WestWater Associates, Inc.

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Job #1010-R
Rico

Mr. Mike England, Town Manager
Town of Rico
P.O. Box 9
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December 13, 2011

Re: Construction and Testing New Production Well – Town of Rico, Colorado

Sir:

This Letter Report is a summary of the construction and testing of a production well for the Town of Rico. The production well was constructed by MWP Drilling of Mosca, Colorado. The well was drilled in close proximity to the monitoring wells that were constructed in 2003. Permit #75420-F was obtained by the Town from the Division of Water Resources in August, 2011. A long term (72 hour/100 gpm) constant rate pumping test performed after construction demonstrates the well capacity is 120 gallons per minute, as permitted by the CDWR.

The production well (PW) was located approximately two and one quarter miles north of Rico, in an alluvial basin first discovered and explored in 1996. After determining there was significant depth (150+- feet) of alluvial gravels, the Town authorized the construction of two monitoring wells. DAK Drilling of Durango constructed these wells between July and August, 2003. The northern most monitoring well (Test Well #2 – Observation well #1) produces from 98-138 feet; approximately 250 feet to the south, Test Well #1 (OB#3), produces from a depth of 83-143 feet. The third monitoring well is shallow (25 feet), and was an unsuccessful attempt to drill through large boulders, prior to moving over and drilling Test Well #1 (OB #3). During drilling, both monitoring wells produced large volumes of water and the wells were test pumped at 77 and 95 gpm, respectively.

Recently the Town received funding from the State of Colorado to assist in their community development. These funds were used to hire MWP Drilling for the first production well. The well was sited outside (west of) the State Highway 145 right-of-way, as far from the Dolores River as practicable. Water Rights obtained by the Town allow up to 80 gpm continuous to be produced from this alluvial deposit. Observation Well #3 encountered a significant tight, fine layer between 80 and 85 feet (as well as some shallower). During testing in 2003 it was demonstrated that the semi-confined aquifer would not directly impact the river.

Drilling of the production well began in August, 2011 with a cable tool rig. Construction proceeded slowly (due to large cobbles and boulders being encountered) until a depth of 141 feet was reached on October 29, 2011. After reviewing the drill cuttings and

conducting geophysical borehole logs (provided previously), it was determined that the 40 feet of 8" diameter stainless steel screen (0.050" slot opening) should be placed between 80 and 120 feet. No significant production zones were observed below 120 feet; however a 6" diameter "tailpipe" was hung below the screens to a total depth of 141 feet.

Approximately 2 yards of silica sand was used as gravel pack, sealed at the top with bentonite, and the remaining annular borehole space was filled with washed clean, round gravel. During placement of gravel pack, granular chlorine was installed in order to disinfect all materials in the well and break down organic chemical drilling fluids used during drilling operations.

Pre-testing Observations: Prior to the well being finished, WWA surveyed locations and elevations of the ground surface at the well and the three monitoring wells and the Dolores River. A monitoring pipe was established in the west bank of the Dolores River, approximately 329 feet east of the production well.

Table 1 attached provides dates, times and water level measurements taken prior to beginning the production testing on November 14, 2011. The table includes manual water level readings taken at the river and in all four wells. The table also includes water levels measured at the river during and after testing. Water levels are reflected as negative numbers, as the "0.00" elevation was established on the east side of the highway in a parking area. It was from this point that direct transit shots could be obtained on all monitoring points. The water level elevations are very similar, with the highest elevation of the water table at the pumping well; OB #1 is slightly lower with OB Wells #2 and OB #3 at the lower end of the water table. This indicates the pre-pumping water table was sloping in a north to south direction. Water levels in the river fluctuated daily due to diurnal runoff events. River elevations generally declined from the period October 5-November 17, at the end of testing.

Well Testing: MWP Drilling had completed construction and developed (cleaning) the production well as of November 10, 2011. They installed a 10 Hp submersible test pump at a depth of 105 feet from top of casing and initial testing was a "step test" at increasing rates in order to determine the long term 72-hour pumping rate. Step #1 was set at 25 gpm and began pumping on November 12. The first step was conducted for one hour, at which time the pumping rate was increased to 50 gpm. These steps were repeated at one-hour intervals with 75 and 100 gpm being produced. Static water level before pumping was 15.5 feet and the final pumping water level was 32.5 feet. From the results of the step testing it was determined that the well could be pumped at 100 gpm for the 72-hour test.

Prior to beginning the long-term test, WWA installed an InSitu "Troll" electronic recording transducers in the production well and OB #1. These transducers were calibrated to the static pre-pumping levels and were programmed to take pressure readings at one-minute intervals for the entire three-day pumping phase and three days of water level recovery. OB #2 and OB #3 were measured with a downhole electric Emscope at intervals adequate to determine impacts of the pumping at distances of 200-250 feet. Elevations were also measured at semi-regular intervals at the river gauging station during the pumping phase.

Long term testing was initiated at 12:00 p.m. on November 14. The volume was regulated at 100 gpm throughout the testing. Manual water levels were also measured in the production well and OB #1 for backup and to verify transducer data when retrieved.

Production Well: Static water level in the PW was measured manually at 15.3 feet below top of casing (TOC). With transducer set at 104 feet below top of casing, it registered the pressure of 49.673 psi, which results in a static water level of 16.0 feet. An edited version of all transducer recordings is provided in Appendix A for the PW and Appendix B for OB #1.

After pumping was initiated, water level in the PW dropped rapidly to 33 feet after one minute, and 34.5 feet after ten minutes. Water level then gradually declined until maximum water depth was achieved after 72-hours at 39.68 feet. After pumping was terminated, water levels rose immediately to 17 feet in one minute, and continued to gradually recover until water level reached 16.7 feet after three days of recovery.

Attached with the data tables for all wells are analysis graphs illustrating the calculation of hydrologic parameters for the aquifer. The drawdown during pumping analysis for PW show the transmissivity to be in the order of 1400 ft. sq/day, with a storage coefficient of 1.38 x 10 (-4).

Results of computations from all four wells are tabulated in Table 2 – Summary of Aquifer Test Results. The high transmissivities and low storativities (10-3 to 10-4) indicate the production zone is below a confining clay layer and reflects artesian pressure of approximately 15 feet. Since the Driller's Log shows a significant amount of fine silt and clay in depths shallower than 80 feet, we believe this is adequate to prevent drawdown in the pumped well from directly influencing shallower water in the overlying near surface gravels. The very rapid initial drawdown and recovery is also an indication of relieving the artesian pressure. Once the water levels go down to approximately 35 feet, the aquifer acts more in a water table or unconfined manner.

The measured specific capacity of the PW is 4.233 gallons per minute per foot of drawdown (100 gpm/4.233 feet) (see Table 2). The estimated transmissivity based on this value would be 8000 – 10,000 gpm/ft or 1.1 – 1.4 x 10(-3) ft sq/day.

With some decrease at higher pumping rates, assuming a minimum specific capacity of 4.0 gpm/ft., the well may be capable of up to 200 gpm for extended production periods. The pumping water level would be approximately 65-70 feet. The limits placed by the water rights, and 120 gpm in the well permit, would control maximum rates.

Observation Well #1: Observation Well #1 is located 49 feet from the pumped well in a northeasterly direction. Pre-pumping water level was 13.13 feet below TOC and, as with the production well, water levels dropped very rapidly to 15.5 feet after 30 minutes of pumping. Water levels remained in the 15.5-16 foot range throughout pumping, with actual rises in water level occurring due to barometric pressure effects. (a "BaroTroll" was installed in OB #1 above water level to measure changes in barometric pressure throughout the testing).

As with the PW, analytical graphs and calculations are provided after the tabulated data sheets. Aquifer characteristics from the observation well are considered more accurate of the true aquifer conditions, as the effects of direct removal of water in the immediate borehole vicinity of the PW are not "masking" true water levels. The transmissivity and storativity data from OB #1 show a somewhat lower range of values. Average of the PW and OB #1 data indicate a very prolific, highly porous aquifer zone, acting in a confined or artesian conditions.

OB #2: This well is located 229 feet to the south of PW, and was constructed to a depth of approximately 25 feet. It was constructed as a monitoring well in the uppermost, shallow gravel zones, similar to the bed of the Dolores River. Static water level was measured at 9.63 feet and declined slightly to 10.2 feet after three days of pumping. The total of approximately 0.6 feet of drawdown is approximately one half of the drop in river level from 8.677 feet to 8.969 feet during testing, or approximately 0.3 feet. Water levels in OB #2 appear to have not been affected **significantly** by the PW, as was anticipated with a confining layer between the intervals of 75 and 80 feet.

Figure 1 attached illustrates the testing data in a "Distance – Drawdown" format. Drawdown measurements are tabulated for each well at 12 hrs., 24 hrs., 48 hrs. and 72 hrs. after pumping began. These data are plotted at the distance from the PW. This semi-log plot shows impacts from the 100 gpm production on the "water table" As can be seen, impacts to OB #2 are minimal. Extending the 72-hour curve shows less than a foot of drawdown at the river (328 feet). With the fine clay aquitard below the river (assumed) this would be a deminimus impact or opportunity for surface water contaminants to reach the PW.

OB #3: This monitoring well is 248 feet south of the PW, approximately 20 feet from OB #2. Since this monitoring well was constructed to 140 feet and screened in the same interval in a similar manner as the PW, we anticipated drawdown to occur in this well. Static water level was 8.33 feet and water levels dropped to a maximum of 9.833 feet (1.50 feet of drawdown) after three days of production. Over one foot of drawdown occurred in the first twenty minutes of pumping. After pumping was terminated water levels rose immediately by one foot in the first 15 minutes of recovery.

Table 2 shows results of aquifer characteristics for OB #2 and OB #3. Since OB #2 is not full depth and in direct communication with the lower aquifer, those values represent the gravel near surface. Calculations of characteristics from OB #3 are very nearly the same as OB #1 recovery phase, and show a confined aquifer with high transmitting capacity.

Water Chemistry: Prior to terminating the pumping, a set of water quality samples was obtained from the well. These included samples for MPA analysis to determine if there is turbidity in the water. These samples were delivered to Harris Water Engineering and they are handling the laboratory analyses and reporting results.

Additional Plots: Included at the end of the Appendix are graphical representations of the pressure and temperature measured by the transducers and Baro Troll. These are for illustrative purposes and were not used in direct calculation of aquifer characteristics.

We appreciate the opportunity to continue assisting the Town of Rico in development of their municipal water supply. Should you have any questions regarding this report, or need additional assistance, please do not hesitate contacting our office.

Respectfully,

Tim L. Decker, C.P.G.

Appendix: A – Production Well Data & Graphs
B – OB #1
C - OB #2
D - OB #3
E – Transducer Plots

FIGURE 1

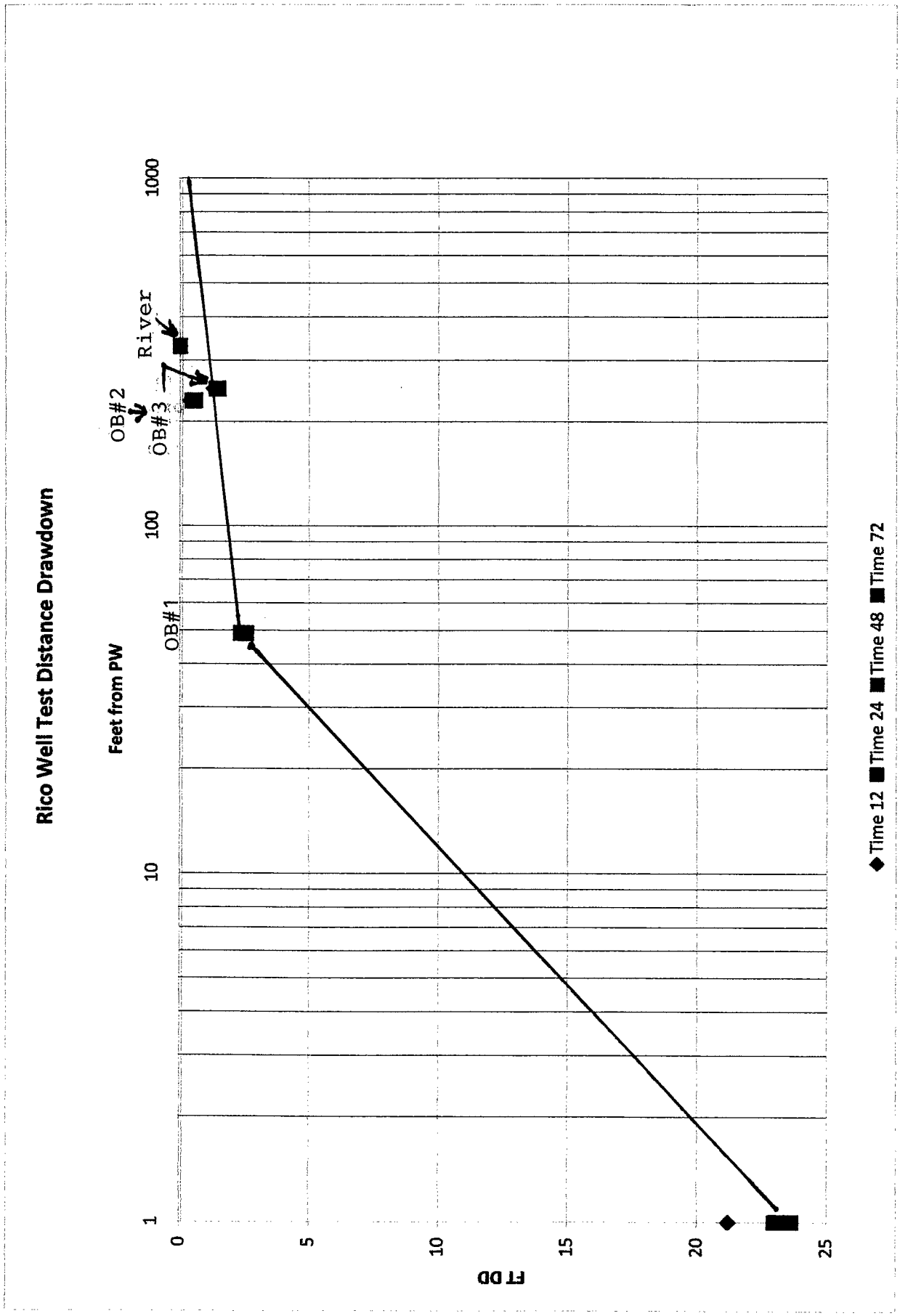

Rico Well Test Distance Drawdown
Feet from PW
FT DD
1
10
100
1000
0
5
10
15
20
25
OB#1
OB#2
OB#3
River
Time 12
Time 24
Time 48
Time 72

TABLE 1 - Rico Wells - Manual WL Readings/Relative Elevations

0.00' = East Parking Lot "X"

Well #	Dist - PW	TOC Elev/MP (FT +- 0.00))	Date/Time	WL Meas FT	WL Elev	12/8/2011
PW	0	6.690	10/5/2011	12.330	-5.640	(Ground Level)
			11/1/2011	12.330	-5.640	(Ground Level)
			11/14/2011	15.270	-8.580	(TOC)
OB #1	49	4.280	10/28/2011	13.080	-8.800	
			11/1/2011	13.146	-8.866	
			11/14/2011	13.125	-8.845	
OB #2	229.4	0.542	10/28/2011	9.667	-9.125	
			11/1/2011	9.667	-9.667	
			11/14/2011	9.710	-9.168	
OB #3	248	-0.740	10/28/2011	8.290	-9.030	
			11/1/2011	8.458	-9.198	
			11/14/2011	8.375	-9.115	
River	328.8	126.625	10/5/2011			
		0.00 TOP Stake	13:00	-8.460	-8.460	
			10/28/2011	-8.800	-8.800	
			11/1/2011	-8.667	-8.667	
			11/14/2011			
			11:30	-8.677	-8.677	
			13:00	-8.550	-8.550	
			18:10	-8.550	-8.550	
			11/15/2011			
			8:00	-8.800	-8.800	
			12:00	-8.760	-8.760	
			16:00	-8.469	-8.469	
			20:00	-8.635	-8.635	
			11/16/2011			
			2:00	-8.635	-8.635	
			8:00	-8.800	-8.800	
			12:00	-8.830	-8.830	
			18:00	-8.635	-8.635	
			24:00:00	-8.844	-8.844	
			11/17/2011			
			05:20	-8.969	-8.969	

TABLE 2 **SUMMARY - AQUIFER TEST RESULTS** **12/9/2011**

Well	Phase	T ft*/dy	Hyd Cond ft/dy	Storativity	Sp Cap gpm/ft dd	T gpd/ft
PW	Pumping	1.42 10(3)	1.14 10(1)	1.36 10(-4)		1.06 10(4)
	Recovery	4.07 10(5)	3.26 10(3)			3.04 10(5)
				24 hr	4.348	
				48 hr	4.291	
				72 hr	4.233	
OB#1	Pumping	1.06 10(3)	8.52 10(0)	2.00 10(-3)		7.9 10(3)
(49 ft/140ft TD)	Recovery	1.25 10(4)	8.46 10(2)			9.3 10(4)
AVG		**1.05 10(5)**	**1.05 10(3)**	**1.07 10(-3)**		**7.85 10(5)**
OB#2	Pumping	1.40 10(4)	1.12 10(2)	8.65 10(-3)		1.05 10(5)
(229 ft/ 23 ft TD)	Recovery	1.40 10(4)	1.12 10(1)	1.3 10(-2)		1.05 10(5)
OB#3	Pumping	2.1 10(4)	1.68 10(2)	4.9 10(-3)**		1.57 10(5)
(248 ft/140 ft TD)	Recovery	2.1 10(4)	1.68 10(2)			1.57 10(5)

DISTANCE/DRAWDOWN

	DD (ft)	12 hr	24 hr	48 hr	72 hr
PW		21.2	23	23.3	23.625
OB#1		2.45	2.57	2.39	2.36
OB#2		0.4	0.49	0.54	0.58
OB#3		1.3	1.42	1.46	1.5

APPENDIX A – Production Well Data & Graphs

Report Date: 11/30/2011 0:00
Report User Name HP_Owner
Report Computer N JASEN

WESTWATER ASSOCIATES
11/30/2011

Log File Properties
File Name 72hour 2011-11-23 10-55-49.wsl
Create Date 11/30/2011 0:00

Device Properties
Device Level TROLL® 300
Site Rico
Device Name Rico197
Serial Number 126557
Firmware Version 2.04

Log Configuration

Log Name	72hour
Created By	HP_Owner
Computer Name	JASEN
Application	WinSitu.exe
Application Version	5.6.0.0
Create Date	11/13/2011 16:08
Notes Size(bytes)	4096
Type	Linear
Overwrite when full	Enabled
Scheduled Start	11/14/2011 11:59
Scheduled Stop	11/20/2011 11:59
Duration	Days: 6 Hours: 00 Mins: 00 Secs: 00
Interval	Days: 0 Hours: 00 Mins: 01 Secs: 00

Log Data:
Record Count 8640

Date and Time	Elapsed Time Seconds	WL	Sensor: Pres 100A SN#: 126557 Pressure (PSI)	FTW	Sensor: Pres 100A SN#: 126557 Temperature (F)	Elapsed Time Min
11/14/2011 11:59	0	16.00537	49.673	104.24463	44.316	0
11/14/2011 12:00	60	33.34654	42.166	86.90346	44.24	1
11/14/2011 12:01	120	33.7531	41.99	86.4969	44.204	2
11/14/2011 12:02	180	33.88015	41.935	86.36985	44.308	3
11/14/2011 12:03	240	34.12732	41.828	86.12268	44.316	4
11/14/2011 12:04	300	34.27285	41.765	85.97715	44.345	5
11/14/2011 12:05	360	34.39297	41.713	85.85703	44.402	6
11/14/2011 12:07	480	34.48306	41.674	85.76694	44.577	8
11/14/2011 12:10	660	34.65862	41.598	85.59138	44.853	11

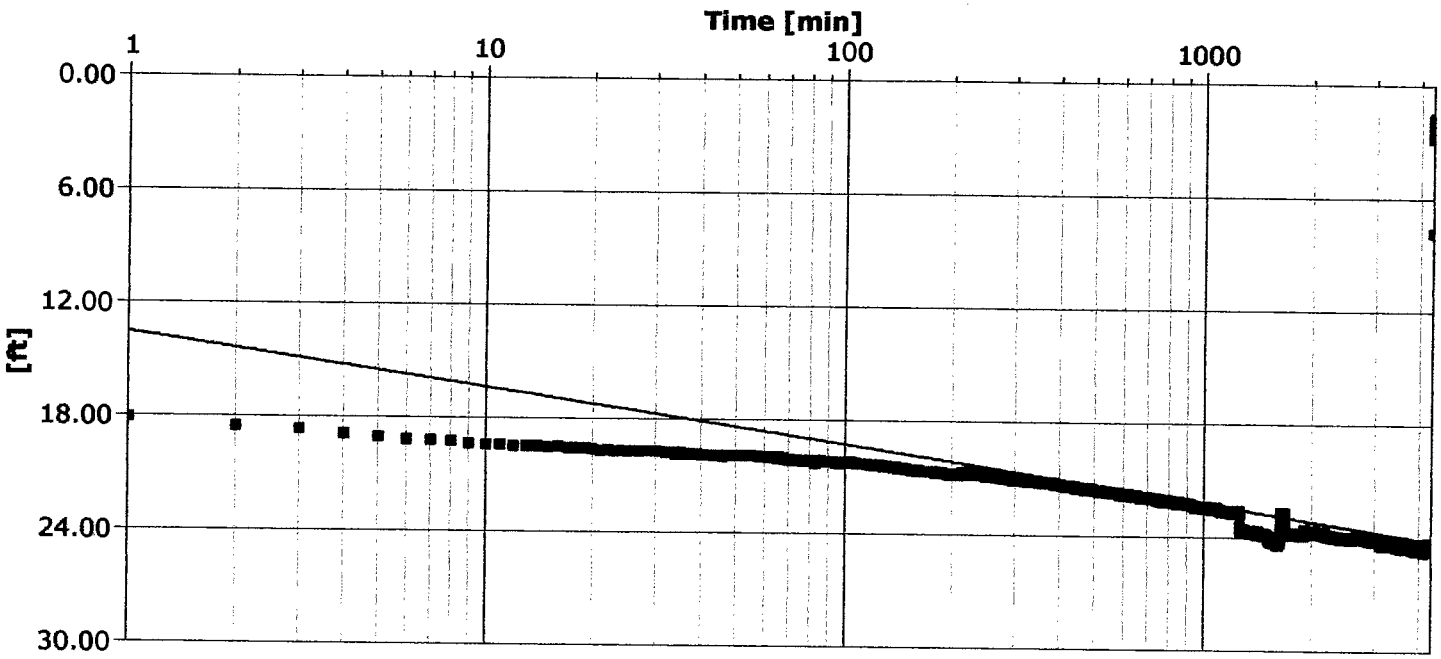
11/14/2011 12:15	960	34.74871	41.559	85.50129	45.274	16	
11/14/2011 12:20	1260	34.91272	41.488	85.33728	45.572	21	
11/14/2011 12:25	1560	34.94968	41.472	85.30032	45.763	26	
11/14/2011 12:30	1860	34.9543	41.47	85.2957	45.906	31	
11/14/2011 12:40	2460	35.14603	41.387	85.10397	46.08	41	
11/14/2011 12:50	3060	35.18299	41.371	85.06701	46.143	51	
11/14/2011 13:00	3660	35.21995	41.355	85.03005	46.205	61	
11/14/2011 13:15	4560	35.40937	41.273	84.84063	46.254	76	
11/14/2011 13:29	5400	35.43709	41.261	84.81291	46.257	90	
11/14/2011 13:59	7200	35.58031	41.199	84.66969	46.311	120	
11/14/2011 14:29	9000	35.80207	41.103	84.44793	46.339	150	
11/14/2011 14:59	10800	35.91295	41.055	84.33705	46.34	180	
11/14/2011 15:29	12600	36.0862	40.98	84.1638	46.35	210	
11/14/2011 15:59	14400	36.03307	41.003	84.21693	46.347	240	
11/14/2011 16:59	18000	36.33799	40.871	83.91201	46.394	300	
11/14/2011 17:59	21600	36.43732	40.828	83.81268	46.395	360	
11/14/2011 18:59	25200	36.60364	40.756	83.64636	46.408	420	
11/14/2011 19:59	28800	36.71221	40.709	83.53779	46.418	480	
11/14/2011 20:59	32400	36.91087	40.623	83.33913	46.433	540	
11/14/2011 21:59	36000	37.04947	40.563	83.20053	46.439	600	
11/14/2011 22:59	39600	37.11646	40.534	83.13354	46.452	660	
11/14/2011 23:59	43200	37.19269	40.501	83.05731	46.453	720	
11/15/2011 1:59	50400	37.45141	40.389	82.79859	46.481	840	
11/15/2011 3:59	57600	37.68703	40.287	82.56297	46.483	960	
11/15/2011 5:59	64800	37.69858	40.282	82.55142	46.502	1080	
11/15/2011 7:59	72000	37.89724	40.196	82.35276	46.481	1200	
11/15/2011 9:59	79200	38.89516	39.764	81.35484	46.497	1320	
11/15/2011 11:59	86400	39.00373	39.717	81.24627	46.518	1440	
11/15/2011 15:59	100800	38.78659	39.811	81.46341	46.6	1680	
11/15/2011 19:59	115200	38.86513	39.777	81.38487	46.494	1920	
11/16/2011 1:59	136800	39.20239	39.631	81.04761	46.534	2280	
11/16/2011 7:59	158400	39.26707	39.603	80.98293	46.531	2640	
11/16/2011 11:59	172800	39.30865	39.585	80.94135	46.54	2880	
11/16/2011 17:59	194400	39.48652	39.508	80.76348	46.539	3240	
11/16/2011 23:59	216000	39.69442	39.418	80.55558	46.536	3600	
11/17/2011 6:39	240000	39.76603	39.387	80.48397	46.528	4000	
11/17/2011 9:59	252000	39.62512	39.448	80.62488	46.549	4200	
11/17/2011 12:19	260400	17.03101	49.229	103.219	46.79	4340	Rec Min
11/17/2011 12:20	260460	17.01715	49.235	103.2329	46.782	4341	1
11/17/2011 12:21	260520	17.03563	49.227	103.2144	46.771	4342	2
11/17/2011 12:22	260580	17.02639	49.231	103.2236	46.763	4343	3
11/17/2011 12:23	260640	17.0287	49.23	103.2213	46.754	4344	4
11/17/2011 12:24	260700	17.01253	49.237	103.2375	46.747	4345	5
11/17/2011 12:26	260820	17.0056	49.24	103.2444	46.738	4347	7
11/17/2011 12:29	261000	16.99867	49.243	103.2513	46.719	4350	10
11/17/2011 12:34	261300	16.99174	49.246	103.2583	46.689	4355	15
11/17/2011 12:39	261600	16.96864	49.256	103.2814	46.648	4360	20
11/17/2011 12:44	261900	16.97788	49.252	103.2721	46.606	4365	25
11/17/2011 12:49	262200	16.98712	49.248	103.2629	46.577	4370	30
11/17/2011 12:59	262800	16.9594	49.26	103.2906	46.55	4380	40

11/17/2011 13:09	263400	16.94092	49.268	103.3091	46.548	4390	50
11/17/2011 13:19	264000	16.93399	49.271	103.316	46.525	4400	60
11/17/2011 13:34	264900	16.93861	49.269	103.3114	46.469	4415	75
11/17/2011 13:49	265800	16.92475	49.275	103.3253	46.448	4430	90
11/17/2011 14:04	266700	16.9132	49.28	103.3368	46.37	4445	105
11/17/2011 14:19	267600	16.89703	49.287	103.353	46.341	4460	120
11/17/2011 14:49	269400	16.89472	49.288	103.3553	46.321	4490	150
11/17/2011 15:19	271200	16.86238	49.302	103.3876	45.892	4520	180
11/17/2011 15:39	272400	16.867	49.3	103.383	45.239	4540	200
11/17/2011 16:29	275400	16.84621	49.309	103.4038	45.073	4590	250
11/17/2011 17:19	278400	16.83466	49.314	103.4153	45.091	4640	300
11/17/2011 18:59	284400	16.78615	49.335	103.4639	44.969	4740	400
11/17/2011 20:39	290400	16.78615	49.335	103.4639	44.892	4840	500
11/17/2011 22:19	296400	16.76767	49.343	103.4823	44.8	4940	600
11/17/2011 23:59	302400	16.75843	49.347	103.4916	44.783	5040	700
11/18/2011 1:39	308400	16.7746	49.34	103.4754	44.697	5140	800
11/18/2011 4:59	320400	16.79308	49.332	103.4569	44.675	5340	1000
11/18/2011 8:19	332400	16.77691	49.339	103.4731	44.635	5540	1200
11/18/2011 11:39	344400	16.86007	49.303	103.3899	44.645	5740	1400
11/18/2011 14:59	356400	16.90858	49.282	103.3414	44.567	5940	1600
11/18/2011 18:19	368400	16.87855	49.295	103.3715	44.534	6140	1800
11/18/2011 21:39	380400	16.90627	49.283	103.3437	44.489	6340	2000
11/19/2011 4:19	404400	16.94092	49.268	103.3091	44.468	6740	2400
11/19/2011 10:59	428400	16.82311	49.319	103.4269	44.457	7140	2800
11/19/2011 17:39	452400	16.85776	49.304	103.3922	44.402	7540	3200
11/20/2011 0:19	476400	16.79077	49.333	103.4592	44.437	7940	3600
11/20/2011 6:59	500400	16.73302	49.358	103.517	44.425	8340	4000
11/20/2011 11:58	518340	16.71916	49.364	103.5308	44.406	8639	4299

WestWater Associates, Inc.
306 West Main Street
Montrose, CO 81401
(970) 249-5683

Pumping Test Analysis Report
Project: Rico
Number:
Client:

Location: Rico, CO	Pumping Test: Pumping Test 1	Pumping well: PW
Test conducted by: Raym Newmyer		Test date: 11/27/2011
Analysis performed by: Jd	Theis	Analysis date: 11/27/2011
Aquifer Thickness: 125.00 ft	Discharge: variable, average rate 99.977 [U.S. gal/min]	



Calculation after Theis with Jacob Correction

Observation well	Transmissivity [ft²/d]	Hydraulic Conductivity [ft/d]	Storage coefficient	Radial distance to PW [ft]	
PW	1.42×10^{3}	1.14×10^{1}	1.36×10^{-4}	0.34	

WestWater Associates, Inc.
306 West Main Street
Montrose, CO 81401
(970) 249-5683

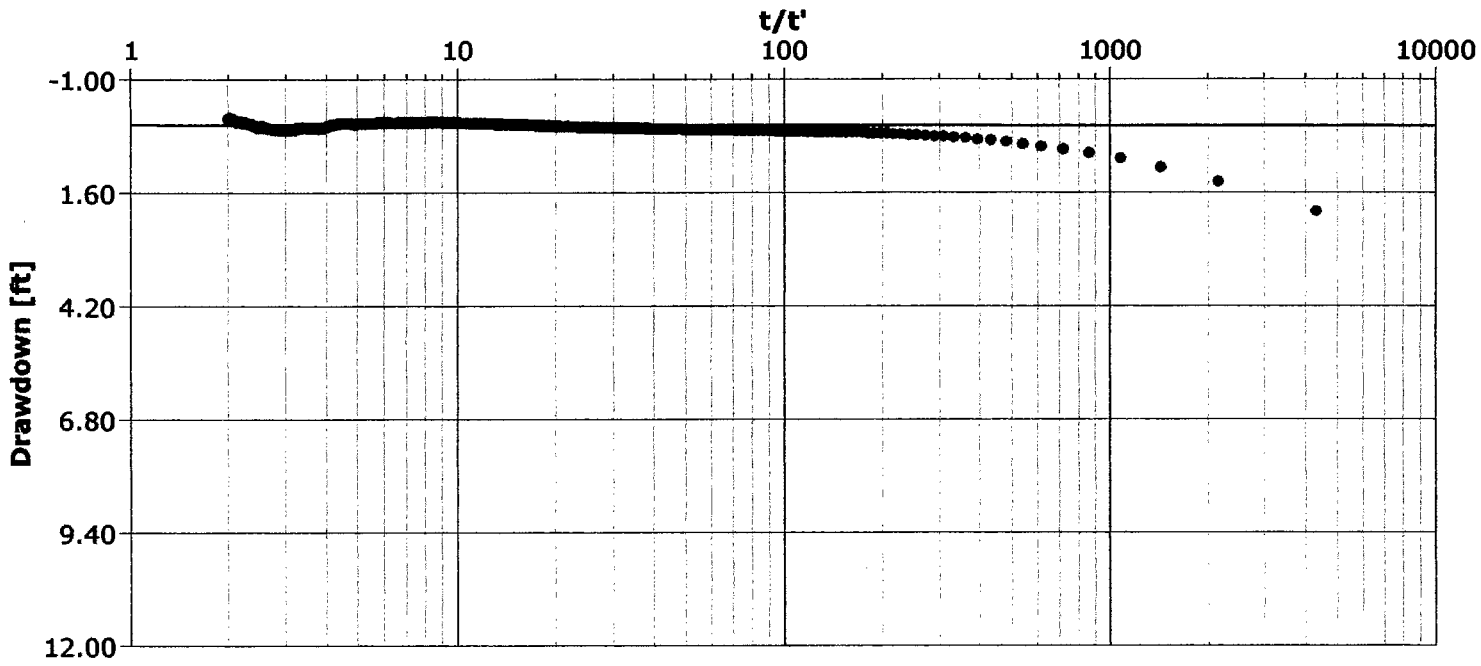
Pumping Test Analysis Report

Project: Rico

Number:

Client:

Location: Rico, CO	Pumping Test: Pumping Test 1	Pumping well: PW
Test conducted by: Raym Newmyer		Test date: 11/27/2011
Analysis performed by:	New analysis 2	Analysis date: 11/27/2011
Aquifer Thickness: 125.00 ft	Discharge: variable, average rate 99.977 [U.S. gal/min]	



Calculation after Theis & Jacob

Observation well	Transmissivity [ft²/d]	Hydraulic Conductivity [ft/d]	Radial distance to PW [ft]	
Well 1	4.07×10^5	3.26×10^3	49.0	

APPENDIX B - OB#1

Report Date: 40874
Report User Name HP_Owner
Report Computer I JASEN WESTWATER ASSOCIATES 11/30/2011

Log File Properties
File Name 72hrOB1 2011-11-23 11-02-57.wsl
Create Date 40870

Device Properties
Device Level TROLL® 300
Site Rico
Device Name Troll 35
Serial Number 126669
Firmware Version 2

Log Configuration

Log Name	72hrOB1
Created By	HP_Owner
Computer Name	JASEN
Application	WinSitu.exe
Application Version	5.6.0.0
Create Date	11/13/2011 0:00
Notes Size(bytes)	4096
Type	Linear
Overwrite when full	Enabled
Scheduled Start	11/14/2011 11:59
Scheduled Stop	11/20/2011 11:59
Duration	Days: 6 Hours: 00 Mins: 00 Secs: 00
Interval	Days: 0 Hours: 00 Mins: 01 Secs: 00

Log Data:
Record Count 8640

	Elapsed Time		Sensor: Pres 30A SN#: 126669		Sensor: Pres 30A SN#: 126669	
Date and Time	Seconds	DD	Pressure (PSI)	FTW	Temperature (F)	Elapsed Min
11/14/2011 11:59	0	13.13124	24.296	31.86876	42.088	0
11/14/2011 12:00	60	14.07372	23.888	30.92628	42.088	1
11/14/2011 12:01	120	14.50569	23.701	30.49431	42.085	2
11/14/2011 12:02	180	14.72976	23.604	30.27024	42.085	3
11/14/2011 12:03	240	14.87529	23.541	30.12471	42.083	4
11/14/2011 12:04	300	14.98386	23.494	30.01614	42.083	5
11/14/2011 12:06	420	15.13632	23.428	29.86368	42.085	7
11/14/2011 12:09	600	15.27723	23.367	29.72277	42.079	10
11/14/2011 12:14	900	15.3858	23.32	29.6142	42.076	15

11/14/2011 12:19	1200	15.44586	23.294	29.55414	42.075	20	
11/14/2011 12:24	1500	15.47127	23.283	29.52873	42.071	25	
11/14/2011 12:29	1800	15.50361	23.269	29.49639	42.063	30	
11/14/2011 12:39	2400	15.53364	23.256	29.46636	42.061	40	
11/14/2011 12:49	3000	15.55212	23.248	29.44788	42.058	50	
11/14/2011 12:59	3600	15.55674	23.246	29.44326	42.051	60	
11/14/2011 13:14	4500	15.57291	23.239	29.42709	42.047	75	
11/14/2011 13:29	5400	15.5937	23.23	29.4063	42.045	90	
11/14/2011 13:44	6300	15.59832	23.228	29.40168	42.053	105	
11/14/2011 13:59	7200	15.6168	23.22	29.3832	42.05	120	
11/14/2011 14:29	9000	15.62373	23.217	29.37627	42.036	150	
11/14/2011 14:59	10800	15.62373	23.217	29.37627	42.027	180	
11/14/2011 15:29	12600	15.63066	23.214	29.36934	42.017	210	
11/14/2011 15:59	14400	15.61449	23.221	29.38551	42.013	240	
11/14/2011 16:59	18000	15.61911	23.219	29.38089	42.005	300	
11/14/2011 17:59	21600	15.60756	23.224	29.39244	41.999	360	
11/14/2011 18:59	25200	15.59601	23.229	29.40399	41.995	420	
11/14/2011 19:59	28800	15.58908	23.232	29.41092	41.988	480	
11/14/2011 20:59	32400	15.5706	23.24	29.4294	41.997	540	
11/14/2011 21:59	36000	15.56829	23.241	29.43171	41.992	600	
11/14/2011 23:59	43200	15.58215	23.235	29.41785	41.993	720	
11/15/2011 1:59	50400	15.62142	23.218	29.37858	41.997	840	
11/15/2011 4:39	60000	15.62142	23.218	29.37858	42.002	1000	
11/15/2011 11:19	84000	15.70227	23.183	29.29773	42.017	1400	
11/15/2011 17:59	108000	15.67224	23.196	29.32776	42.031	1800	
11/16/2011 0:39	132000	15.61449	23.221	29.38551	42.042	2200	
11/16/2011 7:19	156000	15.52671	23.259	29.47329	42.053	2600	
11/16/2011 13:59	180000	15.51285	23.265	29.48715	42.058	3000	
11/16/2011 20:39	204000	15.41814	23.306	29.58186	42.06	3400	
11/17/2011 3:19	228000	15.40659	23.311	29.59341	42.065	3800	
11/17/2011 9:59	252000	15.40197	23.313	29.59803	42.067	4200	
11/17/2011 11:58	259140	15.48513	23.277	29.51487	42.062	4319	Rec Min
11/17/2011 11:59	259200	15.16173	23.417	29.83827	42.063	4320	0
11/17/2011 12:00	259260	14.48721	23.709	30.51279	42.064	4321	1
11/17/2011 12:01	259320	14.14764	23.856	30.85236	42.061	4322	2
11/17/2011 12:02	259380	13.9536	23.94	31.0464	42.067	4323	3
11/17/2011 12:03	259440	13.82655	23.995	31.17345	42.062	4324	4
11/17/2011 12:04	259500	13.72953	24.037	31.27047	42.062	4325	5
11/17/2011 12:06	259620	13.61172	24.088	31.38828	42.063	4327	7
11/17/2011 12:09	259800	13.50546	24.134	31.49454	42.065	4330	10
11/17/2011 12:14	260100	13.41999	24.171	31.58001	42.063	4335	15
11/17/2011 12:19	260400	13.38072	24.188	31.61928	42.063	4340	20
11/17/2011 12:24	260700	13.34607	24.203	31.65393	42.065	4345	25
11/17/2011 12:29	261000	13.34145	24.205	31.65855	42.063	4350	30
11/17/2011 12:39	261600	13.31835	24.215	31.68165	42.065	4360	40
11/17/2011 12:49	262200	13.3068	24.22	31.6932	42.069	4370	50
11/17/2011 12:59	262800	13.29525	24.225	31.70475	42.073	4380	60
11/17/2011 13:14	263700	13.28601	24.229	31.71399	42.068	4395	75
11/17/2011 13:29	264600	13.27215	24.235	31.72785	42.073	4410	90
11/17/2011 13:44	265500	13.26984	24.236	31.73016	42.083	4425	105

11/17/2011 13:59	266400	13.25367	24.243	31.74633	42.084	4440	120
11/17/2011 14:29	268200	13.23288	24.252	31.76712	42.088	4470	150
11/17/2011 14:59	270000	13.22595	24.255	31.77405	42.091	4500	180
11/17/2011 15:29	271800	13.21671	24.259	31.78329	42.097	4530	210
11/17/2011 15:59	273600	13.19361	24.269	31.80639	42.096	4560	240
11/17/2011 16:29	275400	13.17744	24.276	31.82256	42.099	4590	270
11/17/2011 16:59	277200	13.1682	24.28	31.8318	42.104	4620	300
11/17/2011 17:59	280800	13.14741	24.289	31.85259	42.104	4680	360
11/17/2011 19:59	288000	13.12662	24.298	31.87338	42.105	4800	480
11/17/2011 21:59	295200	13.11507	24.303	31.88493	42.108	4920	600
11/17/2011 23:59	302400	13.11507	24.303	31.88493	42.109	5040	720
11/18/2011 1:59	309600	13.11969	24.301	31.88031	42.109	5160	840
11/18/2011 4:39	319200	13.13817	24.293	31.86183	42.099	5320	1000
11/18/2011 7:59	331200	13.13586	24.294	31.86414	42.074	5520	1200
11/18/2011 11:19	343200	13.19592	24.268	31.80408	42.057	5720	1400
11/18/2011 14:39	355200	13.24905	24.245	31.75095	42.042	5920	1600
11/18/2011 17:59	367200	13.2375	24.25	31.7625	42.026	6120	1800
11/18/2011 21:19	379200	13.28139	24.231	31.71861	42.014	6320	2000
11/19/2011 3:59	403200	13.28139	24.231	31.71861	41.996	6720	2400
11/19/2011 7:19	415200	13.25829	24.241	31.74171	41.985	6920	2600
11/19/2011 10:39	427200	13.19592	24.268	31.80408	41.976	7120	2800
11/19/2011 13:59	439200	13.20747	24.263	31.79253	41.973	7320	3000
11/19/2011 20:39	463200	13.12893	24.297	31.87107	41.959	7720	3400
11/20/2011 3:19	487200	13.10814	24.306	31.89186	41.952	8120	3800
11/20/2011 9:59	511200	13.02498	24.342	31.97502	41.942	8520	4200
11/20/2011 11:58	518340	13.03884	24.336	31.96116	41.94	8639	4319

WestWater Associates, Inc.
306 West Main Street
Montrose, CO 81401
(970) 249-5683

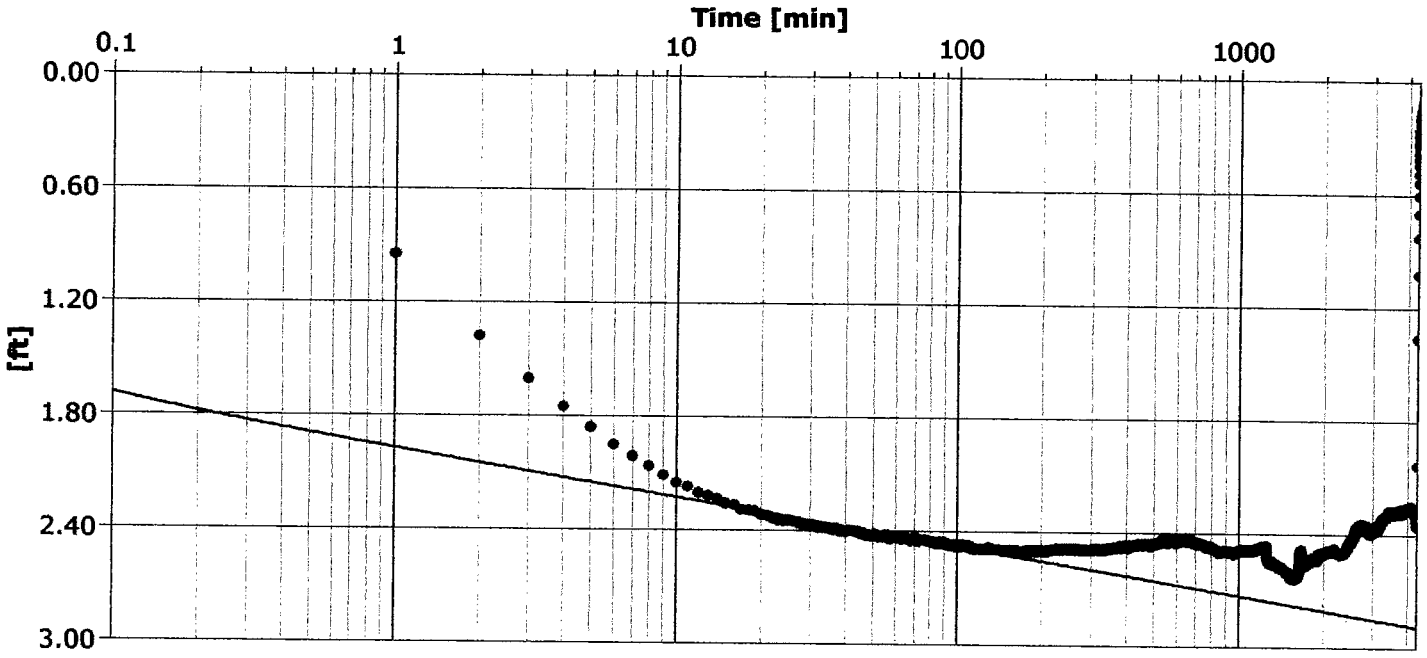
Pumping Test Analysis Report

Project: Rico

Number:

Client:

Location: Rico, CO	Pumping Test: Pumping Test 1	Pumping well: PW
Test conducted by: Raym Newmyer		Test date: 11/27/2011
Analysis performed by: Jd	Theis	Analysis date: 11/27/2011
Aquifer Thickness: 125.00 ft	Discharge: variable, average rate 99.977 [U.S. gal/min]	



Calculation after Papadopulos & Cooper

Observation well	Transmissivity [ft²/d]	Hydraulic Conductivity [ft/d]	Well-bore storage coefficient	Radial distance to PW [ft]	
Well 1	1.40×10^{4}	1.12×10^{-2}	8.85×10^{-6}	49.0	

WestWater Associates, Inc.
306 West Main Street
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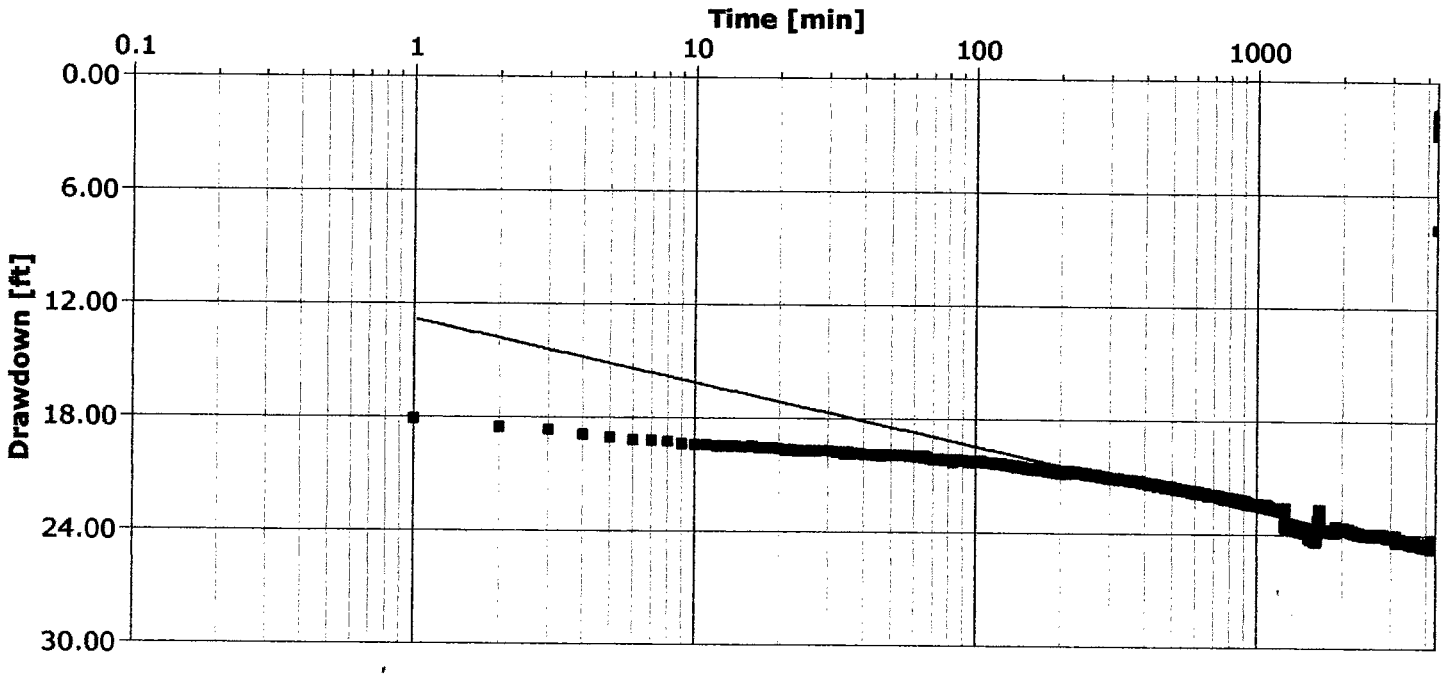
(970) 249-5683

Pumping Test Analysis Report
Project: Rico
Number:
Client:

Location: Rico, CO	Pumping Test: Pumping Test 1	Pumping well: PW
Test conducted by: Raym Newmyer		Test date: 11/27/2011
Analysis performed by: Jd	Theis	Analysis date: 11/27/2011
Aquifer Thickness: 125.00 ft	Discharge: variable, average rate 99.977 [U.S. gal/min]	



Calculation after Theis

Observation well	Transmissivity [ft²/d]	Hydraulic Conductivity [ft/d]	Storage coefficient	Radial distance to PW [ft]	
PW	1.06×10^{3}	8.52×10^{0}	2.00×10^{-3}	0.34	

WestWater Associates, Inc.
306 West Main Street
Montrose, CO 81401
(970) 249-5683

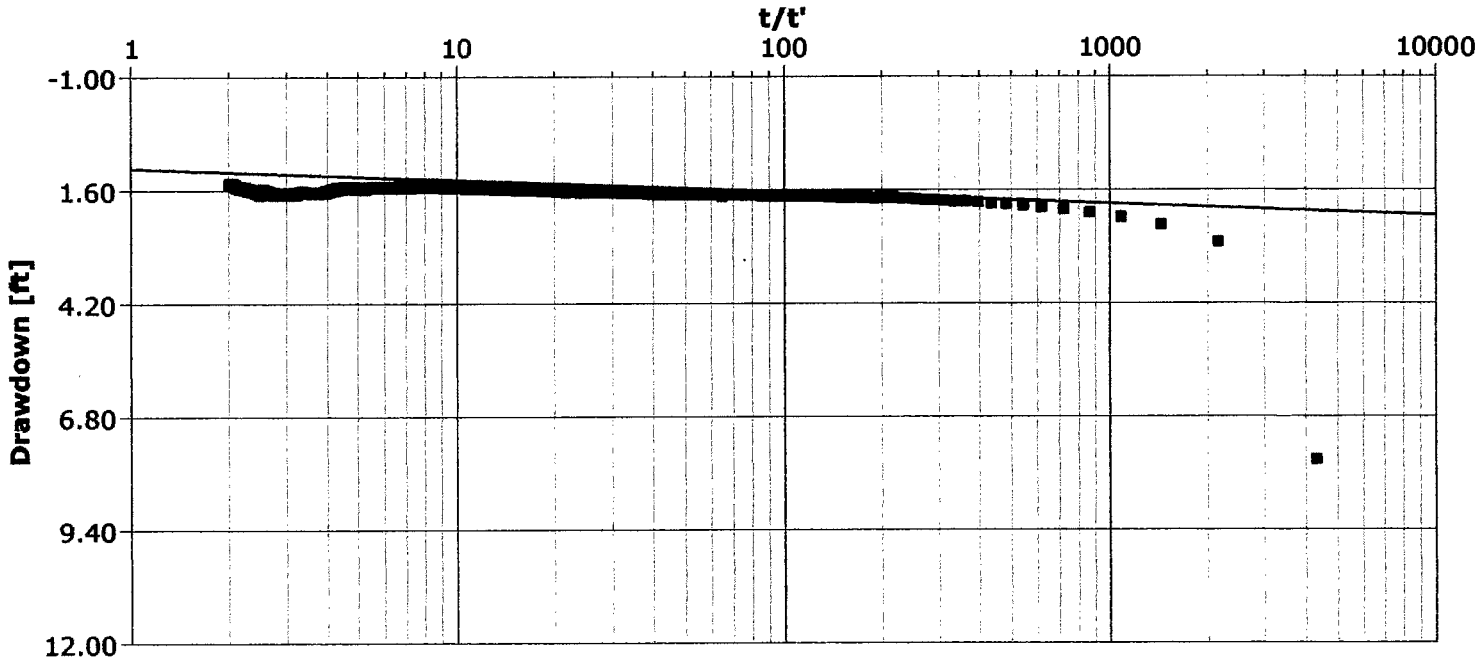
Pumping Test Analysis Report

Project: Rico

Number:

Client:

Location: Rico, CO	Pumping Test: Pumping Test 1	Pumping well: PW
Test conducted by: Raym Newmyer		Test date: 11/27/2011
Analysis performed by:	New analysis 2	Analysis date: 11/27/2011
Aquifer Thickness: 125.00 ft	Discharge: variable, average rate 99.977 [U.S. gal/min]	



Calculation after Theis & Jacob

Observation well	Transmissivity [ft²/d]	Hydraulic Conductivity [ft/d]	Radial distance to PW [ft]	
PW	1.28×10^4	1.03×10^2	0.34	

APPENDIX C - OB#2

WestWater Associates, Inc.
306 West Main Street
Montrose, CO 81401
(970) 249-5683

Pumping Test - Water Level Data

Project: Rico

Number:

Client:

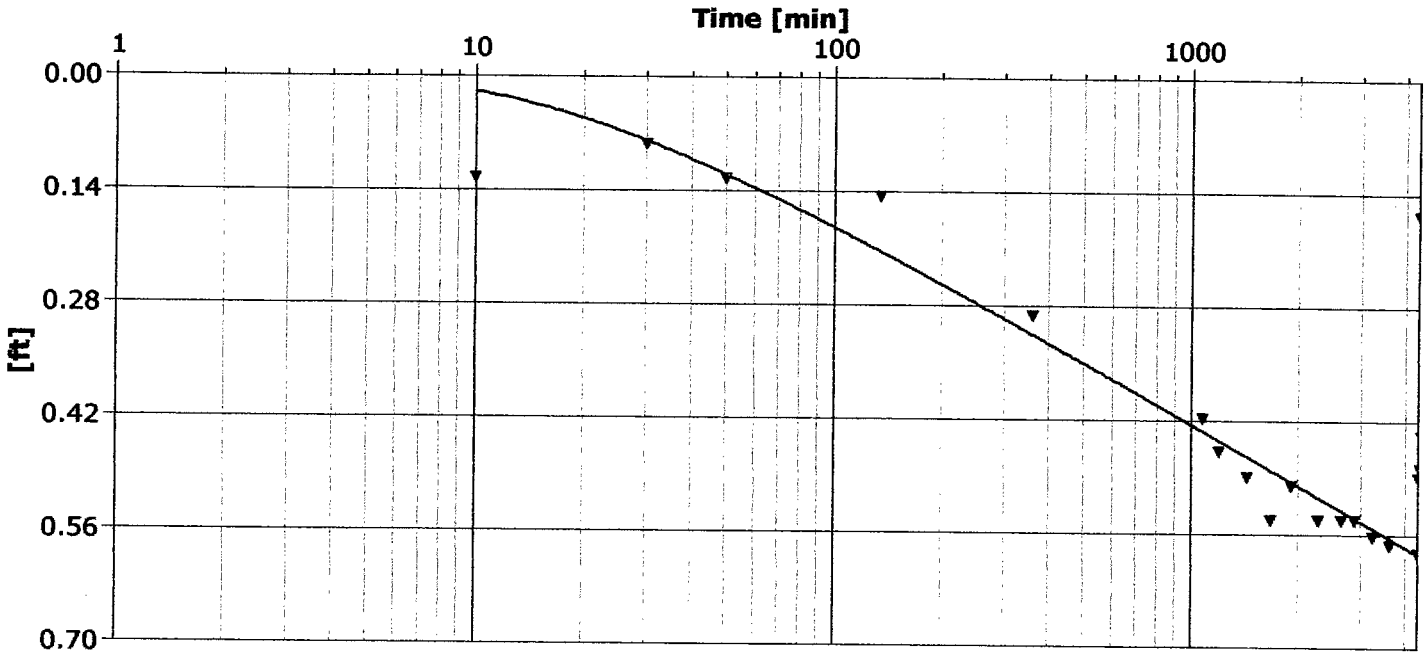
Location: Rico, CO	Pumping Test: Pumping Test 1	Pumping well: PW
Test conducted by: Raym Newmyer	Test date: 11/27/2011	Discharge: variable, average rate 99.977 [U.S. gal/min
Observation well: Well 2	Static water level [ft]: 9.63	Radial distance to PW [ft]: 229

	Time [min]	Water Level [ft]	Drawdown [ft]
1	10	9.75	0.125
2	30	9.708	0.083
3	50	9.75	0.125
4	135	9.771	0.146
5	360	9.917	0.292
6	1080	10.042	0.417
7	1200	10.083	0.458
8	1440	10.115	0.49
9	1680	10.167	0.542
10	1920	10.125	0.50
11	2280	10.167	0.542
12	2640	10.167	0.542
13	2880	10.167	0.542
14	3240	10.188	0.563
15	3600	10.198	0.573
16	4320	10.208	0.583
17	4335	9.792	0.167
18	4350	10.115	0.49
19	4388	10.104	0.479
20	4395	10.063	0.438
21	4440	10.042	0.417
22	4500	10.00	0.375

WestWater Associates, Inc.
306 West Main Street
Montrose, CO 81401
(970) 249-5683

Pumping Test Analysis Report	
Project: Rico	
Number:	
Client:	

Location: Rico, CO	Pumping Test: Pumping Test 1	Pumping well: PW
Test conducted by: Raym Newmyer		Test date: 11/27/2011
Analysis performed by: Jd	Theis	Analysis date: 11/27/2011
Aquifer Thickness: 125.00 ft	Discharge: variable, average rate 99.977 [U.S. gal/min]	



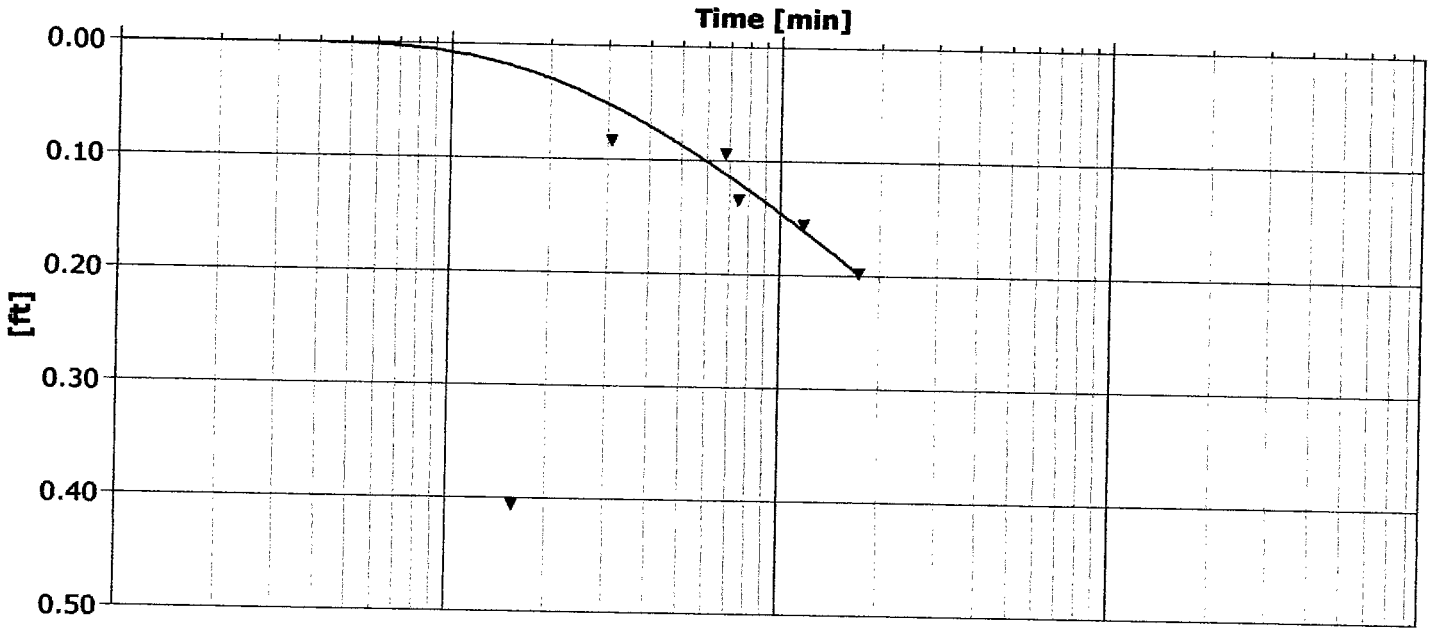
Calculation after Theis

Observation well	Transmissivity [ft²/d]	Hydraulic Conductivity [ft/d]	Storage coefficient	Radial distance to PW [ft]	
Well 2	1.40×10^{4}	1.12×10^{2}	8.65×10^{-3}	229.0	

WestWater Associates, Inc.
306 West Main Street
Montrose, CO 81401
(970) 249-5683

Pumping Test Analysis Report
Project: Rico
Number:
Client:

Location: Rico, CO	Pumping Test: Pumping Test 1	Pumping well: PW
Test conducted by: Raym Newmyer		Test date: 11/27/2011
Analysis performed by: Jd	Theis	Analysis date: 11/27/2011
Aquifer Thickness: 125.00 ft	Discharge: variable, average rate 99.977 [U.S. gal/min]	



Calculation after AGARWAL + Theis

Observation well	Transmissivity [ft²/d]	Hydraulic Conductivity [ft/d]	Storage coefficient	Radial distance to PW [ft]	
Well 2	1.40×10^{4}	1.12×10^{2}	1.30×10^{-2}	229.0	

APPENDIX D - OB#3

WestWater Associates, Inc.
306 West Main Street
Montrose, CO 81401
(970) 249-5683

Pumping Test - Water Level Data

Project: Rico

Number:

Client:

Location: Rico, CO	Pumping Test: Pumping Test 1	Pumping well: PW
Test conducted by: Raym Newmyer	Test date: 11/27/2011	Discharge: variable, average rate 99.977 [U.S. gal/min
Observation well: Well 3	Static water level [ft]: 8.33	Radial distance to PW [ft]: 248

	Time [min]	Water Level [ft]	Drawdown [ft]
1	20	9.438	1.105
2	40	9.417	1.084
3	55	9.50	1.167
4	140	9.646	1.313
5	360	9.625	1.292
6	1080	9.646	1.313
7	1320	9.75	1.417
8	1440	9.75	1.417
9	1680	9.771	1.438
10	1920	9.792	1.459
11	2280	9.792	1.459
12	2640	9.792	1.459
13	2880	9.792	1.459
14	3240	9.792	1.459
15	3600	9.8125	1.4795
16	4320	9.833	1.50
17	4335	8.8125	0.4795
18	4350	8.729	0.396
19	4378	8.667	0.334
20	4395	8.677	0.344
21	4440	8.625	0.292
22	4500	8.604	0.271

WestWater Associates, Inc.
306 West Main Street
Montrose, CO 81401
(970) 249-5683

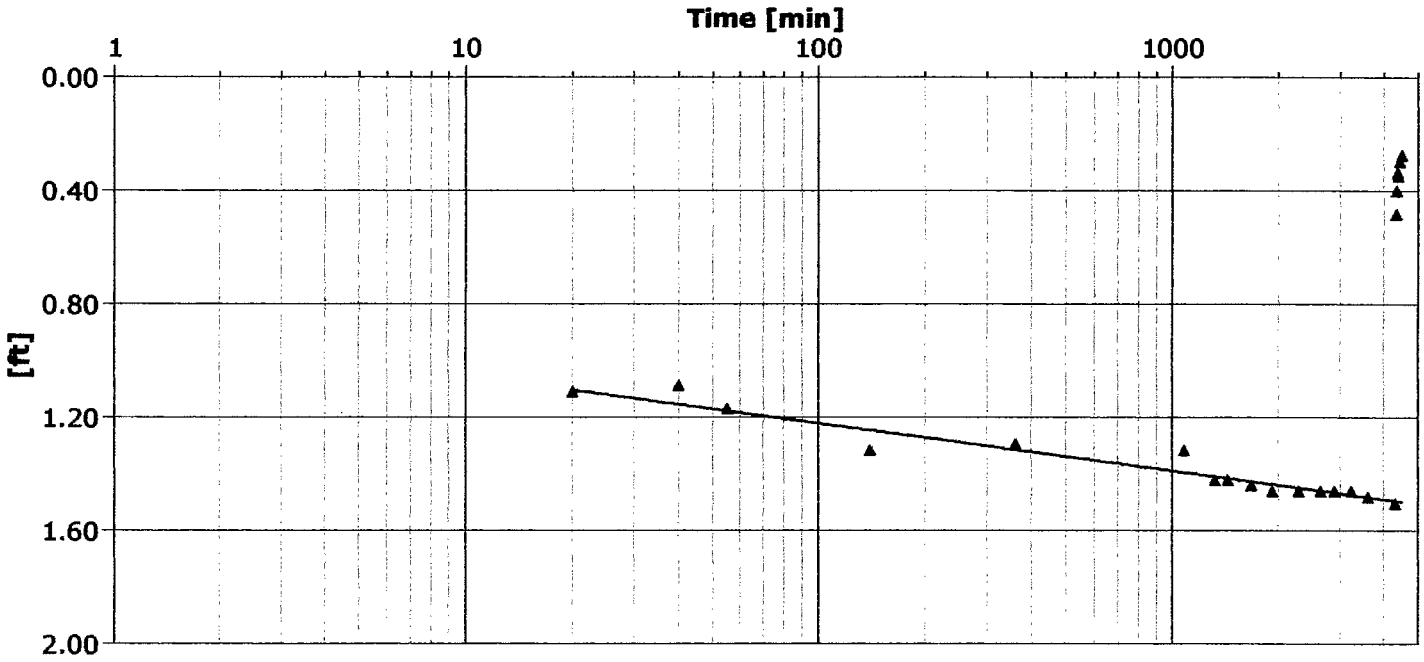
Pumping Test Analysis Report

Project: Rico

Number:

Client:

Location: Rico, CO	Pumping Test: Pumping Test 1	Pumping well: PW
Test conducted by: Raym Newmyer		Test date: 11/27/2011
Analysis performed by:	New analysis 3	Analysis date: 12/7/2011
Aquifer Thickness: 125.00 ft	Discharge: variable, average rate 99.977 [U.S. gal/min]	



Calculation after Papadopulos & Cooper

Observation well	Transmissivity [ft²/d]	Hydraulic Conductivity [ft/d]	Well-bore storage coefficient	Radial distance to PW [ft]	
Well 3	2.10×10^{4}	1.68×10^{2}	4.90×10^{-3}	248.0	

WestWater Associates, Inc.
306 West Main Street
Montrose, CO 81401
(970) 249-5683

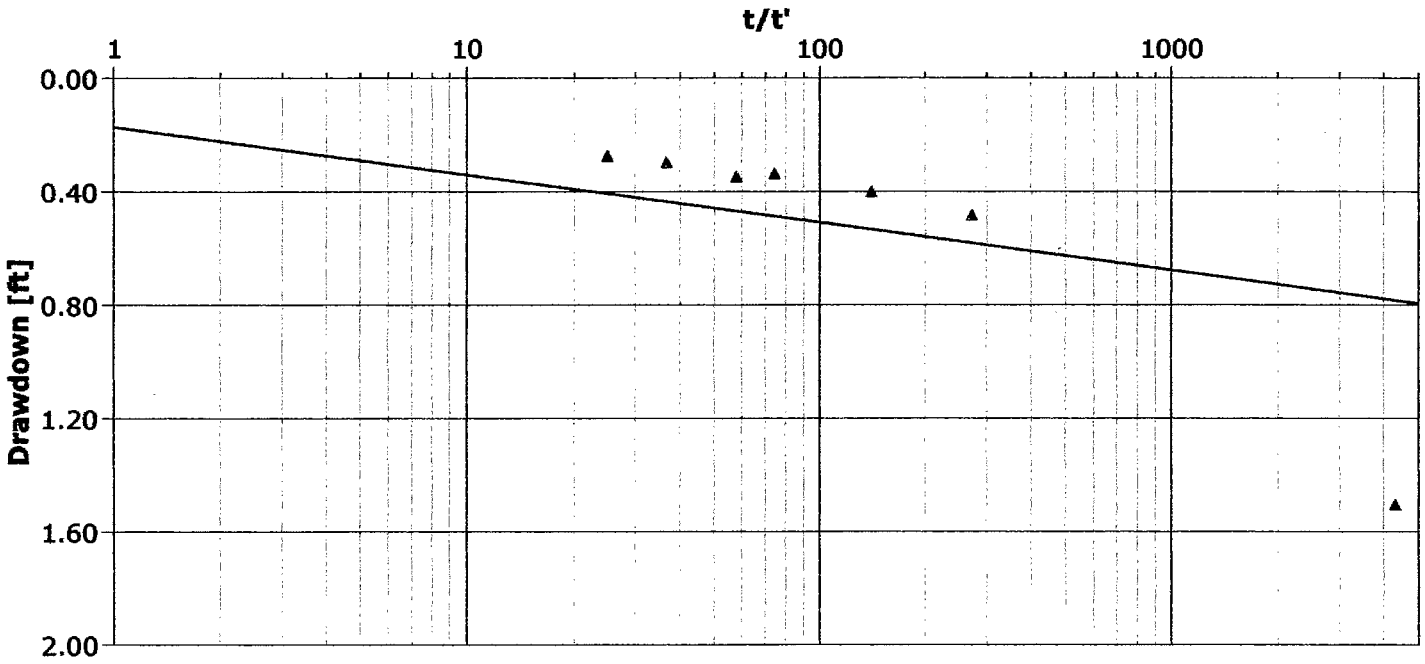
Pumping Test Analysis Report

Project: Rico

Number:

Client:

Location: Rico, CO	Pumping Test: Pumping Test 1	Pumping well: PW
Test conducted by: Raym Newmyer		Test date: 11/27/2011
Analysis performed by:	New analysis 3	Analysis date: 12/7/2011
Aquifer Thickness: 125.00 ft	Discharge: variable, average rate 99.977 [U.S. gal/min]	



Calculation after Theis & Jacob

Observation well	Transmissivity [ft²/d]	Hydraulic Conductivity [ft/d]	Radial distance to PW [ft]	
Well 3	2.10×10^4	1.68×10^2	248.0	

APPENDIX E – Transducer Plots

FIGURE 2

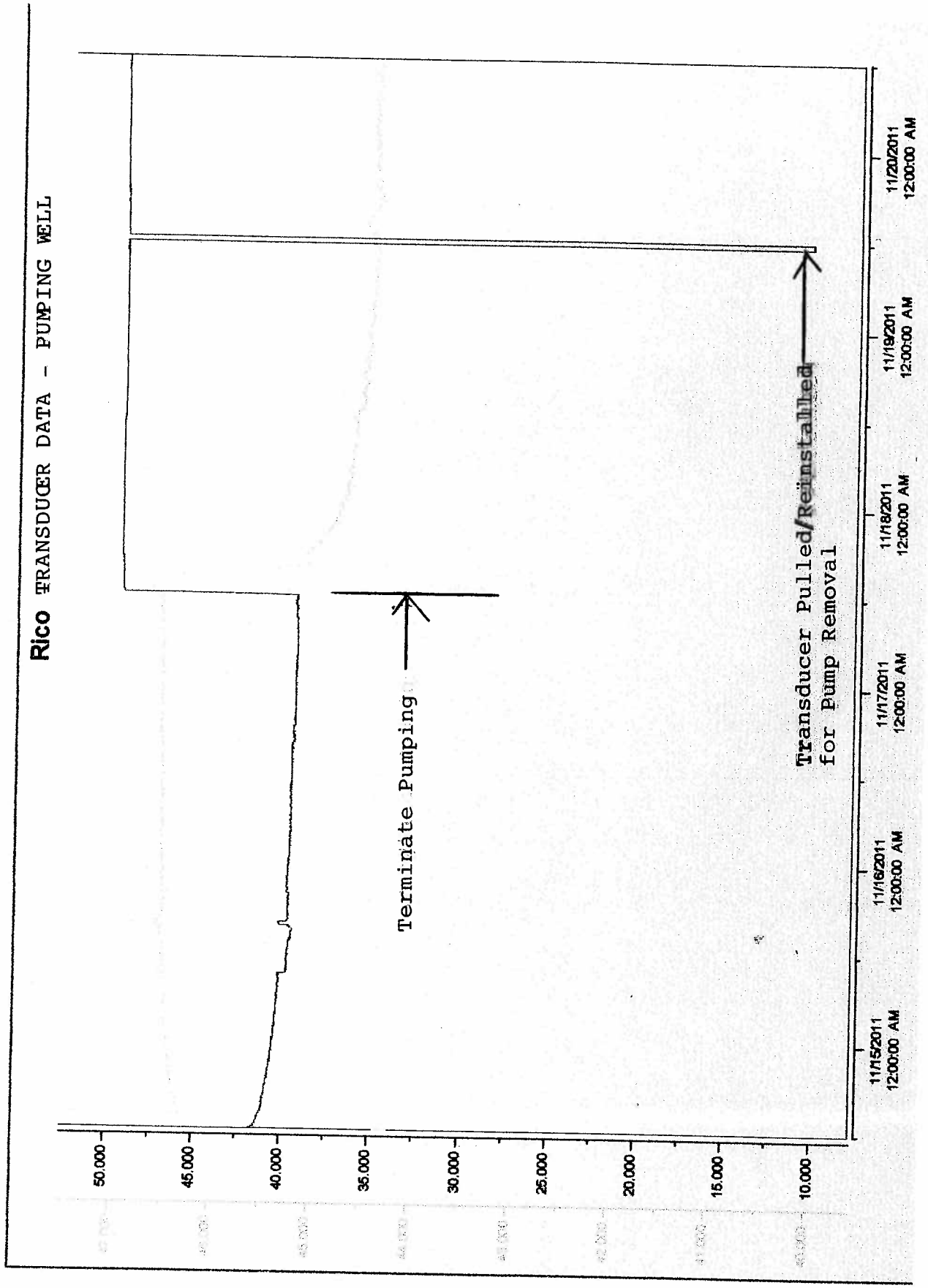
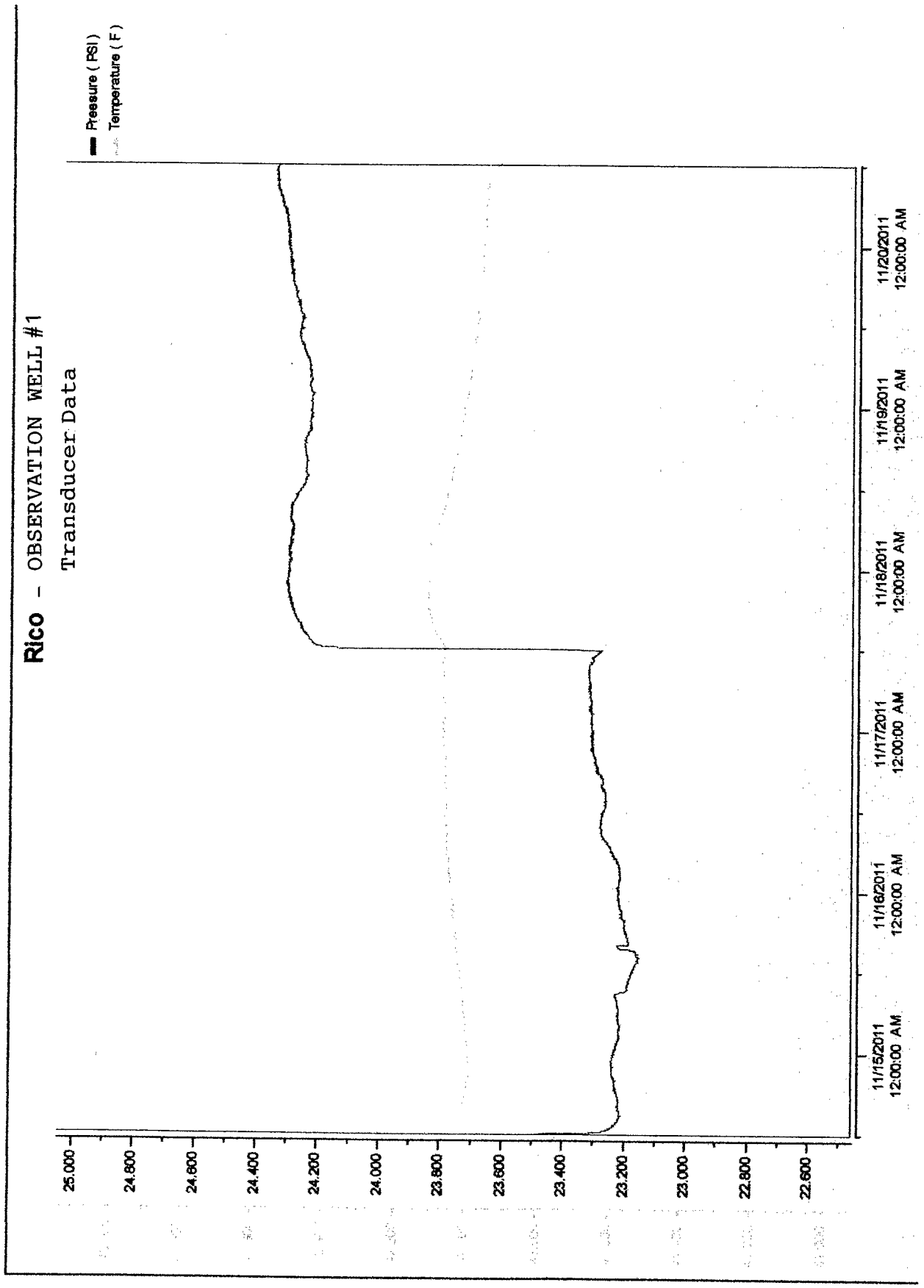

Rico TRANSDUCER DATA - PUMPING WELL
Terminate Pumping
Transducer Pulled/Reinstalled for Pump Removal
50.000
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
11/15/2011 12:00:00 AM
11/16/2011 12:00:00 AM
11/17/2011 12:00:00 AM
11/18/2011 12:00:00 AM
11/19/2011 12:00:00 AM
11/20/2011 12:00:00 AM

FIGURE #3


Rico - OBSERVATION WELL #1
Transducer Data
Pressure (PSI)
Temperature (F)
25.000
24.800
24.600
24.400
24.200
24.000
23.800
23.600
23.400
23.200
23.000
22.800
22.600
11/15/2011 12:00:00 AM
11/16/2011 12:00:00 AM
11/17/2011 12:00:00 AM
11/18/2011 12:00:00 AM
11/19/2011 12:00:00 AM
11/20/2011 12:00:00 AM