

NA

DOC # 0746778
07/09/2009 02:52 PM Deputy: SD

OFFICIAL RECORD

Requested By:

DC/PUBLIC WORKS

Assessor's Parcel Number: N/A

Date: JULY 8, 2009

Recording Requested By:

Douglas County - NV
Karen Ellison - Recorder

Page: 1 Of 8 Fee: 0.00
BK-0709 PG-1862 RPTT: 0.00



Name: EILEEN CHURCH, PUBLIC WORKS

Address: _____

City/State/Zip: _____

Real Property Transfer Tax: \$ N/A

CHANGE ORDER NO 02R (#2009.182)

(Title of Document)

CHANGE ORDER

No. 02R

PROJECT: Jobs Peak Well No. 2 Replacement

DATE OF ISSUANCE: June 22, 2009

EFFECTIVE DATE: June 22, 2009

OWNER: Douglas County

OWNER's Contract No. DO-2009-210

CONTRACTOR: Agua Drilling and Pumping

ENGINEER: Cathe Pool, PE

You are directed to make the following changes in the Contract Documents.

Description: Install a temporary casing to 165 and perform a second pump test to verify the yield of the aquifer below 75 feet, the potential depth of the sanitary seal.

Reason for Change Order: Based on the review of the first pump test, the well yield is 100 gpm. In order to determine if a 75 foot sanitary seal would increase the yield sufficiently, a second pump test is needed before the well is cased.

Attachments: Memo from Dale Bugenig at Ecologic.

FILED
 2009 JUL -8 PM 2:30
 TEDI THREANIE
 CLERK
 DOUGLAS COUNTY
 2009.7.8

CHANGE IN CONTRACT PRICE: Original Contract Price \$192,201.67	CHANGE IN CONTRACT TIMES: Original Contract Times Substantial Completion: <u>September 10, 2009</u> Ready for final payment: <u>October 8, 2009</u>
Net changes from previous Change Orders No. _____ to No. 1 \$17,728.52	Net change from previous Change Orders No. _____ to No. 1 2 days
Contract Price prior to this Change Order \$209,930.19	Contract Times prior to this Change Order Substantial Completion: <u>September 12, 2009</u> Ready for final payment: <u>October 10, 2009</u>
Net Increase (decrease) of this Change Order \$5,091.00	Net Increase (decrease) of this Change Order 2 days
Contract Price with all approved Change Orders \$215,021.20	Contract Times with all approved Change Orders Substantial Completion: <u>September 14, 2009</u> Ready for final payment: <u>October 12, 2009</u>

RECOMMENDED:
 By: [Signature]
 Engineer (Authorized Signature)

APPROVED:
 By: [Signature]
 Owner (Authorized Signature)

ACCEPTED:
 By: [Signature]
 Contractor (Authorized Signature)

Date: 6/26/09

Date: 7/2/09

Date: 06-29-09

10381 Double R Boulevard
Reno, NV 89521775.827.2311 TEL
775.827.2316 FAX

Memorandum

To: Cathe Pool P.E.
From: Dale Bugenig
CC: Ray Kruth, Mark Hanneman
Date: June 20, 2009
Re: Job's Peak Well 2 Replacement – June 19, 2009 Pumping Test Results and Well Design Recommendations

1.0 June 19, 2009 Pumping Test

Aqua Drilling installed temporary 6 5/8-inch outside diameter well casing to a depth of 165 feet to facilitate test pumping the pilot hole for the replacement for Job's Peak Well 2 (referred to as Well 2R). The test was performed to evaluate the effect of installing a sanitary seal to a depth of 100 feet and well screen beginning 105 feet below land surface (bls), versus the 50 feet deep seal and perforations starting at 55 feet bls in the existing Well 2. From the onset of the project there has always been a concern that a significant portion of the groundwater derived from Well 2 originated at relatively shallow depth.

Aqua installed a submersible pump in the well. Recording pressure transducers (In-Situ, Inc. LevelTROLL 700) were installed in the pumped well (Well 2R) and the existing Well 2 to measure and record water levels during and following a brief pumping test. The pumping rate was limited to approximately 40 gallons per minute (gpm) so that the contractor could contain all of the discharge from the well and testing was terminated when the available water storage was used up.

The drawdown and recovery data from the June 19th test are plotted in Figure 1, where they are compared with the drawdown from the 2005 test of Well 2. It is obvious from the test that the drawdown in Well 2R at a pumping rate of 41 gpm is significantly greater than the drawdown in Well 2 at a pumping rate of 90 gpm, which translates to an approximately 40% decrease in effective aquifer transmissivity compared to Well 2, based on transmissivity calculated from early-time drawdown data. These results appear to confirm the results of analysis of previous test pumping and a fluid-entry survey that suggested a significant portion of the groundwater pumped from Well 2 originated at relatively shallow depths. As a result, it is our opinion the replacement well may be expected to yield approximately 90 to 100 gpm.

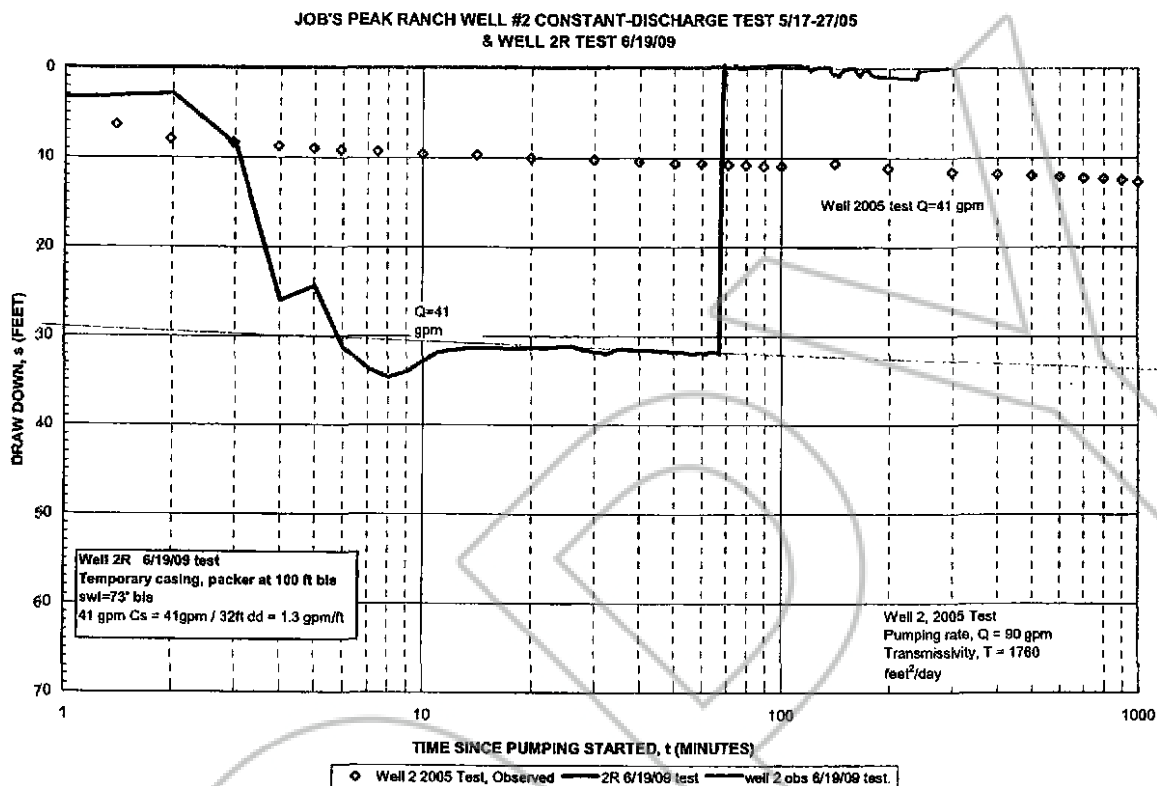


Figure 1: Well 2R pumping test data.

2.0 RECOMMENDATIONS FOR COMPLETION OF WELL 2R

Casing size and material

The preliminary design of Well 2R called for 10 ¾-inch diameter outside diameter stainless steel well casing and screen. Stainless steel was specified because of the corrosive nature of the groundwater in the aquifer at this locale. The diameter of the well was deliberately oversized, considering a target yield of approximately 200 gpm. The primary reason is that the submersible pump must be equipped with a shroud to direct the flow of water over the motor, because most of the groundwater entering the well was expected to originate above the pump. A nominal 6-inch diameter pump will require a nominal 8-inch diameter shroud, which in turn requires nominal 10-inch diameter well casing. Consequently, we do not recommend reducing the well diameter. Another reason not to downsize the diameter of the well bore and the well casing is that the larger diameter well has an opportunity to intersect more fractures in the granitic rocks. Unlike wells completed in alluvial deposits, where a larger well diameter has only a small influence on well performance, a larger-diameter well in fractured rocks often (but not always) can yield significant increases in well performance.

We strongly recommend staying with the well design, which calls for constructing the well with stainless steel well casing. Given the corrosive nature of the groundwater, the only alternative material is PVC. The primary concern we have with PVC casing is the potential for casing collapse due to the heat of hydration of the cement grout annular seal. The heat of hydration is controlled primarily by the thickness of the annular space surrounding the casing. So long as the annulus is

small, say, no more than about three inches, and the height of the seal is also small, the risk of collapsing the casing is small. However, the seal in this well is to be installed to a depth of 100 feet., which will exert considerable pressure on the lower portion of the casing. The alluvial deposits that overly the granitic bedrock contain boulders and cobbles and it is probably that there are portions of the well bore that are certain to be larger than the diameter of the bit. Furthermore, the piezometric level in the aquifer is 73 feet below the land surface, so there is no groundwater above a depth of 73 feet that might help to conduct heat away from the well as the grout cures. We have experienced casing collapse with as little as an 11-foot deep cement grout seal.

Filter pack

As you are aware, the discharge from the well during the June 19th test contained a large amount of fine sand, which is derived from highly-weathered granitic rocks. We performed an analysis of the sand, which yielded a D_{70} retained of 0.0072 inches. The results are shown in Figure 2.

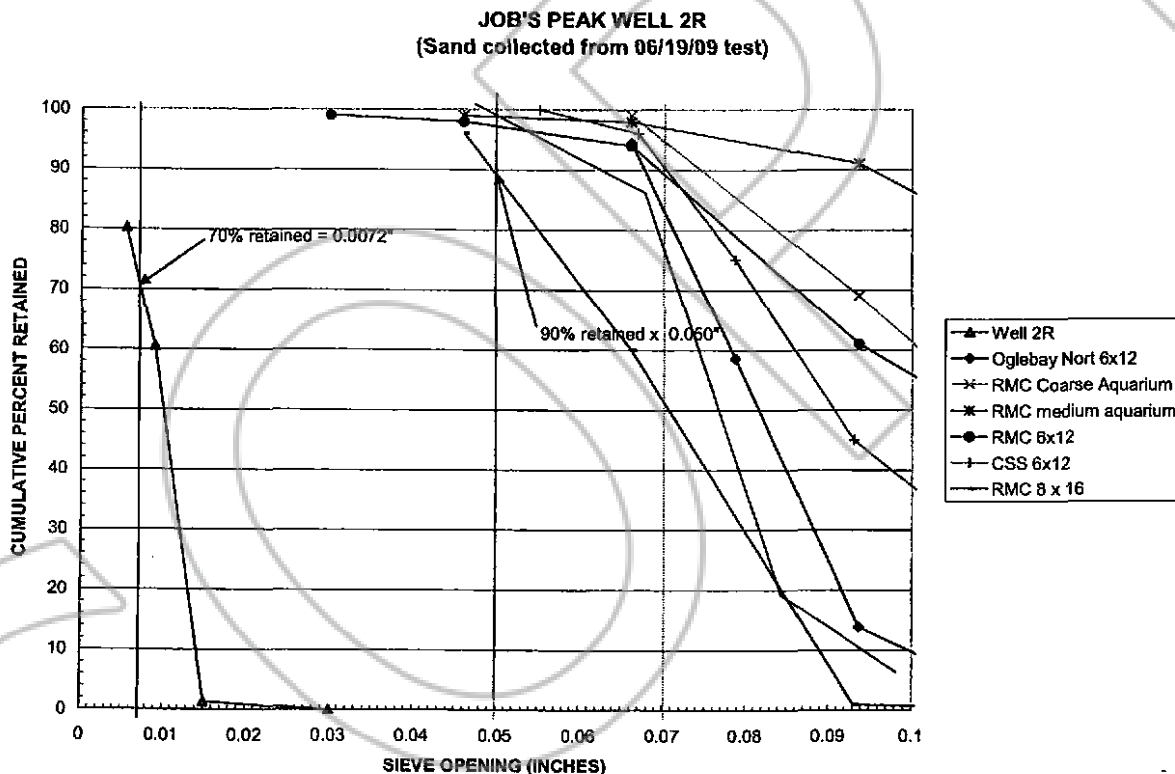


Figure 2: Well 2R sieve analysis.

On the basis of the sieve analysis, we have revised our initial recommendation for filter pack and screen aperture width. Our current recommendation is RMC 8 x 12 mesh filter pack or equivalent, which is compatible with 0.050-inch slot aperture width screen.

The recommended design is provided in Table 1.

Table 1: Jobs Peak Production Final Well Design

Depth Interval (feet bgs.)	Description	Length (feet)*
+1 to 5 feet	10.75-inch outside diameter blank Mild Steel well casing with a wall thickness of 0.250 inch. Welded steel plate on top. Note this will be removed when the pitless adapter is installed.	6
5 to 105	10.75-inch outside diameter blank Type 304 Stainless Steel well casing with a wall thickness of 0.250 inch.	100
105 to 180	10.75-inch outside diameter Type 304 Stainless Steel , continuous slot, shaped wire wound well screen with an aperture width 0.050-inch.	75
180 to 200	10.75-inch outside diameter blank Type 304 Stainless Steel well casing with a wall thickness of 0.250 inch.	20
200 to 220	10.75-inch outside diameter Type 304 Stainless Steel , continuous slot, shaped wire wound well screen with an aperture width 0.050-inch.	20
220 to 230	10.75-inch outside diameter blank Type 304 Stainless Steel well casing with a wall thickness of 0.250 inch.	10
	Welded-on Type 304 Stainless Steel end cap.	
OTHER		
+2 to 103	Gravel Fill Pipe. 3-inch diameter, type 304 Stainless Steel	105
OTHER		
Ground surface to 5	Open hole for installation of pitless adapter	5
5 to 97	Cement grout sanitary seal. Cement grout pumped to 5 ft bgs via a tremie pipe.	92
97 to 100	Grout cutoff. Coated 3/8-inch bentonite pellets placed via a tremie pipe.	3
100 to 240	Filter pack. 8 x 16 mesh RMC Pacific "Lapis Lustre Sand" placed via a tremie pipe. Chlorine must be added to the filter pack during emplacement.	140
240 to 250	Backfill per Nevada regulations	10

* Screen lengths shown above should include length of weld rings at the ends of the vertical bars such that overall length and depth of casing is as shown.

**AQUA DRILLING
&
WELL SERVICE, INC.**

Proposal

675 EDISON WAY
RENO, NEVADA 89502
WWW.AQUADRILLING.COM

PROPOSAL NO.

4215

DATE

6/22/2009

Douglas County Public Works
PO Box 218
Minden, NV 89423

PHONE	FAX

DESCRIPTION	QTY	COST	TOTAL
RE: Job's Peak Ranch Well No. 2 Replacement Project- Additional Work Outside of Scope of Contract Raise Packer to 75' Level & Test Pump for (3) Hours		5,091.00	5,091.00

Due to rapidly changing costs, prices are subject to change. Sales tax is included. Aqua does no excavating or backfilling.

TOTAL \$5,091.00

COPY

CERTIFIED COPY

The document to which this certificate is attached is a full, true and correct copy of the original on file and on record in my office.

DATE: July 8, 2009
[Signature] Clerk of the 9th Judicial District Court
of the State of Nevada in and for the County of Douglas.
By [Signature] Deputy