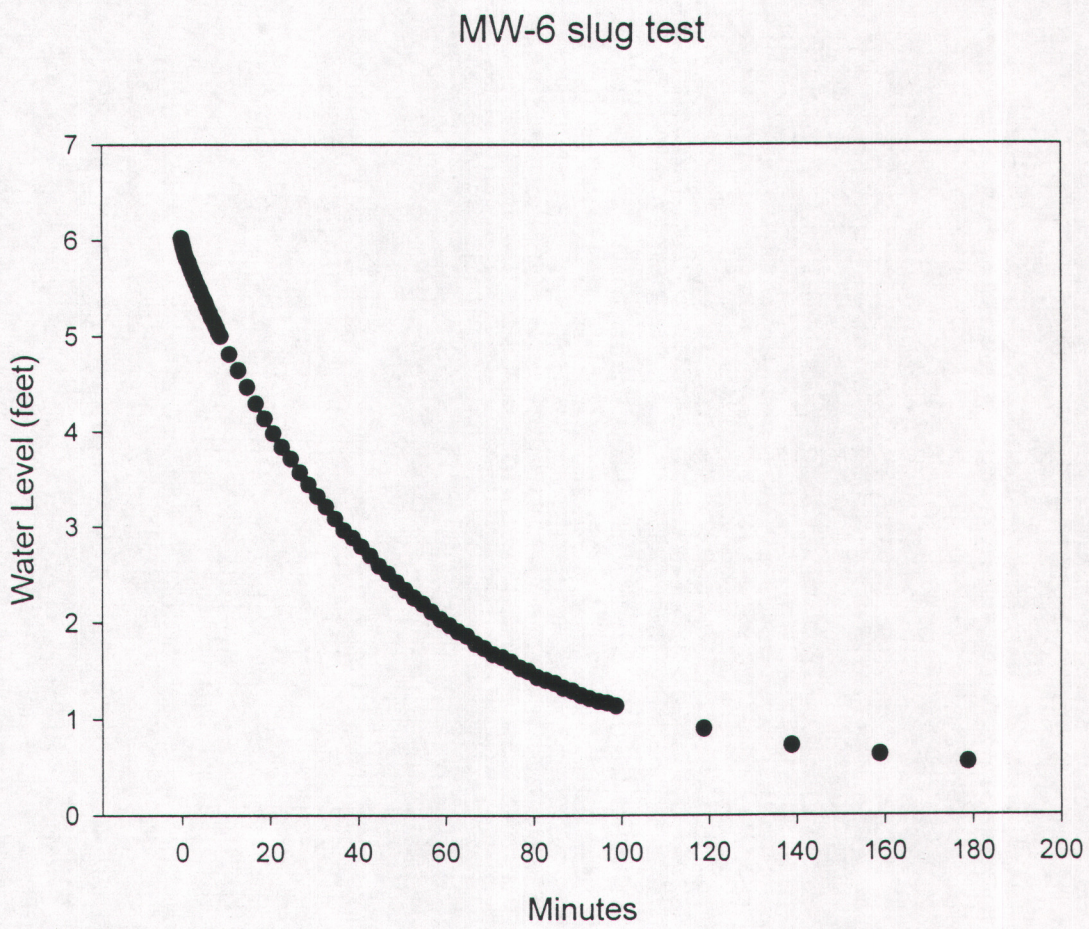
MW-6A slug test

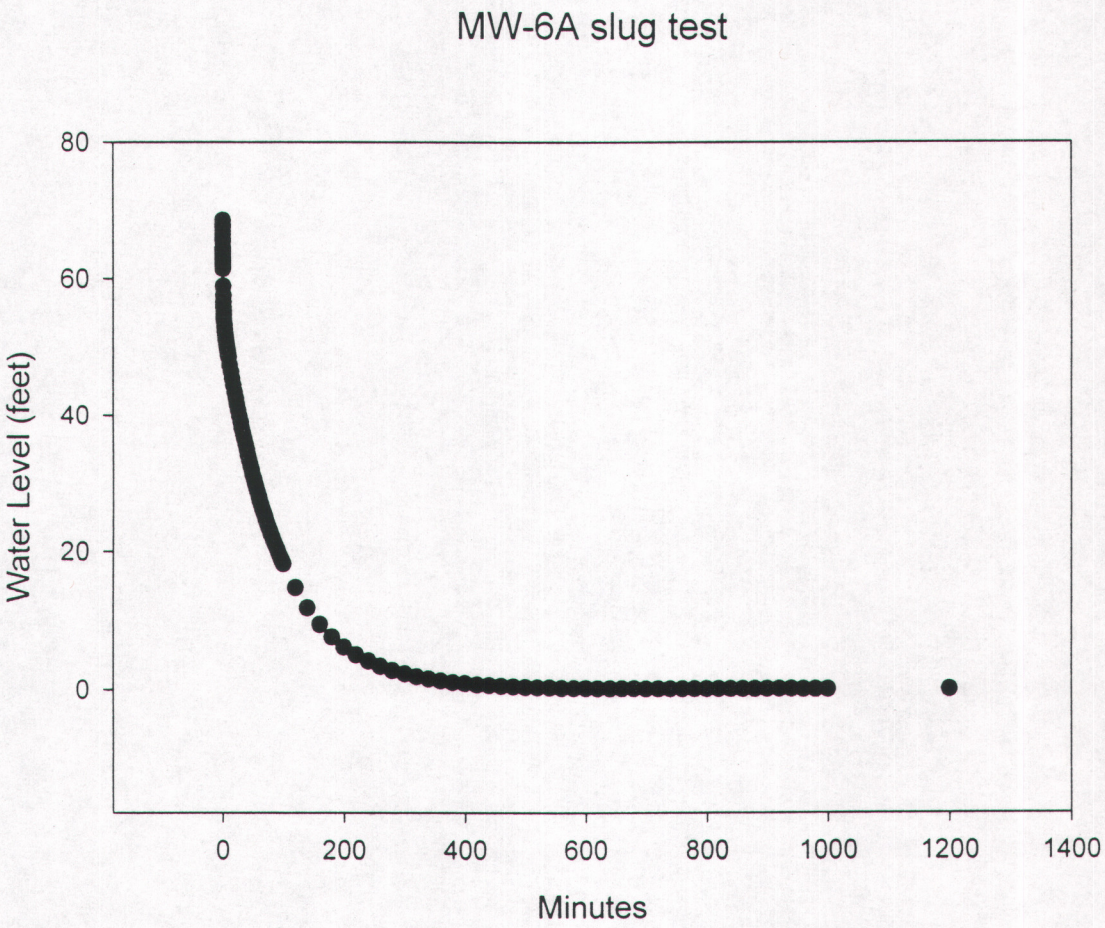
Time (minutes)	Depth to water
719.4	0.115
739.4	0.115
759.4	0.099
779.4	0.099
799.4	0.099
819.4	0.099
839.4	0.099
859.4	0.099
879.4	0.099
899.4	0.099
919.4	0.099
939.4	0.099
959.4	0.084
979.4	0.084
999.4	0.084
1199.4	0.052

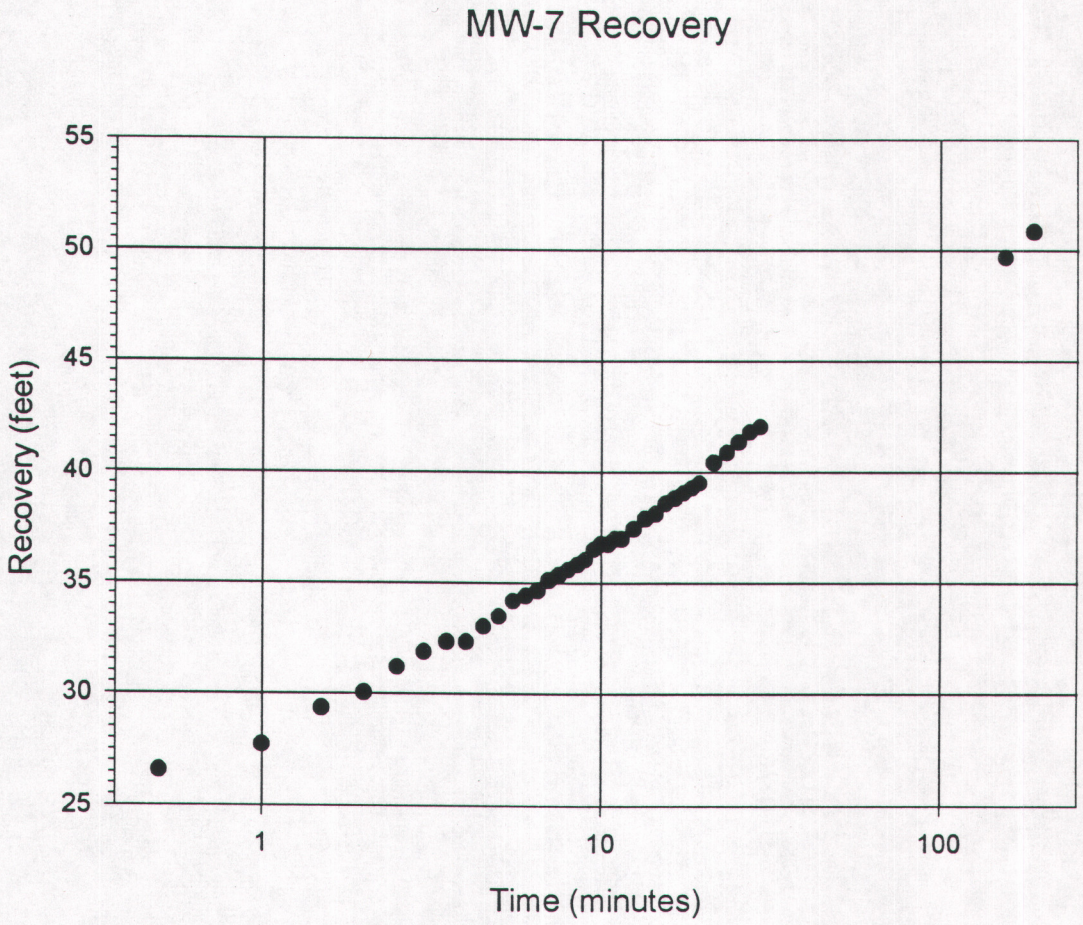
MW-7 Pressure Test

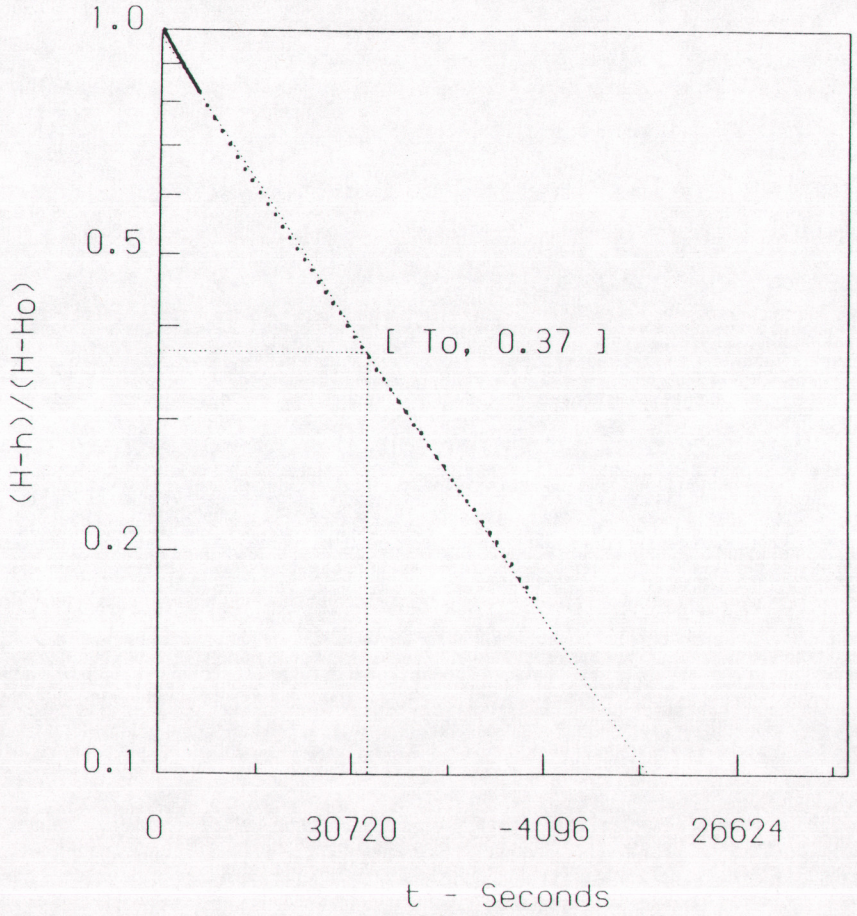
Time	Psi	Feet
00:00:00	0.0	0.00
00:00:30	11.5	26.57
00:01:00	12.0	27.72
00:01:30	12.7	29.34
00:02:00	13.0	30.03
00:02:30	13.5	31.19
00:03:00	13.8	31.88
00:03:30	14.0	32.34
00:04:00	14.0	32.34
00:04:30	14.3	33.03
00:05:00	14.5	33.50
00:05:30	14.8	34.19
00:06:00	14.9	34.42
00:06:30	15.0	34.65
00:07:00	15.2	35.11
00:07:30	15.3	35.34
00:08:00	15.4	35.57
00:08:30	15.5	35.81
00:09:00	15.6	36.04
00:09:30	15.8	36.50
00:10:00	15.9	36.73
00:10:30	15.9	36.73
00:11:00	16.0	36.96
00:11:30	16.0	36.96
00:12:30	16.2	37.42
00:13:30	16.4	37.88
00:14:30	16.5	38.12
00:15:30	16.7	38.58
00:16:30	16.8	38.81
00:17:30	16.9	39.04
00:18:30	17.0	39.27
00:19:30	17.1	39.50
00:21:30	17.5	40.43
00:23:30	17.7	40.89
00:25:30	17.9	41.35
00:27:30	18.1	41.81
00:29:30	18.2	42.04
02:35:30	21.5	49.67
03:08:30	22.0	50.82


MW-2 slug test
Water Level (feet)
14
12
10
8
6
4
2
0
0
200
400
600
800
1000
1200
Minutes


MW-6 slug test
Water Level (feet)
0
1
2
3
4
5
6
7
0
20
40
60
80
100
120
140
160
180
200
Minutes


MW-6A slug test
Water Level (feet)
80
60
40
20
0
0
200
400
600
800
1000
1200
1400
Minutes


MW-7 Recovery
Recovery (feet)
55
50
45
40
35
30
25
1
10
100
Time (minutes)



Well I.D. = MW-2

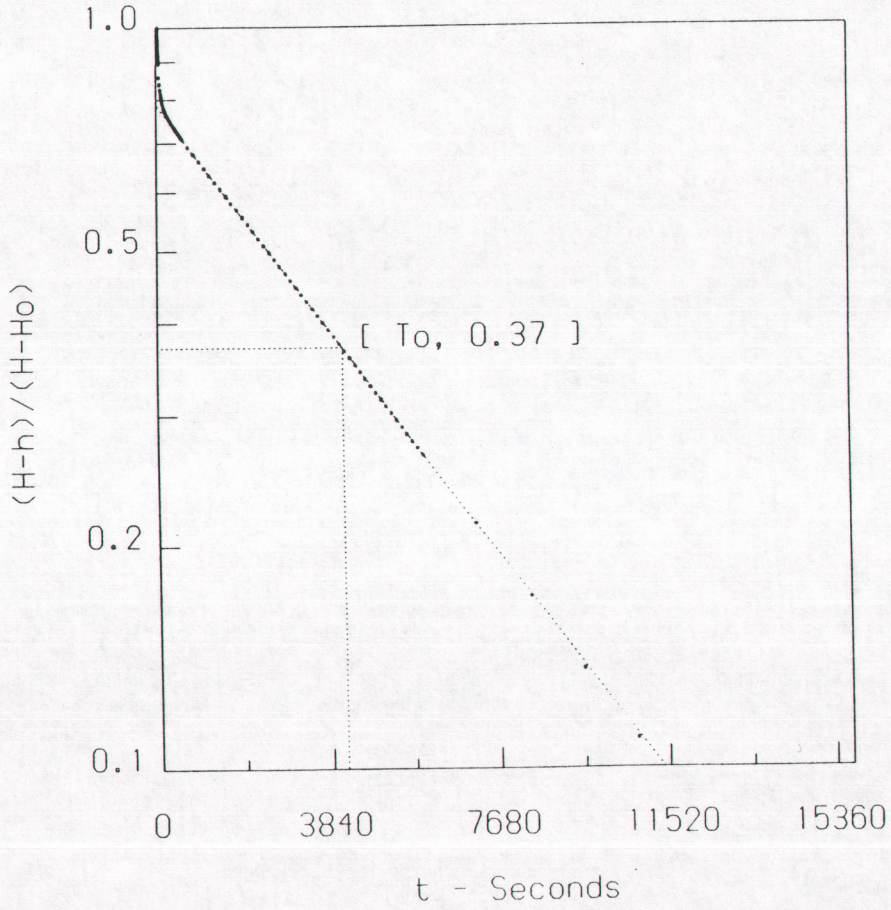
Well radius = 0.1667 ft

Intake radius = 0.1667 ft

Intake length = 50.0000 ft

To = 33342.45 sec.

K = 0.0000000475 ft/s



Well I.D. = MW-6a

Well radius = 0.0520 ft

Intake radius = 0.1250 ft

Intake length = 30.0000 ft

To = 4158.64 sec.

K = 0.0000000594 ft/s

WCI

WELL DRILLER'S REPORT

State of Utah
Division of Water Rights

For additional space, use "Additional Well Data Form" and attach

Well Identification MONITOR WELL: 97-93-001-M-01

Owner *Note any changes*

Genwal Resource Inc.
P.O. Box 1420
Huntington, UT 84528

Contact Person/Engineer: GARY GRAY / GENWAL RESOURCES

Well Location *Note any changes*

NORTH 400 feet WEST 300 feet from the SE Corner of SECTION 2, TOWNSHIP 16S, RANGE 6E, SLB&M.

Location Description: (address, proximity to buildings, landmarks, ground elevation, local well #) MW -7

Drillers Activity Start Date: 3-13-97 Completion Date: 4-4-97

Check all that apply:

[X] New [ ] Repair [ ] Deepen [ ] Abandon [ ] Replace [ ] Public Nature of Use:

DEPTH (feet) FROM	TO	BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
0	100	3	FLUID ROTARY	WATER

Well Log

DEPTH (feet) FROM	TO	WATER	PERMEABLE high	PERMEABLE low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTIONS AND REMARKS (include comments on *water quality* if known.)
0	100										X			SANDSTONE / CLAYSTONE

Static Water Level

Date 4-3-97 Water Level 0 feet Flowing? [X] Yes [ ] No

Method of Water Level Measurement WCI If Flowing, Capped Pressure [illegible] PSI

Point to Which Water Level Measurement was Referenced GROUND LEVEL

Height of Water Level reference point above ground surface 0 feet Temperature N/A [ ] °C [ ] °F

Well Log

Construction Information

DEPTH (feet) FROM	TO	CASING: CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	DEPTH (feet) FROM	TO	SCREEN ☒ PERFORATIONS ☐: SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PER (per round/interval)
0	53	1 1/4" SCH 40 PVC		1 1/4	53	93	.010	1 1/4	

Well Head Configuration: FLUSH MOUNT Access Port Provided? ☒ Yes ☐ No

Casing Joint Type: FLUSH Perforator Used: _____

DEPTH (feet) FROM	TO	FILTER PACK / GROUT / PACKER / ABANDONMENT MATERIAL: ANNULAR MATERIAL, ABANDONMENT MATERIAL and/or PACKER DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal., # bag mix, gal./sack etc.)
0	1	CONCRETE	1	
1	40	CEMENT BENTONITE MIXTURE	2	
40	50	3/8" BENTONITE PELLETS	1	
50	100	16-40 SILICA SAND	2	

Well Development / Pump or Bail Tests

Date	Method	Yield	Units Check One: GPM	CFS	DRAWDOWN (ft)	TIME PUMPED (hrs & min)

Pump (Permanent)

Pump Description: _____ Horsepower: _____ Pump Intake Depth: _____ feet

Approximate maximum pumping rate: _____ Well disinfected upon completion? ☐ Yes ☐ No

Comments

Description of construction activity, additional materials used, problems encountered, extraordinary circumstances, abandonment / procedures. *Use additional well data form for more space.*

Well Driller Statement

This well was drilled or abandoned under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name LAYNE CHRISTENSEN COMPANY License No. 626

(~~Person, Firm~~, or Corporation – Print or Type)

Signature _____ Date 4-10-97

(Licensed Well Driller)

WL1

WELL DRILLER'S REPORT

State of Utah
Division of Water Rights

For additional space, use "Additional Well Data Form" and attach

Well Identification MONITOR WELL: 97-93-001-M-02

Owner *Note any changes*

Genwal Resource Inc.
P.O. Box 1420
Huntington, UT 84528

Contact Person/Engineer: GARY GRAY / GENWAL RESOURCES

Well Location *Note any changes*

NORTH 200 feet EAST 400 feet from the SW Corner of SECTION 35, TOWNSHIP 15S, RANGE 6E, SLB&M.

Location Description: (address, proximity to buildings, landmarks, ground elevation, local well #) MW-8

Drillers Activity Start Date: 3-13-97 Completion Date: 4-4-97

Check all that apply:

[X] New [ ] Repair [ ] Deepen [ ] Abandon [ ] Replace [ ] Public Nature of Use:

DEPTH (feet) FROM	TO	BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
0	107	3	FLUID ROTARY	WATER

Well Log

DEPTH (feet) FROM	TO	WATER	PERMEABLE high	PERMEABLE low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTIONS AND REMARKS (include comments on *water quality* if known.)
0	107										X			SANDSTONE / CLAYSTONE

Static Water Level

Date 3-31-97 Water Level 1.4 feet Flowing? [ ] Yes [ ] No

Method of Water Level Measurement WLI If Flowing, Capped Pressure NO PSI

Point to Which Water Level Measurement was Referenced GROUND LEVEL

Height of Water Level reference point above ground surface N/A feet Temperature N/A [ ] °C [ ] °F

Well Log

Construction Information

DEPTH (feet) FROM	TO	CASING: CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	DEPTH (feet) FROM	TO	SCREEN ☐ PERFORATIONS ☐: SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)
0	70	1 1/4"SCH 40 PVC		1 1/4	70	100	.010	1 1/4	

Well Head Configuration: FLUSH MOUNT

Access Port Provided? ☒ Yes ☐ No

Casing Joint Type: FLUSH

Perforator Used:

DEPTH (feet) FROM	TO	FILTER PACK / GROUT / PACKER / ABANDONMENT MATERIAL: ANNULAR MATERIAL, ABANDONMENT MATERIAL and/or PACKER DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal.,# bag mix, gal./sack etc.)
0	1	CONCRETE	1	
1	50	CEMENT BENTONITE GROUT	2	
50	55	3/8" BENTONITE PELLETS	1	
55	107	16-40	2	

Well Development / Pump or Bail Tests

Date	Method	Yield	Units Check One GPM	CFS	DRAWDOWN (ft)	TIME PUMPED (hrs & min)

Pump (Permanent)

Pump Description: Horsepower: Pump Intake Depth: feet

Approximate maximum pumping rate: Well disinfected upon completion? ☐ Yes ☐ No

Comments

Description of construction activity, additional materials used, problems encountered, extraordinary circumstances, abandonment / procedures. *Use additional well data form for more space.*

Well Driller Statement

This well was drilled or abandoned under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name LAYNE CHRISTENSEN COMPANY (Person, Firm, or Corporation – Print or Type) License No. 626

Signature (Licensed Well Driller) Date 4-10-97

WL1

WELL DRILLER'S REPORT

State of Utah
Division of Water Rights

For additional space, use "Additional Well Data Form" and attach

Well Identification MONITOR WELL: 97-93-002-M-02

Owner *Note any changes*

Genwal Resources Inc.
P.O. Box 1420
Huntington, UT 84528

Contact Person/Engineer: GARY GRAY / GENWAL RESOURCES

Well Location *Note any changes*

NORTH 70 feet WEST 300 feet from the SE Corner of SECTION 2, TOWNSHIP 16S, RANGE 6E, SLB&M.

Location Description: (address, proximity to buildings, landmarks, ground elevation, local well #) MW-6A

Drillers Activity Start Date: 3-28-97 Completion Date: 4-4-97

Check all that apply:
[X] New [ ] Repair [ ] Deepen [ ] Abandon [ ] Replace [ ] Public Nature of Use:

DEPTH (feet) FROM	TO	BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
0	102	3	FLUID ROTARY	WATER

Well Log

DEPTH (feet) FROM	TO	WATER	PERMEABLE high	PERMEABLE low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTIONS AND REMARKS (include comments on *water quality* if known.)
0	102										X			SANDSTONE / CLAYSTONE

Static Water Level

Date 3-28-97 Water Level 2.5 feet Flowing? [ ] Yes [X] No

Method of Water Level Measurement WL1 If Flowing, Capped Pressure NO PSI

Point to Which Water Level Measurement was Referenced GROUND LEVEL

Height of Water Level reference point above ground surface N/A feet Temperature N/A [ ] °C [ ] °F

Well Log

Construction Information

DEPTH (feet) FROM	TO	CASING: CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	DEPTH (feet) FROM	TO	SCREEN ☒ PERFORATIONS ☐: SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)
0	72	1 1/4" SCH PVC		1 1/4	72	102	.010	1 1/4	

Well Head Configuration: FLUSH MOUNT Access Port Provided? ☒ Yes ☐ No

Casing Joint Type: FLUSH Perforator Used: _____

DEPTH (feet) FROM	TO	FILTER PACK / GROUT / PACKER / ABANDONMENT MATERIAL: ANNULAR MATERIAL, ABANDONMENT MATERIAL and/or PACKER DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal.,# bag mix, gal./sack etc.)
0	1	CONCRETE	1	
1	70	CEMENT	4	
70	72	3/8 BENTONITE PELLETS	1	
72	102	16-40 SILICA SAND	2	

Well Development / Pump or Bail Tests

Date	Method	Yield	Units Check One: GPM	CFS	DRAWDOWN (ft)	TIME PUMPED (hrs & min)

Pump (Permanent)

Pump Description: _____ Horsepower: _____ Pump Intake Depth: _____ feet

Approximate maximum pumping rate: _____ Well disinfected upon completion? ☐ Yes ☐ No

Comments

Description of construction activity, additional materials used, problems encountered, extraordinary circumstances, abandonment / procedures. *Use additional well data form for more space.*

Well Driller Statement

This well was drilled or abandoned under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name LAYNE CHRISTENSEN COMPANY License No. 626
(Person, Firm, or Corporation – Print or Type)

Signature _____ Date 4-10-97
(Licensed Well Driller)

P.O. Box 1420
Huntington, UT 84528

Contact Person/Engineer: GARY GRAY / GENWAL RESOURCES

Well Location *Note any changes*

NORTH ~~620~~ 640 feet WEST ~~290~~ 300 feet from the SE Corner of SECTION 2, TOWNSHIP 16S, RANGE 6E, SLB&M.

Location Description: (address, proximity to buildings, landmarks, ground elevation, local well #) MW-6

Drillers Activity Start Date: 3-28-97 Completion Date: 4-4-97

Check all that apply:

[X] New [ ] Repair [ ] Deepen [ ] Abandon [ ] Replace [ ] Public Nature of Use:

DEPTH (feet) FROM	TO	BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
0	350	3	FLUID ROTARY	WATER

Well Log

DEPTH (feet) FROM	TO	WATER	PERMEABLE high	PERMEABLE low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTIONS AND REMARKS (include comments on *water quality* if known.)
0	350										X			SANDSTONE/CLAYSTONE

Static Water Level

Date 3-28-97 Water Level 2.5 feet Flowing? [ ] Yes [X] No

Method of Water Level Measurement WL1 If Flowing, Capped Pressure NO PSI

Point to Which Water Level Measurement was Referenced GROUND LEVEL

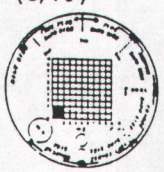
Height of Water Level reference point above ground surface N/A feet Temperature N/A [ ] °C [ ] °F

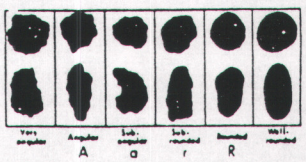
[redacted] ***Well Log*** [redacted]

97.2
11

Note: Water level @: 7:15 A 3/13/97
2.35' bgL

C - 1857 (8/79)





HOLE NO MW-6

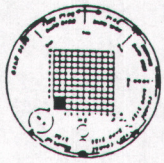
TYPE OF DESCRIPTION	
CUTTINGS	
CORE	X
OUTCROP	

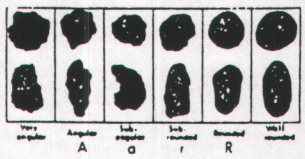
Andalex Resources, Inc.

HOLE NO. MW-6
PAGE 2 OF 4
Geologist R. Holland

BOX NO.	SMPL. NO.	DEPTH FROM	DEPTH TO	THICKNESS	STRIP LOG 1"=	MEDIAN GRAIN SIZE (V S F M C C V)	ROUNDNESS (A r R)	SORTING (P M W)	DESCRIPTION & REMARKS
11	38 Horiz. Fract. Bedd.				100				Sandstone, lt to med. gray, fine to very fine, s&p, Quartz grains are dominate
107.0									Clast, calcareous, v. minor carbonaceous laminae.
12	10 Horiz. Fract. Bedd.								@ 103 SS as above with carb laminae increasing slightly.
					110				@ 110.5' Sandstone as ab with interbeds of clayey siltstone, dark gray, calcareous,
116.7									cross laminated.
									@ 111.15 SS as ab.
									@ 113.45 SS as ab with siltstone as ab
									@ 114.1 SS as above.
13	3 Horiz. Fract. Bedd.				120				@ 117.5' Sandstone and interbeds of silt st. as ab. carbonate increased to highly calc. clay fraction inc. with depth
				123.8					
126.6		123.8	129.2	5.4'					@ 123.8' Sandstone, brown black, fine grained, carbonaceous, noncalcareous, quartz clast
14	3 Horiz. Fract. Bedding								are sub to well rounded, frosted to clear.
			Storrs		130				@ 129.2' Sandstone, lt brown gray to tan, med. to fine grained, noncalc, quartz clast sub to well rounded, frosted to clear, some s&p
136.5									Note: Hole Purged at 130.6' - water level rose 2.5' in 4 minutes. = .25 gpm 0.17 gpm
15	0 Fractures Bedding								Sandstone becoming lighter gray with depth and grain size increasing. White Feldspar(?) common. s&p
					140				Sandstone as above fine to med. gray, becoming slightly calcareous, very
146.5									uniform, very little carb. material, massive bedding.
16	0 Fractures Bedding				150				Sandstone as ab, clean, uniform, massive.
155.7									
17	1 fracture				160				@ 160' Sandstone, lt gray, fine grained, s&p, uniform, massive, calcareous.
165.6									
18	2 Fractures bedding				170				
175.4									@ 174.8 SS as ab with claystone laminae, dark grey to black, appear noncalcareous.
19	4 Fractures Bedding				180				@ 175.4 Sandstone as above, clay fraction decreased to 0%, SS is uniform, massive.
185.2									@ 182. and 183 sandstone as ab with silty claystone interbeds to laminae, dark gray to black. Bedding planes occur at zones of high clay content.
20	5 Fractures Bedding				190				@ 187.85 Interbedded claystone, dark gray to black and sandstone as above.
194.6									Note: Hole purged @ 5:00 pm 3/13/97 @ 7:15 AM on 3/14/97 water level at 2.5' bgl
21					200				@ 196.5' Claystone fraction increasing claystone is dark gray to black, calc. to non calc., carbonaceous.

C - 1857 (8/79)





TYPE OF DESCRIPTION	
CUTTINGS	
CORE	X
OUTCROP	

Andalex Resources, Inc.

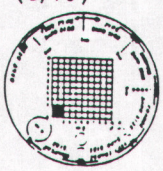
HOLE NO. MW-6

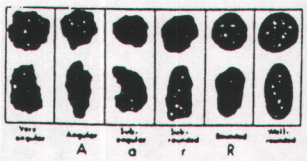
PAGE 3 OF 4

Geologist R. Holland

BOX NO.	SMPL. NO.	DEPTH FROM	DEPTH TO	THICKNESS	STRIP LOG 1" =	MEDIAN GRAIN SIZE (V S F M C C V)	ROUNDNESS (A S R)	SORTING (P M W)	DESCRIPTION & REMARKS
21 204.65	7 Fract. Bedd.				200				@ 201.1 sandstone, lt gray, vfg to fg, slightly calcareous, well indurated,
									quartz clast are sub to well rounded, frosted to clear, minor sap
22 214.4	6 Fract. Bedding								Note: at 205.7' .49 gpm flow.
									@ 205' sandstone as ab with some
					210				clay laminae - zones of turbation.
23 224.2	11 Fract. Bedd. 1 Vertical Fract.								@ 216 well developed cross laminae.
									clay fraction inc. with depth. Bedding
									fractures occure prim. along clay
					220				laminae. Coal laminae at 217.5'
									@ 222.7' verticle fracture, pyrite
									common along fracture face.
24 234.9	6 Fract - Bedd 2 Fract - vert.								@ 226 verticle fracture with pyrite.
									sandstone, lt gray, vfg, calc, clayey
									laminae common but dec. with depth.
					230				@ 227' sandstone, med to dark gray, vfg,
									clayey laminae and turbation zones,
									calcareous. worm burrows(?) noted.
25 243.8	8 Fract - Bedd 2 Fract. - vert.								Note: since encountering the verticel fract.
									the drilling fluid returns have decreased.
									@ 231.5 core becoming darker gray with
					240				increase in clay fraction.
									verticle fracture @ 231 to 235.5'
26 253.6	6 Fract. - Bedd.								@ 236.5' hole making 4.22 gpm.
									@ 238 verticle fracture with abundant
									pyrite along fracture face.
									core displays bioturbation and clay
					250				laminae.
									Circulation becoming a problem - lost into fra
27 263.3	2 Fract. - Bedd 1 Fract. - vert.								@ 242.2 ss, lt gray, vfg to fg, slightly to
									calcareous, well indurated, massive,
									minor clay laminae.
									@ 246 Artesian flow @ 1.0 gpm
					260				@ 249.5 + 251.7 dark gray round spots.
									@ 260' verticle fracture with pyrite
28 273.15	4 Fract. - Bedd 1 Fract. - vert.								some cross laminae and claystone
									inclusions.
		267.2	269.4	2.2					@ 265.5 pinkish calcite inclusion 1" long
									@ 267' hydrolic head at 1.9' bgl 3/15/97
					270				@ 267.2 ss, lt to dark gray, vf to fg, strongly
									bioturbated, slightly calcareous, base
									is cross laminated, clayey.
29 282.9	0 fractures								@ 269.4 sandstone, lt gray, vfg, slightly
									calc., sap, uniform.
									@ 275 ss as above becoming darker
		269.4	284.9	15.5'	280				gray and fine grained.
									@ 284.9' sandstone as ab with claystone bands
									and inclusions, claystone is dark gray to blk,
									non to slightly calcareous. - most of the
									inclusions are prob. clean clast.
292.5	9 Fract. - Bedd.	284.9	292.0	7.1					@ 290.5 - 291.7 rounded brown inclusions
					290				up to 2" diameter - ss.
									@ 292.0' sandstone, med gray, fine grained, calc.,
		292.0	315.3	23.3					with abundant clay laminae, carbonaceous.
									@ 297.2 sandstone as ab with interbeds of
									siltstone, clayey, blk, slightly calc. and claystone,
									blk, slightly calc.
					300				

C - 1857 (8/79)





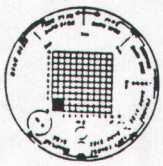
TYPE OF DESCRIPTION	
CUTTINGS	
CORE	X
OUTCROP	

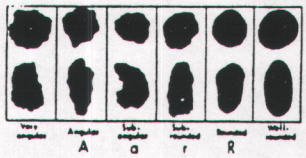
Andalex Resources, Inc.

HOLE NO. MW-6
PAGE 4 OF 4
Geologist R. Holland

BOX NO.	SMPL. NO.	DEPTH FROM	DEPTH TO	THICKNESS	STRIP LOG 1"=	MEDIAN GRAIN SIZE V S F M C V C	ROUNDNESS A gr R	SORTING P M W	DESCRIPTION & REMARKS
31 303.4	11 Frac-Bedding				300				at 301.8 - 303.2 claystone with interbedded ss as ab
32 311.15	6 Fract-Bedding								@ 307.3' Sandstone, lt to med. gray, vfg to fg, slightly calc., low angle cross bedding.
					310				Calcite inclusions <1" at 310.5'
									308.8 - 311.75 ss as above with minor interbeds of claystone, dark gray to blk.
33 321.0	10 Fract-Bedding								@ 311.75' Purged hole with core barrel — Recharge measured at 1.4 gpm. Blow hole with air compressor for 1.25 hr - hole made 2.9 gpm
		315.3	Panther 357.0	35.7	320				@ 312.7 Claystone interbed, blk, silty, non calc, to slightly calc. Clay interbeds increase to 313.8. @ 313.8 sandstone, med to dark gray, cross laminae, coal at 315.2 to 315.3.
34 330.9	5 Fract-Bedding								@ 315.3' sandstone, lt to med gray, fine gr., slightly calc, sdp, becoming very uniform with depth. minor clay laminae.
					330				@ 331.5 ss as ab, cross bedded, fine to medium grained
35 340.7	7 Fract-Bedding								@ 338.8 claystone parting <1" sandstone as above cross bedding
					340				
36 351.0	6 Fract.-Bedd 1 Vertical								@ 344.7 - 345.0 ss as ab with claystone interbeds exhibiting bioturbation.
									@ 347.3 Interbedded claystone, siltstone and vfg sandstone, med gray to dark gray to black, calcareous, bioturbation common.
					350				at 350.7' vfg to silty sandstone, dark gray to black when wet.
			TD 351.0						Note: From 347.3 To 351.0 will most likely act as impervious to downward migration of water. Purged hole: water level rose 10.8' in 25 sec. = 9.6 gpm.
									Roger F Holland 3/15/97

C - 1857 (8/79)





Construction Information

DEPTH (feet) FROM	TO	CASING: CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	DEPTH (feet) FROM	TO	SCREEN ☒ PERFORATIONS ☐: SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)
0	305	1 1/4" SCH 40 PVC		1 1/4	305	345	.010	1 1/4	
345	350	1 1/4" SCH 40 PVC		1 1/4					

Well Head Configuration: FLUSH MOUNT Access Port Provided? ☒ Yes ☐ No

Casing Joint Type: FLUSH Perforator Used:

DEPTH (feet) FROM	TO	FILTER PACK / GROUT / PACKER / ABANDONMENT MATERIAL: ANNULAR MATERIAL, ABANDONMENT MATERIAL and/or PACKER DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal.,# bag mix, gal./sack etc.)
0	1	CONCRETE	1	
1	290	CEMENT BENTONITE GROUT	14	
290	300	BENTONITE SLURRY	1	
300	350	16-40 SILICA SAND	3.5	

Well Development / Pump or Bail Tests

Date	Method	Yield	Units Check One: GPM	CFS	DRAWDOWN (ft)	TIME PUMPED (hrs & min)

Pump (Permanent)

Pump Description: Horsepower: Pump Intake Depth: feet

Approximate maximum pumping rate: Well disinfected upon completion? ☐ Yes ☐ No

Comments

Description of construction activity, additional materials used, problems encountered, extraordinary circumstances, abandonment / procedures. *Use additional well data form for more space.*

Well Driller Statement

This well was drilled or abandoned under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name LAYNE CHRISTENSEN COMPANY License No. 626
(Person, Firm, or Corporation – Print or Type)

Signature Date 4-10-97
(Licensed Well Driller)