WATER AVAILABILITY ASSESSMENT FOR BEAU SOLEIL SUBDIVISION TAOS COUNTY, NEW MEXICO

prepared for
Beau Soleil Subdivision
Taos County, New Mexico

prepared by
Jason Hall
Water Solutions
1408 Seville Road
Santa Fe, New Mexico 87505

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TABLE OF CONTENTS

I. INTRODUCTION 1
II. GEOLOGIC SETTING 2
III. SITE HYDROGEOLOGY 4
Site Specific Geology 5
Site Hydrogeologic System 6
IV. WELL RG-92910 CONSTRUCTION AND DEVELOPMENT 7
V. WELL RG-92910 PUMPING TEST 8
Constant Rate Discharge Test 8
Pumping Well, RG-92910 9
Drawdown Data 9
Specific Capacity 10
Recovery Data 10
VI. WATER USE, WATER AVAILABILITY, AND MODELING 11
Current Water Use Within 1,000 feet 11
Proposed Beau Soleil Subdivision Water Use 12
Analytical Modeling 13
Projected Drawdowns 13
Streamflow Effects 13
Lowest Practical Pumping Water Level 14
VII. HISTORIC WATER LEVEL DATA 15
VIII. ADDITIONAL WELLS ON PROPOSED BEAU SOLEIL SUBDIVISION 16
IX. WELL RG-92910 WATER QUALITY 17
X. SUMMARY AND CONCLUSIONS 19
XI. REFERENCES 20

TABLES

1. Summary of aquifer characteristics derived from RG-92910 pumping test data.
2. Wells within 1,000 feet of proposed Beau Soleil Subdivision property boundaries.
3. Water quality analytical results for RG-92910.

FIGURES

1. Site Location Map
2. Geologic Map
3. Geologic Cross-Section
4. Taos Area Stratigraphic Chart
5. Potentiometric Surface Map
6. Lithologic Log and Well Completion Diagram

APPENDICES

A. NMOSE Well Records:
   On-Site Well RG-92910 and Wells Within 1,000 feet of Property
B. RG-92910 48-hour Pumping Test Data and Graphs
C. TH96S Model Results
D. Glover-Balmer Model Results
E. USGS Historic Water Level Data
F. RG-92910 Laboratory Water Quality Report

I. INTRODUCTION

Jason Hall Water Solutions (JHWS) was retained to prepare the Water Availability Assessment (Geohydrology Report) for the proposed Beau Soleil Subdivision. This Report has been prepared according to the County of Taos, New Mexico, Ordinance No. 2005-8, Subdivision Regulations: Article 4, Section 4.3.3, Section 4.3.4, and Section 4.3.5, and Article 16, Appendix A, as well as the New Mexico Subdivision Act, as amended in 1995.

The location of the proposed Beau Soleil Subdivision (the property) is approximately 8 miles north of the Town of Taos in Taos County, New Mexico. The property is west of Arroyo Seco and east of New Mexico 522, in projected Section 1 of Township 26 North, Range 12 East in the Antonio Martinez or Godoi Grant (Figure 1). The total area of the proposed Type IV subdivision is 400 acres to be divided into 35 lots of no less than 10 acres each, and two common areas that will be left undeveloped.

The proposed water supply plan for the property consists of domestic wells permitted with the New Mexico Office of the State Engineer (NMOSE) for 3.0 acre-feet per annum (afa) under New Mexico State Statute 72-12-1 for multiple household domestic use. Covenants will allow for each well to serve from one to six lots and will limit each lot to 0.5 afa maximum diversion, for a total diversion of no more than 3.0 afa per well. The total diversion for the proposed subdivision, 35 lots at 0.5 afa per lot, equals 17.5 afa. The large, 10-acre-plus lot sizes assure a low density of wells on the property. The large lot sizes also raise the costs of infrastructure for delivering water to multiple lots from shared wells. It may be more economical overall, and it will not increase the demand on the aquifer beneath the site, to have fewer than six lots connected to each well, or even a well on each lot.

The property is situated on Quaternary alluvium shed from the west side of the Sangre de Cristo Mountains (Figure 2). JHWS oversaw the drilling and completion of well RG-92910 to a total depth of 440 feet below ground surface (bgs) and performed a 48-hour Constant Rate Discharge Test (pumping test) on the completed well at a constant discharge rate of

10.5 gallons per minute (gpm). Well RG-92910 was drilled and completed in September 2011 by Fennell Drilling Company of Taos, NM, NMWD License Number WD-987. The well site is situated on a Pleistocene alluvial fan surface. The 440-ft boring penetrated the underlying sequence of interbedded sand, sandy/silty clays, and fluvial gravels from ground surface to 385 feet bgs, and hard, black, fractured basalt from 385 to 440 feet bgs (Figure 6).

II. GEOLOGIC SETTING

The proposed Beau Soleil Subdivision is situated on the northern edge of the Taos Valley, which is in the southeastern corner of the San Luis Basin, the northernmost basin within the Rio Grande Rift. The San Luis Basin is bordered on the east by the Sangre de Cristo Mountains and on the west by the San Juan and Tusas Mountains. The basin is made up of the broad San Luis Valley in south-central Colorado and the narrow Taos Plateau in north-central New Mexico. Taos is situated near the southern boundary of the 150-mile long San Luis Basin on its the eastern margin, west of the Sangre de Cristo uplift (Figures 1 and 2).

The Rio Grande Rift has been formed by extensional tectonic activity since the middle Tertiary period. The Rift is comprised of a series of well-defined asymmetrical grabens that extend from Colorado to Mexico for more than 600 miles (Baldridge, et al., 1984). The other major basins within the Rio Grande Rift in northern New Mexico lie south of the San Luis Basin; they are the Española Basin and the Albuquerque Basin. The Embudo Fault Zone south of Taos separates the east-tilted San Luis Basin from the west-tilted Española Basin (Dungan et al., 1984). Mountain blocks that were uplifted along faults at their edges typically flank these basins. In the Taos area, the Sangre de Cristo Mountains were uplifted along the Sangre de Cristo fault, a major normal fault that trends northwest to southeast near the mountain front (Rawling, 2005). In the vicinity of the Taos Plateau Volcanic Field, the Rio Grande Rift consists of a series of horsts and grabens, with the Rio Grande flowing along the surface of a deep graben. The sources of the Taos Plateau volcanic field are volcanic centers located primarily within the western side of the rift.

Down-cutting of the Rio Grande, through the Servilleta basalts in the Taos area, has generally occurred along weaknesses caused by fracturing parallel to the axis of the rift. Stratigraphy to the east of the rift generally dips to the west toward the Rio Grande, and strata on the west side of the Rift generally dip to the east, but less steeply and less uniform in orientation than on the east side (Coons and Kelley, 1984). Normal faults that dip 50-80 degrees from horizontal dominate faulting in the Rift (Kelley, 1978). Quaternary alluvial fan sediments derived from the Sangre de Cristo Mountains underlie the Taos Valley.

The property is underlain by approximately 40 feet Quaternary age alluvial fan deposits, consisting of calcium carbonate bearing, medium to coarse grained sandy gravel and silty clay. Beneath that is a late Tertiary to middle Pleistocene deposit of poorly sorted yellow to tan colored clay, sand, gravel, and cobbles, known as the Blueberry Hill Formation (Johnson et al., 2009). This formation is interpreted to be a sequence of highly oxidized and weathered alluvial and mudflow deposits, due to extensive saturation in the past, that was likely formed during the early to middle Pleistocene as a result of alluvial deposition on the plateau, prior to regional incision of the Rio Grande and the resulting drop of the water table (Bauer and Kelson, 2004). RG-92910 penetrates about 385 feet of Tertiary-age basin fill. The material encountered from 260 to 385 feet bgs was moderately well sorted arkosic coarse sand and gravel, sub-rounded to rounded, and water bearing from approximately 320 feet down (Figures 2, 3, 4, and 6).

Hard, black, massive, crystalline fractured basalt of the Servilleta Formation, or alternately of the Cerro Negro dacite volcano, was encountered from 385 feet bgs in the boring to total depth at 440 feet bgs. Within the 55 feet of fractured basalt drilled in the borehole, arkosic, sub-rounded coarse sand and gravel was encountered, indicating interbedded water-bearing alluvial sand layers or lenses, and/or buried channel deposits. The Servilleta basalts range in age from 2.8 to 4.5 million years old (Lipman and Mehnert, 1979). The source vents of the Servilleta basalts are located to the northwest of Taos and the basalt flows thin, from up to 650 feet thick to zero, toward the south and east (Dungan et al., 1984).

The other potential source of the basalt encountered in the boring is the Cerro Negro dacite volcano. This small, Pliocene age dacite shield volcano is situated a few miles northeast of

the property. The Cerro Negro dacite is dark gray to black, extensively fractured, and comprised of two-pyroxene dacite flows and/or shallow intrusions (Rawling, 2005). It is well exposed in the narrow gorge of the Rio Hondo at the Gates of Valdez, where the rock is massive, dark gray to black, and extensively fractured (Rawling, 2005). The basalt encountered in the RG-92910 well boring may be either buried lava flows or sills (Figure 3). The source was either the Cerro Negro dacite volcano or outlying flows of the Servilleta Formation basalts.

Underlying the Servilleta Formation is the Miocene to Pliocene age Chamita Formation, which was originally defined in the Española Basin as the uppermost portion of the Santa Fe Group, which includes middle Miocene to upper Pliocene rift-fill sediments of the Rio Grande Valley in north-central New Mexico (Galusha and Blick, 1971). The lower formations of the Santa Fe Group make up the Miocene-age Tesuque Formation, which has a much greater thickness and lateral extent than does the overlying Chamita Formation. The Tesuque Formation consists of pinkish-tan soft arkosic, silty sandstone with minor conglomerate and siltstone, up to thousands of feet thick (Spiegel and Baldwin, 1963). The Tesuque Formation is subdivided into five members; from upper to lower they are: the Ojo Caliente Member, the Chama-El Rito Member, the Pojoaque Member, the Skull Ridge Member, and the Nambe Member (Galusha and Blick, 1971).

III. SITE HYDROGEOLOGY

The proposed Beau Soleil Subdivision is located on Quaternary alluvial deposits shed from the Sangre de Cristo Mountains to the east of the property. The test well at Beau Soleil, RG-92910, was completed into arkosic sand and gravel sequences and the upper basalt bed of the Servilleta Formation or the Cerro Negro dacite. The alluvial sediments that the upper portion of the well penetrated are comprised of tan and yellow, silty, arkosic sand and gravel, with silty/sandy clay interbeds. The basalt that the bottom of the well is completed into is hard, black, crystalline, and fractured.

Regional groundwater in the vicinity of the property exists primarily within the Quaternary-Tertiary alluvial fan sediments known as the Blueberry Hill deposit, the Servilleta Formation basalts and interbedded sediments, and the Cerro Negro dacite. The alluvial aquifer in the Blueberry Hill Formation is south of the Rio Hondo and east of the Airport fault, and is semi-perched on the Cerro Negro dacite, a massive, crystalline volcanic unit. The Cerro Negro dacite contains localized, productive aquifers in fractured and rubble zones but generally appears to behave as a perching bed for shallow alluvial aquifers. (Johnson, 2009)

The aquifer system is recharged by infiltration of runoff from the Sangre de Cristo and Picuris Mountains through fractures in canyons and at the mountain front. Additionally, recharge from precipitation and irrigation return flows occurs through the arroyos and alluvium of the fan deposits on the land surface.

Site Specific Geology

JHWS oversaw well drilling and completion, analyzed and described the drill cuttings pulled at 10-ft intervals, compiled a lithologic log, and conducted constant rate discharge and water quality testing on well RG-92910 (Figure 6 and Appendix B). The well was drilled and completed to a total depth of 440 feet in late August and early September of 2011 by Fennell Drilling Company of Taos, NM. The ground surface elevation at the wellhead is approximately 7,390 feet above mean sea level (msl). The well was drilled into a dissected Plio-Pleistocene-age alluvial fan surface (Figures 2 and 3). From ground surface to 50 feet bgs, the well was drilled through coarse sand and gravel of the alluvial fan. From 50 feet to 385 feet, poorly sorted, yellow to tan, very fine to coarse sand, gravel, and interbedded silt and clay, interpreted to be alluvial deposits of the Blueberry Hill Formation, were encountered in the boring. Below 385 feet, massive black basalt was encountered, either the upper bed of the Servilleta Formation or from the Cerro Negro Volcanic Complex (Appendix A). A comprehensive local hydrogeologic cross-section, representative of the conditions encountered in the Beau Soleil test well, was available from "Geology and Hydrogeology of the Arroyo Seco Area, Taos County, New Mexico Final Technical Report" by Geoffrey C. Rawling. The cross section is shown in Figure 3 and the location of the line of section, A - A'- A", is shown in Figure 2.

Site Hydrogeologic System

The principal hydrostratigraphic units underlying the property of the proposed Beau Soleil Subdivision are alluvial sand and gravel of the Blueberry Hill Formation and fractured basalt from either the Servilleta Formation or the Cerro Negro Dacite Volcano. The water level in RG-92910 was 306 feet bgs (7,084 feet above msl) upon completion of well development and at commencement of the pumping test.

The aquifer system is recharged by snowmelt and rainfall in the Sangre de Cristo and Picuris Mountains that bound the eastern side of the rift. Rainfall and snow melt percolate through the fractured Precambrian and upper Paleozoic rocks of these mountains and into the sedimentary units filling the rift. Losing reaches of streams draining the Sangre de Cristo Mountains provide additional groundwater recharge. The ultimate discharge point for this water is the Rio Grande. The Rio Grande is a gaining reach from Arroyo Hondo north of Taos to Taos Junction Bridge below the confluence with the Rio Pueblo, indicating that basin-fill sediments in the northern Taos Valley discharge into the Rio Grande (Figure 5).

The regional water table and potentiometric surface beneath and in the near vicinity of the property indicate a west/southwest groundwater flow direction at a gradient of approximately 0.05 ft/ft (Figure 5). A high-transmissivity downward flow area was mapped, based on well records and water level measurements, to the southwest of the property (Drakos, 2004). The alluvial sand and gravel and fractured basalt allow for rapid groundwater movement through the aquifer.

Taos is located within the Rio Pueblo de Taos drainage basin, which drains the Sangre de Cristo Mountains and enters the Rio Grande southwest of the Town of Taos. Groundwater in the vicinity of the property is generally flowing toward the Rio Grande, to the west/southwest, similar to local ground surface topography. The groundwater gradient in the vicinity of the property calculated from the potentiometric surface map is 0.05ft/ft to the west/southwest (Figure 5).

IV. WELL RG-92910 CONSTRUCTION AND DEVELOPMENT

Jim Fennell of Fennell Drilling Company drilled the test well on the proposed Beau Soleil Subdivision by mud rotary method with an 8 ¾-inch tri-cone button bit between August 22 and September 5, 2011. First water was encountered during drilling, in coarse sand and gravel, at approximately 310 - 320 feet bgs. Basalt was encountered from 385 feet bgs to total depth of 440 feet bgs in the boring. Within the 55 feet of fractured basalt drilled, coarse, sub-rounded arkosic sand and gravel was observed in the drill cuttings, indicating interbedded water-bearing alluvial sand layers or lenses, and/or buried channel deposits in the basalt. The mud-rotary drilling method, however, does not allow for accurate determinations of water production in formations during drilling, so an accurate estimate of production from the formations encountered was not established until the well was completed and developed.

Once the total depth of 440 feet had been reached in the well boring, the well was cased with 6 5/8-inch outer diameter, 0.188-inch wall thickness, mild steel pipe. A 10-ft blank section of pipe was installed at the bottom of the casing string as a sump. Above the sump, 100 feet of 0.040-inch perforated pipe was installed in 20-ft sections, from 430 to 330 feet bgs. Above the perforations, 331.65 feet of blank pipe was installed in 20-ft sections from 330 feet bgs to 1.65 feet above ground surface (ags) and the casing was landed at total depth. All joints in the casing were welded securely, with no gaps or holes. Centralizers were installed around the casing throughout and above the perforated section.

The filter pack that was installed, following installation of the well casing, consisted of ¼-inch rounded and washed pea gravel, poured slowly from ground surface. The filter pack was installed from 440 to 40 feet bgs and was surged with a bailer run inside of the well casing during the gravity pour of the gravel to ensure proper settling and no bridging. Prior to installation of the bentonite surface seal, the well was developed to ensure total settling of the filter pack.

The well was developed by air-lifting through the drill pipe, utilizing a 900 cubic feet per minute (cfm), 300 pounds per square inch (psi) compressor. The well was air-lifted for approximately 16 hours over three days, intermittently shutting off the air and allowing the water column to recover. The water level recovered to static very quickly every time that the air was shut off during development. Once it was determined that the gravel pack had not settled during air-lifting, the bentonite surface seal was installed from 40 to 4 feet bgs, allowing room for installation of the pitless adapter at approximately 3 feet bgs.

The 5 horsepower (hp) test pump was installed on September 19, 2011, set on 2 3/8-inch outer diameter drill pipe at 420 feet bgs. A ¾-inch PVC pipe was set from 2.2 feet above ground surface to the pump at 420 feet bgs for the water level monitoring device (sounder). Additional well development was conducted, utilizing the pump, for approximately four hours on September 19, 2011. A free discharge with a fine-thread gate valve was installed from an elbow at the top of the pump column pipe for installation of the weir. The well was allowed to recover prior to conducting the pumping test.

V. WELL RG-92910 PUMPING TEST

Constant Rate Discharge Test

A 48-hour (2880-minute) constant rate discharge test (pumping test) was conducted on RG-92910 once the well was completed, developed, and the water column had recovered. The pumping test was conducted from September 21 to 23, 2011 and commenced at 9:00 on the 21st. The static water level prior to starting the pump was 308.30 feet below the measuring point (bmp) at the top of the ¾-inch PVC pipe installed in the well for the water level meter (sounder). The top of the sounder tube was 2.2 feet ags, yielding a measuring point correction of -2.2 feet. The static water level below ground surface prior to starting the pump, therefore, was 306.1 feet.

The discharge rate from the well was measured using a 3-inch circular orifice weir with a 1-inch orifice. The discharge rate was periodically verified throughout the test by timing the

filling of a 5-gallon bucket. Upon start-up of the pump, the discharge rate was approximately 25 gpm and the gate valve in the discharge line was closed down and adjusted to limit the discharge to 10.5 gpm. The valve was adjusted and opened slowly throughout the 48 hours of pumping to maintain 10.5 gpm. Discharge was clear after the first minute of pumping and averaged 10.5 gpm over the duration of the test. No sediment was detected in the discharge throughout the test. Approximately 10 hours into the pumping test, the generator started missing slightly and smoking (at approximately 620-minutes), but continued to run and power the pump until it was replaced at 650-minutes, with minimal downtime of the pump. The water column did recover somewhat while the generator was being replaced, but drawdown resumed at the same slope as prior to the generator replacement within approximately 100-minutes of restarting the pump and was consistent for the duration of the test, another 38 hours (Appendix B).

Water levels in the pumping well were measured manually to the nearest 0.01 ft using an electronic water level monitoring device. Upon starting the pump at the beginning of the drawdown phase of the test and upon shutting off the pump at the beginning of the recovery phase of the test, the water column dropped and rose sharply, in a manner reflective of a wave passing through the well across the top of the water table, before stabilizing. This observed effect is mirrored in the drawdown and recovery plots, one inverse to the other. No boundary effects were observed in the drawdown or recovery data. Drawdown and recovery data and plots are contained in Appendix B.

Pumping Well, RG-92910

DRAWDOWN DATA

The pumping test was run for 2880-minutes. Maximum drawdown measured in the well once the discharge rate was stabilized at 10.5 gpm was 13.57 feet. Casing storage was calculated using the Schafer (1978) modified Papadopulus-Cooper equation (Driscoll, 1986) and was negligible after approximately 19 minutes of pumping, at 10.23 feet of drawdown (see Appendix B and Table 1, below).

Drawdown data from RG-92910 were plotted on semi-log scales and analyzed using the Cooper-Jacob method to determine aquifer transmissivity (T) and hydraulic conductivity (K). Pumping well drawdown data exhibit one distinct slope, after casing storage effects. A transmissivity value of approximately 2,772 gpd/ft (371 ft^2/day) was calculated from the average of drawdown data. The maximum drawdown for the test was 13.57 feet, to a water level of 321.87 feet bmp. The total discharge from the well during the 48-hour pumping test was approximately 30,240 gallons, or 0.09 acre-feet.

Hydraulic conductivity (K) was calculated using an aquifer thickness (b) of 100 feet, based on the perforated interval in the well and a conservative quantification of the producing alluvium and fractured basalt encountered in the boring (Table 1). Based on an average of drawdown and recovery data, K at the Beau Soleil site is approximately 6.49 ft/day. This value of hydraulic conductivity is in the same range as other wells completed into the unconfined alluvial aquifer nearby (Drakos, 2004). There was no nearby well that was not in production on a daily basis to employ as an observation well for this test; therefore, storativity (S) could not be calculated from this pumping test. Storage coefficients for unconfined aquifers range from 0.01 to 0.30 (Sterrett, 2007). Data from a pumping test with an observation well on the nearby Quail Ridge unconfined alluvial well yielded a storage coefficient of 0.012 (Drakos, 2004). A conservative value of 0.01 is used for the storage coefficient (S) in the following calculations and modeling.

SPECIFIC CAPACITY

Specific capacity of the well (in gallons per minute per foot of drawdown) stabilized at 0.8 gpm/ft at 150 minutes, or 12.67 feet of drawdown, and remained relatively constant throughout the duration of the test.

RECOVERY DATA

Recovery water levels were measured directly following shut off of the pump for 150 minutes, until 11:30 on September 23, 2011. The water level had recovered to 308.39 feet

bmp, or 0.09 feet below the original static water level measured prior to the start of the pumping test. Transmissivity calculated from the recovery data using the Cooper-Jacob straight-line methodology is 6,930 gpd/ft (927 ft^2/day). The transmissivity calculated from recovery data is approximately 2.5 times that of the drawdown data. This is likely due to well inefficiency observed during the drawdown phase of the pumping test. The recovery data is more representative of the natural aquifer conditions beneath the property than the drawdown data. However, to be conservative, the average of transmissivity values derived from both the drawdown and the recovery data, 4,851gpd/ft (649 ft^2/day) is used in the following calculations and modeling. Based on the data collected from well development and the pumping test, the well can produce at a higher pumping rate than 10.5 gpm without significantly greater drawdown.

Table 1. Summary of aquifer characteristics derived from RG-92910 pumping test data.

Test Phase	Time Period (min.)	Analytical Method	T (gpd/ft)	T (ft^2/day)	K* (ft/day)
Pumping Well Drawdown	0 - 2880	Cooper-Jacob	2772	371	3.71
Pumping Well Recovery	2880 -3030	Cooper-Jacob	6930	927	9.27
Average (drawdown & recovery):			**4851**	**649**	**6.49**

* K calculated using a saturated aquifer thickness (b) of 100'

VI. WATER USE, WATER AVAILABILITY, AND MODELING

Current Water Use Within 1,000 feet

There are currently four wells within 1,000 feet of the proposed Beau Soleil Subdivision boundaries, according to NMOSE records. Three of the wells have well records on file with the NMOSE (see Appendix A and Table 2, below); RG-56130 does not have a well record on file with the NMOSE.

One significant surface water feature, the Mariposa Ditch, exists within 1,000 feet of the property boundaries. This feature is located to the northwest of the property, hydrologically up gradient from the proposed groundwater diversion that will supply the proposed Beau Soleil Subdivision. Due to the up gradient location of this feature, the 300-ft depth to groundwater, and the relatively low annual diversion proposed, it is very unlikely that the Mariposa Ditch will be impacted from the groundwater diversion proposed at Beau Soleil.

Table 2. Wells within 1,000 feet of proposed Beau Soleil property boundaries.

NMOSE Permit Number	Owner	Diversion (afa)	Total Depth (feet bgs)	Depth to Water (feet bgs)	Distance from RG-92910 and Bearing/ Distance from Property Boundary (feet)
RG-69936	George Bornstein	3	610	320	4290' NW / 344'
RG-56130	Dale Jenssen	3	?	?	4871' SW / 587'
RG-88383	Michael Yaccino	1	480	267	1381' NE / 649'
RG-88425	Roger Eiteljorg	1	420	178	1382' NE / 650'

Proposed Beau Soleil Subdivision Water Use

The proposed Beau Soleil Subdivision, if fully developed, will consist of 35 lots, each one limited to 0.5 afa of water use. The maximum diversion for the proposed subdivision will be 17.5 afa, or a constant single pumping rate of 10.8 gpm if the subdivision wells are pumped at full demand, with each lot diverting its maximum allowable use of 0.5 afa per lot. The following calculations were made conservatively, using a single point of diversion pumping at the full subdivision demand.

Analytical Modeling

Projected Drawdowns

The projected drawdown due to pumping the proposed Beau Soleil Subdivision at full development was modeled using the Theis analytical model. The NMOSE TH96S program was employed to analyze drawdowns in the pumping well, RG-92910, at full subdivision demand, 17.5 afa or 10.8 gpm, and the four wells of other ownership within 1,000 feet, pumping at their maximum allowable diversions (see Appendix C). The model was set up using RG-92910 as the pumping center for the entire subdivision demand at 10.8 gpm. The value of transmissivity used in the model, 4,851 gpd/ft, was conservatively based on the average between the drawdown and recovery data acquired from the 48-hour pumping test on RG-92910 on the proposed Beau Soleil Subdivision.

The four wells currently in use within 1,000 feet of the property boundaries listed in Table 2 range from 1,381 to 4,871 feet in distance from the pumping well RG-92910. In order to be conservative and procure results from the Theis model that will represent the subdivision at full development with the 17.5 afa diversion spread across the property, the distances to the wells from the property boundaries, 344 to 649 feet, were input into the model. The diversion rates input for the wells currently in use were based on NMOSE permits. For a permitted diversion of 3.0 afa, 1.9gpm was input into the model, and for 1.0 afa, 0.6 gpm was input.

The Theis model projects a drawdown at the pumping well, RG-92910, of 6.99 feet after 50 years. The drawdowns projected at the four wells currently in use, from nearest to farthest from the property boundaries, are: 4.36 feet, 4.18 feet, 3.95 feet, and 3.92 feet (Appendix C).

Streamflow Effects

The nearest stream systems to the proposed Beau Soleil Subdivision property are the Arroyo Seco (1.5 miles SW), the Rio Hondo (2 miles N), and the Rio Grande (5.75 miles W). The Arroyo Seco is generally dry; therefore effects on it were not calculated in the Glover-Balmer

model. The Rio Hondo lies about 2 miles up gradient from the property and depletion effects on it are unlikely, so effects on it were not calculated in the model. The Rio Grande is perennial and down gradient from the property at a distance of approximately 5.75 miles and all depletion effects will ultimately be felt on the Rio Grande. The Glover-Balmer model was utilized to calculate 50-year stream depletion effects on the Rio Grande. The model results indicate that pumping the full subdivision demand of 17.5 afa at the proposed Beau Soleil Subdivision, projected for the next 50 years, will result in 11.37 afa, or 65%, stream depletion effects per year on the Rio Grande after 50 years of pumping the full subdivision demand (see Appendix D).

In order to be conservative and assess depletion effects on the Arroyo Seco and the Rio Hondo, in addition to the Rio Grande, a ratio can be employed based on distance to each of the streams. If it is assumed that the full subdivision demand of 17.5 afa comes from the stream systems, then it can be divided between the Arroyo Seco and the Rio Hondo, which will ultimately result in depletions on the Rio Grande. Based on their distances from the test well, 1.5 miles to the Arroyo Seco and 2.0 miles to the Rio Hondo, the percentage of depletions on the stream systems will be 57%, or 10.0 afa, on the Arroyo Seco and 43%, or 7.5 afa, on the Rio Hondo.

Lowest Practical Pumping Water Level

In well RG-92910, completed into the alluvial aquifer and basalt beneath the Beau Soleil Subdivision, the lowest practical pumping water level may be defined by a maximum allowable drawdown equal to 70% of the initial water column based on Taos County Subdivision Regulations Appendix A, Section 1B.4. The initial water column is 134 feet (440-ft total depth, less 306-ft static water level). The maximum allowable drawdown, 70% of the initial 134-ft water column, is equal to 94 feet. The allowable drawdown shall be reduced by a factor of 20% to take into account drought, pump setting and well inefficiencies, equal to 27 feet. The result is a maximum allowable drawdown of 67 feet in the well, or 373 feet bgs for the lowest practical pumping water level. There is sufficient

water column in the test well to absorb the Theis model predicted drawdown of 6.13 feet and support pumping at full subdivision demand, 17.5 afa total, for 50 years.

VII. HISTORIC WATER LEVEL DATA

A water level was obtained from a well east/northeast of RG-92910 known as the "Old Mariposa Ranch Well". The NMOSE permit number of this well is unknown. A water level was measured in this well on July 24, 1995 at 295 feet bgs, or 7,110 feet above msl (Rawling, 2005). The total well depth is estimated at 700 feet bgs and screened intervals are unknown. The water level in the well was measured by JHWS on November 3, 2011 at 286.16 feet bgs, or 7,118.84 feet above msl. These data indicate that the water level has risen 8.84 feet in the past 16 years, at a rate of approximately 0.55 feet per year.

Historic water level data are available for a USGS groundwater monitoring well, site number 362246105395801, located southwest of the property at 25N.12E.21.434 (Township 25 North, Range 12 East, Section 21, SE ¼, SW ¼, SE ¼) in Taos County, New Mexico Latitude 36°21'52.7", Longitude 105°47'57.1" NAD83. The ground surface elevation at the wellhead is 6,870 feet above msl. The total depth of the well is 530 feet bgs. This well is completed into alluvium (USGS, 2011). The well was monitored for 21 years, from 1983 to 2004 (see Appendix E). The first data point in 1983 appears to be erroneous or representative of an abnormally high water table at 16 feet bgs. From 1988 to 1993 water level data indicate fluctuations up and down between 35 and 40 feet bgs without a consistent pattern. In 1988 the water level was measured at 40.40 feet bgs. Ten years later, in 1998, the water level had risen to 37.38 bgs and began to exhibit a consistent trend of decline that continued until 2004, at which point the water level was measured at 38.62 feet bgs. In the 6 years between 1998 and 2004 the water level in the well declined 1.24 feet, at a rate of approximately 0.21 feet per year. This is the most conservative available data for determining historic water level declines in the shallow alluvial aquifers in the Taos Valley.

At a rate of 0.2 feet per year of decline, the water levels in the proposed subdivision wells

will decline 10 feet over the next 50 years. The 134-ft water column in the well is sufficient to absorb the Theis model predicted drawdown of 6.13 feet, plus the anticipated water level decline of 10 feet based on historic water level data, for a total of 16.13 feet, or 12% of the total water column, and still be well within acceptable maximum allowable drawdown limits (less than 50%) according to Taos County Regulations.

VIII. ADDITIONAL WELLS ON PROPOSED BEAU SOLEIL SUBDIVISION

Based on data collected from the test well on the proposed Beau Soleil Subdivision and presented in this report, the additional wells required on the subdivision for full development, if completed properly in a similar manner to the test well, will produce sufficient water to supply the demands of up to six lots per well, with one home and one guesthouse per lot. For homes with conservative plumbing fixtures and water saving appliances, a water requirement of 60 gallons per capita day can be assumed for normal household uses and an average occupancy rate of 3 occupants per household is reasonable for calculation purposes (Wilson, 1996). The result is a water demand of 180 gallons per day per household, or a conservatively high maximum estimate of 360 gallons per day per lot with a fully occupied main home and guesthouse, which is not common. Over one year, that is 0.4 afa, 20% below the proposed maximum use per lot of 0.5 afa. The proposed water supply plan will allow for wells to serve anywhere from one to six lots. The maximum projected demand per well, therefore, is 2,160 gallons per day with six lots per well. Over one year, that equals 2.4 afa, 20% below the NMOSE allowable diversion per well of 3.0 afa.

At pumping rates of 10.5 gpm or greater, the wells will need to pump for 206 minutes per day (14% of the time), or less, to supply the maximum potential demands on each well. In order to have enough water to supply peak demands, such as in the mornings or evenings, and to prevent premature pump failures due to pumps cycling on and off continuously, installation of pressure tanks at each wellhead will be recommended.

IX. WELL RG-92910 WATER QUALITY

Samples were collected for water quality analysis after 2860 minutes of pumping at 10.5 gpm during the pumping test (at 8:40 on September 23, 2011). Samples were placed on ice and delivered to Hall Environmental Analysis Laboratories (HEAL) in Albuquerque, NM for analyses. Water quality results are summarized in Table 4, below, and complete laboratory reports are contained in Appendix F.

All primary constituents analyzed for were below U.S. Environmental Protection Agency (EPA) and New Mexico Water Quality Control Commission (NMWQCC) primary (health-related) Maximum Contaminant Levels (MCLs). All secondary constituents analyzed for were below EPA secondary (aesthetic) MCLs.

Table 4. Water quality analytical results for RG-92910.

Parameter	Analytical Result	EPA Standard	Units
pH	8.02	6.5 - 8.5*	s.u.
Conductivity	450	none	umhos/cm
TDS	269	500*	mg/l
Alkalinity	190	none	mg/l
Hardness	170	250*	mg/l
Color	10	15 *	C.U.
Odor	<1	3*	T.O.N.
Surfactants	<0.05	0.5*	mg/l
Turbidity	2.1	5*	N.T.U.
Cyanide	<0.01	0.2	mg/l
OH	<2.0	none	mg/l
CO3	<2.0	none	mg/l
HCO3	190	none	mg/l
Cl	6.8	250*	mg/l
F	0.44	4	mg/l
Nitrate (Nitrate+Nitrite)	1.3	10	mg/l
Sulfate	35	250*	mg/l
Ca	52	none	mg/l
Na	27	100*	mg/l
K	1.7	none	mg/l
Mg	11	none	mg/l
Al	<0.02	.05-.2*	mg/l
Sb	<0.001	0.006	mg/l
As	<0.001	0.01	mg/l
Ba	<0.05	2	mg/l
Be	<0.002	0.004	mg/l
Cd	<0.002	0.005	mg/l
Cr	<0.006	0.1	mg/l
Cu	<0.006	1	mg/l
Fe	0.065	0.3*	mg/l
Pb	<0.005	0.015	mg/l
U	0.02	0.03	mg/l
Mn	0.012	0.05*	mg/l
Hg	<0.0002	0.002	mg/l
Ni	<0.01	0.1	mg/l
Se	0.0018	0.05	mg/l
Ag	<0.005	0.1*	mg/l
Tl	<0.001	0.002	mg/l
Zn	0.071	5.0*	mg/l

Objects in bold are above EPA Drinking Water Standards.

Notes: *secondary (aesthetic) standard, all others are primary (health related) EPA drinking water standards.

X. SUMMARY AND CONCLUSIONS

1. The proposed Type IV Beau Soleil Subdivision consists of 35 lots, each 10 acres or greater, and two common areas, on a total of 400 acres.
2. Covenants will limit water use to a maximum of 0.5 afa per lot. The total demand at full development of the proposed subdivision will be 17.5 afa.
3. Groundwater available beneath the proposed Beau Soleil Subdivision is more than sufficient in quantity and quality to meet the proposed subdivision demands.
4. The pumping test and analytical model results indicate that the aquifer beneath the property is capable of producing sufficient water to support the proposed subdivision at full demand for 50 years.
5. The pumping test data indicate that there were no hydrologic boundaries encountered during the test and that the aquifer penetrated by the test well has no significant barriers to groundwater flow in the near vicinity.
6. The test well on site at the proposed Beau Soleil Subdivision is completed to a total depth of 440 feet into unconfined alluvial deposits and fractured basalt with a static water level of 306 feet bgs.
7. The 2880-minute specific capacity in Well 5 is 0.8 gpm/ft at a production rate of 10.5 gpm, average transmissivity is 4851 gpd/ft (649 ft^2/day), and average hydraulic conductivity is 6.49 ft/day, based on aquifer thickness of 100 feet penetrated by the completed well.
8. Water quality analyses were performed and no primary or secondary EPA or NMWQCC MCL's are exceeded in Well RG-92910 discharge.
9. Long-term water level trends from the USGS groundwater monitoring well, site number 362246105395801, located southwest of the property, indicate a decline of approximately 0.21 feet/year, which the Beau Soleil test well is capable of absorbing over the next 50 years with ample water column still available.

XI. REFERENCES

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FIGURES

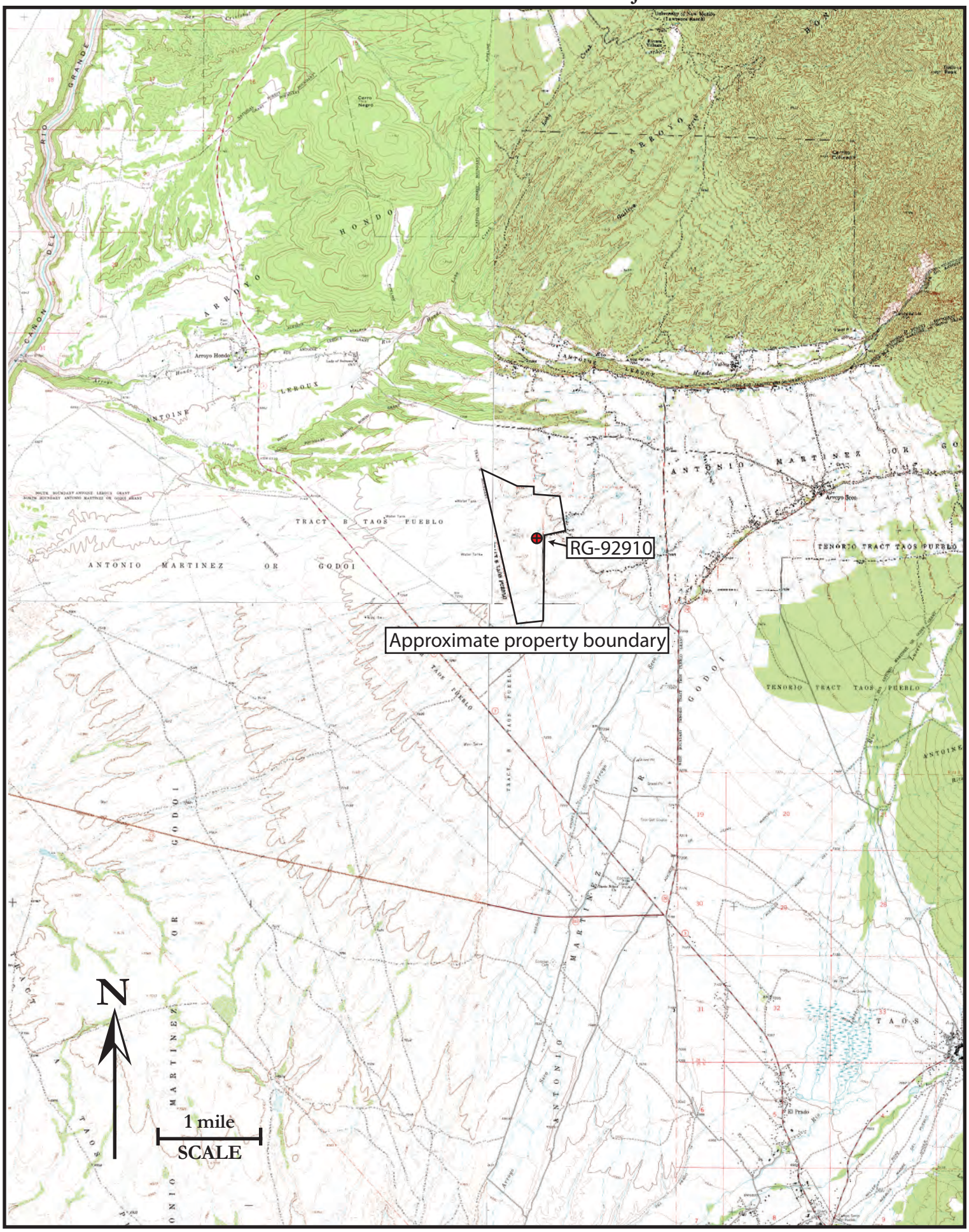
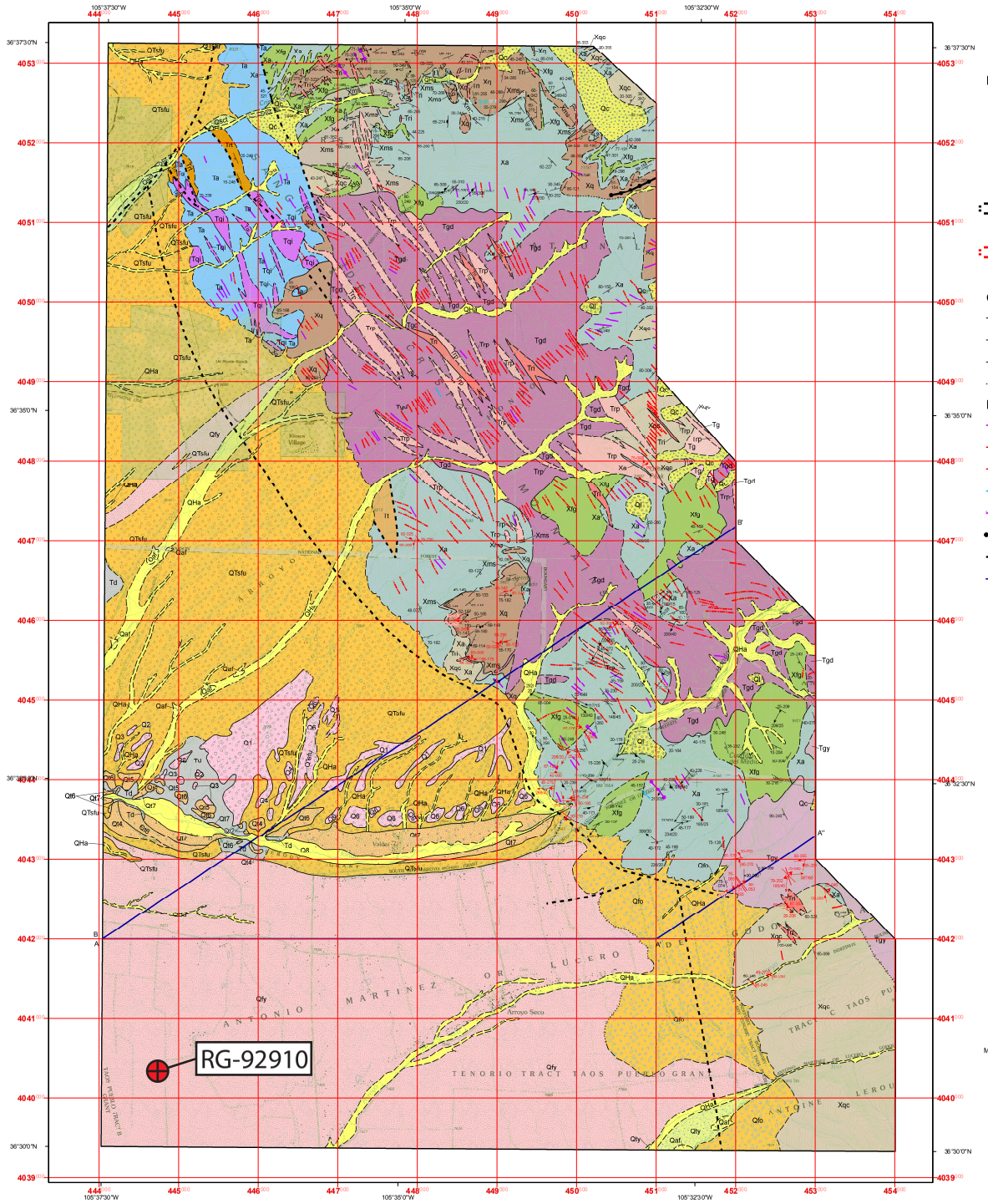


FIGURE 1. Site location of Test Well, RG-92910, and proposed Beau Soleil Subdivision.



· Geologic Map of a portion of the Arroyo Seco 7.5 - minute Quadrangle
by
Geoffrey C. Rawling

July 2005

1:24,000

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

FIGURE 2. Geologic map with line of cross section A - A' - A" (Rawling, 2005) and RG-92910 well location identified.

APPENDIX I. DESCRIPTIONS OF GEOLOGIC MAP UNITS

Note: LR indicates description from or adapted from Lipman and Reed (1989).

Quaternary Surficial Deposits

QHa, Q8 - Arroyo alluvium, undivided (Holocene to Historic) – Units are equivalent. Gravel and poorly to moderately sorted fine- to coarse-grained sand in active drainages. Bar and swale topography is well developed. Soils are very weakly developed.

Qc – Colluvium (Pleistocene to Holocene) - Poorly lithified and stratified bouldery to sandy colluvium that obscures underlying bedrock. Exists in steep drainages within the Sange de Cristo Mountains.

Ql – Landslide deposits (Pleistocene to Holocene) - Lobate accumulations of poorly sorted soil and rock debris on slopes marked by hummocky topography and downslope-facing scarps. Derived from bedrock and glacial deposits, and includes small earthflow, block-slump, and block-slide deposits (LR).

Qaf - Alluvial fans – (Pleistocene to Holocene) – moderately to poorly sorted clay, silt, sand and gravel in low relief fans at the mouths of small tributary drainages.

Qty – Young stream terrace deposits – (Pleistocene to Holocene) – Poorly sorted silt, sand, pebbles, and boulders in low terraces along the Rio Lucero. Equivalent to unit Qt6 of Kelson (1986). (Unit description adapted from Bauer et al. (2001))

Qt6, 7 – Fluvial terraces - (late (?) Pleistocene) – Strath terrace treads along the Rio Hondo valley eroded on older Santa Fe Group sediments. Thin deposits composed of veneers of sand and gravel.

Q6 – Undifferentiated alluvial fan and/or valley side-slope surface – (late (?) Pleistocene) – Deposits mantling older Santa Fe Group sediments. Composed of sand and gravel up to a few meters thick.

Qsct – Stream terrace deposits along San Cristobal Creek - (middle to early (?) Pleistocene) - Poorly sorted silt, sand, pebbles, and boulders in low terraces along San Cristobal Creek. Appear to be higher in elevation and more stabilized by vegetation than similar deposits along the Rio Lucero. Surface commonly disturbed by development.

Qt5, 4 – Fluvial terraces - (middle (?) Pleistocene) – Strath terrace treads along the Rio Hondo valley eroded on older Santa Fe Group sediments. Thin deposits composed of veneers of sand and gravel.

Q4, 3 – Undifferentiated alluvial fan and/or valley side-slope surfaces – (middle to early (?) Pleistocene) – Deposits mantling older Santa Fe Group sediments. Composed of sand and gravel up to a few meters thick.

Qt2 – Fluvial terraces - (middle to early (?) Pleistocene) – Strath terrace treads along the Rio Hondo valley eroded on older Santa Fe Group sediments. Thin deposits composed of veneers of sand and gravel.

Q2 – Undifferentiated alluvial fan and/or valley side-slope surface – (middle to early (?) Pleistocene) – Deposits mantling older Santa Fe Group sediments. Composed of sand and gravel up to a few meters thick.

Q1,Qfy – Highest extensive geomorphic surface and associated piedmont deposits (early Pleistocene) – Units are probably equivalent. Deposits mantle older Santa Fe

Group sediments. Composed of sand and gravel probably up to several meters thick south of the Rio Hondo.

Qfo – Older piedmont and fan deposits (earliest (?) Pleistocene) – Dissected piedmont and alluvial fan deposits along mountain front in the El Salto area. Field relations with Qtsfu are uncertain.

Quaternary and Tertiary Sedimentary Rocks

QTsfu – undivided Santa Fe Group sediments – (late Tertiary to Pleistocene (?)) – Well-stratified clay, sand, and gravel deposited by streams and in alluvial fans. Probably includes Blueberry Hill deposits of (Bauer et al., 2001). See sections IID and E for more detailed description.

Tertiary Igneous Rocks

Td – Cerro Negro dacite – (late Miocene) – Dark gray to black, extensively fractured two-pyroxene dacite flows and/or shallow intrusions. Age is 5.7 Ma (McIntosh et al., 2004).

Tgy – Lucero Peak Pluton – (Miocene) - White to pale pink, medium- to coarse-grained, equigranular granite to quartz monzonite.

Tg - Biotite granite – (Oligocene) – Granitic roof phase of the Rio Hondo pluton emplaced in the Questa caldera at about 26 Ma, during volcanism and caldera formation. Medium-grained and equigranular, with sparse aplite and no hornblende (LR).

Tgd – Rio Hondo Pluton (Oligocene) – White to pale grayish-orange, medium- to fine-grained, massive to locally foliated granodiorite. White to pale orange, aphanitic-porphyritic border facies has quartz phenocrysts and local breccia. Has potassium feldspar phenocrysts up to 4 cm in size. Generally forms rounded outcrops with abundant grus.

Ta – Andesitic lava flows – (Oligocene) – Purplish-gray to gray, aphanitic to porphyritic andesite lava flows and flow breccias, with minor interbedded volcaniclastic sediments. Phenocrysts include plagioclase and hornblende.

Tqi – Latite and quartz latite – (Miocene and Oligocene) - Light tan to gray latite and quartz latite, often stained rust brown, with 15-30% phenocrysts of sanidine, pyroxene and/or hornblende, sparse quartz, and altered cubes of pyrite. Plagioclase phenocrysts to several centimeters in length are present. Occurs as dikes up to 20 m wide and elongate intrusive masses north of the Lawrence Ranch.

Trp – Porphyritic rhyolite - (Miocene and Oligocene) - White to light tan to light gray porphyritic rhyolite typically containing 5-20% phenocrysts of quartz, sandine, and sparse plagioclase and biotite. Occurs as dikes 1-10 m wide and local irregular and shallow intrusions (LR). Generally only observed as float.

Tri – Aphanitic rhyolite –(Miocene and Oligocene) – Aphanitic to sparsely porphyritic rhyolite, otherwise similar to Trp.

Tapi – Porphyritic andesite and dacite – (Miocene and Oligocene) – Fine-grained dark gray aphanitic and porphyritic andesite and minor basalt. Where present, phenocrysts include hornblende, plagioclase, biotite, and little or no quartz or sanidine.

Tqk – Potassium feldspar quartz latite – (Miocene and Oligocene) – Coarsely porphyritic, light-gray quartz latite containing potassium feldspar phenocrysts as long as 5 cm (LR).

Trt - Amalia Tuff - (Oligocene) – Pinkish-red, welded rhyolite tuff with fiamme to 5 cm in length. Contains abundant phenocrysts of quartz and sanidine, and volcanic lithic fragments.

Tt – Tuff of Tetilla Peak – (Oligocene) – Quartz-rich, light-colored, weakly welded, rhyolitic ash-flow tuff containing abundant small volcanic fragments. Contains 10-30% phenocrysts of quartz, sanidine, plagioclase and sparse chloritized biotite. Lithic fragments mostly andesite and quartz-bearing rhyolite (LR).

Proterozoic Igneous and Metamorphic Rocks

Xd – Diabase – (early Paleozoic or late Proterozoic(?)) – Nonfoliated, dark gray-green, medium- to fine-grained rocks with well preserved ophitic texture (LR).

Xqc – Quartz monzonite of Columbine Creek (early Proterozoic) - White to gray to pale tan, moderately to strongly foliated quartz monzonite. Recrystallized to sugary textured, non foliated rock near Tertiary plutons. Age is 1730 Ma (Lipman and Reed, 1989).

Xq – Quartzite (early Proterozoic) - White to gray, massive, vitreous quartzite with crossbeds defined by heavy mineral concentrations. Pervasively fractured into decimeter-scale, angular lozenges by joints, irregular fractures, and bedding.

Xms - Biotite muscovite schist and gneiss – (early Proterozoic) – Medium- to coarse-grained, thinly layered to massive, lustrous quartz mica schist and gneiss. Commonly contains sillimanite. Locally contains garnet, andalusite and cordierite (LR).

Xfg – Felsic gneiss (early Proterozoic) - Pale gray to orange-brown, micaceous, weakly to moderately foliated, quartzofeldspathic gneiss locally grading to micaceous quartzite. Commonly interlayered with amphibolite and amphibole gneiss.

Xa – Amphibolite (early Proterozoic) - Thinly layered to massive, fine- to coarse-grained, medium green to dark green to black amphibolite and amphibole gneiss. Locally contains calc-silicate gneiss, biotite-hornblende gneiss, felsic gneiss, and muscovite biotite schist (LR).

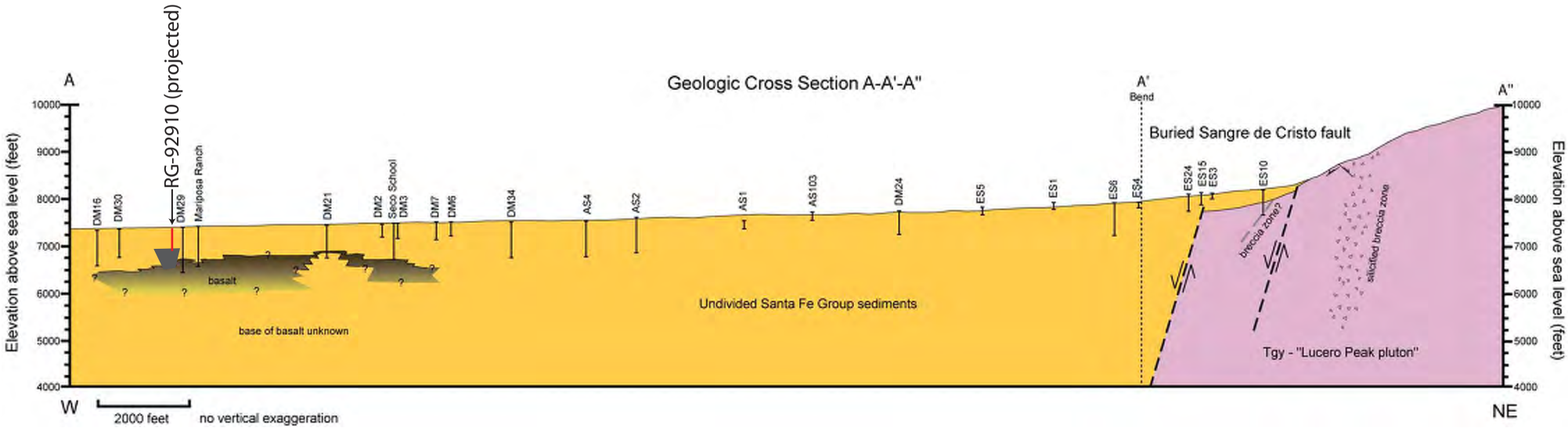


FIGURE 3. Geologic cross section A - A' - A" (Rawling, 2005) with projected location of well RG-92910 and revised depth to basalt.

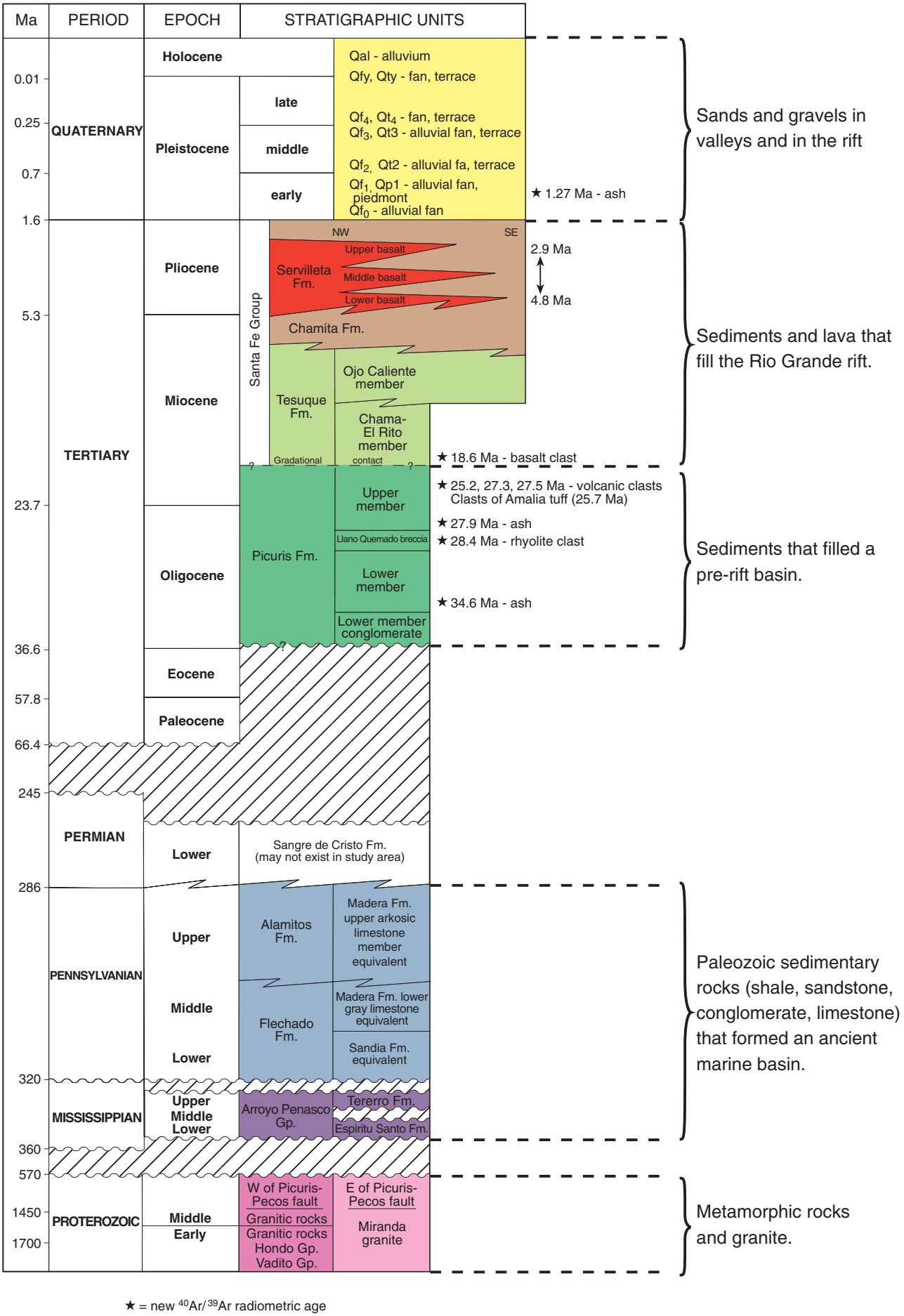


FIGURE 4. Straigraphic chart for the Taos area, New Mexico (Bauer et al., 1999)

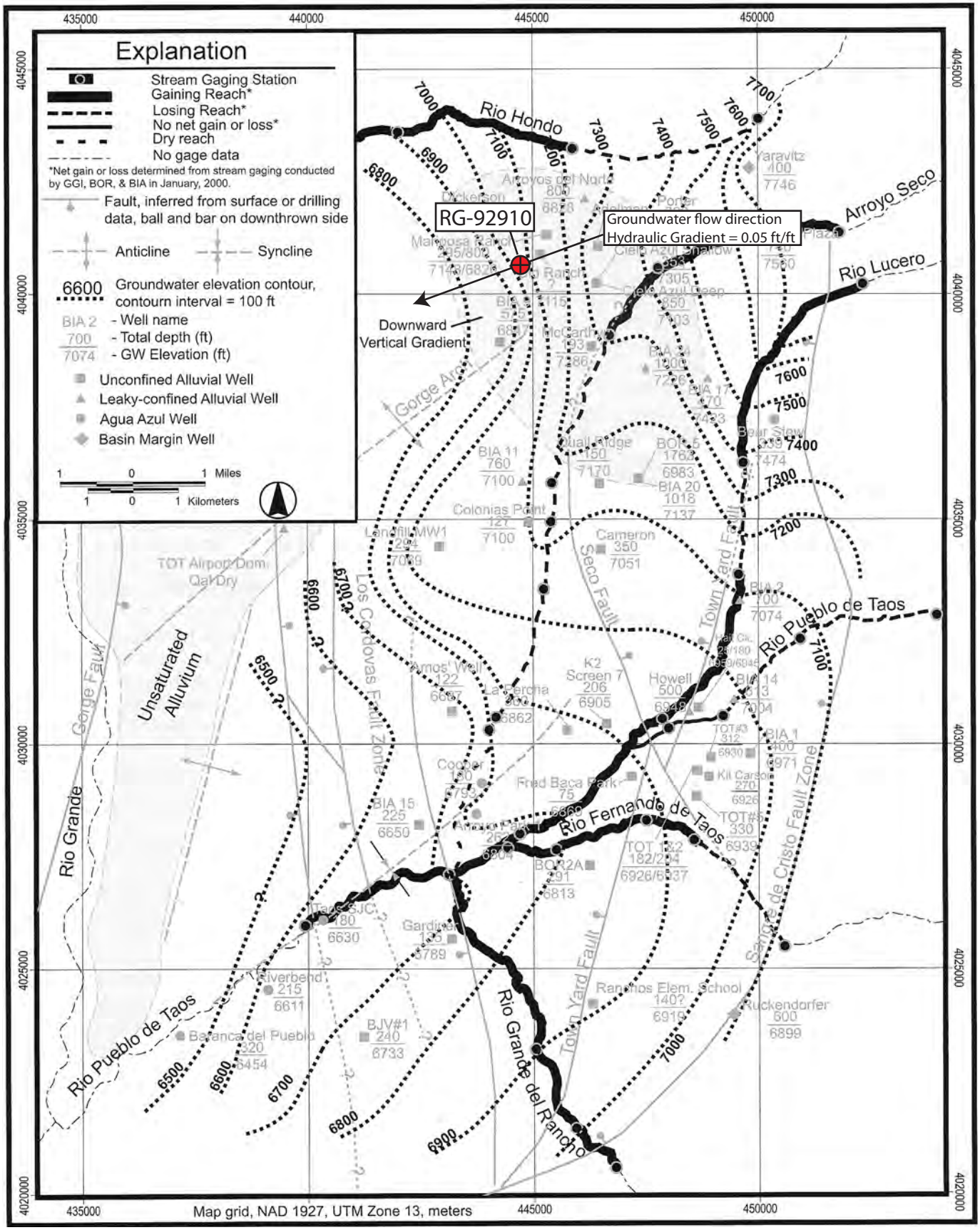


FIGURE 5. Potentiometric surface map of the Taos Valley shallow alluvial aquifer with gaining and losing stream reaches. (Drakos et al, 2004a) RG-92910 well location, groundwater flow direction in vicinity of the property, and hydraulic gradient identified.

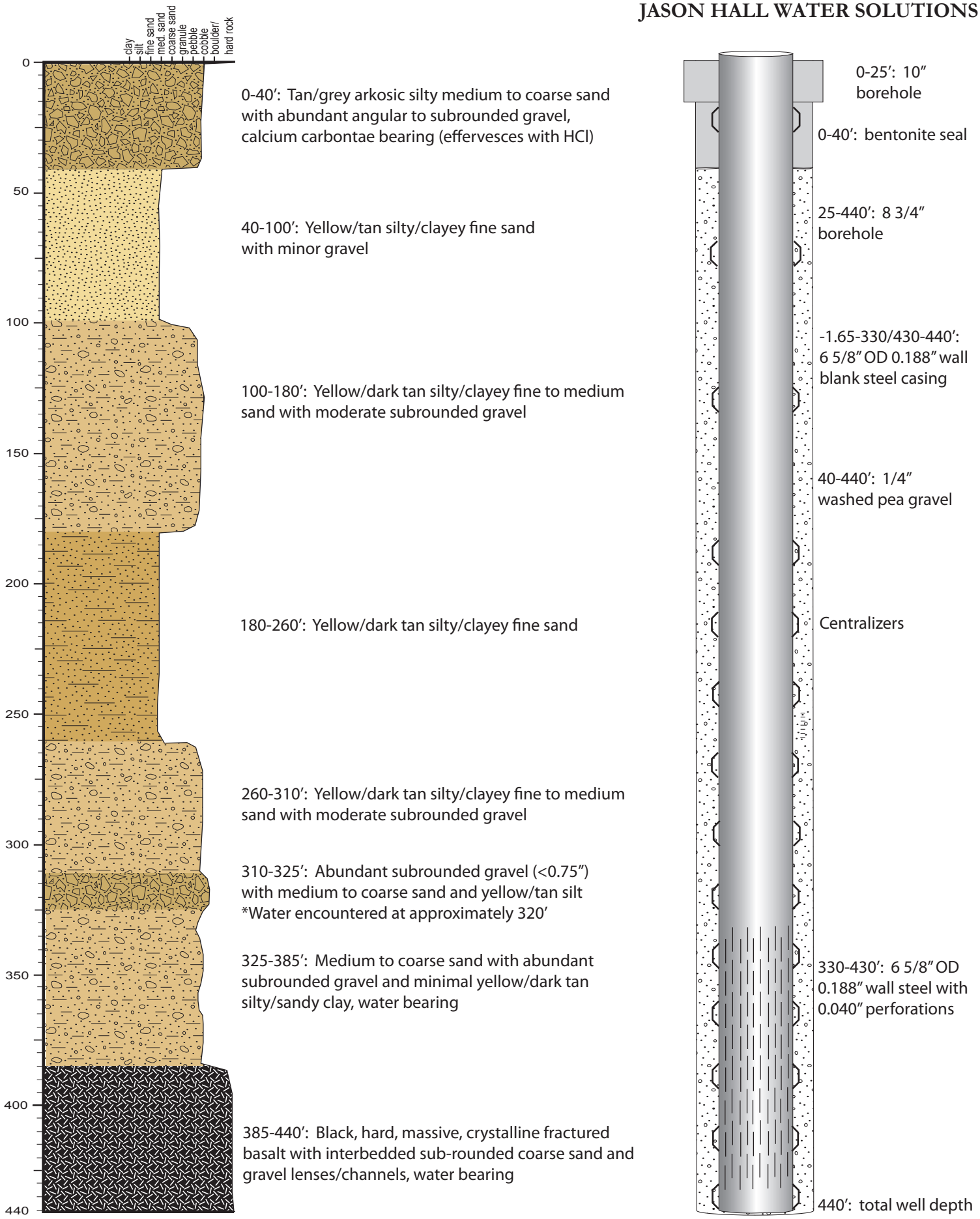


Figure 6. Lithologic log and schematic well completion diagram for RG-92910

APPENDIX A:

NMOSE Well Records:

On-Site Well RG-92910 and Wells Within 1,000 feet of Property

WELL RECORD & LOG

OFFICE OF THE STATE ENGINEER

www.ose.state.nm.us

RECEIVED
OFFICE OF STATE ENGINEER
SANTA FE NEW MEXICO
DATE 10/3/11

1. GENERAL AND WELL LOCATION

POD NUMBER (WELL NUMBER)	OSE FILE NUMBER(S)
RG 92910	RG 92910
WELL OWNER NAME(S)	PHONE (OPTIONAL)
Jerome De Bontin	
WELL OWNER MAILING ADDRESS	CITY / STATE / ZIP
PO Box 1499	Ranchos de Taos / NM / 87557

WELL LOCATION (FROM GPS)		DEGREES	MINUTES	SECONDS	
	LATITUDE	36	30	35.80	N
	LONGITUDE	105	37	0.40	W

* ACCURACY REQUIRED: ONE TENTH OF A SECOND
* DATUM REQUIRED: WGS 84

DESCRIPTION RELATING WELL LOCATION TO STREET ADDRESS AND COMMON LANDMARKS: Mariposa Ranch

2. OPTIONAL

(2.5 ACRE)	(10 ACRE)	(40 ACRE)	(160 ACRE)	SECTION	TOWNSHIP	RANGE
¼	¼	¼	¼		☐ NORTH ☐ SOUTH	☐ EAST ☐ WEST

SUBDIVISION NAME	LOT NUMBER	BLOCK NUMBER	UNIT/TRACT

HYDROGRAPHIC SURVEY	MAP NUMBER	TRACT NUMBER

3. DRILLING INFORMATION

LICENSE NUMBER	NAME OF LICENSED DRILLER	NAME OF WELL DRILLING COMPANY
WD 987	Jim Fennell	Fennell Drilling Co.

DRILLING STARTED	DRILLING ENDED	DEPTH OF COMPLETED WELL (FT)	BORE HOLE DEPTH (FT)	DEPTH WATER FIRST ENCOUNTERED (FT)
8/22/2011	9/5/2011	440	440	321

COMPLETED WELL IS: ☐ ARTESIAN ☐ DRY HOLE ☑ SHALLOW (UNCONFINED)

STATIC WATER LEVEL IN COMPLETED WELL (FT): 306

DRILLING FLUID: ☐ AIR ☑ MUD ☐ ADDITIVES – SPECIFY:

DRILLING METHOD: ☑ ROTARY ☐ HAMMER ☐ CABLE TOOL ☐ OTHER – SPECIFY:

DEPTH (FT) FROM	DEPTH (FT) TO	BORE HOLE DIA. (IN)	CASING MATERIAL	CONNECTION TYPE (CASING)	INSIDE DIA. CASING (IN)	CASING WALL THICKNESS (IN)	SLOT SIZE (IN)
0	25	10	steel	weld	6.125	0.188	
25	440	8 3/4	steel	weld	6.125	0.188	
330	430	8 3/4	perforated steel	weld	6.125	0.188	0.040

4. WATER BEARING STRATA

DEPTH (FT) FROM	DEPTH (FT) TO	THICKNESS (FT)	FORMATION DESCRIPTION OF PRINCIPAL WATER-BEARING STRATA (INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES)	YIELD (GPM)
309	325	16	sand & gravel 3/4 down	5
325	355	30	gravel 1/4 to 1/2 with .30 to .250 thousands sand & gravel	5
355	385	30	1/4 to 1/2 gravel with .30 to .250 thousands sand & gravel	5
385	440	55	fractured basalt	3

METHOD USED TO ESTIMATE YIELD OF WATER-BEARING STRATA	TOTAL ESTIMATED WELL YIELD (GPM)
5 horsepower pump	18

FOR OSE INTERNAL USE — WELL RECORD & LOG (Version 6/9/08)

FILE NUMBER	POD NUMBER	TRN NUMBER
LOCATION		PAGE 1 OF 2

5. SEAL AND PUMP

TYPE OF PUMP: ☐ SUBMERSIBLE ☐ JET ☑ NO PUMP – WELL NOT EQUIPPED ☐ TURBINE ☐ CYLINDER ☐ OTHER – SPECIFY:

ANNULAR SEAL AND GRAVEL PACK	DEPTH (FT) FROM	DEPTH (FT) TO	BORE HOLE DIA. (IN)	MATERIAL TYPE AND SIZE	AMOUNT (CUBIC FT)	METHOD OF PLACEMENT
	40	440	8 3/4	1/4 down pea gravel	96	gravity pour
	0	40	10	bentonite seal	10	gravity pour

6. GEOLOGIC LOG OF WELL

DEPTH (FT) FROM	DEPTH (FT) TO	THICKNESS (FT)	COLOR AND TYPE OF MATERIAL ENCOUNTERED (INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES)	WATER BEARING?
0	30	30	clay & cobbles	☐ YES ☑ NO
30	200	170	sandy clay with small sand & gravel stringers	☐ YES ☑ NO
200	260	60	clay	☐ YES ☑ NO
260	309	49	clay with small sand & gravel stringers	☐ YES ☑ NO
309	325	16	sand & gravel 3/4 down to 1/8	☑ YES ☐ NO
325	335	10	sandy clay with sand stringers .30 to .125	☑ YES ☐ NO
335	355	20	1/4 to 1/2 sand & gravel .30 to .250 thousands	☑ YES ☐ NO
355	365	10	sandy clay with sand stringers .30 to .125	☑ YES ☐ NO
365	385	20	1/4 to 1/2 gravel with .30 to .250 sand & gravel	☑ YES ☐ NO
385	440	55	fractured basalt	☑ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO

ATTACH ADDITIONAL PAGES AS NEEDED TO FULLY DESCRIBE THE GEOLOGIC LOG OF THE WELL

7. TEST & ADDITIONAL INFO

WELL TEST — METHOD: ☐ BAILER ☑ PUMP ☐ AIR LIFT ☐ OTHER – SPECIFY:

TEST RESULTS - ATTACH A COPY OF DATA COLLECTED DURING WELL TESTING, INCLUDING START TIME, END TIME, AND A TABLE SHOWING DISCHARGE AND DRAWDOWN OVER THE TESTING PERIOD.

ADDITIONAL STATEMENTS OR EXPLANATIONS:

5 horsepower pump used for testing.

See 48-hour pumping test data, attached.

8. SIGNATURE

THE UNDERSIGNED HEREBY CERTIFIES THAT, TO THE BEST OF HIS OR HER KNOWLEDGE AND BELIEF, THE FOREGOING IS A TRUE AND CORRECT RECORD OF THE ABOVE DESCRIBED HOLE AND THAT HE OR SHE WILL FILE THIS WELL RECORD WITH THE STATE ENGINEER AND THE PERMIT HOLDER WITHIN 20 DAYS AFTER COMPLETION OF WELL DRILLING:

Jim L Tonnell — SIGNATURE OF DRILLER

9-30-2011 — DATE

FOR OSE INTERNAL USE — WELL RECORD & LOG (Version 6/9/08)

FILE NUMBER	POD NUMBER	TRN NUMBER
LOCATION		PAGE 2 OF 2

RG-92910 EXPLORATORY 2880-MINUTE PUMPING TEST: DRAWDOWN DATA

LOCATION: Arroyo Seco, Taos, NM
NMOSE PERMIT NO: RG-92910 Exploratory
WEIR: 3.0" with 1.0" orifice

TOTAL DEPTH: 440 feet
CASING TYPE: Steel, 0.188 Wall
CASING DIAMETER: 6 5/8 inches OD
STATIC WATER LEVEL: 308.3

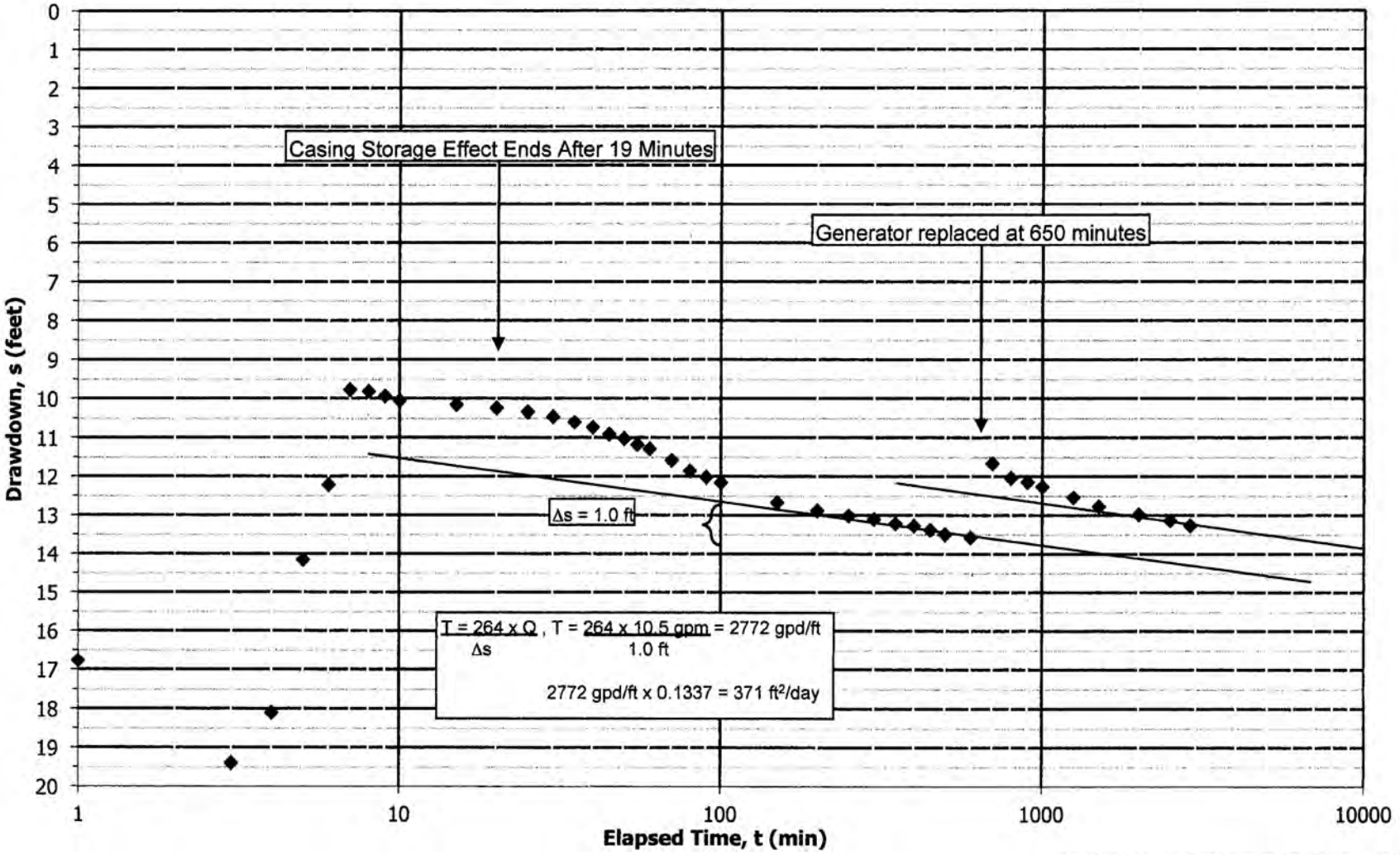
PERFORATIONS: 330-430 feet bgs
PUMP DEPTH: 420 feet bgs
COLUMN PIPE DIA: 1 5/8 ID (2 3/8 OD) inches
MP COR: -2.2 feet

DATE	TIME	ELAPSED TIME, t (min)	WATER LEVEL (feet)	DRAWDOWN, s (feet)	DISCHARGE, Q (gpm)	Q/s (gpm/ft)	WEIR (inches)	BAROMETRIC PRESSURE (mbar)	COMMENTS
9/21/11	9:00	0	308.30					779	
		1	325.07	16.77					discharge to surface, cloudy tan
		2	329.15	20.85			20+		choking back with gate valve
		3	327.69	19.39					
		4	326.40	18.10					
	9:05	5	322.45	14.15			6.0		
		6	320.51	12.21	9.8	0.8	7.0		
		7	318.07	9.77	10.1	1.0	7.5		
		8	318.11	9.81	10.5	1.1	8.0		28.7 sec/5 gal
		9	318.23	9.93	10.5	1.1	8.0		
	9:10	10	318.35	10.05	10.5	1.0	8.0		
		15	318.45	10.15	10.5	1.0	8.0		
	9:20	20	318.54	10.24	10.5	1.0	8.0		
		25	318.63	10.33	10.5	1.0	8.0		
	9:30	30	318.76	10.46	10.5	1.0	8.0		
		35	318.90	10.60	10.5	1.0	8.0		
	9:40	40	319.03	10.73	10.5	1.0	8.0		
		45	319.21	10.91	10.5	1.0	8.0		
	9:50	50	319.32	11.02	10.5	1.0	8.0	779.0	
		55	319.47	11.17	10.5	0.9	8.0		28.8 sec/5 gal
	10:00	60	319.58	11.28	10.5	0.9	8.0		
	10:10	70	319.88	11.58	10.5	0.9	8.0		
	10:20	80	320.15	11.85	10.5	0.9	8.0		
	10:30	90	320.31	12.01	10.5	0.9	8.0		
	10:40	100	320.45	12.15	10.5	0.9	8.0	778.0	28.7 sec/5 gal
	11:30	150	320.97	12.67	10.5	0.8	8.0	777.0	
	12:20	200	321.18	12.88	10.5	0.8	8.0	777.0	28.7 sec/5 gal
	13:10	250	321.31	13.01	10.5	0.8	8.0		
	14:00	300	321.40	13.10	10.5	0.8	8.0	778.0	
	14:50	350	321.51	13.21	10.5	0.8	8.0	778.0	
	15:40	400	321.57	13.27	10.2	0.8	7.8		
	16:30	450	321.68	13.38	10.5	0.8	8.0		
	17:20	500	321.79	13.49	10.2	0.8	7.8	778.0	
	19:00	600	321.87	13.57	10.5	0.8	8.0	779	generator missing and smoking
	20:40	700	319.96	11.66	10.5	0.9	8.0		switched generators @ 650 min
	22:20	800	320.33	12.03	10.5	0.9	8.0		
Midnight	0:00	900	320.44	12.14	10.5	0.9	8.0		
9/22/11	1:40	1000	320.56	12.26	10.5	0.9	8.0	780	
	5:50	1250	320.84	12.54	10.5	0.8	8.0	782	
	10:00	1500	321.07	12.77	10.5	0.8	8.0		
	18:20	2000	321.28	12.98	10.5	0.8	8.0		
9/23/11	2:40	2500	321.43	13.13	10.5	0.8	8.0	782	
	9:00	2880	321.56	13.26	10.5	0.8	8.0	782	

RG-92910 2880-minute Pumping Test - Drawdown

Average Q = 10.5 gpm

9/21 - 9/23/11



JASON HALL WATER SOLUTIONS

RG-92910 EXPLORATORY 2880-MINUTE PUMPING TEST: RECOVERY DATA

LOCATION: Arroyo Seco, Taos, NM
NMOSE PERMIT NO: RG-92910 Exploratory
WEIR: 3.0" with 1.0" orifice

TOTAL DEPTH: 440 feet
CASING TYPE: Steel, 0.188 Wall
CASING DIAMETER: 6 5/8 inches OD
STATIC WATER LEVEL: 308.3

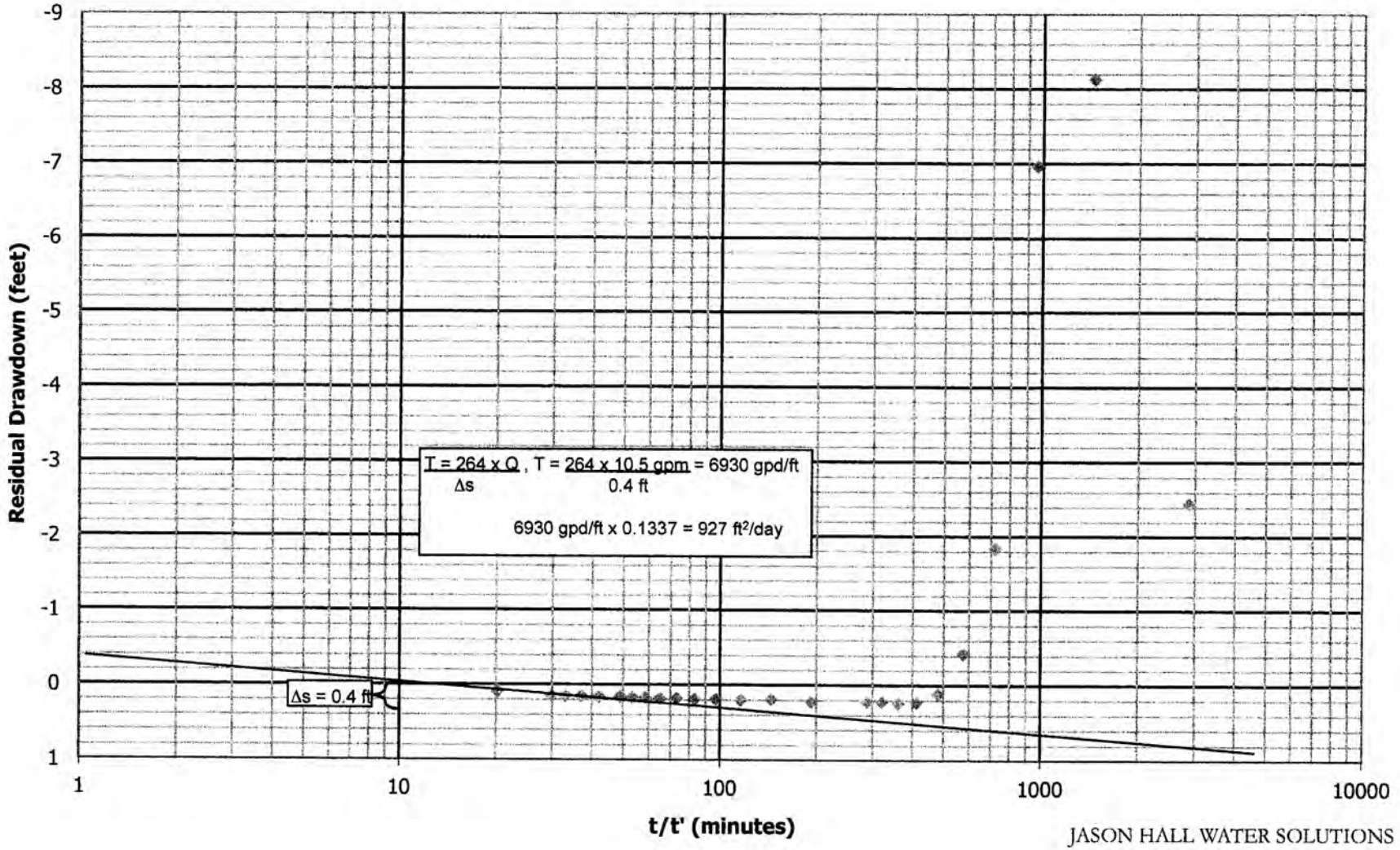
PERFORATIONS: 330-430 feet bgs
PUMP DEPTH: 420 feet bgs
COLUMN PIPE DIA: 1 5/8 ID (2 3/8 OD) inches
MP COR: -2.2 feet

DATE	TIME	ELAPSED TIME, t (min)	RECOVERY TIME, t' (min)	WATER LEVEL (feet)	RESIDUAL DRAWDOWN, s' (feet)	t/t'	BAROMETRIC PRESSURE (lbs/in Hg)	COMMENTS
9/23/11	9:00	2880	0	321.56	13.26		782	
		2881	1	305.85	-2.45	2881		
		2882	2	300.17	-8.13	1441		
		2883	3	301.33	-6.97	961		
		2884	4	306.46	-1.84	721		
	9:05	2885	5	307.87	-0.43	577		
		2886	6	308.41	0.11	481		
		2887	7	308.53	0.23	412		
		2888	8	308.54	0.24	361		
		2889	9	308.52	0.22	321		
	9:10	2890	10	308.52	0.22	289	782	
		2895	15	308.52	0.22	193		
	9:20	2900	20	308.49	0.19	145		
		2905	25	308.50	0.20	116		
	9:30	2910	30	308.49	0.19	97		
		2915	35	308.49	0.19	83		
	9:40	2920	40	308.48	0.18	73		
		2925	45	308.48	0.18	65		
	9:50	2930	50	308.47	0.17	59	782	
		2935	55	308.47	0.17	53		
	10:00	2940	60	308.46	0.16	49		
	10:10	2950	70	308.46	0.16	42		
	10:20	2960	80	308.45	0.15	37		
	10:30	2970	90	308.45	0.15	33		
	10:40	2980	100	308.44	0.14	30	782	
	11:30	3030	150	308.39	0.09	20	782	MPC top of sounder tube to top of
	12:20	3080	200			15		permanent steel casing = 0.56'

RG-92910 2880-minute Pumping Test - Recovery

Average Q = 10.5 gpm

9/23/11



JASON HALL WATER SOLUTIONS

Revised June 1972

98 SEP 28 PM 1:50

STATE ENGINEER OFFICE

WELL RECORD

Section 1. GENERAL INFORMATION

(A) Owner of well Mariposa Ranch Subdivision LLC. Owner's Well No.
Street or Post Office Address P.O. Box 1980
City and State El Prado NM 87529

Well was drilled under Permit No. RG 69936 and is located in the:

a. ___ ¼ ___ ¼ ___ ¼ ___ ¼ of Section ___ Township ___ Range ___ N.M.P.M.

b. Tract No. ___ of Map No. ___ of the ___

c. Lot No. ___ of Block No. ___ of the ___
Subdivision, recorded in ___ County.

d. X= 685,000 feet, Y= 2,040,000 feet, N.M. Coordinate System Central Zone in the Antoine Leroux Grant.

(B) Drilling Contractor Fennell Drilling Co License No. WD987

Address P.O. Box 480 Arroyo Hondo NM 87513

Drilling Began 8-15-98 Completed 9-22-98 Type tools rotary Size of hole 8 3/4 in.

Elevation of land surface or ___ at well is ___ ft. Total depth of well 610 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 320 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
400	460	60	sand & gravel	15
500	520	20	sand clay & gravel	10
560	600	40	sand & gravel	20

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet Top	Depth in Feet Bottom	Length (feet)	Type of Shoe	Perforations From	Perforations To
6 5/8	13		0	610	610		400	460
							500	520
							560	600

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement
10	30	8 3/4			6 sacks of Bentonite Chips

Section 5. PLUGGING RECORD

Plugging Contractor ___
Address ___
Plugging Method ___
Date Well Plugged ___
Plugging approved by:
___
State Engineer Representative

No.	Depth in Feet Top	Depth in Feet Bottom	Cubic Feet of Cement
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY V=685,000 Y=2,040,000 ✓

Date Received 9-28-98 Quad ___ FWL ___ FSL Central

File No RG-69936 Use Dom Location No. Antoine Leroux

Section 6. LOG OF HOLE

Depth in Feet From	Depth in Feet To	Thickness in Feet	Color and Type of Material Encountered
0	25	25	brown clay
25	340	315	sandy clay with some gravel
340	380	40	sand + gravel
380	400	20	clay
400	460	60	sand + gravel with clay stringers
460	500	40	clay + gravel
500	520	20	sand + gravel
520	560	40	clay with gravel stringers
560	600	40	sand + gravel
600	610	10	clay
610	640	30	basalt

Section 7. REMARKS AND ADDITIONAL INFORMATION

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Jim L Bennett
Driller

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any wells

Revised June 1972

STATE ENGINEER OFFICE

WELL RECORD

Section 1. GENERAL INFORMATION

(A) Owner of well Michael Yaccino Owner's Well No. RG-88383

Street or Post Office Address P.O. Box 1320

City and State El Prado, N.M. 87529

Well was drilled under Permit No. RG-88383 and is located in the:

a. ____ ¼ ____ ¼ ____ ¼ ____ ¼ of Section ____ Township ____ Range ____ N.M.P.M.

b. Tract No. 2 of Map No. 2 of the Survey 3

c. Lot No. ____ of Block No. ____ of the ____ Subdivision, recorded in Taos County.

d. X= 687615.0 feet, Y= 2005682 feet, N.M. Coordinate System Central Zone in the ____ Grant.

(B) Drilling Contractor Vigil's Well Drilling License No. WD-523

Address P.O. Box 142 Ranchos De Taos, N.M. 87557

Drilling Began 9/8/06 Completed 9/8/06 Type tools Rotary Size of hole 7 7/8" in.

Elevation of land surface or ____ at well is ____ ft. Total depth of well 480' ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 267' ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
267'	480'	213'	Brown Clay & Gravel	15-20

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet Top	Depth in Feet Bottom	Length (feet)	Type of Shoe	Perforations From	Perforations To
5" PVC	SDR-17	Eagle Loc.	1'	480'	480'	None	360'	440'

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement

2006 SEP 13 AM 11 [illegible]

Section 5. PLUGGING RECORD

Plugging Contractor ____

Address ____

Plugging Method ____

Date Well Plugged ____

Plugging approved by:

____ State Engineer Representative

No.	Depth in Feet Top	Depth in Feet Bottom	Cubic Feet of Cement
1			
2			
3			
4			

TRN# 367055

FOR USE OF STATE ENGINEER ONLY

Date Received

Quad ____ FWL ____ FSL ____

File No. RG-88383 Use ____ Location No. ____

Section 6. LOG OF HOLE

Depth in Feet From	Depth in Feet To	Thickness in Feet	Color and Type of Material Encountered
1'	20'	20'	Brown Dirt, Caliche & Boulder
20'	60'	40'	Gravel
60'	140'	80'	Brown Clay & Gravel
140'	180'	40'	Gravel
180'	240'	60'	Yellow Clay & Gravel
240'	300'	60'	Light Yellow Clay
300'	340'	40'	Light Brown Clay
340'	380'	40'	Gravel
380'	420'	40'	Sand & Gravel
420'	460'	40'	Gravel
460'	480'	20'	Brown Clay & Gravel

Section 7. REMARKS AND ADDITIONAL INFORMATION

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Driller

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1(a) and Section 5 need be completed.

Revised June 1972

STATE ENGINEER OFFICE

WELL RECORD

OFFICE OF STATE ENGINEER
SANTA FE, NEW MEXICO

2006 DEC 21 PM 2:25

Section 1. GENERAL INFORMATION

(A) Owner of well Roger Eiteljorg Owner's Well No. _____
Street or Post Office Address 109 Kit Carson Rd.
City and State Taos, N.M. 87571

Well was drilled under Permit No. RG-88425 and is located in the:

a. _____ ¼ _____ ¼ _____ ¼ _____ ¼ of Section _____ Township _____ Range _____ N.M.P.M.

b. Tract No. _____ of Map No. _____ of the _____

c. Lot No. _____ of Block No. _____ of the _____
Subdivision, recorded in Taos County.

d. X= 687,615 feet, Y= 2,005,682 feet, N.M. Coordinate System Central Zone in the Antonio Martinez Grant.

(B) Drilling Contractor Vigil's Well Drilling License No. WD-523

Address P.O. Box 142 Ranchos De Taos, NM 87557

Drilling Began 12/5/06 Completed 12/5/06 Type tools Rotary Size of hole 7" in.

Elevation of land surface or _____ at well is _____ ft. Total depth of well 420' ft.

Completed well is XXXshallow ☐ artesian. Depth to water upon completion of well 178' ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
178'	420'	242'	Gravel	25-30

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet Top	Depth in Feet Bottom	Length (feet)	Type of Shoe	Perforations From	Perforations To
5" PVC	SDR 17	Eagle loc.	1'	420'	420'	None	320'	400'

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement

Section 5. PLUGGING RECORD

Plugging Contractor _____
Address _____
Plugging Method _____
Date Well Plugged _____
Plugging approved by: _____
State Engineer Representative

TRN#367757

No.	Depth in Feet Top	Depth in Feet Bottom	Cubic Feet of Cement
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

Date Received

Quad _____ FWL _____ FSL _____

File No. RG-88425 Use DOM Location No. _____

Section 6. LOG OF HOLE

Depth in Feet From	Depth in Feet To	Thickness in Feet	Color and Type of Material Encountered
1'	20'	20'	Brown Dirt, Caliche & Boulder
20'	60'	40'	Gravel
60'	140'	80'	Brown Clay & Gravel
140'	220'	80'	Light Brown Clay
220'	300'	80'	Yellow Clay & Gravel
300'	340'	40'	Gravel
340'	380'	40'	Sand & Gravel
380'	420'	40'	Gravel

Section 7. REMARKS AND ADDITIONAL INFORMATION

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Driller

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1( ) and Section 5 need be completed.

APPENDIX B:

RG-92910 48-hour Pumping Test Data and Graphs

RG-92910 EXPLORATORY 2880-MINUTE PUMPING TEST: DRAWDOWN DATA

LOCATION: Arroyo Seco, Taos, NM
NMOSE PERMIT NO: RG-92910 Exploratory
WEIR: 3.0" with 1.0" orifice

TOTAL DEPTH: 440 feet
CASING TYPE: Steel, 0.188 Wall
CASING DIAMETER: 6 5/8 inches OD
STATIC WATER LEVEL: 308.3

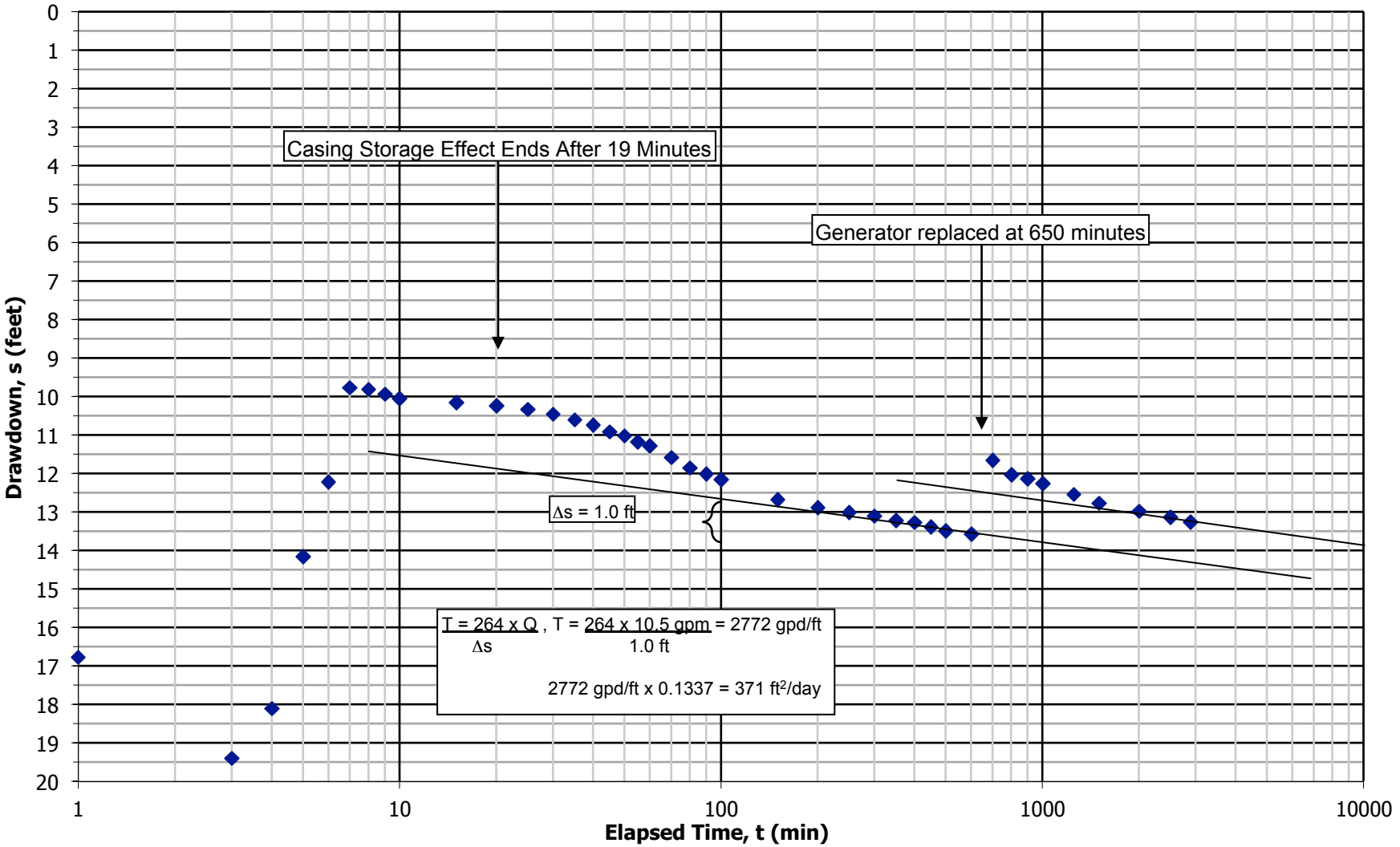
PERFORATIONS: 330-430 feet bgs
PUMP DEPTH: 420 feet bgs
COLUMN PIPE DIA: 1 5/8 ID (2 3/8 OD) inches
MP COR: -2.2 feet

DATE	TIME	ELAPSED TIME, t (min)	WATER LEVEL (feet)	DRAWDOWN, s (feet)	DISCHARGE, Q (gpm)	Q/s (gpm/ft)	WEIR (inches)	BAROMETRIC PRESSURE (mbar)	COMMENTS
9/21/11	9:00	0	308.30					779	
		1	325.07	16.77					discharge to surface, cloudy tan
		2	329.15	20.85			20+		choking back with gate valve
		3	327.69	19.39					
		4	326.40	18.10					
	9:05	5	322.45	14.15			6.0		
		6	320.51	12.21	9.8	0.8	7.0		
		7	318.07	9.77	10.1	1.0	7.5		
		8	318.11	9.81	10.5	1.1	8.0		28.7 sec/5 gal
		9	318.23	9.93	10.5	1.1	8.0		
	9:10	10	318.35	10.05	10.5	1.0	8.0		
		15	318.45	10.15	10.5	1.0	8.0		
	9:20	20	318.54	10.24	10.5	1.0	8.0		
		25	318.63	10.33	10.5	1.0	8.0		
	9:30	30	318.76	10.46	10.5	1.0	8.0		
		35	318.90	10.60	10.5	1.0	8.0		
	9:40	40	319.03	10.73	10.5	1.0	8.0		
		45	319.21	10.91	10.5	1.0	8.0		
	9:50	50	319.32	11.02	10.5	1.0	8.0	779.0	
		55	319.47	11.17	10.5	0.9	8.0		28.8 sec/5 gal
	10:00	60	319.58	11.28	10.5	0.9	8.0		
	10:10	70	319.88	11.58	10.5	0.9	8.0		
	10:20	80	320.15	11.85	10.5	0.9	8.0		
	10:30	90	320.31	12.01	10.5	0.9	8.0		
	10:40	100	320.45	12.15	10.5	0.9	8.0	778.0	28.7 sec/5 gal
	11:30	150	320.97	12.67	10.5	0.8	8.0	777.0	
	12:20	200	321.18	12.88	10.5	0.8	8.0	777.0	28.7 sec/5 gal
	13:10	250	321.31	13.01	10.5	0.8	8.0		
	14:00	300	321.40	13.10	10.5	0.8	8.0	778.0	
	14:50	350	321.51	13.21	10.5	0.8	8.0	778.0	
	15:40	400	321.57	13.27	10.2	0.8	7.8		
	16:30	450	321.68	13.38	10.5	0.8	8.0		
	17:20	500	321.79	13.49	10.2	0.8	7.8	778.0	
	19:00	600	321.87	13.57	10.5	0.8	8.0	779	generator missing and smoking
	20:40	700	319.96	11.66	10.5	0.9	8.0		switched generators @ 650 min
	22:20	800	320.33	12.03	10.5	0.9	8.0		
Midnight	0:00	900	320.44	12.14	10.5	0.9	8.0		
9/22/11	1:40	1000	320.56	12.26	10.5	0.9	8.0	780	
	5:50	1250	320.84	12.54	10.5	0.8	8.0	782	
	10:00	1500	321.07	12.77	10.5	0.8	8.0		
	18:20	2000	321.28	12.98	10.5	0.8	8.0		
9/23/11	2:40	2500	321.43	13.13	10.5	0.8	8.0	782	
	9:00	2880	321.56	13.26	10.5	0.8	8.0	782	

RG-92910 2880-minute Pumping Test - Drawdown

Average Q = 10.5 gpm

9/21 - 9/23/11



JASON HALL WATER SOLUTIONS

RG-92910 EXPLORATORY 2880-MINUTE PUMPING TEST: RECOVERY DATA

LOCATION: Arroyo Seco, Taos, NM
NMOSE PERMIT NO: RG-92910 Exploratory
WEIR: 3.0" with 1.0" orifice

TOTAL DEPTH: 440 feet
CASING TYPE: Steel, 0.188 Wall
CASING DIAMETER: 6 5/8 inches OD
STATIC WATER LEVEL: 308.3

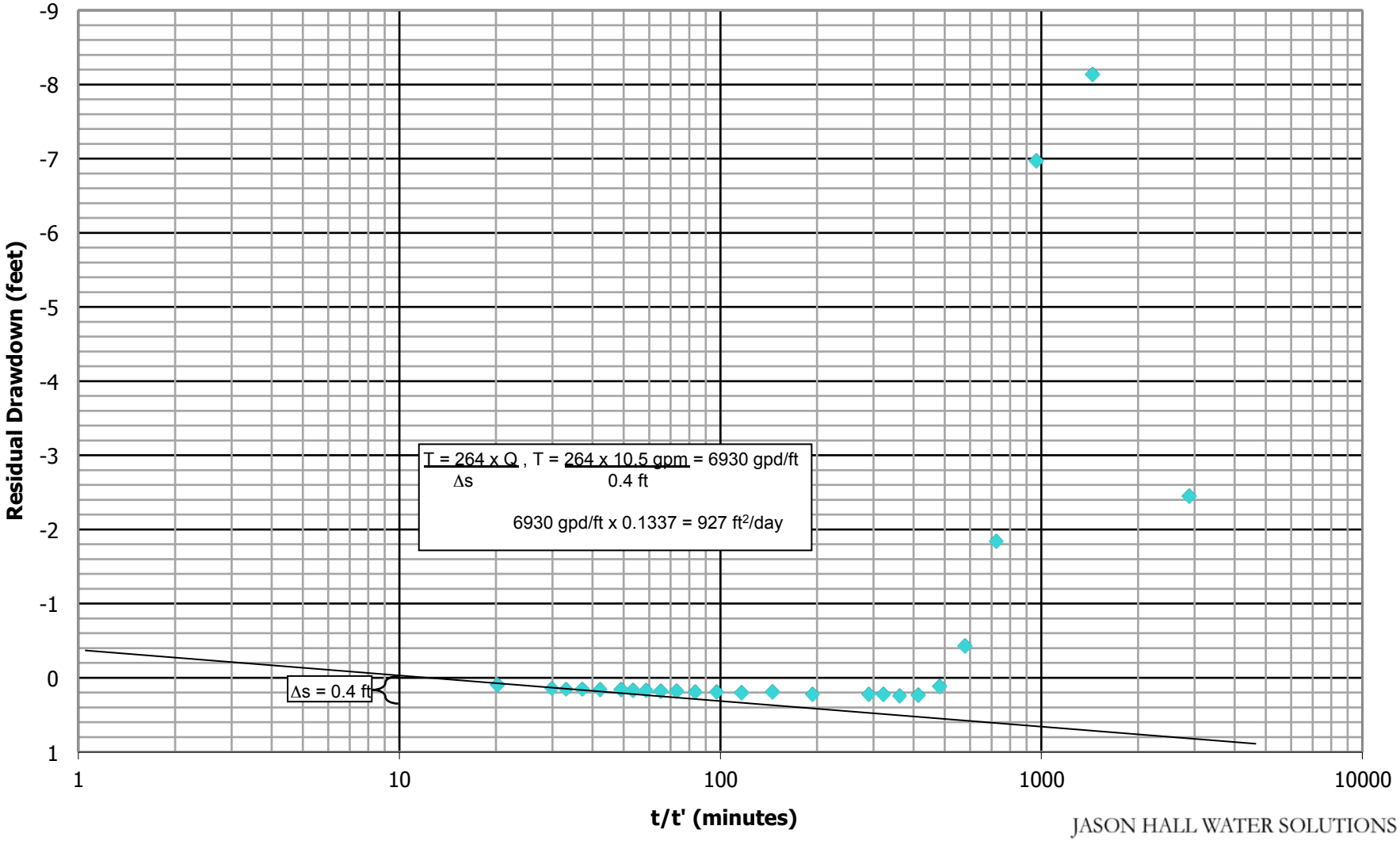
PERFORATIONS: 330-430 feet bgs
PUMP DEPTH: 420 feet bgs
COLUMN PIPE DIA: 1 5/8 ID (2 3/8 OD) inches
MP COR: -2.2 feet

DATE	TIME	ELAPSED TIME, t (min)	RECOVERY TIME, t' (min)	WATER LEVEL (feet)	RESIDUAL DRAWDOWN, s' (feet)	t/t'	BAROMETRIC PRESSURE (lbs/in Hg)	COMMENTS
9/23/11	9:00	2880	0	321.56	13.26		782	
		2881	1	305.85	-2.45	2881		
		2882	2	300.17	-8.13	1441		
		2883	3	301.33	-6.97	961		
		2884	4	306.46	-1.84	721		
	9:05	2885	5	307.87	-0.43	577		
		2886	6	308.41	0.11	481		
		2887	7	308.53	0.23	412		
		2888	8	308.54	0.24	361		
		2889	9	308.52	0.22	321		
	9:10	2890	10	308.52	0.22	289	782	
		2895	15	308.52	0.22	193		
	9:20	2900	20	308.49	0.19	145		
		2905	25	308.50	0.20	116		
	9:30	2910	30	308.49	0.19	97		
		2915	35	308.49	0.19	83		
	9:40	2920	40	308.48	0.18	73		
		2925	45	308.48	0.18	65		
	9:50	2930	50	308.47	0.17	59	782	
		2935	55	308.47	0.17	53		
	10:00	2940	60	308.46	0.16	49		
	10:10	2950	70	308.46	0.16	42		
	10:20	2960	80	308.45	0.15	37		
	10:30	2970	90	308.45	0.15	33		
	10:40	2980	100	308.44	0.14	30	782	
	11:30	3030	150	308.39	0.09	20	782	MPC top of sounder tube to top of
	12:20	3080	200			15		permanent steel casing = 0.56'

RG-92910 2880-minute Pumping Test - Recovery

Average Q = 10.5 gpm

9/23/11



JASON HALL WATER SOLUTIONS

CASING STORAGE CALCULATION FOR BONNE TERRE WELL RG-92910: 2880-minute Pumping Test

iteration	d_c (inches)	d_p (inches)	s (feet)	Q (gpm)	Q/s (gpm/ft)	$t_c = [0.6 (d_c^2 - d_p^2)] / (Q/s)$
1	6.25	2.5	9.77	10.5	1.074718526	18.31875
2	6.25	2.5	10.21	10.5	1.028403526	19.14375
3	6.25	2.5	10.23	10.5	1.026392962	19.18125
4	6.25	2.5	10.24	10.5	1.025390625	19.2
5	6.25	2.5	10.24	10.5	1.025390625	19.2

CASING STORAGE ENDS AFTER ~ 19 MINUTES OF PUMPING

t_c	time, in minutes, when casing storage effect becomes negligible
d_c	inside diameter of well casing, in inches
d_p	outside diameter of pump column pipe, in inches
Q/s	specific capacity of the wel in gpm/ft of drawdown at time tc

APPENDIX C:

TH96S Model Results

BT TH96S

DRAWDOWN AT RANDOM COORDINATES IN AN INFINITE
STRIP, NON - LEAKY AQUIFER USER SPECIFIED BOUNDARIES
AT Y = 0 AND A Y SPECIFIED BY USER
PUMPING MULTIPLE WELLS LOCATED AT POINTS SPECIFIED
BY USER. EACH WELL MAY HAVE A DIFFERENT
PUMPING SCHEDULE. ALL COORDINATES IN THE X - Y PLANE.

(Theis equation)

At y = 0, there is no boundary
There is no other boundary to system

T = 4851. gpd/ft S = 0.100000

Number of pumping wells = 5

Coordinates of pumping wells and the no. of pumping rates

Well #	X Coordinate	Y Coordinate	No. of Pumping Rates
1	0.0	0.0	1
2	344.0	0.0	1
3	587.0	0.0	1
4	649.0	0.0	1
5	650.0	0.0	1

PUMPING SCHEDULES FOR THE WELLS

Well Schedule for Pumping Well Number 1

Pumping Rate		Pumping Time
Q(1) = 10.8 gpm	for	18250.000 days

Well Schedule for Pumping Well Number 2

Pumping Rate		Pumping Time
Q(1) = 1.9 gpm	for	18250.000 days

Well Schedule for Pumping Well Number 3

Pumping Rate		Pumping Time
Q(1) = 1.9 gpm	for	18250.000 days

Well Schedule for Pumping Well Number 4

Pumping Rate		Pumping Time
Q(1) = 0.6 gpm	for	18250.000 days

Well Schedule for Pumping Well Number 5

Pumping Rate		Pumping Time
Q(1) = 0.6 gpm	for	18250.000 days

Coordinates of Computation Points

(Number of computation points = 5)

Point #	X Coordinates feet	Y Coordinates feet
1	0.5	0.0
2	344.5	0.0
3	587.5	0.0
4	649.5	0.0
5	650.5	0.0

Image Control = .1000000E-04

time variable (t)

t min = 3650.000 days; t max = 18250.000 days;
delta t = 3650.000 days

********** RESULTS **********

Drawdowns and Coordinates of computation points
Measured in feet

	X = 0.5	X = 344.5	X = 587.5
	Y = 0.0	Y = 0.0	Y = 0.0
Time in days			
3650.000	5.530	2.904	2.722
7300.000	5.788	3.162	2.980
10950.000	5.940	3.314	3.131
14600.000	6.047	3.421	3.239
18250.000	6.130	3.504	3.322

********** RESULTS **********

Drawdowns and Coordinates of computation points
Measured in feet

	X = 649.5	X = 650.5
	Y = 0.0	Y = 0.0
Time in days		
3650.000	2.491	2.457
7300.000	2.749	2.715
10950.000	2.900	2.866
14600.000	3.007	2.973
18250.000	3.090	3.057

APPENDIX D:

Glover-Balmer Model Results

TIME and DATE
month: 10 day: 21 year: 2011
hour: 13 minute: 12 second: 51

STREAM DEPLETION CAUSED BY PUMPING MULTIPLE WELLS AT
VARIOUS RATES IN AN INFINITE - STRIP, NON - LEAKY AQUIFER.
THE WELLS ARE BETWEEN THE STREAM AND A PLANE BOUNDARY.

(Glover and Balmer equation)

T = 649. square ft/day S = .100000

Number of wells = 1

Distance from stream to plane boundary = 10.00 miles

Distances of the wells from the stream and the
number of pumping rates

Well #	Distance (miles)	No. of rates
1	5.75	1

PUMPING SCHEDULES FOR THE WELLS

Pumping schedule for well number 1

	Pumping rate		Pumping time	
Q(1) =	17.5 ac-ft/yr	for	50.000	years

Image Control = .10000000E-04

Time variable (t) Only 500 timesteps allowed

t min = 5.000 years; t max = 50.000 years;
delta t = 5.000 years

Time (years)	Rate of Depletion (ac-ft/yr)	Accumulated Depletion Volume (acre-feet)	Depletion Volume in Time Period (acre-feet)
5.000	.000000	.000000	.000000
10.000	.000181	.000151	.000151
15.000	.005565	.009605	.009454
20.000	.031881	.090927	.081322
25.000	.092615	.386492	.295565
30.000	.190849	1.080023	.693531
35.000	.322522	2.350844	1.270821
40.000	.480880	4.349714	1.998869
45.000	.659013	7.192547	2.842833
50.000	.850891	10.962685	3.770138

APPENDIX E:

USGS Historic Water Level Data

News updated July, 2011

Groundwater levels for New Mexico

Search Results -- 1 sites found

Search Criteria

Agency code = usgs
site_no list =
- 362246105395801

Minimum number of levels = 1

Save file of selected sites to local disk for future upload

USGS 362246105395801 25N.12E.21.434

Taos County, New Mexico
Latitude 36°21'52.7", Longitude 105°47'57.1" NAD83
Land-surface elevation 6,870 feet above NGVD29
The depth of the well is 530 feet below land surface.
This well is completed in the Alluvium, Bolson Deposits and Other Surface Deposits (110AVMB) local aquifer.

Output formats

Table of data
Tab-separated data
Graph of data
Reselect period

Date	Time	Water level, feet below land surface	Water level, feet above specific vertical datum	Referenced vertical datum	Status	Measuring Agency
1983-02-01		16.32				
1988-03-16		39.94				
1988-10-14		35.37				
1989-05-11		39.98				
1989-08-03		40.40				
1993-01-25		39.95				
1998-03-05		37.38				
2003-03-11		38.38				USGS
2004-03-10	16:39 MST	38.62				USGS

Explanation

Section	Code	Description
Status		The reported water-level measurement represents a static level
Measuring Agency		Not determined
Measuring Agency	USGS	US GEOLOGICAL SURVEY

Questions about sites/data?
Feedback on this web site
Automated retrievals
Help

Data Tips
Explanation of terms
Subscribe for system changes
News

Accessibility Plug-Ins FOIA Privacy Policies and Notices

U.S. Department of the Interior | U.S. Geological Survey

Title: Groundwater for New Mexico: Water Levels
URL: http://nwis.waterdata.usgs.gov/nm/nwis/gwlevels?

Page Contact Information: New Mexico Water Data Maintainer

Page Last Modified: 2011-10-18 16:32:29 EDT

0.31 0.31 nadww01

APPENDIX F:

RG-92910 Laboratory Water Quality Report

HALL
ENVIRONMENTAL
ANALYSIS
LABORATORY

COVER LETTER

Tuesday, October 18, 2011

Jason Hall
Water Solutions
1408 Seville Rd
Santa Fe, NM 87505

TEL: (505) 699-1112
FAX

RE: Debontin RG-92910

Order No.: 1109882

Dear Jason Hall:

Hall Environmental Analysis Laboratory, Inc. received 1 sample(s) on 9/23/2011 for the analyses presented in the following report.

This report is a revised report and it replaces the original report issued October 14, 2011

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. All samples are reported as received unless otherwise indicated.

Please don't hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

Andy Freeman, Laboratory Manager

NM Lab # NM9425 NM0901
AZ license # AZ0682

Hall Environmental Analysis Laboratory, Inc.

Date: *18-Oct-11*
Analytical Report

CLIENT:	Water Solutions	**Client Sample ID:**	Ra-92910
Lab Order:	1109882	**Collection Date:**	9/23/2011 8:40:00 AM
Project:	Debontin RG-92910	**Date Received:**	9/23/2011
Lab ID:	1109882-01	**Matrix:**	AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: **LJB**
Fluoride	0.44	0.10		mg/L	1	9/26/2011 2:22:41 PM
Chloride	6.8	0.50		mg/L	1	9/26/2011 2:22:41 PM
Nitrate (As N)+Nitrite (As N)	1.3	1.0		mg/L	5	9/28/2011 7:03:32 AM
Sulfate	35	0.50		mg/L	1	9/26/2011 2:22:41 PM
EPA METHOD 200.7: DISSOLVED METALS						Analyst: **RAGS**
Aluminum	ND	0.020		mg/L	1	9/29/2011 3:49:31 PM
Barium	0.050	0.0020		mg/L	1	9/29/2011 3:49:31 PM
Beryllium	ND	0.0020		mg/L	1	9/29/2011 3:49:31 PM
Cadmium	ND	0.0020		mg/L	1	9/29/2011 3:49:31 PM
Calcium	52	1.0		mg/L	1	9/29/2011 3:49:31 PM
Copper	ND	0.0060		mg/L	1	9/29/2011 3:49:31 PM
Iron	0.065	0.020		mg/L	1	9/29/2011 3:49:31 PM
Lead	ND	0.0050		mg/L	1	9/29/2011 3:49:31 PM
Magnesium	11	1.0		mg/L	1	9/29/2011 3:49:31 PM
Manganese	0.012	0.0020		mg/L	1	9/29/2011 3:49:31 PM
Nickel	ND	0.010		mg/L	1	9/29/2011 3:49:31 PM
Potassium	1.7	1.0		mg/L	1	9/29/2011 3:49:31 PM
Silver	ND	0.0050		mg/L	1	9/29/2011 3:49:31 PM
Sodium	27	1.0		mg/L	1	9/29/2011 3:49:31 PM
Zinc	0.071	0.010		mg/L	1	9/29/2011 3:49:31 PM
EPA METHOD 200.7: METALS						Analyst: **RAGS**
Calcium	50	1.0		mg/L	1	9/29/2011 4:53:43 PM
Chromium	ND	0.0060		mg/L	1	9/29/2011 4:53:43 PM
Magnesium	11	1.0		mg/L	1	9/29/2011 4:53:43 PM
EPA 200.8: DISSOLVED METALS						Analyst: **SNV**
Antimony	ND	0.0010		mg/L	1	10/4/2011 11:13:33 AM
Arsenic	ND	0.0010		mg/L	1	10/4/2011 11:13:33 AM
Selenium	0.0018	0.0010		mg/L	1	10/4/2011 11:13:33 AM
Thallium	ND	0.0010		mg/L	1	10/7/2011 3:38:56 PM
Uranium	0.020	0.0010		mg/L	1	10/7/2011 3:38:56 PM
EPA METHOD 245.1: MERCURY						Analyst: **BRM**
Mercury	ND	0.00020		mg/L	1	9/28/2011 12:01:54 PM
EPA 200.7: HARDNESS						Analyst: **RAGS**
Hardness (As CaCO3)	170	1.0		mg/L	1	9/29/2011

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	MCL	Maximum Contaminant Level
NC	Non-Chlorinated	ND	Not Detected at the Reporting Limit
PQL	Practical Quantitation Limit	S	Spike recovery outside accepted recovery limits

Hall Environmental Analysis Laboratory, Inc.

Date: *18-Oct-11*
Analytical Report

CLIENT:	Water Solutions	**Client Sample ID:**	Ra-92910
Lab Order:	1109882	**Collection Date:**	9/23/2011 8:40:00 AM
Project:	Debontin RG-92910	**Date Received:**	9/23/2011
Lab ID:	1109882-01	**Matrix:**	AQUEOUS

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
SM 2320B: ALKALINITY						Analyst: **LJB**
Alkalinity, Total (As CaCO3)	190	20		mg/L CaCO3	1	9/26/2011 7:24:00 PM
Carbonate	ND	2.0		mg/L CaCO3	1	9/26/2011 7:24:00 PM
Bicarbonate	190	20		mg/L CaCO3	1	9/26/2011 7:24:00 PM
Hydroxide	ND	2.0		mg/L CaCO3	1	9/26/2011 7:24:00 PM
EPA 120.1: SPECIFIC CONDUCTANCE						Analyst: **LJB**
Specific Conductance	450	0.010		µmhos/cm	1	9/26/2011 7:24:00 PM
SM4500-H+B: PH						Analyst: **LJB**
pH	8.02	0.100	H	pH units	1	9/26/2011 7:24:00 PM
SM2540C MOD: TOTAL DISSOLVED SOLIDS						Analyst: **KS**
Total Dissolved Solids	269	20.0		mg/L	1	9/30/2011 11:28:00 AM
EPA METHOD 180.1: TURBIDITY						Analyst: **KS**
Turbidity	2.1	0.50	H	NTU	1	9/26/2011 2:56:00 PM

Qualifiers:

- * Value exceeds Maximum Contaminant Level
- E Estimated value
- J Analyte detected below quantitation limits
- NC Non-Chlorinated
- PQL Practical Quantitation Limit
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- MCL Maximum Contaminant Level
- ND Not Detected at the Reporting Limit
- S Spike recovery outside accepted recovery limits

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: HALL ENVIRONMENTAL ANALYSIS LAB
Address: 4901 HAWKINS NE SUITE D
ALBUQUERQUE, NM 87109
Attn: ANDY FREEMAN

Batch #: 110927033
Project Name: 1109882

Analytical Results Report

Sample Number	110927033-001	**Sampling Date**	9/23/2011	**Date/Time Received**	9/27/2011 12:36 PM
Client Sample ID	1109882-01C / RA-92910	**Sampling Time**	8:40 AM		
Matrix	Water				
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Cyanide	ND	mg/L	0.01	10/5/2011	CRW	EPA 335.4	

Sample Number	110927033-002	**Sampling Date**	9/23/2011	**Date/Time Received**	9/27/2011 12:36 PM
Client Sample ID	1109882-01E / RA-92910	**Sampling Time**	8:40 AM		
Matrix	Water				
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Color	10	Color Units	5	9/28/2011	KFG	SM 2120B	
Odor	ND	TON	1	9/28/2011	KFG	SM2150B	

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client:	HALL ENVIRONMENTAL ANALYSIS LAB	**Batch #:**	110927033
Address:	4901 HAWKINS NE SUITE D	**Project Name:**	1109882
	ALBUQUERQUE, NM 87109		
Attn:	ANDY FREEMAN		

Analytical Results Report

Sample Number	110927033-003	**Sampling Date**	9/23/2011	**Date/Time Received**	9/27/2011 12:36 PM
Client Sample ID	1109882-01F / RA-62910	**Sampling Time**	8:40 AM		
Matrix	Water				
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
MBAS	ND	mg/L	0.05	10/12/2011	CRW	SM5540C	

Authorized Signature

John Coddington, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C585
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2832; ID:WA00169; WA:C585; MT:Cert0095

Thursday, October 13, 2011

QA/QC SUMMARY REPORT

Client: Water Solutions
Project: Debontin RG-92910 **Work Order:** 1109882

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Method: EPA Method 200.7: Metals											
Sample ID: MB-28619		*MBLK*				Batch ID:	**28619**	Analysis Date:	9/29/2011 3:26:54 PM		
Calcium	ND	mg/L	1.0								
Chromium	ND	mg/L	0.0060								
Magnesium	ND	mg/L	1.0								
Sample ID: MB		*MBLK*				Batch ID:	**R48070**	Analysis Date:	9/29/2011 3:20:23 PM		
Aluminum	ND	mg/L	0.020								
Barium	ND	mg/L	0.0020								
Beryllium	ND	mg/L	0.0020								
Cadmium	ND	mg/L	0.0020								
Calcium	ND	mg/L	1.0								
Copper	ND	mg/L	0.0060								
Iron	ND	mg/L	0.020								
Lead	ND	mg/L	0.0050								
Magnesium	ND	mg/L	1.0								
Manganese	ND	mg/L	0.0020								
Nickel	ND	mg/L	0.010								
Potassium	ND	mg/L	1.0								
Silver	ND	mg/L	0.0050								
Sodium	ND	mg/L	1.0								
Zinc	ND	mg/L	0.010								
Sample ID: LCS-28619		*LCS*				Batch ID:	**28619**	Analysis Date:	9/29/2011 3:30:16 PM		
Calcium	51.02	mg/L	1.0	50	0	102	85	115			
Chromium	0.4757	mg/L	0.0060	0.5	0	95.1	85	115			
Magnesium	51.09	mg/L	1.0	50	0.0047	102	85	115			
Sample ID: LCS		*LCS*				Batch ID:	**R48070**	Analysis Date:	9/29/2011 3:23:51 PM		
Aluminum	0.5054	mg/L	0.020	0.5	0	101	85	115			
Barium	0.4830	mg/L	0.0020	0.5	0	96.6	85	115			
Beryllium	0.4908	mg/L	0.0020	0.5	0	98.2	85	115			
Cadmium	0.4884	mg/L	0.0020	0.5	0	97.7	85	115			
Calcium	48.80	mg/L	1.0	50	0	97.6	85	115			
Copper	0.4886	mg/L	0.0060	0.5	0	97.7	85	115			
Iron	0.4744	mg/L	0.020	0.5	0	94.9	85	115			
Lead	0.4864	mg/L	0.0050	0.5	0	97.3	85	115			
Magnesium	48.78	mg/L	1.0	50	0	97.6	85	115			
Manganese	0.4697	mg/L	0.0020	0.5	0	93.9	85	115			
Nickel	0.4598	mg/L	0.010	0.5	0	92.0	85	115			
Potassium	47.42	mg/L	1.0	50	0	94.8	85	115			
Silver	0.09733	mg/L	0.0050	0.1	0	97.3	85	115			
Sodium	47.70	mg/L	1.0	50	0	95.4	85	115			
Zinc	0.4749	mg/L	0.010	0.5	0	95.0	85	115			

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	NC	Non-Chlorinated
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits

QA/QC SUMMARY REPORT

Client: Water Solutions
Project: Debontin RG-92910 **Work Order:** 1109882

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Method: **EPA Method 200.7: Dissolved Metals**											
Sample ID: **MB**		*MBLK*				Batch ID:	**R48070**	Analysis Date:	9/29/2011 3:20:23 PM		
Aluminum	ND	mg/L	0.020								
Barium	ND	mg/L	0.0020								
Beryllium	ND	mg/L	0.0020								
Cadmium	ND	mg/L	0.0020								
Calcium	ND	mg/L	1.0								
Copper	ND	mg/L	0.0060								
Iron	ND	mg/L	0.020								
Lead	ND	mg/L	0.0050								
Magnesium	ND	mg/L	1.0								
Manganese	ND	mg/L	0.0020								
Nickel	ND	mg/L	0.010								
Potassium	ND	mg/L	1.0								
Silver	ND	mg/L	0.0050								
Sodium	ND	mg/L	1.0								
Zinc	ND	mg/L	0.010								
Sample ID: **LCS**		*LCS*				Batch ID:	**R48070**	Analysis Date:	9/29/2011 3:23:51 PM		
Aluminum	0.5054	mg/L	0.020	0.5	0	101	85	115			
Barium	0.4830	mg/L	0.0020	0.5	0	96.6	85	115			
Beryllium	0.4908	mg/L	0.0020	0.5	0	98.2	85	115			
Cadmium	0.4884	mg/L	0.0020	0.5	0	97.7	85	115			
Calcium	48.80	mg/L	1.0	50	0	97.6	85	115			
Copper	0.4886	mg/L	0.0060	0.5	0	97.7	85	115			
Iron	0.4744	mg/L	0.020	0.5	0	94.9	85	115			
Lead	0.4864	mg/L	0.0050	0.5	0	97.3	85	115			
Magnesium	48.78	mg/L	1.0	50	0	97.6	85	115			
Manganese	0.4697	mg/L	0.0020	0.5	0	93.9	85	115			
Nickel	0.4598	mg/L	0.010	0.5	0	92.0	85	115			
Potassium	47.42	mg/L	1.0	50	0	94.8	85	115			
Silver	0.09733	mg/L	0.0050	0.1	0	97.3	85	115			
Sodium	47.70	mg/L	1.0	50	0	95.4	85	115			
Zinc	0.4749	mg/L	0.010	0.5	0	95.0	85	115			

Qualifiers:

E	Estimated value	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	NC	Non-Chlorinated
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits

QA/QC SUMMARY REPORT

Client: Water Solutions
Project: Debontin RG-92910 **Work Order:** 1109882

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Method: EPA 200.8: Dissolved Metals											
Sample ID: MB		*MBLK*				Batch ID:	**R48158**	Analysis Date:	10/4/2011 11:01:15 AM		
Antimony	ND	mg/L	0.0010								
Arsenic	ND	mg/L	0.0010								
Selenium	ND	mg/L	0.0010								
Sample ID: MB		*MBLK*				Batch ID:	**R48158**	Analysis Date:	10/4/2011 12:48:31 PM		
Arsenic	ND	mg/L	0.0010								
Selenium	ND	mg/L	0.0010								
Sample ID: MB		*MBLK*				Batch ID:	**R48287**	Analysis Date:	10/7/2011 3:26:38 PM		
Antimony	ND	mg/L	0.0010								
Arsenic	ND	mg/L	0.0010								
Selenium	ND	mg/L	0.0010								
Thallium	ND	mg/L	0.0010								
Uranium	ND	mg/L	0.0010								
Sample ID: LCS		*LCS*				Batch ID:	**R48158**	Analysis Date:	10/4/2011 11:05:22 AM		
Antimony	0.02547	mg/L	0.0010	0.025	0	102	85	115			
Arsenic	0.02548	mg/L	0.0010	0.025	0	102	85	115			
Selenium	0.02737	mg/L	0.0010	0.025	0	109	85	115			
Sample ID: LCS		*LCS*				Batch ID:	**R48158**	Analysis Date:	10/4/2011 12:50:34 PM		
Arsenic	0.02549	mg/L	0.0010	0.025	0	102	85	115			
Selenium	0.02710	mg/L	0.0010	0.025	0	108	85	115			
Sample ID: LCS		*LCS*				Batch ID:	**R48287**	Analysis Date:	10/7/2011 3:30:45 PM		
Antimony	0.02407	mg/L	0.0010	0.025	0	96.3	85	115			
Arsenic	0.02528	mg/L	0.0010	0.025	0	101	85	115			
Selenium	0.02577	mg/L	0.0010	0.025	0	103	85	115			
Thallium	0.02413	mg/L	0.0010	0.025	0	96.5	85	115			
Uranium	0.02410	mg/L	0.0010	0.025	0	96.4	85	115			
Method: EPA Method 245.1: Mercury											
Sample ID: MB-28611		*MBLK*				Batch ID:	**28611**	Analysis Date:	9/28/2011 11:58:24 AM		
Mercury	ND	mg/L	0.00020								
Sample ID: LCS-28611		*LCS*				Batch ID:	**28611**	Analysis Date:	9/28/2011 12:00:09 PM		
Mercury	0.005217	mg/L	0.00020	0.005	5E-05	103	80	120			

Qualifiers:

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QA/QC SUMMARY REPORT

Client: Water Solutions
Project: Debontin RG-92910 **Work Order:** 1109882

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Method: EPA Method 300.0: Anions											
Sample ID: 1109882-01AMSD		*MSD*				Batch ID:	**R48002**	Analysis Date:		9/26/2011 2:57:29 PM	
Fluoride	0.9023	mg/L	0.10	0.5	0.437	93.1	71.7	114	2.25	20	
Chloride	11.82	mg/L	0.50	5	6.789	101	78	107	1.77	20	
Sulfate	44.69	mg/L	0.50	10	35.1	95.8	87	106	1.67	20	
Sample ID: MB		*MBLK*				Batch ID:	**R48002**	Analysis Date:		9/26/2011 1:47:52 PM	
Fluoride	ND	mg/L	0.10								
Chloride	ND	mg/L	0.50								
Nitrate (As N)+Nitrite (As N)	ND	mg/L	0.20								
Sulfate	ND	mg/L	0.50								
Sample ID: MB		*MBLK*				Batch ID:	**R48010**	Analysis Date:		9/27/2011 12:29:20 PM	
Fluoride	ND	mg/L	0.10								
Chloride	ND	mg/L	0.50								
Nitrate (As N)+Nitrite (As N)	ND	mg/L	0.20								
Sulfate	ND	mg/L	0.50								
Sample ID: LCS		*LCS*				Batch ID:	**R48002**	Analysis Date:		9/26/2011 2:05:16 PM	
Fluoride	0.5080	mg/L	0.10	0.5	0	102	90	110			
Chloride	4.917	mg/L	0.50	5	0	98.3	90	110			
Nitrate (As N)+Nitrite (As N)	3.517	mg/L	0.20	3.5	0	100	90	110			
Sulfate	9.967	mg/L	0.50	10	0	99.7	90	110			
Sample ID: LCS		*LCS*				Batch ID:	**R48010**	Analysis Date:		9/27/2011 12:46:45 PM	
Fluoride	0.5148	mg/L	0.10	0.5	0	103	90	110			
Chloride	4.948	mg/L	0.50	5	0	99.0	90	110			
Nitrate (As N)+Nitrite (As N)	3.544	mg/L	0.20	3.5	0	101	90	110			
Sulfate	9.933	mg/L	0.50	10	0	99.3	90	110			
Sample ID: 1109882-01AMS		*MS*				Batch ID:	**R48002**	Analysis Date:		9/26/2011 2:40:05 PM	
Fluoride	0.8822	mg/L	0.10	0.5	0.437	89.0	71.7	114			
Chloride	11.62	mg/L	0.50	5	6.789	96.6	78	107			
Sulfate	43.95	mg/L	0.50	10	35.1	88.4	87	106			
Method: SM 2320B: Alkalinity											
Sample ID: 1109882-01AMSD		*MSD*				Batch ID:	**R48023**	Analysis Date:		9/26/2011 8:04:00 PM	
Alkalinity, Total (As CaCO3)	248.8	mg/L Ca	20	80	189.8	73.8	37.1	121	1.99	7.21	
Sample ID: MB-1		*MBLK*				Batch ID:	**R48023**	Analysis Date:		9/26/2011 7:07:00 PM	
Alkalinity, Total (As CaCO3)	ND	mg/L Ca	20								
Carbonate	ND	mg/L Ca	2.0								
Bicarbonate	ND	mg/L Ca	20								
Sample ID: LCS-1		*LCS*				Batch ID:	**R48023**	Analysis Date:		9/26/2011 7:14:00 PM	
Alkalinity, Total (As CaCO3)	85.40	mg/L Ca	20	80	8.48	96.2	90	110			
Sample ID: 1109882-01AMS		*MS*				Batch ID:	**R48023**	Analysis Date:		9/26/2011 7:46:00 PM	
Alkalinity, Total (As CaCO3)	253.8	mg/L Ca	20	80	189.8	80.0	37.1	121			

Qualifiers:

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QA/QC SUMMARY REPORT

Client: Water Solutions
Project: Debontin RG-92910 **Work Order:** 1109882

Analyte	Result	Units	PQL	SPK Va	SPK ref	%Rec	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Method: SM2540C MOD: Total Dissolved Solids											
Sample ID: 1109882-01AMSD		*MSD*				Batch ID: **28615**		Analysis Date:		9/30/2011 11:28:00 AM	
Total Dissolved Solids	1284	mg/L	20.0	1000	269	102	80	120	0.156	5	
Sample ID: MB-28615		*MBLK*				Batch ID: **28615**		Analysis Date:		9/30/2011 11:28:00 AM	
Total Dissolved Solids	ND	mg/L	20.0								
Sample ID: LCS-28615		*LCS*				Batch ID: **28615**		Analysis Date:		9/30/2011 11:28:00 AM	
Total Dissolved Solids	1007	mg/L	20.0	1000	0	101	80	120			
Sample ID: 1109882-01AMS		*MS*				Batch ID: **28615**		Analysis Date:		9/30/2011 11:28:00 AM	
Total Dissolved Solids	1286	mg/L	20.0	1000	269	102	80	120			
Method: EPA Method 180.1: Turbidity											
Sample ID: MB		*MBLK*				Batch ID: **R47968**		Analysis Date:		9/26/2011 2:56:00 PM	
Turbidity	ND	NTU	0.50								

Qualifiers:

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J	Analyte detected below quantitation limits	NC	Non-Chlorinated
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits