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Spring Creek Replacement Well No.5
Well Construction & Test Pumping
Summary Report

WASHOE COUNTY

DEPARTMENT OF WATER RESOURCES

4930 ENERGY WAY RENO, NEVADA 89502

Department of Water Resources

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Well Construction & Test Pumping
Summary Report

Prepared by:
Washoe County Department of Water Resources
Water Resources Planning Division
February 2006

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1.0 Summary and Conclusions

In 2000 Spring Creek Well No. 5 (SC5-Old Well) was producing large enough volumes of sand during supply pumping that the well had to be removed from service. It was determined that sand production could not be decreased by reducing the well's pumping rate without adversely limiting the wells production capability. A replacement well was considered the best solution for preventing sand from entering the water system with the potential bonus for increasing pumping capacity since the existing well produced only 250 gallons per minute (gpm). It was anticipated that the tertiary volcanic aquifer that Spring Creek Well No. 6 was completed in could be intercepted during drilling at this location. In June 2000, the bid for construction and testing of a 12-inch diameter production well was awarded to Humboldt Drilling and Pump Company of Winnemucca, NV. The contractor started the drilling project on July 21, 2000 and completed well construction and development on September 8, 2000.

1.1 Results

The 12-inch diameter production well was constructed to a total depth of 620 feet by the dual-tube reverse circulation method. A 7-hour step test consisting of four steps at the pumping rates of 408, 618, 805 and 1000 gpm was conducted. Well efficiency ranged from 64% at 408 gpm to 42% at 1000 gpm. A 48-hour constant discharge test and recovery test were conducted from September 5-8, 2000. Static water level in the well was measured at 49.75 feet below ground level prior to start of constant discharge testing. An aquifer transmissivity of 43,500 gallons per day per foot (gpd/ft) and a horizontal hydraulic conductivity of 17 feet per day were calculated for the production well from the constant discharge test data. An aquifer storativity of 8×10^{-5} was determined from observation data collected in the SC5-Old Well located 18 feet away.

Sand content measured during constant discharge testing reached <5 parts per million (ppm) within 15 minutes from start of testing and remained below 5 ppm for remainder of the pumping test. A water sample was collected during the first day of the aquifer stress test by department staff for complete organic and inorganic compound testing. Water quality test analyses show Spring Creek Well No. 5 meets primary and secondary drinking water standards for the State of Nevada as well as all requirements specified by the federal Safe Drinking Water Act. Complete analyses are included in the appendix.

1.2 Recommended Pumping Rate and Pump Setting

The SC5-New Well can be equipped to pump at 1000 gpm based on the results of the constant discharge test. A pumping level of approximately 187 feet with 137 feet of drawdown after 30 days of continuous pumping is predicted at this rate. It is recommended that the pump be set in a blank section located between 480 and 500 feet. The new well was immediately fitted for a capacity of 330-350 gpm as an interim solution for supply pumping until the facility was upgraded to handle the higher design pumping rate.

1.0 Summary and Conclusions

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2.0 Location

Figure 1 is a location map showing system location of the SC5-New Well. Location coordinates and wells used during aquifer testing are found in Table 1. Distances between production wells are also included.

Well	Latitude	Longitude	Distance from SC5
Spring Creek Well 4	39° 38′ 31″ North	119° 40′ 34″ West	2310 Feet
SC5-Old Mon. Well	N/A	N/A	18 Feet
Spring Creek Well 5	39° 38′ 6″ North	119° 40′ 30″ West	0 Feet
Spring Creek Well 6	39° 37′ 44″ North	119° 40′ 30″ West	2150 Feet
Spring Creek Well 7	39° 36′ 32″ North	119° 40′ 38.″ West	4815 Feet

Table 1-Well Location and Distances

3.0 Well Construction and Testing

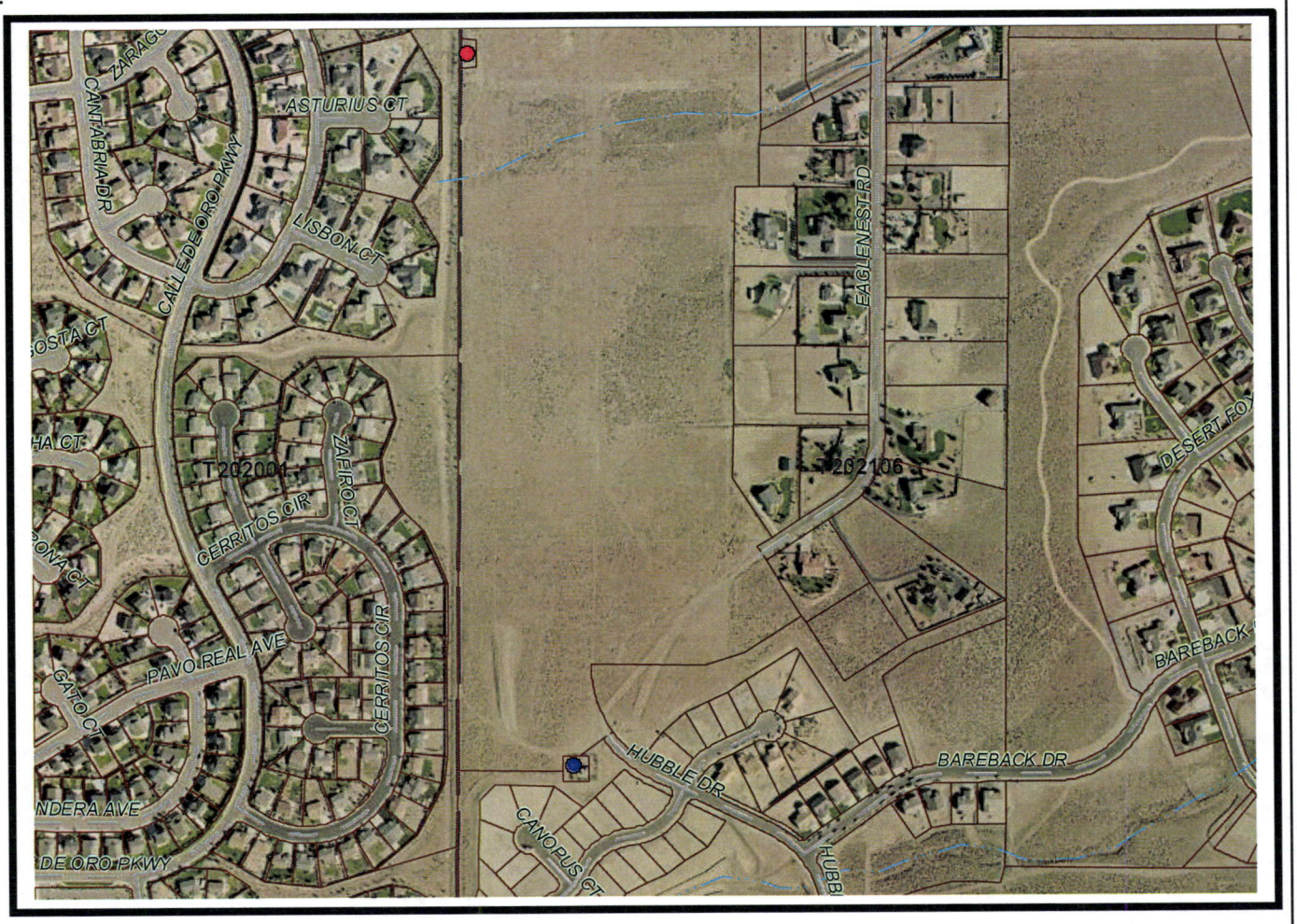
The conductor borehole was drilled using a bucket auger. The auger method was allowed in order to accelerate the start of the project even though the resulting conductor borehole was larger than specified in the drilling contract. The production casing borehole was drilled using the dual tube, reverse circulation method. The dual tube drilling method was selected in order to reduce drilling fluid infiltration into the aquifer during drilling and to help minimize loss circulation of drilling fluid in the borehole. Primarily potable water with minor use of polymer and bentonite additives was used during the first 300 to 400 feet of borehole drilling. As drilling progressed a higher viscosity bentonite and water drilling fluid was used. Two portable mud tanks were used to mix and hold the drilling fluid. A shaker with de-sanding cones was used to separate borehole cuttings from the drilling fluid and to help maintain a particulate free drilling fluid for return circulation into the borehole.

3.1 Construction Summary

Table 2 shows a well construction summary for Spring Creek Well No. 5. A copy of the well driller's report is found in the appendix. A final design diagram is shown in Figure 2.

Construction Item	Diameter	Interval	Length
Conductor Casing Borehole	36 Inches	0 to 100 feet	100 feet
Conductor Casing	20 Inches	+1 to 99 feet	100 feet
Production Casing Borehole	12 Inches	100 to 620 feet	520 feet
Blank Production Casing	12 Inches	+2 to 300 feet	302 feet
Blank Production Casing	12 Inches	480 to 500 feet	20 feet
Wire Wrap Well Screen, 50 slot (0.50")	12 Inches	300 to 480 feet	180 feet
Wire Wrap Well Screen, 50 slot (0.50")	12 Inches	500 to 620 feet	120 feet
Sanitary Surface Seal	Annulus	0 to 100 feet	100 feet

Table 2-Well Construction Summary



LEGEND

SC5-NEW WELL

SC4 PRODUCTION WELL

SCALE: 1-Inch = 400 Feet

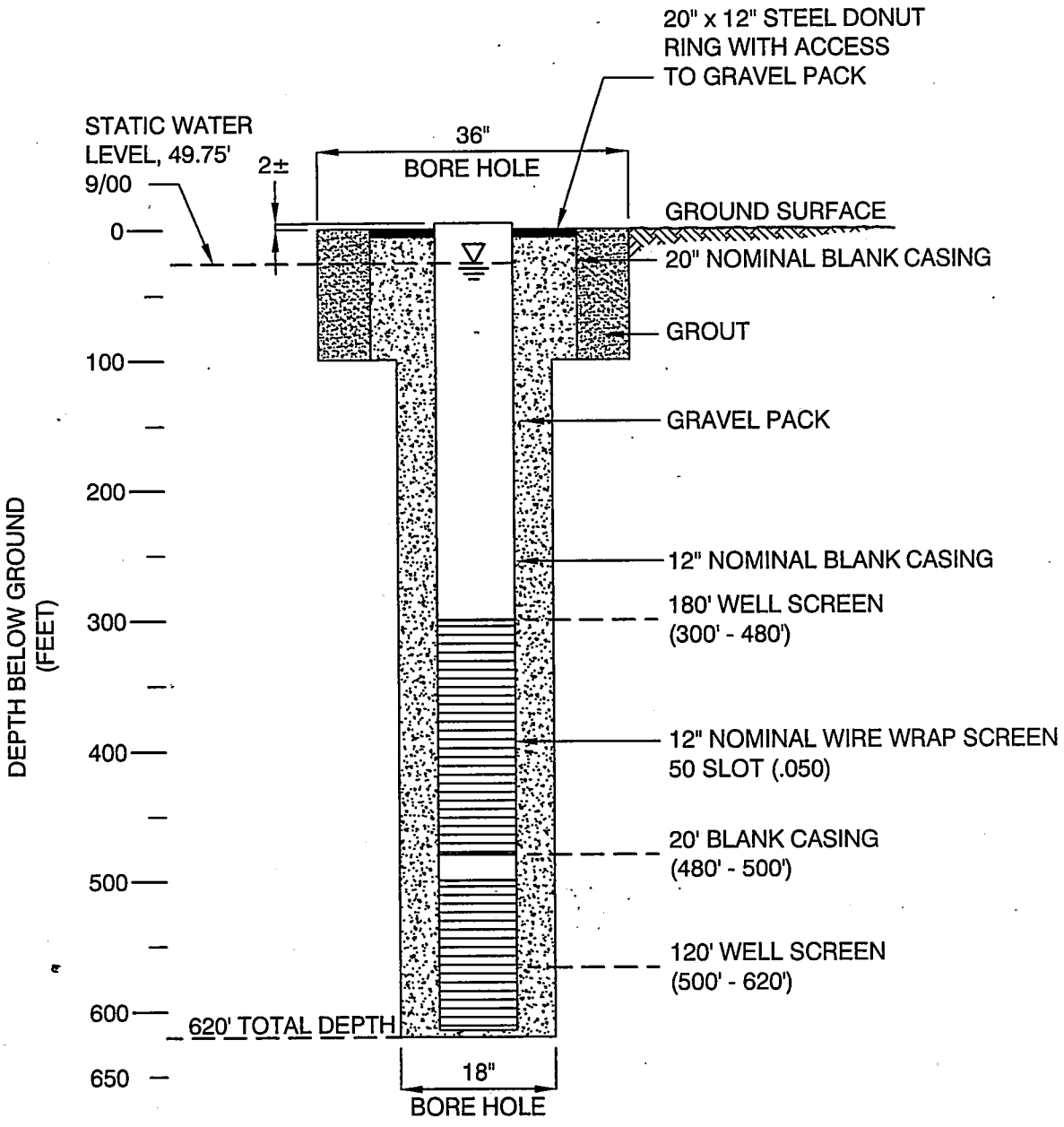
N

N.T.S.

Department of Water Resources
4930 ENERGY WAY
RENO, NV 89502
(775) 954-4600

SPRING CREEK REPLACEMENT WELL 5 LOCATION MAP

FIGURE 1



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SEAL OF WASHOE COUNTY * STATE OF NEVADA *

SPRING CREEK REPLACEMENT WELL #5 FINAL WELL DESIGN CROSS SECTION

FIGURE 1

Y:\hydrol\well diagrams\springcreek production well5.dwg Plotted: 09 Feb 06 – 1:56pm, Layout:Layout1

No additives were added to the grout slurry to the grout mix to accelerate the cure time of the seal. The sanitary seal remain undisturbed for 24-hours from placement of the first placement of grout. Centralizers were welded on the casing at 60-foot intervals.

3.2 Gravel Pack Installation

The production well was installed with a gravel envelope consisting of well rounded, siliceous 1/4-inch by 1/8-inch gravel supplied by Silica Resources Inc., Auburn, California. The gravel was funneled from plastic shipping bags using a gravel bin set on the top of the conductor casing since the static water level was 49 feet below ground level. A steel, sanitary doughnut seal with a two inch diameter gravel access cap was welded between the 20-inch conductor casing and 12-inch production well casing.

Gravel pack installation required substantially more gravel than estimated in the drilling contract. 121 yds^3 of gravel was installed compared to the design estimate of 22 yds^3. A reason for the excessive amount of required gravel pack may be voids in the fine aquifer material because of sand pumping from the old SC5-Old Well. This action may have also disturbed the borehole formation material enough to facilitate continued sloughing during drilling. It is also believed that the Contractor's decision to drill the upper portion of the borehole using only water and/or a low viscosity bentonite based drilling fluid enhanced the problem and aided in the removal of uncommonly large amounts of formation material. Correspondences concerning the volume of gravel needed for project completion occurred between the Contractor and Owner and are documented in the appendix.

3.3 Airlift and Pumping Development

The production well was developed for 36 hours using a surge block tool that combined mechanical surging with airlifting. The surge tool was constructed using a short section of perforated pipe separated by tight fitting rubber packers at the top and bottom. The screen was airlifted in approximately 20-foot sections until the discharge water was relatively clear of drilling fluid and suspended material. The well was then developed by pumping at the design rate of 700 gpm for 24 hours prior to testing. The use of the chemical dispersant product NU-Well 220(US Filter) was applied during pump development. The product was poured into the well during pump installation and worked by "raw hiding"; a process where the water in the well is moved up the discharge pipe during power on but the pump is shut off before surface discharge occurs thereby allowing the raised column of water to fall back into the well and create agitation. Pump development was continued in incremental stages starting at a reduced pumping rate and maintained at the same rate until discharge was producing relatively sand free water between 1-5 ppm.

4.0 Aquifer Testing

A submersible pump was installed at a pump setting of 210 feet for step drawdown and aquifer testing. Power to the pump was supplied by a Whisper Watt quiet running, portable generator. A gate valve installed at the discharge head was used to maintain a constant flow rate during testing.

The discharge rate was measured using an 8-inch x 6-inch orifice weir discharge assembly with an in-line manometer. A Rossum sand testing device was installed in front of the orifice weir on the discharge pipe. Pumping discharge was allowed to travel over open ground to a drainage ditch located at the eastern edge of the Cimarron subdivision.

An In-Situ 100 psi pressure transducer was installed in the pumping well and connected to a Hermit 3000^{TM} data logger to collect measurements during step and constant discharge testing. The water level in the SC5-Old Well was manually measured using an electric water level indicator. Water levels were also hand measured periodically in the test well as a precaution in case of data logger or transducer failure. A summary of pumping tests performed is found in Table 3.

Test	Date	Start (Hour)	Stop (Hour)	Duration (min)	Rate (gpm)
Step Test	9/1/00	0915	1545	400(6.5 hrs)	408, 618 806, 1000
Constant Discharge	9/5/00 9/7/00	0930	1030	2,940(49 hrs)	800
Recovery	9/7/00 9/8/00	1030	1130	1,500(25 hrs)	0

Table 3-Pumping Tests Performed

A step drawdown test was performed to determine pumping level, specific capacity, and well efficiency at different pumping rates. A discharge rate for the aquifer stress test was selected on the results of the step drawdown test. The step drawdown data were analyzed with AquiferWin32 Analytical software using the Eden & Hazel, 1973 method. Table 4 summarizes the step drawdown analysis.

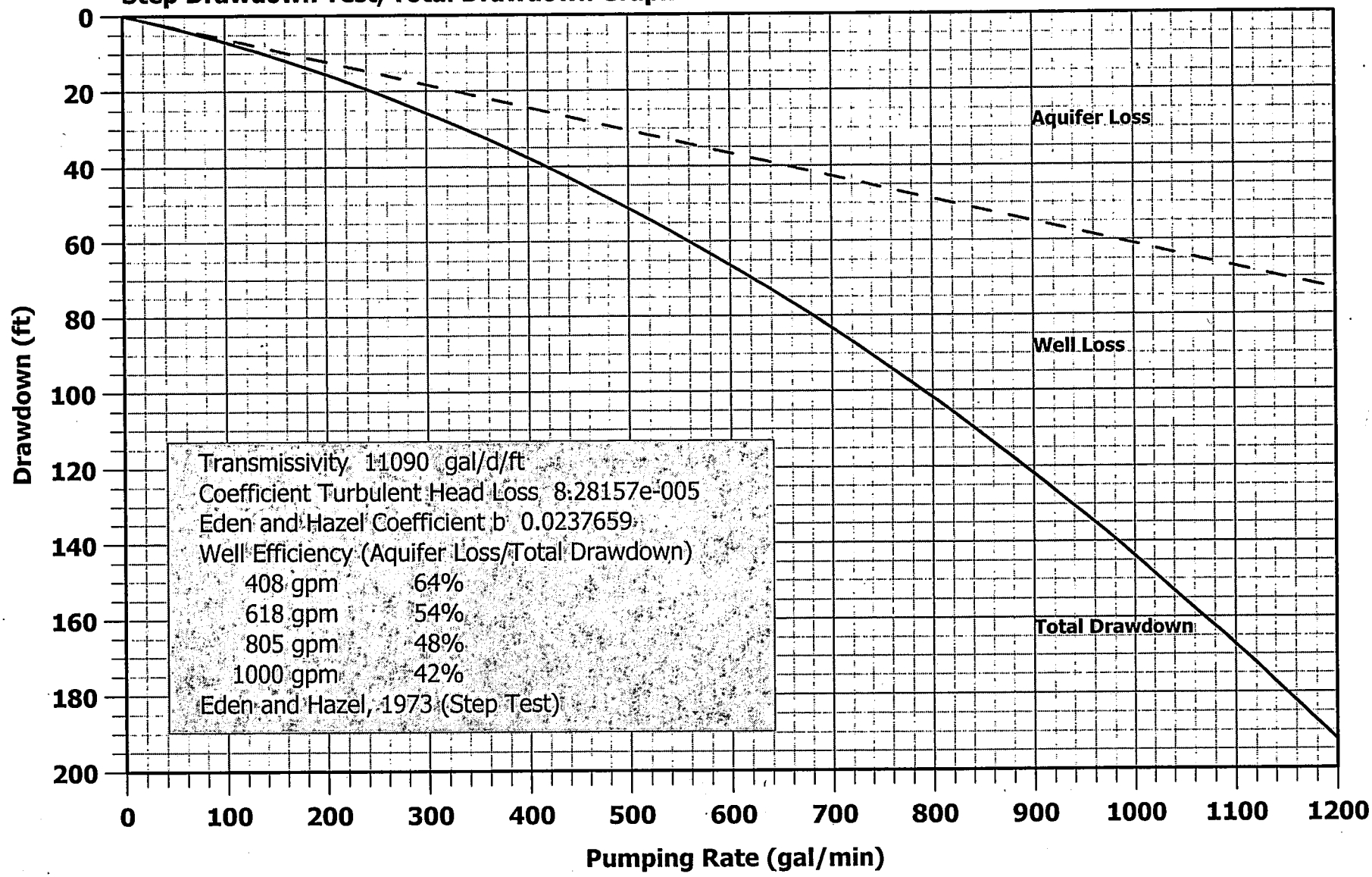
Step (n)	Pumping Rate (gpm)	Drawdown (ft.) @ 100 minutes	Spec. Capacity (gpm/foot)	Spec. Drawdown (feet/gpm)	Well Efficiency (%)
1	408	55.56	7.3	0.0541	64
2	618	71.25	8.5	0.0584	54
3	806	103.30	7.8	0.0641	48
4	1000	147.52	6.8	0.0694	42

Table 4-Step Drawdown Test Summary

4.1 Step Drawdown Test

A total drawdown and well loss graph is shown in Figure 3. The well efficiency range is typical for wells constructed in fractured rock aquifers. A significant portion of the drawdown in the SC5-New Well is calculated to be well loss that is created by movement of formation water from irregular formation fractures, into the artificial filter pack and through the well screen to the pump. The efficiency range also suggests that the problems associated with the installation of gravel pack

Figure 3
SC5-New Well
Step Drawdown Test, Total Drawdown Graph



probably added additional head loss because formation water is moving through a thicker than specified, non-uniform gravel pack envelope. Well efficiency (E) was calculated using the formula:

$$E = \frac{Aquifer\ Loss}{Total\ Drawdown}$$

4.2 Constant Discharge Test

A constant discharge test was performed on the SC5-New Well for 49 hours at a constant pumping rate of 800 gpm. The well was essentially sand free immediately upon start-up with a sand content of <1 ppm measured after 12 minutes. A maximum drawdown of 106.52 feet at a pumping level of 156.27 feet was measured at the end of testing.

Aquifer parameters from the aquifer stress test for all wells were calculated using the Cooper-Jacob straight-line method and the AquiferWIN32 computer program. All predicted drawdowns were generated using the same computer program. Aquifer parameters from the aquifer stress testing were analytically determined graphically in the field during testing using the Cooper-Jacob straight-line method and the following equations for transmissivity (T) in gallons per day per foot (gpd/ft) and storativity (S):

$$Transmissivity(T) = \frac{264Q}{\Delta s} \qquad Storativity(S) = \frac{0.3Tt_o}{r^2}$$

4.3 Transmissivity

Transmissivity from the constant discharge and recovery tests was estimated in detail using an analytical model in the AquiferWIN^{32} computer program. The Theis (1935) model for a well completed in a confined aquifer was the model selected for pumping analysis. A respective transmissivity of 42,000 gal/day/ft and 43,000 gal/day/ft were determined for the new pumping well and old well/observation well from the constant discharge test data.

Figure 4 shows the observed and simulated drawdown versus time plot from the constant discharge test for the SC5-New Well. The small break in data between 30-40 minutes was caused by a recording malfunction in the data logger. Figure 5 shows observed and simulated drawdown for the SC5-Old Well that was used as an observation well. An aquifer transmissivity of 42,500 gal/day/ft was determined from the constant discharge test data by averaging the individual values from each well. A horizontal hydraulic conductivity of 17 feet per day was determined by dividing the average transmissivity with the estimated total volcanic aquifer thickness of 330 feet (SC6 Driller's Report, 1997).

4.4 Storativity

A storativity of 8.0×10^{-8} was determined from the observation well constant discharge test data. This value may be adversely influenced by potential formation destruction around the old SC5 well from sand pumping, impacts from drilling or that the observation well is simply too close to the test

Figure 4
SC5-New Well
Constant Discharge Test

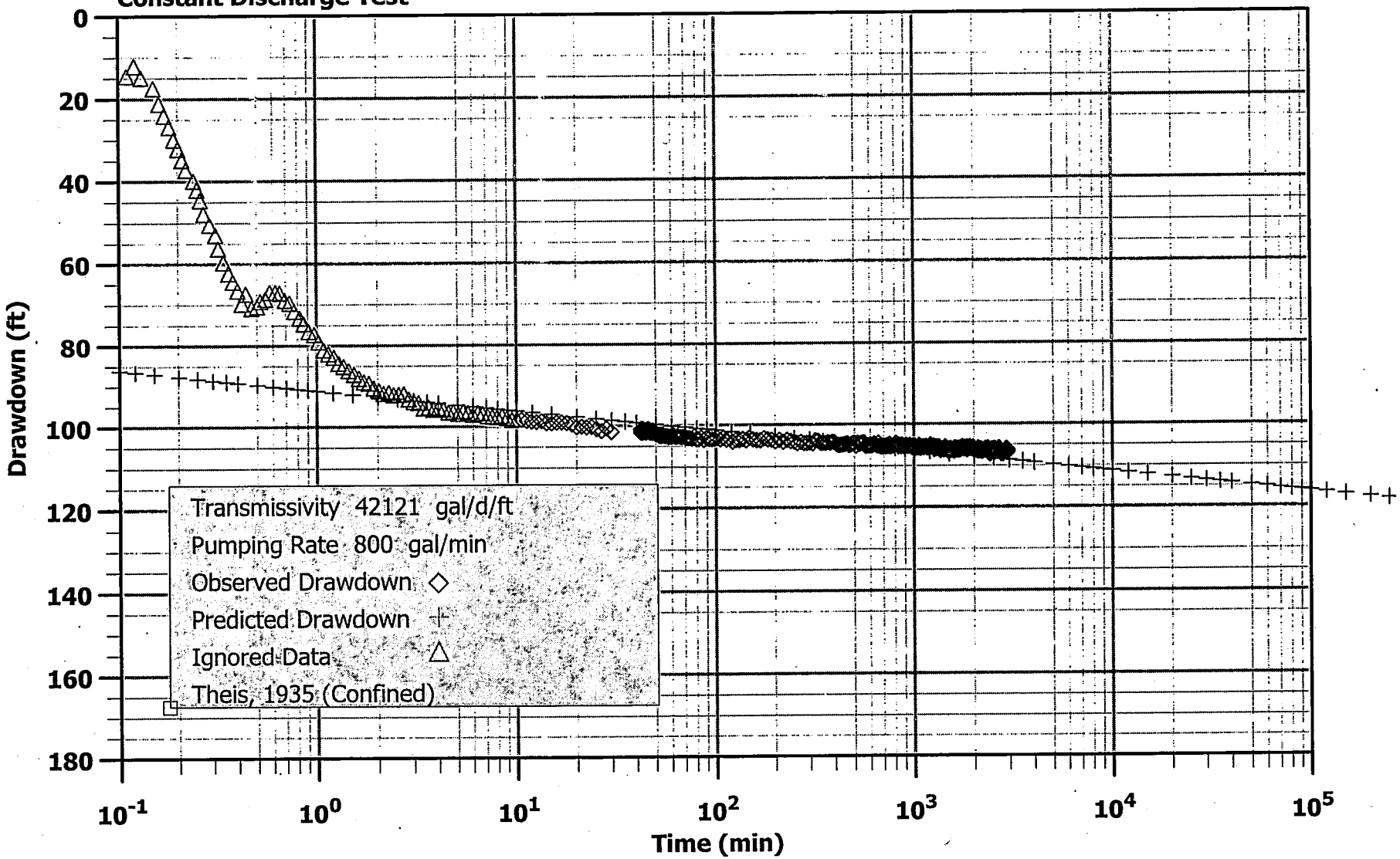
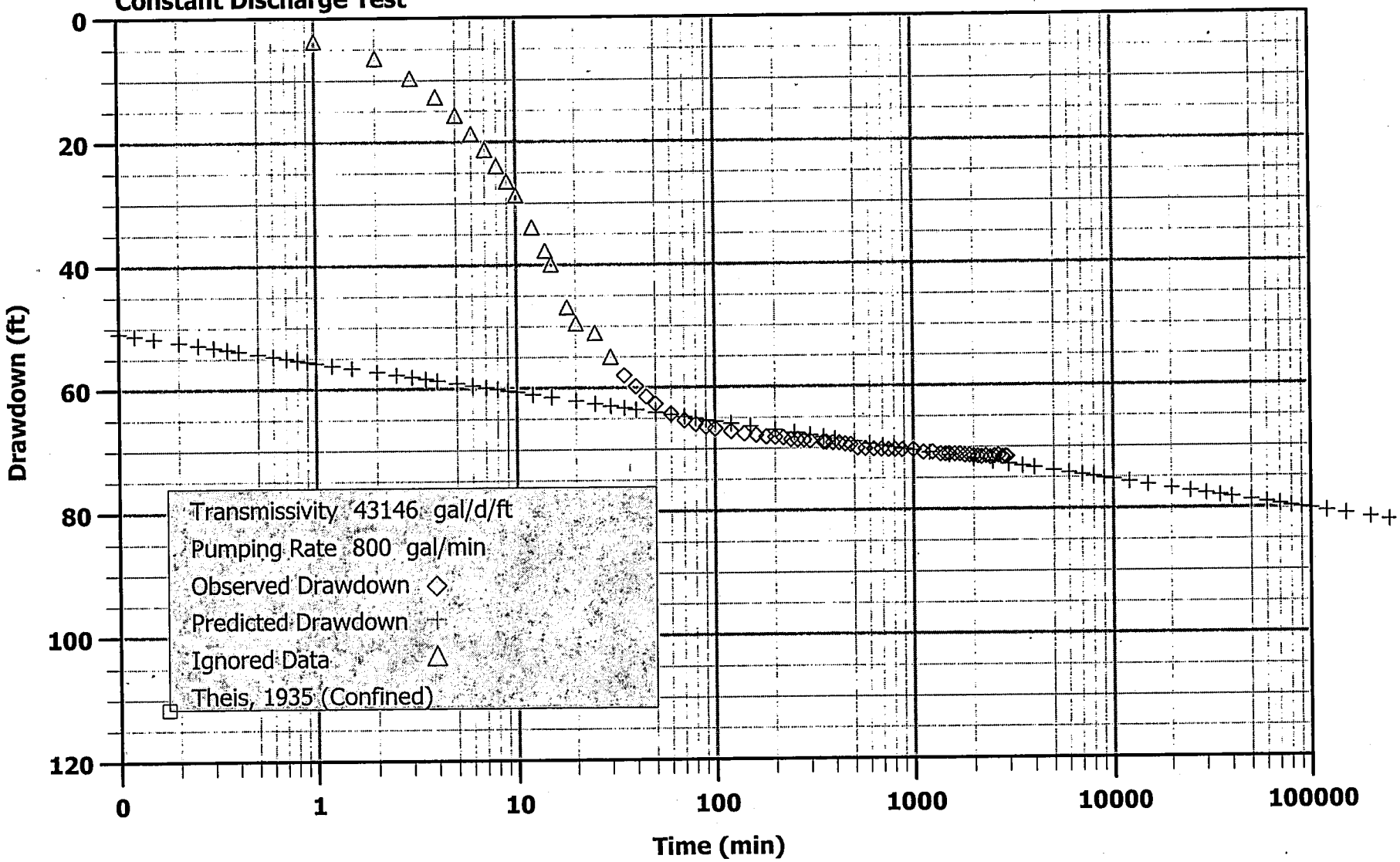


Figure 5
SC5-Old Well/Observation Well
Constant Discharge Test



well to determine an accurate storage coefficient. The slightly larger storativity of 8×10^{-5} determined from the SC5-Old Well recovery test data was ultimately selected as representative for the local aquifer formation.

4.5 Recovery Test

Recovery test analysis for the SC5-New Well yielded a transmissivity of 51,000 gal/day/ft with a transmissivity of 49,500 gal/day/ft determined for the SC5-Old Well. A storativity is not calculated in the computer program with this analysis method. A storativity of 8×10^{-5} was calculated graphically by the Cooper-Jacob straight-line method using the SC5-Old Well recovery data. A recovery test graph for the new production well is found in Figure 6. Water levels recovered to within 95% of the pre-test static water level within 10 minutes after constant test shut off and recovered above the pre-test static water level. This indicates that not enough time was allowed for the water level to recover after development and before start of testing. The rapid recovery further indicates a major portion of drawdown in the well is due to the fractured nature of the aquifer and well construction. A recovery test graph for the SC5-Old Well is shown in Figure 7.

5.0 Predicted Drawdown Estimates

The transmissivity of 42,500 gpd/ft, high horizontal hydraulic conductivity of 17 feet per day and a storativity of 8×10^{-5} indicate the formation penetrated by the production well is confined, laterally extensive and highly permeable. The aquifer parameters from the constant discharge test were used to predict drawdown in the new well at various pumping rates. Estimates for drawdown in the new well after 30 days of continuous pumping were calculated using AquiferWin32 and are shown in Figure 8. A summary of estimated drawdown and pumping levels for increasing pumping rates are found in Table 5. The design pumping rate and estimated drawdown is bold highlighted.

Pumping Rate GPM	30 Day Drawdown (Feet)	30 Day Pumping Level (Feet)
1000	**137**	**187**
1100	150	200
1200	164	214
1300	178	227
1400	191	241
1500	205	255

Table 5-Predicted Drawdown

6.0 Water Quality

Water quality samples for inorganic compounds, volatile organic compounds and synthetic organic compounds were collected during test pumping. Water samples for general inorganic compounds were collected after 24 hours of test pumping. Due to generator failure, a complete water quality sample wasn't collected until after completion of the well recovery test. The new well meets State Of Nevada primary and secondary drinking water standards for all parameters tested. A general

Figure 6
SC5-New Well
Recovery Test

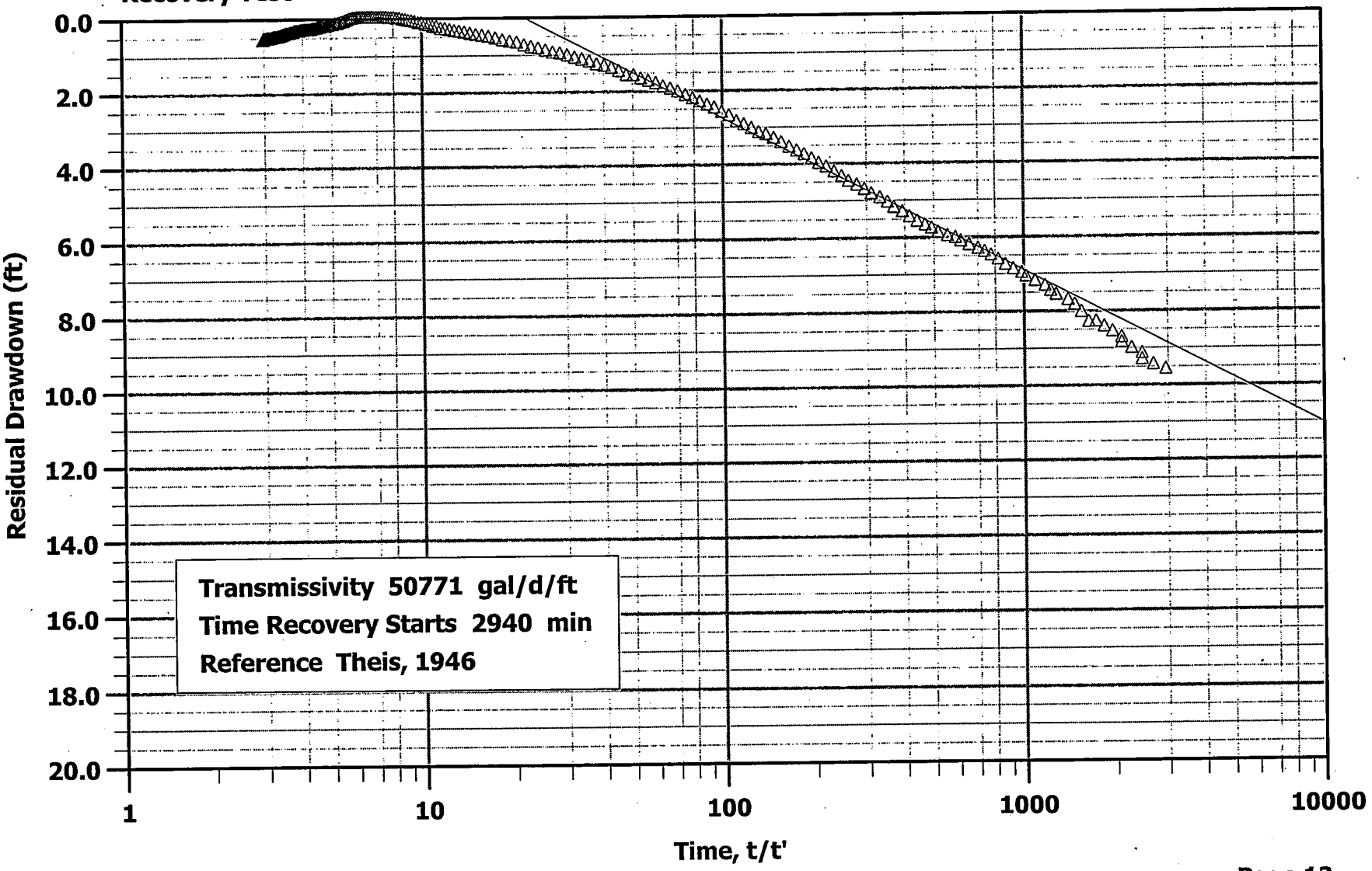


Figure 7
SC5-Old Well/Observation Well
Recovery Test

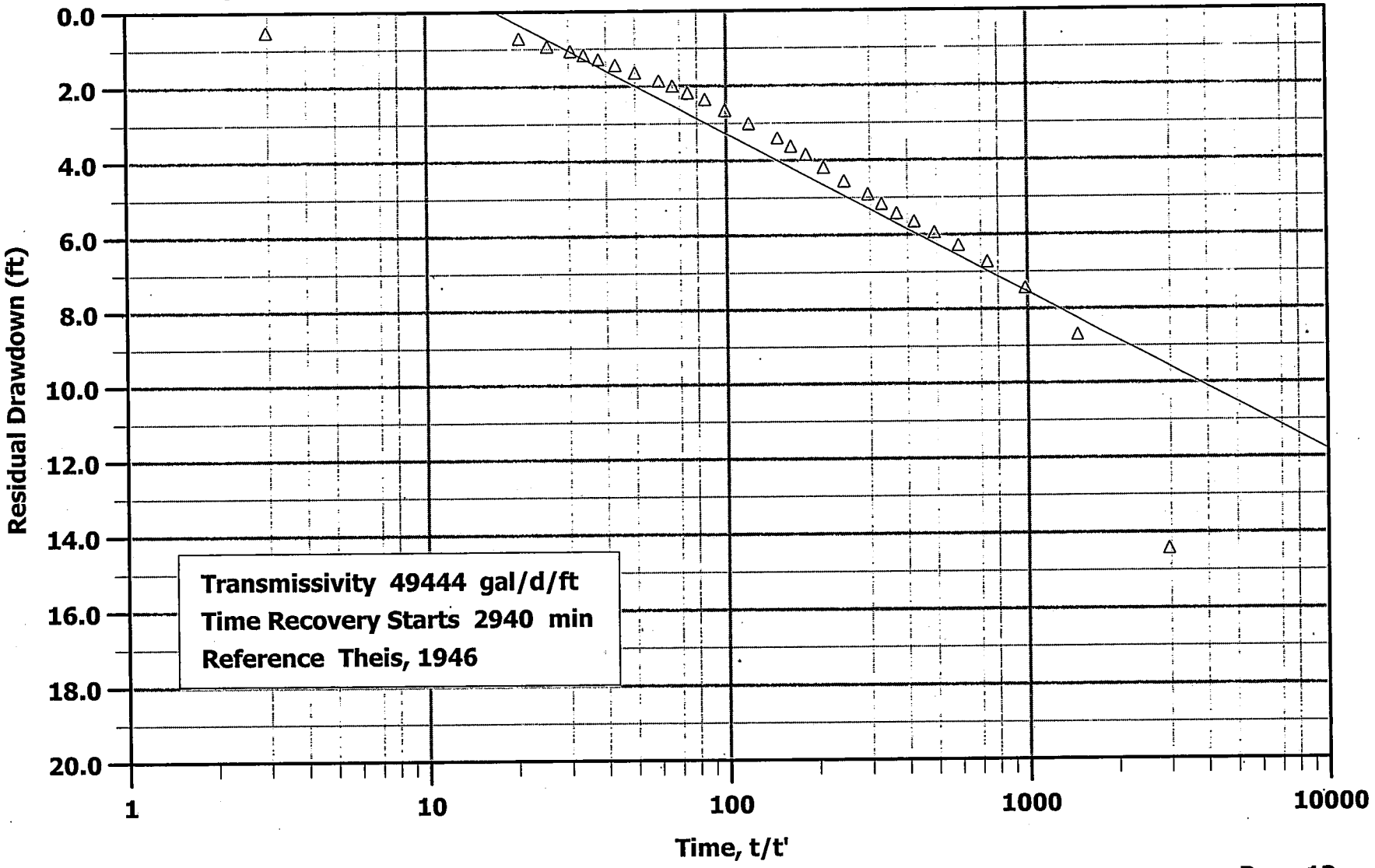
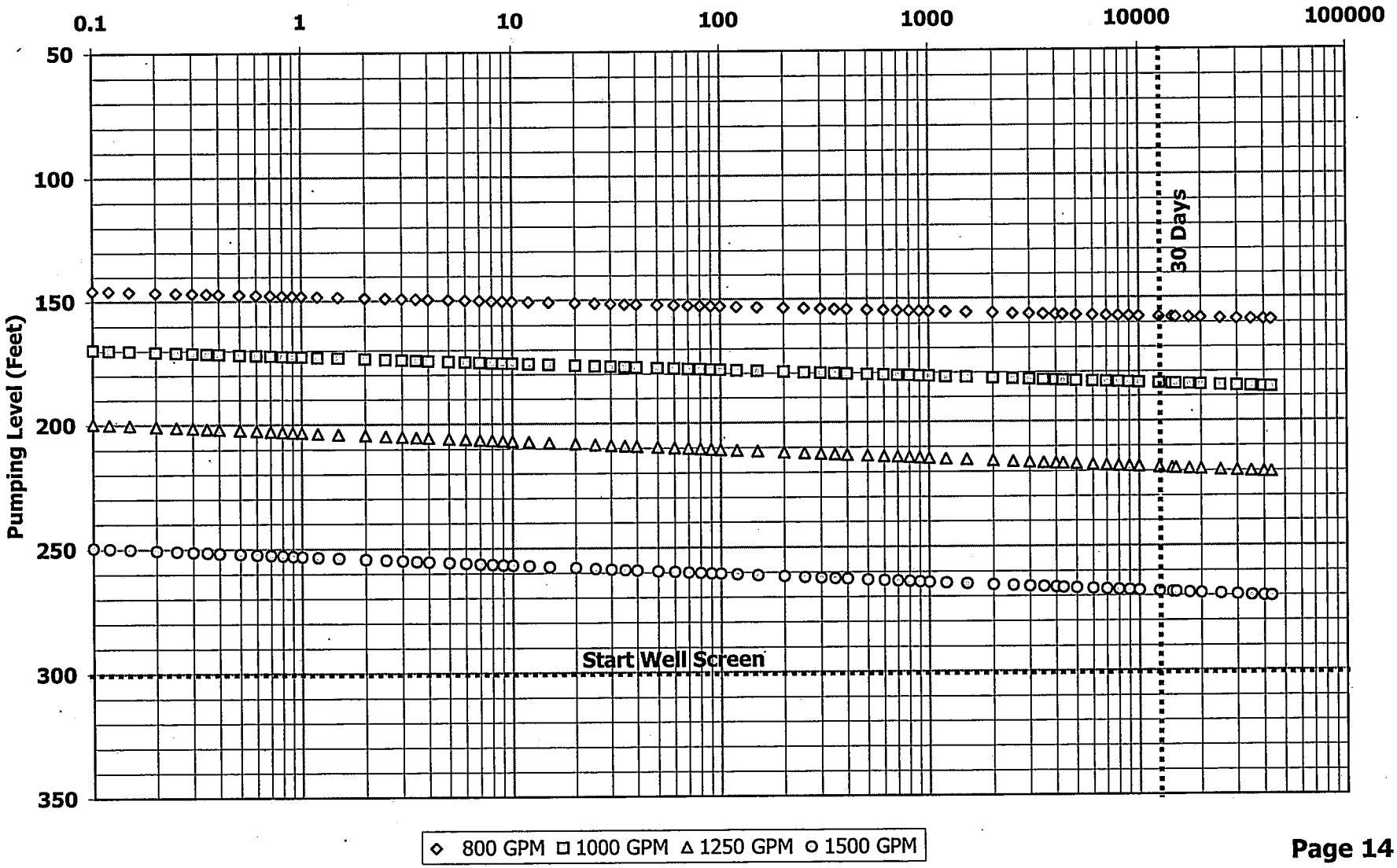


Figure 8
SC5-New Well
Predicted Drawdown



water quality summary for the well is found in Table 6. A complete water quality analyses for the well is found in the appendix.

Well	TDS	NO^3-N	SO^4	Cl	HCO^3	Fe	Na	K	Ca	Fl	As
SC5 New Well	157	2.1	14	7	102	0.12	30	2	10	0.19	0.005

Table 6-Water Quality Summary Values in mg/L

7.0 Down Hole Surveys

A suite of borehole geophysics was done on completion of borehole drilling to aid in determining well construction even though this was not a contract item. This was performed by an independent contractor (Dewey Data) with the graphical output found in the appendix.

Directional and video surveys were done on the well upon completion of testing. The directional survey was used to measure the vertical deviation of the well to verify the well met the contract specifications. A vertical deviation of not more than 0.67 feet per 100 feet or a cumulative total of 2.00 feet at the end of the 300-foot blank casing interval is required for passing. The SC5 New Well has a deviation of 4.38 feet at 300 feet or 2.2 times greater than allowed in the specifications. Due to the uneventful installation of a pump for aquifer testing it was decided that rejection of the well was unnecessary and the Contractor would adjust certain billable items to reflect a failure to maintain the plumbness requirements. A directional survey graph is shown in Figure 9. A video survey was conducted to document its construction and internal condition. A detailed copy of the directional survey is found in the appendix.

8.0 Design Recommendations

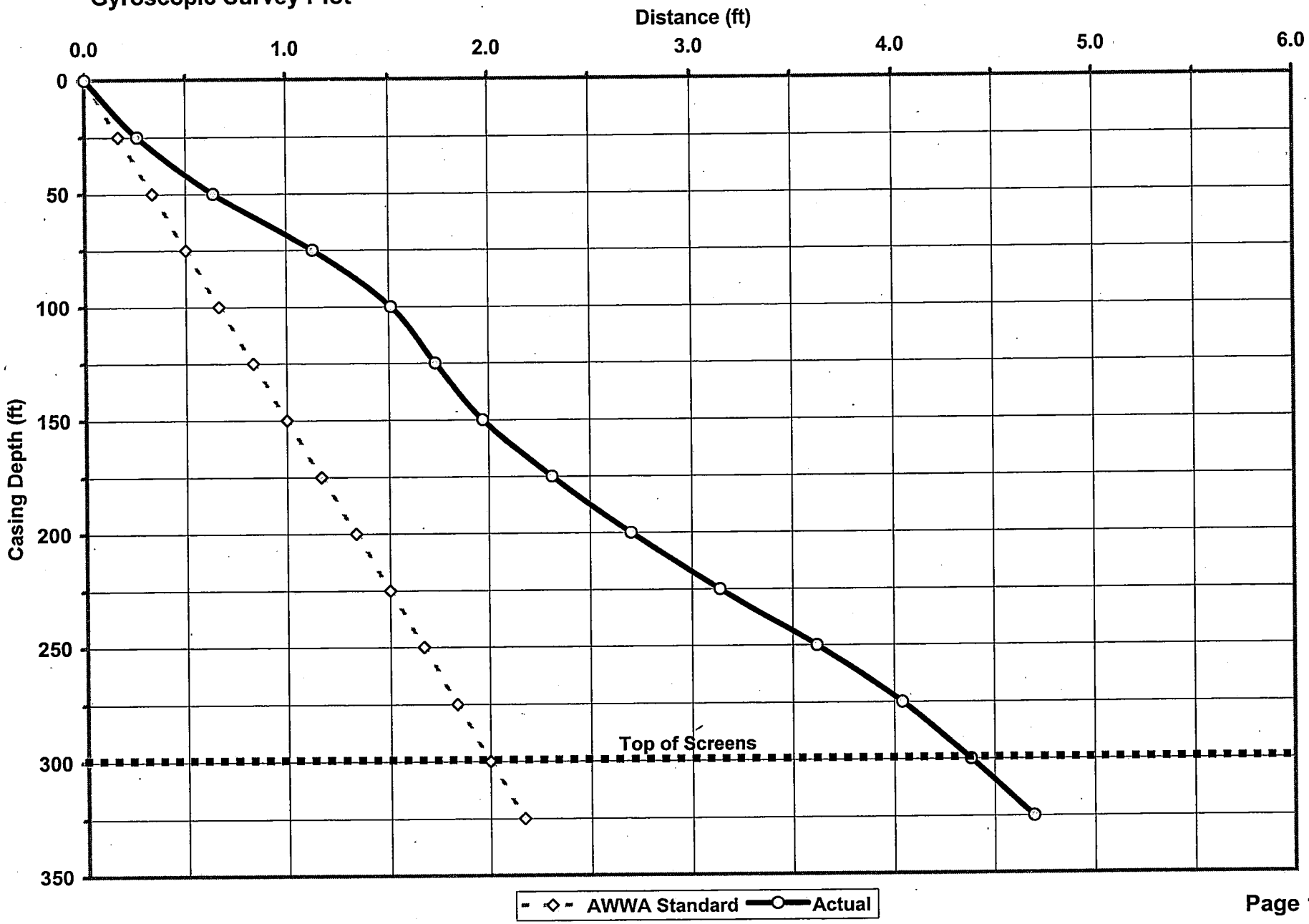
Staff recommends the following when equipping the new well. All recommendations are estimated after 30 days of continuous, non-stop pumping using a static water level of 50 feet.

Pump Capacity:	1000 GPM
Pump Intake Setting:	480 Feet
Drawdown:	137 Feet
Pumping Level:	160-187 Feet
Pump Submergence:	295 Feet
Well Efficiency:	42%

9.0 Temporary Pump Installation

The new well was temporarily equipped for a pumping capacity of 330 gpm in October 2000 by the contractor to incorporate the new well as a supply well until final distribution design and modifications were completed. Complete documentation of pump selection is in the appendix.

Figure 9
SC5-New Well
Gyroscopic Survey Plot



10.0 SC5-Old Well Abandonment

According to state statutes the SC5-Old Well had to be abandoned upon completion of the replacement well. The SC5-Old Well was abandoned using neat cement and since there was a possibility of cement migration into the new well a brief pumping test was performed on the replacement well on November 29, 2000 to verify specific capacity. A specific capacity of 11.5 gpm/ft was measured after 10 minutes of pumping at 340 gpm that corresponds with the step test specific capacities shown in Table 4. All documents pertaining to this process including cost proposals are found in the appendix.

APPENDIX

Spring Creek Well #5
Bid Results
5/31/00

Item Description	Quantity	Unit	Humboldt Drilling		Lang Exploratory Drilling		
			Unit Cost	Item Cost	Unit Cost	Item Cost	
Mobilization	1	LS	$12,368.00	$12,368.00	$13,300.00	$13,300.00	
26" min dia borehole	100	LF	$130.00	$13,000.00	$150.00	$15,000.00	
20" dia conductor casing	101	LF	$48.00	$4,848.00	$50.50	$5,100.50	
Sanitary seal	8	CY	$350.00	$2,800.00	$40.80	$326.40	(LF)
18" min dia prod casing borehole	500	LF	$65.00	$32,500.00	$80.00	$40,000.00	
Furnish/install 12' dia bland prod casing	300	LF	$28.00	$8,400.00	$28.50	$8,550.00	
Furnish/install 12' dia wire wrap well screen	300	LF	$42.00	$12,600.00	$49.75	$14,925.00	
Furnish/install design gravel pack	22	Yd3	$225.00	$4,950.00	$345.00	$7,590.00	
Air lift development by surging	36	HRS	$300.00	$10,800.00	$375.00	$13,500.00	
Furnish/install/remove nec equip for test pumping	400	LF	$15.00	$6,000.00	$18.00	$7,200.00	
Well development by pumping	24	HRS	$125.00	$3,000.00	$180.00	$4,320.00	
Operate/maintain nec equip for test pumping	80	HRS	$125.00	$10,000.00	$180.00	$14,400.00	
Video survey of the well	1	LS	$1,200.00	$1,200.00	$1,200.00	$1,200.00	
Plumbness & alignment test	1	LS	$1,200.00	$1,200.00	$1,700.00	$1,700.00	
Well disinfection & capping inc. doughnut ring seal	1	LS	$1,000.00	$1,000.00	$1,125.00	$1,125.00	
Standby hours	12	HRS	$200.00	$2,400.00	$240.00	$2,880.00	
				$127,066.00		**$151,116.90**	
						154,870.50	

SPRING CREEK WELL 5
FINAL COST
10/10/00

SPRING CREEK 5 ITEM		Quantity	Units	Price	Quantity Pay Est. 1	Cost Pay Est. 1	Amount Remaining	Percent Item Used
1	Mobilization	1	L.S.	12368.00	1.00	12368.00	0	100
2	Drill 26" Borehole	100	L.F.	130.00	100.00	13000.00	0	100
3	20" Conductor Casing	101	L.F.	48.00	101.00	4848.00	0	100
4	Sanitary Seal	8	Cu. Yds	350.00	20.00	7000.00	-12	250
5	Drill 18" Borehole	500	L.F.	65.00	547.00	35555.00	-47	109
6	12' Blank Casing	300	L.F.	28.00	322.00	9016.00	-22	107
7	12' Well Screen	300	L.F.	42.00	300.00	12600.00	0	100
8	Design Gravel Pack	22	Cu. Yds	225.00	121.20	27270.00	-99	551
9	Air lift Development	36	Hrs.	300.00	33.50	10050.00	3	93
10	Install Test Pump	400	L.F.	15.00	220.00	3300.00	180	55
11	Pumping Development	24	Hrs.	125.00	12.50	1562.50	12	52
12	Test Pumping	80	Hrs.	125.00	55.70	6962.50	24	70
13	Video Survey	1	L.S.	1200.00	1.00	1200.00	0	100
14	Plumbness & Alignment Test	1	L.S.	1200.00	1.00	1200.00	0	100
15	Disinfection/Capping	1	L.S.	1000.00	1.00	1000.00	0	100
16	Standby	12	Hrs.	200.00	12.00	2400.00	0	100
Change	Reimburse Drilling Mud	1	L.S.	6400.00	1.00	6400.00	0	100
Change	Water Supply	1	L.S.	9450.00	1.00	9450.00	0	100
Change	Geophysical Log	1	Each	2200.00	1.00	2200.00	0	100
					TOTAL	**167382.00**		

WHITE - DIVISION OF WATER RESOURCES
CANARY - CLIENT'S COPY
PINK - WELL DRILLER'S COPY

PRINT OR TYPE ONLY
DO NOT WRITE ON BACK

STATE OF NEVADA
DIVISION OF WATER RESOURCES

WELL DRILLER'S REPORT

Please complete this form in its entirety in accordance with NRS 534.170 and NAC 534.340

OFFICE USE ONLY
Log No. _____
Permit No. _____
Basin _____

NOTICE OF INTENT NO. 44883

1. OWNER Washoe County - Spring Creek #5
MAILING ADDRESS 4930 Energy Way
Reno, NV 89502

ADDRESS AT WELL LOCATION Spring Creek #5

2. LOCATION ____ 1/4 ____ 1/4 Sec. 6 T 20N N/S R 21E E Washoe County
PERMIT NO. 48034 (Issued by Water Resources) | Lot 5 (Parcel No.) | (Subdivision Name)

3. WORK PERFORMED
☐ New Well ☒ Replace ☐ Recondition
☐ Deepen ☐ Abandon ☐ Other ____

4. PROPOSED USE
☐ Domestic ☐ Irrigation ☐ Test
☒ Municipal/Industrial ☐ Monitor ☐ Stock

5. WELL TYPE
☐ Cable ☐ Rotary ☒ RVC
☐ Air ☐ Other ____

6. LITHOLOGIC LOG

Material	Water Strata	From	To	Thickness
Sand		0	11	
sandy clay		11	17	6
sand		17	25	8
sandy clay		25	43	18
sand sm/gravel		43	47	4
sandy clay		47	52	5
sand sm. gravel		52	55	3
sandy clay		55	84	29
sand		84	86	2
sandy clay		86	89	3
brown & gray clay		89	100	11
brown clay		100	125	25
sandy brown & gray clay		125	261	136
coarse sand,		261		
clay,cobbles,basalt			269	8
blk. basalt w/streaks of		269		
sandy clay			271	2
fractured rock/blk.		271		
basalt			274	3
sandy clay w/blk. basalt		274	283	9
blk. basalt w/layers of		283		
br. clay			285	2
br. clay		285	286	1
basalt		286	291	5
br. clay w/sm. rocks		291	305	14
Continued on next page				

Date started 7/21/00 , 19__
Date completed 8/18/00 , 19__

7. WELL TEST DATA

TEST METHOD: ☐ Bailer ☒ Pump ☐ Air Lift

G.P.M.	Draw Down (Feet Below Static)	Time (Hours)
800	106	49 hrs.
Pumping Level	155	

8. WELL CONSTRUCTION

Depth Drilled 647 Feet Depth Cased 620 Feet

HOLE DIAMETER (BIT SIZE)

	From	To
36 Inches	0 Feet	100 Feet
18 Inches	100 Feet	647 Feet
____ Inches	____ Feet	____ Feet

CASING SCHEDULE

Size O.D. (Inches)	Weight/Ft. (Pounds)	Wall Thickness (Inches)	From (Feet)	To (Feet)
20		.375	0	100
12-3/4		.250	+2	300
12-3/4		.250	480	500

Perforations:
Type perforation Johnson wire wrap screen
Size perforation .050
From 300 feet to 480 feet
From 500 feet to 620 feet
From ____ feet to ____ feet
From ____ feet to ____ feet
From ____ feet to ____ feet

Surface Seal: ☒ Yes ☐ No
Depth of Seal 100
Placement Method: ☒ Pumped ☐ Poured
Seal Type: ☐ Neat Cement ☒ Cement Grout ☐ Concrete Grout

Gravel Packed: ☒ Yes ☐ No
From 0 feet to 647 feet

9. WATER LEVEL

Static water level 49 feet below land surface
Artesian flow ____ G.P.M. ____ P.S.I.
Water temperature cool °F Quality ____

10. DRILLER'S CERTIFICATION

This well was drilled under my supervision and the report is true to the best of my knowledge.

Name Humboldt Drilling & Pump Co., Inc. (Contractor)
Address 4675 W. Winnemucca Blvd (Contractor)
Winnemucca, Nevada 89445

Nevada contractor's license number issued by the State Contractor's Board 015234

Nevada driller's license number issued by the Division of Water Resources, the on-site driller 1572

Signed _____ (By driller performing actual drilling on-site or contractor)

Date 8/25/00

RECEIVED
SEP 11 2000
WASHOE COUNTY
DEPT. OF WATER RESOURCES

IN TRIPLICATE
(PLEASE PRINT OR TYPE)

NEVADA STATE HEALTH LABORATORY
University of Nevada School of Medicine/385
Reno, Nevada 89557
(775) 688-1335

14134

WATER CHEMISTRY ANALYSIS:

RECEIVED
00 SEP -7 AM 11:23
NEVADA STATE
HEALTH LABORATORY

Attn: Fees may apply to some types of samples.

All of the information below must be filled in or the analysis will not be performed.

State Nevada County Washoe
Township 20 Range 21 Section 6
General Location Spanish Springs
Source Address Spring Creek East #5 Replacement well

TYPE OF ANALYSIS:

☒ Check here for ROUTINE DOMESTIC ANALYSIS
Circle the constituents needed for PARTIAL ANALYSIS

SAMPLING INSTRUCTIONS:

The sample submitted must be representative of the source. Spring and surface water samples should be as free of dirt and debris as possible. Wells should be pumped thoroughly before sampling, changing the water in the casing at least three times. Product water from filters should be sampled after running for about ten (10) minutes.

Sampled by John Hulett Date 9-7-00
Owner Washoe County Phone
Address P.O. Box 11130
City Reno State Nevada

REPORT TO:

Name Terri Svetich (Washoe County)
Address P.O. Box 11130
City Reno
State Nevada Zip 89520-0027

REASON FOR ANALYSIS:

- ☐ Loan
- ☐ Personal health reasons
- ☐ Purchase of the property
- ☐ Rental or sale of property
- ☐ Subdivision approval
- ☒ Other SDWA

USE OF WATER:

- ☒ Domestic drinking water
- ☐ Geothermal
- ☐ Industrial or mining
- ☐ Irrigation
- ☐ Other
- Initials

SOURCE OF WATER:

Filter ☐ Yes ☐ No
Public ☒ Yes ☐ No
Spring
Well X Depth ft.
Hot Cold
IN USE: ☐ Yes ☒ No

Type
Name Spring Creek #5 Repl
Surface
Casing diameter in.
Casing depth ft.

The results below are representative only of the sample submitted to this laboratory.

FOR LABORATORY USE ONLY

Constituent		Constituent		Constituent		Constituent		PRINT OTHER DESIRED CONSTITUENTS BELOW	
Color 15	174 ppm	Color 15.0	ppm 4.8	Constituent 0.2	ppm 294	Constituent 361	S.U.	Constituent	ppm
T.D.S. @ 180° C.	157	Chloride	7	Iron	0.12	Color	3	Cd	<0.001
Hardness	50	Nitrate -N	2.1	Manganese	0.00	Turbidity	0.5	Cr	0.004
Calcium	10	Alkalinity	92	Copper	0.00	pH	8.60	Hg	<0.0005
Magnesium	6	Bicarbonate	102	Zinc	0.00	EC	258	Se	<0.00
Sodium	30	Carbonate	5	Barium	0.00	SI@20C	0.06	Sb	<0.00
Potassium	2	Fluoride	0.19	Boron	0.0			Be	<0.00
Sulfate	14	Arsenic	0.005	Silica	32			Ni	<0.00
MBAS	<0.1	NO_2	<0.01	gross α	3pCi/L	CN^-	<0.005	Tl	<0.000
				gross β	3pCi/L	Pb	<0.001		

Fee
Collected by
WS I.D. 800-02 replacement
SDWA — Pri. Sec.
1st 2nd 3rd
Date Rec'd Init.

Remarks
JM 9-11-00
JM
DR 9/14/00
JM 9-14-00

Alpha Analytical, Inc.
255 Glendale Ave. • Suite 21 • Sparks, Nevada 89431-5778
(775) 355-1044 • (775) 355-0406 FAX • 1-800-283-1183

CASE NARRATIVE
October 5, 2000

One sample was received on 09/07/00 for the analysis of SOC compounds for source compliance monitoring in the state of Nevada. Sample containers were received in good condition.

Alpha Analytical ID	Client ID	Date	Time Collected
WCW00090723-01	Spring Creek #5 Replacement	09/07/00	10:15

METHOD 504.1:
Your sample was spiked as the batch Laboratory Fortified Matrix (LFM). All QC criteria were met with no abnormalities.

METHOD 505:
Your sample was spiked as the batch LFM. All QC criteria were met with no abnormalities.

METHOD 515.1:
Your sample was spiked as the batch LFM. All compounds were spiked and have acceptable recoveries except for the recovery of 2,4,5-TP (Silvex). This compound was recovered in the LFM at 40%. This compound was recovered in the Laboratory Fortified Blank (LFB) and the LFBdup at 69% and 70% respectively. All other QC criteria were met with no abnormalities.

METHOD 525.2:
All QC criteria were met with no abnormalities.

METHOD 531.1:
All QC criteria were met with no abnormalities.

METHOD 547:
All QC criteria were met with no abnormalities.

METHOD 548.1:
Your sample was spiked as the batch LFM. All QC criteria were met with no abnormalities.

METHOD 549.2:
All QC criteria were met with no abnormalities.

Walter Hinchman
Walter J. Hinchman
Quality Assurance Officer

10/5/00
Date

Alpha Analytical, Inc.
255 Glendale Ave. • Suite 21 • Sparks, Nevada 89431-5778
(775) 355-1044 • (775) 355-0406 FAX • 1-800-283-1183

ANALYTICAL REPORT

Client: Washoe County Water Resources
4930 Energy Way
Reno, NV, 89502
Attn: John Hulett
Client Sample ID: Sring Creek #5 Replacement

Lab Sample ID: 00090723-01A
Date Sampled: 9/7/00
Date Received: 9/7/00
Matrix: Drinking Water
PWS/DWR#:

National Primary Drinking Water Phase II and Phase V - Regulated and Unregulated Synthetic Organic Compounds (SOCs)

Analyte	Result	R.L.	Units	Date Analyzed
E504.1 EDB AND DBCP				
1,2-Dibromoethane	ND	0.010	µg/L	9/9/00
1,2-Dibromo-3-chloropropane	ND	0.020	µg/L	9/9/00
E505 ORGANOHALIDE PESTICIDES AND PCBS				
Hexachlorocyclopentadiene	ND	0.10	µg/L	9/7/00
Hexachlorobenzene	ND	0.10	µg/L	9/7/00
Alachlor	ND	0.20	µg/L	9/7/00
gamma-BHC	ND	0.020	µg/L	9/7/00
Heptachlor	ND	0.040	µg/L	9/7/00
Aldrin	ND	0.20	µg/L	9/7/00
Heptachlor epoxide	ND	0.020	µg/L	9/7/00
Chlordane	ND	0.20	µg/L	9/7/00
Dieldrin	ND	0.20	µg/L	9/7/00
Endrin	ND	0.010	µg/L	9/7/00
Methoxychlor	ND	0.10	µg/L	9/7/00
Toxaphene	ND	1.0	µg/L	9/7/00
Aroclor 1016	ND	0.080	µg/L	9/7/00
Aroclor 1221	ND	20	µg/L	9/7/00
Aroclor 1232	ND	0.50	µg/L	9/7/00
Aroclor 1242	ND	0.30	µg/L	9/7/00
Aroclor 1248	ND	0.10	µg/L	9/7/00
Aroclor 1254	ND	0.10	µg/L	9/7/00
Aroclor 1260	ND	0.20	µg/L	9/7/00
E515.1 CHLORINATED ACID HERBICIDES				
Dalapon	ND	1.0	µg/L	9/20/00
Dicamba	ND	0.50	µg/L	9/20/00
2,4-D	ND	0.10	µg/L	9/20/00
PCP	ND	0.040	µg/L	9/20/00
2,4,5-TP	ND	0.20	µg/L	9/20/00
Dinoseb	ND	0.20	µg/L	9/20/00
Pichloram	ND	0.10	µg/L	9/20/00

Analyte	Result	R.L.	Units	Date Analyzed
E525.2 SVOCS BY GCMS				
Propachlor	ND	1.0	µg/L	9/21/00
Simazine	ND	0.070	µg/L	9/21/00
Atrazine	ND	0.10	µg/L	9/21/00
Metribuzin	ND	1.0	µg/L	9/21/00
Alachlor	ND	0.20	µg/L	9/21/00
Metolachlor	ND	1.0	µg/L	9/21/00
Butachlor	ND	1.0	µg/L	9/21/00
bis(2-Ethylhexyl)adipate	ND	0.60	µg/L	9/21/00
bis(2-Ethylhexyl)phthalate	ND	0.60	µg/L	9/21/00
Benzo(a)pyrene	ND	0.020	µg/L	9/21/00
E531.1 CARBAMATES				
Aldicarb sulfoxide	ND	0.50	µg/L	9/12/00
Aldicarb sulfone	ND	0.80	µg/L	9/12/00
Oxamyl	ND	2.0	µg/L	9/12/00
Methomyl	ND	1.0	µg/L	9/12/00
3-Hydroxycarbofuran	ND	1.0	µg/L	9/12/00
Aldicarb	ND	0.50	µg/L	9/12/00
Carbofuran	ND	0.90	µg/L	9/12/00
Carbaryl	ND	1.0	µg/L	9/12/00
E547 GLYPHOSATE				
Glyphosate	ND	6.0	µg/L	9/16/00
E548.1 ENDOTHALL				
Endothall	ND	9.0	µg/L	9/14/00
E549.2 DIQUAT/PARAQUAT				
Diquat	ND	0.40	µg/L	9/14/00

ND = Not Detected

Approved By: Walter Hinchman Date: 10/4/00
Walter Hinchman
Quality Assurance Officer

Alpha Analytical, Inc.
255 Glendale Ave. • Suite 21 • Sparks, Nevada 89431-5778
(775) 355-1044 • (775) 355-0406 FAX • 1-800-283-1183

ANALYTICAL REPORT

Washoe County Water Resources
4930 Energy Way
Reno, NV 89502

Job#:
Phone: (775) 954-4641
Attn: John Hulett

Alpha Analytical Number: WCW00090723-01A
Client I.D. Number: Sring Creek #5 Replacement

Sampled: 09/07/00
Received: 09/07/00
Analyzed: 09/07/00

SDWA Volatiles (plus Lists 1 & 3 Unregulated)
EPA Method 524.2

	Compound	Concentration µg/L	Reporting Limit		Compound	Concentration µg/L	Reporting Limit
1	Benzene	ND	0.500 µg/L	38	trans-1,3-Dichloropropene	ND	0.500 µg/L
2	Vinyl chloride	ND	0.500 µg/L	39	2,2-Dichloropropane	ND	0.500 µg/L
3	Carbon tetrachloride	ND	0.500 µg/L	40	1,1,1,2-Tetrachloroethane	ND	0.500 µg/L
4	1,2-Dichloroethane	ND	0.500 µg/L	41	1,1,2,2-Tetrachloroethane	ND	0.500 µg/L
5	Trichloroethene	ND	0.500 µg/L	42	1,2,3-Trichloropropane	ND	0.500 µg/L
6	1,4-Dichlorobenzene	ND	0.500 µg/L	43	Bromochloromethane	ND	0.500 µg/L
7	1,1-Dichloroethene	ND	0.500 µg/L	44	n-Butylbenzene	ND	0.500 µg/L
8	1,1,1-Trichloroethane	ND	0.500 µg/L	45	Dichlorodifluoromethane	ND	0.500 µg/L
9	cis-1,2-Dichloroethene	ND	0.500 µg/L	46	Trichlorofluoromethane	ND	0.500 µg/L
10	1,2-Dichloropropane	ND	0.500 µg/L	47	Hexachlorobutadiene	ND	0.500 µg/L
11	Ethylbenzene	ND	0.500 µg/L	48	Isopropylbenzene	ND	0.500 µg/L
12	Chlorobenzene	ND	0.500 µg/L	49	4-Isopropyltoluene	ND	0.500 µg/L
13	1,2-Dichlorobenzene	ND	0.500 µg/L	50	Naphthalene	ND	0.500 µg/L
14	Styrene	ND	0.500 µg/L	51	n-Propylbenzene	ND	0.500 µg/L
15	Tetrachloroethene	ND	0.500 µg/L	52	sec-Butylbenzene	ND	0.500 µg/L
16	Toluene	ND	0.500 µg/L	53	tert-Butylbenzene	ND	0.500 µg/L
17	trans-1,2-Dichloroethene	ND	0.500 µg/L	54	1,2,3-Trichlorobenzene	ND	0.500 µg/L
18	Xylenes, total	ND	0.500 µg/L	55	1,2,4-Trimethylbenzene	ND	0.500 µg/L
19	Dichloromethane	ND	0.500 µg/L	56	1,3,5-Trimethylbenzene	ND	0.500 µg/L
20	1,1,2-Trichloroethane	ND	0.500 µg/L	57	Methyl tert-butyl ether (MTBE)	ND	0.500 µg/L
21	1,2,4-Trichlorobenzene	ND	0.500 µg/L				
22	Bromobenzene	ND	0.500 µg/L				
23	Bromodichloromethane	ND	0.500 µg/L				
24	Bromoform	ND	0.500 µg/L				
25	Bromomethane	ND	0.500 µg/L				
26	Dibromochloromethane	ND	0.500 µg/L				
27	Chloroethane	ND	0.500 µg/L				
28	Chloroform	ND	0.500 µg/L				
29	Chloromethane	ND	0.500 µg/L				
30	2-Chlorotoluene	ND	0.500 µg/L				
31	4-Chlorotoluene	ND	0.500 µg/L				
32	Dibromomethane	ND	0.500 µg/L				
33	1,3-Dichlorobenzene	ND	0.500 µg/L				
34	1,1-Dichloroethane	ND	0.500 µg/L				
35	1,1-Dichloropropene	ND	0.500 µg/L				
36	1,3-Dichloropropane	ND	0.500 µg/L				
37	cis-1,3-Dichloropropene	ND	0.500 µg/L				

pH = 2

ND = Not Detected
Phase I Regulated Compounds (1-8); Phase II Regulated Compounds (9-18); Phase V Regulated Compounds (19-21); List 1 Unregulated Compounds (22-41); List 3 Unregulated Compounds (42-56); and, Additionally requested Compounds (57+)

Approved By: R L Scholl Date: 9/19/00

Roger L. Scholl, Ph.D.
Laboratory Director

MONTGOMERY WATSON LABORATORIES
a Division of Montgomery Watson Americas, Inc.
555 East Walnut Street
Pasadena, California 91101
Tel: 626 568 6400 Fax: 626 568 6324
1 800 566 LABS (1 800 566 5227)

RECEIVED
SEP 20 2000
WASHOE COUNTY
DEPT. OF WATER RESOURCES

Laboratory Report

for

Washoe County Dept. of Water
Resources
4930 Energy Way

Reno , NV 89502-4106

Attention: John Hulett
Fax: (775) 954-4610

DATE OF ISSUE
SEP 13 2000
MONTGOMERY WATSON LABS

HDS Hillary Strayer
Project Manager

Report#: 69689
DRINKING

Laboratory certifies that the test results meet all QA/QC requirements unless noted in the Comments section or the Case Narrative. Following the cover page are QC Report,QC Summary,Data Report, totaling 3 page[s].

MONTGOMERY WATSON LABORATORIES CHAIN OF CUSTODY RECORD

555 E. Walnut St., Pasadena, CA 91101
(626) 568-6400 (800) 566-5227

MWLABS USE ONLY:

LOGIN COMMENTS:

SAMPLES CHECKED/LOGGED IN BY:

SAMPLE TEMP, RECEIPT AT LAB: 7 °C

BLUE ICE: FROZEN X PARTIALLY FROZEN ___ THAWED ___

TO BE COMPLETED BY SAMPLER:

PROJECT NAME	PROJECT JOB # / P.O.#

SAMPLER(S): PRINTED NAME AND SIGNATURE

John Hulett

REFER TO ATTACHED BOTTLE ORDER FOR ANALYSES ☐ (check for yes)

ANALYSES REQUIRED (mark an 'X' in all tests required for each sample line)

TIME	DATE	LOCATION	IDENTIFIER	GRAB	COMP	Radon	SAMPLER COMMENTS
[redacted]				X			
10:15	9-7-00	Spring Creek #5 replacement well		X		X	

	SIGNATURE	PRINT NAME	COMPANY/TITLE	DATE	TIME
RELINQUISHED BY:		John Hulett	CDWR	9-7-00	13:15
RECEIVED BY:		[illegible]	MWC	9/8/00	7:20
RELINQUISHED BY:					
RECEIVED BY:					
RELINQUISHED BY:					
RECEIVED BY:					

C-O-C# ___

PAGE 1 OF 1

Montgomery Watson Laboratories
555 E. Walnut St., Pasadena, CA 91101
PHONE: 626-568-6400/FAX: 626-568-6324

ACKNOWLEDGMENT OF SAMPLES RECEIVED

Washoe County Dept. of Water Resources
4930 Energy Way
Reno, NV 89502-4106
Attn: John Hulett
Phone: (775) 954-4625

Customer Code: WASHOE
PO#: 179701
Group#: 69689
Project#: DRINKING
Proj Mgr: Hillary Strayer
Phone: (626) 568-6412

The following samples were received from you on **09/08/00**. They have been scheduled for the tests listed beside each sample. If this information is incorrect, please contact your service representative. Thank you for using Montgomery Watson Laboratories.

Sample#	Sample Id	Matrix	Sample Date
	Tests Scheduled		
2009080043	SPRING CREEK 5	Water	07-sep-2000 10:15:00
	@RN		

Test Acronym Description

Test Acronym	Description
@RN	Radon 222

MONTGOMERY WATSON LABORATORIES
a Division of Montgomery Watson Americas, Inc.
555 East Walnut Street
Pasadena, California 91101
Tel: 626 568 6400 Fax: 626 568 6324
1 800 566 LABS (1 800 566 5227)

Laboratory
Data Report
#69689

Washoe County Dept. of Water
Resources
John Hulett
4930 Energy Way
Reno , NV 89502-4106

Samples Received

09/08/00

Prepared	Analyzed	QC Batch#	Method	Analyte	Result	Units	MRL	Dilution
SPRING CREEK 5 (2009080043) Sampled on 09/07/00 10:15								
				Radon 222				
09/08/00 12:00		123441	(SM7500RN	) Radon 222	380	pCi/l	50	1
09/08/00 12:00		123441	(SM7500RN	) Radon 222, Two Sigma Error	18	pCi/l	0.0000	1

MONTGOMERY WATSON LABORATORIES
a Division of Montgomery Watson Americas, Inc.
555 East Walnut Street
Pasadena, California 91101
Tel: 626 568 6400 Fax: 626 568 6324
1 800 566 LABS (1 800 566 5227)

Laboratory
QC Summary
#69689

Washoe County Dept. of Water
Resources

QC Batch #123441 - Radon 222 Analysis Date: 09/08/2000

2009080043 SPRING CREEK 5

MONTGOMERY WATSON LABORATORIES
a Division of Montgomery Watson Americas, Inc.
555 East Walnut Street
Pasadena, California 91101
Tel: 626 568 6400 Fax: 626 568 6324
1 800 566 LABS (1 800 566 5227)

Laboratory
QC Report
#69689

Washoe County Dept. of Water
Resources

QC Batch #123441 Radon 222

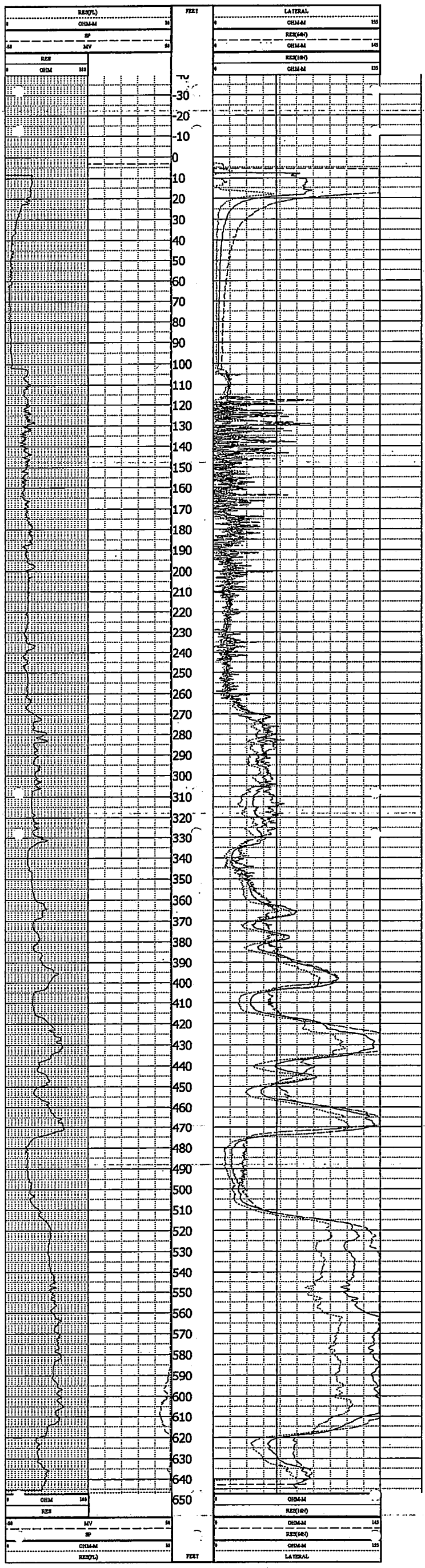
QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
LCS1	Radon 222	1000	933	93.3	(80.00 - 120.00)	
LCS2	Radon 222	1000	960	96.0	(80.00 - 120.00)	2.9
MBLK	Radon 222	ND				

Spikes which exceed Limits and Method Blanks with positive results are highlighted by Underlining. Criteria for MS and DUP are advisory only, batch control is based on LCS. Criteria for duplicates are advisory only, unless otherwise specified in the method.

COMPANY	: WASHOE CO.				OTHER SERVICES:		
WELL	: SPR. CREEK-5				N/A		
LOCATION/FIELD	: SPAN.SPRING				Invoic		
COUNTY	: WASHOE				11118		
STATE	: NEVADA						
SECTION	: N/A	TOWNSHIP	: N/A	RANGE	: N/A		
DATE	: 08/16/00	PERMANENT DATUM	: Ground				
DEPTH DRILLER	: 647 FT.			KB	: N/A		
LOG BOTTOM	: 647.20	LOG MEASURED FROM:	Ground	DF	: N/A		
LOG TOP	: 3.10	DRL MEASURED FROM:	GROUND	GL	: N/A		
CASING DIAMETER	: 20	LOGGING UNIT	: 20				
CASING TYPE	: STEEL	FIELD OFFICE	: North Amer				
CASING THICKNESS:	0	RECORDED BY	:				
BIT SIZE	: 18	BOREHOLE FLUID	: CLAY/GE	FILE	: ORIGINAL		
MAGNETIC DECL.	: 0	RM	: 0	TYPE	: 8044A		
MATRIX DENSITY	: 2.71	RM TEMPERATURE	: 0				
NEUTRON MATRIX	: Dolomite	MATRIX DELTA T	: 64				
				THRESH:	4000		

WATER-

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS



WELLBORE NAVIGATION, INC.
ELKO, NV.

GYROSCOPIC DIRECTIONAL SURVEY
BY MINIMUM CURVATURE

FOR

****
* HUMBOLT DRILLING *
****

JOB NUMBER:

WELL NAME: SPRING CREEK #5

LOCATION: SPARKS NV.

SURVEY DATE: SEPTEMBER 12,2000

SURVEY ENGINEER: THORSEN

GYRO REFERENCE BEARING: TRUE NORTH

TIE-ON COORDINATES AT: 0 M.D.
TAKEN FROM: COLLAR
WATER CONTACT= 50

****
****** DEPTH MEASURED IN FEET *******
****

COMMENTS: 12 INCH CASED
GYRO REF.136

****
****
*** THIS DIRECTIONAL SURVEY REPORT IS ***
** CORRECT TO THE BEST OF MY KNOWLEDGE **
* AND IS SUPPORTED BY ACTUAL FIELD DATA! *
**
**
**
**
****
****

WELLBORE NAVIGATION, INC.
ELKO, NV.

J' NUMBER:

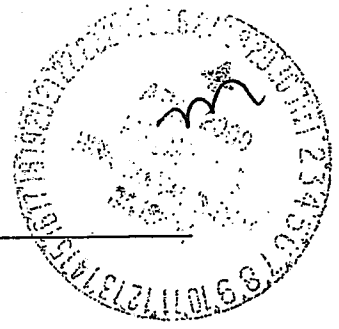
WELL NAME: SPRING CREEK #5

INRUN SURVEY
BY MINIMUM CURVATURE

MEAS. DEPTH	VERT. DEPTH	VERT. SECT.	L/R CLOS.	INCL HORZ	BEARING AZIMUTH	COORDINATES LATITUDE	COORDINATES DEPARTURE	D-LEG /100	D-LEG /CL	STATION DISPLACEMENT DISP. DIRECTION	TEMP. DEG F
0.0	0.00	0.00	0.000	-89.41	009.35	0.00 N	0.00 E	0.00		0.00 AT 000.00	
25.0	25.00	0.26	0.099	-89.30	029.03	0.26 N	0.10 E	0.98	0.25	0.28 AT 020.04	318.13
50.0	49.99	0.64	0.249	-88.81	015.63	0.64 N	0.24 E	2.14	0.53	0.69 AT 020.36	318.16
75.0	74.99	1.13	0.311	-88.89	356.23	1.14 N	0.29 E	1.58	0.40	1.17 AT 014.47	318.11
100.0	99.99	1.51	0.223	-89.27	330.75	1.52 N	0.20 E	2.20	0.55	1.53 AT 007.49	318.11
125.0	124.99	1.73	0.126	-89.64	342.98	1.73 N	0.10 E	1.54	0.39	1.73 AT 003.26	318.14
150.0	149.98	1.97	0.171	-89.19	021.45	1.97 N	0.14 E	2.29	0.57	1.97 AT 004.07	318.17
175.0	174.98	2.31	0.304	-89.13	019.44	2.31 N	0.27 E	0.27	0.07	2.33 AT 006.61	318.14
200.0	199.98	2.70	0.368	-89.01	358.54	2.71 N	0.33 E	1.43	0.36	2.73 AT 006.86	318.14
225.0	224.97	3.14	0.398	-88.99	007.45	3.14 N	0.35 E	0.63	0.16	3.16 AT 006.33	318.13
250.0	249.97	3.62	0.371	-88.74	346.63	3.63 N	0.31 E	1.91	0.48	3.64 AT 004.94	318.13
275.0	274.97	4.04	0.175	-89.06	317.44	4.05 N	0.11 E	2.54	0.63	4.05 AT 001.58	318.08
300.0	299.96	4.38	0.029	-89.16	355.96	4.38 N	0.04 W	2.38	0.59	4.38 AT 359.47	318.13
325.0	324.96	4.70	0.000	-89.36	351.45	4.70 N	0.07 W	0.83	0.21	4.70 AT 359.10	318.13

THE HORIZONTAL DISPLACEMENT AT THE DEPTH OF

325.0 FEET EQUALS 4.70 FEET AT 359.10



WELL SPECIFICATIONS

1. SCOPE OF WORK, MOBILIZATION AND DEMOBILIZATION

The work to be performed includes the furnishing of all labor, materials, transportation, tools, supplies, plant equipment and appurtenances, unless hereinafter specifically excepted, necessary to the complete and satisfactory construction, development and testing of a 12 inch diameter, steel cased, gravel envelope well approximately 600 feet. The new well will replace the existing Spring Creek Well #5 production well. **The well shall be drilled by the dual wall, flooded reverse circulation rotary method**. Payment for Mobilization and Demobilization will be made as follows:

> When 10% of the total original contract amount is earned from other bid items, 100% of the amount bid for mobilization, or 10% of the total original contract amount, whichever is the least will be paid. Upon completion of all work on the contract, payment of any amount bid for mobilization in excess of 10% of the total original contract amount will be paid. Demobilization shall be considered incidental to mobilization.

2. CONTRACTOR'S QUALIFICATIONS

The Contractor shall have been engaged in the business of constructing dual wall, flooded reverse circulation rotary method drilled gravel envelope wells of diameter, depth and capacity equivalent to the proposed wells for a period not less than 5 years.

Bid Comparison Rating System - Award of bid will be based on bid cost proposal, Contractor experience and past performance. The Contractor shall submit the information described below on the supplied Contractors Qualifications form (Attachment 2) with the bid proposal. Each factor will be rated according to a relative weight.

> Cost Rating - Cost will be rated based on competitiveness and balanced prices.
>
> Experience Rating – At the time of the bid submission the Contractor will also be required to submit a summary of past experience in completing comparable wells using the specified drilling and well construction methods. This summary will be compared and rated with others submitted for bid. An emphasis will be placed on comparable wells drilled within the past two 2 years.
>
> Performance Rating – The Contractor shall submit with the bid proposal at least 3 clients for which the Contractor has completed similar wells within the last 2 years.

The list shall include the telephone number of a contact person representing the referenced client for which the Contractor has drilled similar wells. The County will contact each person listed and request information regarding Contractor performance. The rating system will be based on reference response to questions related to quality of workmanship, timeliness of completion and final cost in relationship to original bid. Any work completed for Washoe County within the last ten 10 years must also be included. The Owner reserves the right to make reference checks of any previous customers of the Contractor.

The Contractor shall employ only competent workman for the execution of his work and all such work shall be performed under the direct supervision of an experienced, State of Nevada licensed well driller satisfactory to the owner.

3. PERMITS, CERTIFICATES, LAWS AND ORDINANCES

The Contractor shall, at his own expense, procure all permits, certificates and licenses required of him by law of the execution of his work. He shall comply with all local, County and State regulations necessary for the performance of his work.

4. LOCATION AND ACCESS

The Spring Creek Well #5 site is located in Spanish Springs Valley in Section 6 of T20N, R21E. The new well will be constructed inside a chain link fenced compound that surrounds the existing production well and pump house. A portion of the chain link fence will need to be removed in order to drill the well. The Contractor must reinstall any sections of the fence removed for access to original or better condition upon project completion. Access to the well site is by dirt road. A site location and access map is shown in Figure 1. A well driller's report for the existing Spring Creek #5 production well to be replaced is shown in Figure 2. The Contractor shall familiarize himself with surface and subsurface conditions at the drilling site prior to bidding.

5. EQUIPMENT AND OPERATING REQUIREMENTS

The equipment to be furnished shall be approved by the Owner and have excess capacity to construct the well as specified herein; and shall include the following accessory equipment:

a. Portable, self contained mud system with operational desanders and shale-shaker. The system provided shall have a minimum volume capacity equal to fifty percent (50%) total borehole volume for the 12-inch production well. Fifty percent (50%) volume for a 600 foot, 18-inch diameter borehole is approximately 3,500 gallons.

b. Mud pressure gauge.

c. Weight indicator.

d. Drill collars for added weight during early stages of drilling.

e. Plastic sheeting or drip pans will be placed under the drill rig and all motorized equipment associated with drilling operations, development pumping and test pumping to prevent soil contamination by petroleum based products.

6. DRILLING FLUID CONTROL

The Contractor shall develop and maintain a drilling fluid program that addresses mix volumes of all additives, gradual formation fluid loss, loss circulation zones and appropriate methods for measuring all required fluid properties. When it becomes necessary to add clays or chemicals to the drilling fluid, it is the Contractor's responsibility to maintain a mud system containing a minimum of clay and fine sand and to deposit a thin, easily removable filter cake on the face of the borehole. If there should be a conflict between the mud requirements for ease in drilling and the mud requirements for protection of the aquifer, then the ruling requirements shall be those for aquifer protection.

The Contractor will measure basic and complete drilling fluid properties during drilling of the production well borehole. Basic fluid properties to be monitored shall at least include fluid viscosity and density. Basic fluid properties shall be measured a minimum of every 2 hours during a drilling shift. Complete fluid properties will at least include viscosity, density, sand content, and wall cake thickness. Complete fluid properties shall be monitored a minimum of 2 times a shift or every 100 foot of borehole drilled, whichever occurs first. Fluid properties will be measured using a Marsh Funnel for viscosity, a fluid density balance for density and sand content and a mud cake filter press for wall cake thickness. The Contractor is responsible for providing the necessary equipment and qualified personnel for performing all measurements. Copies of all recorded measurements will be supplied to the Owner.

In the event it is the opinion of the Owner that drilling fluid properties are not being maintained in the best interest of aquifer protection, the Owner may require the Contractor to obtain the services of a qualified mud engineer. The Contractor shall be responsible for any payment required for the services of the mud engineer. A mud engineer shall have the responsibility to maintain mud and loss-circulation properties in a manner meeting goals of aquifer protection. The Contractor shall monitor and maintain the fluid properties as outlined by a mud engineer. In the event the Contractor cannot attain these properties, the mud shall be replaced at no additional cost to the Owner.

7. WELL CONSTRUCTION

Borehole - The conductor casing and production casing boreholes shall be drilled to the depth specified by the Owner. The conductor casing borehole shall be a minimum diameter of 26-inches to a depth of 100 feet. The production casing borehole shall be a minimum diameter of 18-inches to an anticipated total depth of 600 feet.

Formation samples shall be taken at 10 foot intervals or at each change in formation during drilling of the production casing borehole. Samples shall be labeled and stored in sample bags provided by the Contractor. The Owner may require the Contractor to perform grain size analyses on a minimum of four formation samples selected by the Owner. The results of the analyses shall be delivered to the Owner for review within 72 hours of sample collection. No standby time will be paid for the time period required for grain size analysis. Results shall include recommendations for gravel pack size and well screen slot size opening.

Payment for the borehole shall be based on a per foot basis as outlined in the "SCHEDULE OF ITEMS AND PRICES" for the total footage drilled at the request of the Owner. No payment shall be made for over drilling as desired by the Contractor.

Pipe and Casing - All conductor and production well casing shall be spiral welded, fabricated or mill-type black steel pipe. Steel for fabricated pipe shall conform to ASTM Standard A 283 Grade B or better. Where applicable, fabricated and mill pipe shall conform to ASTM Standard A-53 or A-120, or API Standard 5A or 5L. The conductor casing shall have an outside diameter of 20-inches with a minimum wall thickness of 0.375 inches and the production well casing shall have an outside diameter of 12-inches with a minimum wall thickness of 0.250 inches. All production and conductor casing shall be of new, first quality materials and free of defects in workmanship and handling. No reject, sub-grade or limited-use pipe is acceptable

Payment for conductor and production well casing shall be at the per foot price for casing installed at the request and approval of the Engineer as outlined in the "SCHEDULE OF ITEMS AND PRICES".

Well Screen - Well screen shall have an outside diameter of 12-inches and be wire wrap or continuous slot with V-shaped slot configuration as manufactured by Roscoe Moss Corporation, US Filter/Johnson Screens or approved equal. Well screen shall be of new, first quality material, free of defects in workmanship or handling. The well screen shall be constructed of low carbon steel and have a minimum strength of construction recommended by the manufacturer for the depth specified. Final selection for the well screen slot size will be determined from the sieve analysis and recommendations. Final selection shall be specified to the Contractor within 24 hours of receiving the sieve analysis. For bid purposes, the Contractor

shall anticipate a design size of 80 slot (0.08 inches) in all wells. A 5-foot, 12-inch diameter blank casing sump with a steel bullnose plug shall be welded to the bottom of the well screen.

Payment for well screen casing shall be at the per foot price for screen installed at the request and approval of the Engineer as outlined in the "SCHEDULE OF ITEMS AND PRICES".

Conductor Casing Installation - The conductor casing borehole shall have a minimum diameter of 26-inches and drilled to a depth of 100 feet. The conductor casing shall be equipped with centering guides that are approved by the Owner prior to installation. Centering guides will be placed starting 5 feet above the bottom of the casing and approximately every 30 feet thereafter. The top of the conductor casing shall extend 1 foot above land surface.

Payment for conductor casing shall be at the per foot price for casing installed at the request and approval of the Engineer as outlined in the "SCHEDULE OF ITEMS AND PRICES".

Sanitary Surface Seal Installation - The annular space between the conductor casing borehole and conductor casing shall be sealed with cement grout or neat cement from a depth of 100 feet to the ground surface. The slurry shall be placed by positive displacement through a tremmie pipe or by the Haliburton method. The cement grout or neat cement shall be mixed according to the definitions for the respective type as described in *Regulations for Water Well and Related Drilling, Nevada Department of Conservation and Natural Resources, Division of Water Resources, January 1998, pages 534-4 and 534-5.* The slurry shall be thoroughly mixed and free of lumps and stones and run through a protective strainer before pumping into the well. Calcium chloride, bentonite or other additives are not allowed in the slurry. The seal shall be placed in one continuous operation once the process begins. The sanitary surface seal shall be left undisturbed for a minimum of 24 hours after the final batch or lift of slurry has been placed. No standby time shall be paid during this period.

Payment for sanitary seal shall be at the per cubic yard price installed at the request and approval of the Engineer as outlined in the "SCHEDULE OF ITEMS AND PRICES". The Contractor shall provide an invoice stating the quantity of grout pumped into the annular space.

Casing, Screen and Gravel Installation - The borehole shall be drilled with diligence and without undue delays. The gravel must be at or near the project site so there will be no waiting on gravel once the casing has been installed. The reamed production well borehole shall be drilled to a minimum diameter of 18-inches.

Casing and screen shall be installed using methods approved by the Owner. The production well casing and screen shall be suspended above the bottom of the hole at a sufficient distance to insure that neither will be supported from the bottom. The suspended casing shall be firmly secured at the surface until gravel and doughnut ring seal are permanently installed. The

production well casing shall have centering guides approved by the Owner. Centering guides shall be installed at points specified by the Owner but in no case shall be more than 60 feet apart. A 2"x 2"or larger steel nipple with threaded cap shall be installed on the doughnut ring seal to allow access for measuring the filter pack level. Welders required for field assembly of well casing and screen shall be qualified in accordance with the latest revision of the section titled, Welding Procedures of the AWA Standard Qualification Procedure. A continuous, watertight full fillet weld shall join all sections.

Gravel - The gravel to be installed shall be composed of sound, durable, well-rounded particles containing no silt, clay, organic matter or deleterious materials. Gravel shall be delivered and stored at the drill site in protective bag containers. The Contractor shall use Silica Resources SRI Supreme Gravel 1/4 x 1/8-inch washed material or equivalent as gravel pack for the monitoring and production wells. Payment for gravel shall be at the per cubic yard price for gravel installed, as outlined in the "SCHEDULE OF ITEMS AND PRICES". The Contractor shall supply Owner with a gravel invoice, stating quantity of gravel delivered on site.

The Contractor shall have the responsibility to determine when conditions with respect to drilling fluid and hole stability are satisfactory for gravel placement without bridging. Placement of gravel shall be through a tremmie pipe installed to the depth specified by the Owner. Only potable water shall be mixed with the gravel during placement through the tremmie pipe. Shoveling gravel directly into the hole or end dumping with a loader is not allowed. The gravel pack in the production wells shall be sterilized by mixing a minimum twenty (20) pounds of 65-70%-granulated calcium hypochlorite with the gravel during placement.

The Contractor shall be responsible for placing the gravel in the annulus without bridging. Bridging of gravel pack shall be assumed if gravel packing does not utilize at least 90% of the calculated annular space volume for the total borehole depth. If the gravel bridges, the Contractor shall correct the problem with no damage to the well or drill a new well, complete, at his expense. If the Contractor chooses to drill a new well, he shall be responsible for all costs associated with properly abandoning the existing well.

8. AIR LIFT DEVELOPMENT

The well shall be initially developed by surging. The Contractor shall provide an air development tool that is approved by the Owner. The development tool will be comprised of double surge blocks or packers and perforated pipe and fabricated according to the diagram shown in Figure 3. For development tool description and operation, the Contractor is referred to *Groundwater and Wells, Second Edition, Fletcher Driscoll, Johnson Filtration Systems, p. 515*. The compressor for development shall have a minimum capacity to unload 550 feet of

water from a setting of 600 feet below top of casing. The compressor shall produce a minimum air volume of 400 cubic feet per minute. Contractor shall provide compressor specifications if requested by the Owner. Development by surging shall begin at the top of the screen and shall move downward gradually to within 5 feet of the bottom of the well.

The Contractor will use a dispersing polymer during air lift development to facilitate breakdown of clay and polymer based fluids remaining from drilling operations. Use of phosphate products such as sodium acid pyrophosphate (SAPP) during well development is not allowed. The Contractor shall use U.S. Filter/Johnson Screens NW-220 dispersing polymer or approved equivalent and apply the dispersant in the quantity necessary to properly develop the well. It is the responsibility of the Contractor to develop the well using the selected product in a manner recommended by the manufacturer for wells of this diameter, depth and formations penetrated. Documentation of proper application volumes, ratios and method of introduction will be supplied to the Owner prior to product use. The dispersant will be mixed thoroughly and allowed to remain in the well undisturbed according to manufacturer recommendation before resuming development. No stand by time will be paid during this period. Well development by surging will continue upon completion of dispersant treatment at 10 foot intervals until it is the opinion of the Owner that well development is complete. The Contractor will contain and direct all discharge water produced during well development.

Payment shall be at the hourly rate outlined in the "SCHEDULE OF ITEMS AND PRICES". Payment shall be for actual surging time and shall not include setup or tripping in and out of well.

9. PUMP DEVELOPMENT AND PUMPING TESTS

Pump Development - The Contractor shall furnish, install, operate and remove a pump for developing and testing the production wells. The test pumping equipment shall include a submersible pump with a capacity of 500 gpm from an estimated pumping level of 300 feet and intake setting of 400 feet below ground level. The estimated static water level in the well is 50 feet. The pump shall not have a check valve at the bottom so water is allowed to free-fall back through the column pipe when the pump is shut off. A "Whisperwatt" or equivalent quiet running generator shall be used as the power source for the pump and furnished with a 110-volt outlet for use by the Owner during testing.

The discharge rate shall be measured during development pumping by an orifice weir and manometer. The discharge piping shall also include a new, easily operable and stable gate valve to control flow rates. All flow rate monitoring equipment shall be approved by the Owner before installation. The Contractor shall install a 1-inch diameter PVC stilling well approximately 5 feet above the pump intake when installing the pump. The PVC stilling well

shall be open at the bottom and provide easy access for measuring water levels during development and testing.

The Contractor shall furnish and install discharge piping of sufficient size and length to convey discharge water from the well head and pumping equipment into a drainage ditch approximately 100 feet from the well. The Contractor will be required to install, maintain and remove all protective liners or control devices, such as plastic sheeting and straw bales, necessary to minimize bank erosion to the drainage ditch.

The initial pumping rate shall be restricted and as the water clears, the rate shall be gradually increased until the maximum rate is reached. The Owner shall determine the maximum rate after consideration of the well drawdown and discharge characteristics. At periodic intervals, the pump shall be stopped and water in the pump column shall be allowed to surge back through the pump bowls and into the well. The Contractor shall measure the gravel level in the annular space during development and maintain the gravel level within 2 feet of the top of the conductor casing.

The Owner shall determine when development is complete. Payment for installation and removal of development and pumping test equipment shall be at the per foot rate as outlined in the "SCHEDULE OF ITEMS AND PRICES. Payment for operation and maintenance of development and pumping test equipment shall be at the hourly rate as outlined in the "SCHEDULE OF ITEMS AND PRICES". No standby time will be paid from the end of pumping development to the start of any pumping tests.

Pumping Tests - Following development operations the Contractor shall perform a complete pumping test of the production well. The discharge rate shall be measured using an orifice weir and manometer that are assembled according to the construction diagram shown in Figure 4. The weir dimensions shall include an 8-inch diameter pipe with 5-inch diameter orifice plate. Installation of necessary appurtenances such as orifice weir, gate valve, and stilling well shall be approved by the Owner prior to initiation of testing for yield and drawdown. Appurtenances will be evaluated and approved by the Owner based on correct installation, quality of equipment and ease of operation. The Contractor shall provide a 1/4-inch-threaded tap into the discharge line to allow attachment of a Rossum Sand Tester. The Owner shall provide and operate the sand testing device. The Owner shall direct test pumping with the anticipated pumping scenario for the respective wells to include but not be limited to the following:

a. Step Test - The step test will include a minimum of four different pumping rates between 200 and 500 gpm. Each rate will be pumped for a minimum of 100 minutes. After step test completion, the well shall be allowed to recover for a minimum of 12 hours before beginning the constant discharge test. No standby time will be paid during this period.

b. Constant Discharge Test - The constant discharge test must be continuous without interruption for a minimum of 72 hours. At the end of the 72 hour pumping period the pump may not be removed for a period of 36 hours or until approved by the Owner. If the constant discharge test is interrupted before 72 hours of continuous pumping have elapsed, the well shall be allowed to recover before test restart, for at least the amount of time the pump ran before failure. No payment shall be made for a constant discharge test that does not extend for a minimum of 72 hours or the time specified by the Owner.

Equipment installation for all tests shall be installed and ready to operate between 8:00-10:00 a.m. If test equipment is not ready to operate prior to 10:00 a.m. the scheduled test will be postponed until 8:00 a.m. the following morning with no bid item hourly rate or standby time being paid for the overnight delay. Actual measurements taken while testing for yield and drawdown will be the responsibility of the Owner. The Contractor shall maintain and operate all equipment and ensure its continuous uninterrupted operation as required.

Payment for development and testing by pumping shall be at the hourly rate specified as outlined in the "SCHEDULE OF ITEMS AND PRICES". The hourly rate does not include the time spent for equipment installation and removal.

10. PLUMBNESS AND ALIGNMENT

The Contractor shall guarantee that the well when completed, shall be sufficiently straight and plumb to permit the free installation and operation of a submersible pump regularly recommended to be installed in a 12-inch diameter well casing. The Contractor shall conduct a gyroscopic directional survey of the total depth of the well to verify plumbness and alignment. The Gyroscopic directional tool shall record the measured depth, the direction the casing is traveling and the angle or inclination of the casing. The survey shall be recorded on VHS tape format with readings every 10 to 50 feet. The information shall be analyzed and plotted with vertical and horizontal projection prints in a clear and readable format. The Gyroscopic Deviation survey shall be performed by a Contractor experienced in such surveys such as Welenco of Bakersfield, CA or approved equal.

Failure to pass the Gyroscopic Deviation survey plumbness and alignment test shall result in rejection of the subject well. A deviation from plumbness not greater than two-thirds (2/3) the well's inside diameter per 100 feet to the top of the well screen is allowed. A deviation greater than this amount will be cause for rejection. No payment shall be made for any portion of the contract if the owner rejects the well. Should the well fail to pass the plumbness and alignment test and have to be abandoned, the Contractor shall be responsible for proper abandonment of the well at no cost to the Owner.

Payment for the Gyroscopic Deviation survey shall be at the lump sum price as outlined in the "SCHEDULE OF ITEMS AND PRICES".

11. VIDEO SURVEY

The Contractor shall conduct a video survey after completion of the pumping tests. The video surveying equipment shall be specifically designed and constructed for underwater operation and viewing in wells. The recorded video survey shall be in color and VHS format. Numbers indicating the depth of the camera below the top of casing shall be recorded legibly and appear continuously on the videotape.

The video camera tool must have a bottom lens and light source for looking vertically down the well and a side-viewing camera and light source for viewing horizontally in the well. The side-viewing camera must be capable of providing images of the entire circumference of the well and be capable of switching instantaneously between the downhole and side-views. A Contractor experienced in video surveys such as Welenco of Bakersfield, CA or approved equal shall perform the video survey. The well shall be sounded for total depth using the video survey and the Contractor shall remove any sand and debris from the bottom of the well.

Payment for the video survey shall be at the lump sum price as outlined in the "SCHEDULE OF ITEMS AND PRICES".

12. WELL DISINFECTION AND WELL CAP

After completion of testing and all down hole surveys, each well shall be disinfected by adding 40 pounds of approximately 65-70 percent granular calcium hypochlorite mixed in solution with potable water and 4 gallons of muriatic acid (12-18% hydrochloric acid). The chlorinating solution will be introduced into the well below the static water level well through a tremmie pipe and mixed throughout the water column in the well by surge block or other mechanical action.

After testing and approval of the well by the Owner, the well shall be capped in a manner approved by the Owner. The production casing shall be capped with a 0.250-inch minimum thickness steel plate fully welded to the casing. A 2-inch lockable access cap shall be welded to the plate to allow access for measuring the static water level in the well.

13. SITE RESTORATION

The Contractor shall restore site to original or better condition. All drilling fluids and cuttings shall be removed from the site or leveled, dried and mixed with native material. If after drilling fluids and cuttings are removed, importation of suitable material is required, it shall be imported

and placed at the sole expense of the Contractor. Site restoration shall include compaction of suitable materials in areas planned for future construction of roads, buildings or other structures per Washoe County specifications. It is the responsibility of the Contractor to familiarize himself with any special requirements of site restoration. All site restoration shall be considered incidental to mobilization and demobilization and no additional payment will be made to the Contractor for site restoration work.

PROPOSAL - SCHEDULE OF ITEMS AND PRICES

Washoe County Department of Water Resources
Utility Services Division
4930 Energy Way
Reno, Nevada 89502

Gentlemen:

I (we) hereby submit my (our) proposal for **"SPRING CREEK #5 PRODUCTION WELL"** (PWP-WA-).

Having carefully examined the contract documents as described in the Agreement form, together with addenda numbered _____and having examined all the conditions affecting the work, the undersigned proposes to furnish all labor, materials, tools and equipment called for by said documents and to contract for completion of the work as listed in the following Bid Proposal and to comply with all conditions of the Contract Documents.

PROPOSAL - SCHEDULE OF ITEMS & PRICES

SPRING CREEK WELL #5

Item No.	Approx. Quantity		Description with Unit Prices In Words	Unit Price	Total Amount
1.	1	L.S.	Mobilization and Demobilization for construction, testing and site rehabilitation for one production well as described in Specs:_____ _____ _____lump sum.	_____	_____
2.	100	L.F.	Drill 26" minimum dia. borehole to a depth of 100 feet:_____ _____ _____ _____per lineal foot.	_____	_____

3.	101	L.F.	Furnish and install 20" dia. conductor casing to a depth of 101 feet:___ _____ _____ _____per lineal foot.	_____	_____
4.	100	L.F.	Furnish and install sanitary seal: _____ _____ _____ _____per lineal foot.	_____	_____
5.	500	L.F.	Drill 18" minimum dia. production casing borehole from 100' to approx. 600': _____ _____ _____per lineal foot.	_____	_____
6.	300	L.F.	Furnish and install 12" dia. blank production casing:_____ _____ _____ _____per lineal foot.	_____	_____
7.	300	L.F.	Furnish and install 12" dia. wire wrap well screen:_____ _____ _____ _____per lineal foot.	_____	_____

8.	22	Yd^3.	Furnish and install design gravel pack: _____ _____ _____ _____ yd^3.	_____	_____
9.	36	Hrs.	Air lift development by surging: _____ _____ _____ _____ per hour.	_____	_____
10.	400	L.F.	Furnish, install, and remove necessary equipment for development and test pumping: _____ _____ _____ per lineal foot.	_____	_____
11.	24	Hrs.	Well development by pumping: _____ _____ _____ _____ per hour.	_____	_____
12.	80	Hrs.	Operate and maintain necessary equipment for test pumping: _____ _____ _____ _____ per hour.	_____	_____

13.	1	L.S.	Video survey of the well: _____ _____ _____ _____ lump sum.	_____	_____
14.	1	L.S.	Plumbness and alignment test using Gyroscopic Deviation survey: _____ _____ _____lump sum.	_____	_____
15.	1	L.S.	Well disinfection and capping, including welded doughnut ring seal:_____ _____ _____ lump sum.	_____	_____
16.	12	Hrs.	Standby hours at Owner's request: _____ _____ _____ _____ per hour.	_____	_____

BID PROPOSAL TOTAL _____

Humboldt and Pump Co. Inc.
4675 W. Winnemucca Blvd. Winnemucca, NV 89445
Ph 775-623-5259 Fax 775-623-0307
E-mail HDP@the-onramp.net

Aug. 9, 2000

Dan Dragon
Washoe County Utility Services
P.O. Box 11130
Reno, NV 89520
Ph 775-954-4600 Fax 775-856-7310
Re: Well location and water

Dear Dan:

The new well has been located 18.5ft from the old well. I want to raise caution to the wind, that at this distance trouble may arise and possible well interference may be encountered.

Using water from this well is not a good idea. Move pipe line from fire hydrant to another water source. 2 hrs
Stand by time 200.00/hr total 400.00 CONFUSION
Move pipe line from another water source back to fire hydrant 2 hrs 200.00/hr = 400.00
Set pump in a well about 3,000 ft away, set 400 gpm 15hp sub pump, quite gen set, lay out Al line, etc.

Rain for rent delivery and pick up	1,500.00
3,000 ft 6" ring lock Al pipe, .50/ft	1,500.00/month
Unload and string out pipe	800.00
Pick up pipe and load pipe	800.00
Set pump	1,000.00
Rent pump and quiet gen set	1,500.00
Pull pump	1,000.00
Time to load and unload pipe and pump work	550.00
Moving pipe line from one source to another	800.00
Total	9,450.00 SCL

We would like to have extra time on contract if time becomes and issue.

Aug. 9. 2000 we started to load pipe on to trailer, pull pump and prepare and wire sub for anticipation that water use from the fire hydrant was taxing the system too much. We had half the pipe loaded when the report came back that we were to continue using the fire hydrant. We then proceeded to unload the pipe and re-stack it.

We had about 6 hrs loading and unloading the pipe and pre-checking and wiring the pump Total man hr about 10 at 55.00/hr total 550.00

Aug 11, 2000 Washoe now wanted to stop using the fire hydrant and string out approx. 3,000ft Al line and set a pump in a well and use this well for our water supply. We laid the Al line out Saturday Aug. 12, 2000, and set the pump on Sunday Aug 13, 2000.

Thank you.

Sincerely,

Gary Tompkins

Humboldt and Pump Co. Inc.
4675 W. Winnemucca Blvd. Winnemucca, NV 89445
Ph 775-623-5259 Fax 775-623-0307
E-mail HDP@the-onramp.net

Dan Dragon
Washoe County Utility Services
P.O. Box 11130
Reno, NV 89520 954-4610
Ph 775-954-4600 Fax 775-856-7310
Re: Well location and water

Aug. 9, 2000

Dear Dan:

The new well has been located 18.5ft from the old well. I want to raise caution to the wind, that at this distance trouble may arise and possible well interference may be encountered.

Using water from this well is not a good idea. Move pipe line from fire hydrant to another water source. 2 hrs
Stand by time 200.00/hr total 400.00

Set pump in a well about 3,000 ft away, set 250 gpm pump, quite gen set, lay out Al line, etc.

Rain for rent delivery and pick up	1,500.00
3,000 ft 6" ring lock Al pipe, .50/ft	1,500.00/month
Unload and string out pipe	000.00
Pick up pipe and load pipe	800.00
Set pump	1,000.00
Rent pump and quiet gen set	1,500.00
Pull pump	1,000.00
Total	8,100.00

Thank you.

Sincerely,

Gary Tompkins

Humboldt and Pump Co. Inc.
4675 W. Winnemucca Blvd. Winnemucca, NV 89445
Ph 775-623-5259 Fax 775-623-0307
E-mail HDP@the-onramp.net

Dan Dragon 8/17/00
Washoe County Utility Services
P.O. Box 11130
Reno, NV 89520
Ph 775-954-4600 Fax 775-856-7310
Re: Well caving problems & E-log

Dear Dan:

On Aug. 9, 2000 I fax a letter about the closeness of the new well from the old well 18.5ft and that the two wells may interfere with each other.

We circulated material out of the well while we were not drilling. The longest time we circulated before we could add drill steel was about 4.5 hrs. Some of the times were as little as 15 minutes. We mixed about 800 bags of mud to get the hole to stabilize and to keep the hole stable during drilling.

This extra time was about 48 hr all together at 200.00/hr	9,600.00
800 bags mud at 8.00/bag	6,400.00
We E-logged well	2,200.00
	$18,200.00

16,000.00

If time becomes an issue, I would like to see 2 extra days added to our completion time.

Thank you.

Sincerely,

Gary Tompkins

Dragan, Dan

Subject: Meet to discuss Humboldt Drilling Requests for extra money
Location: South Hallway conference room (168)

Start: Wed 8/23/00 10:00 AM
End: Wed 8/23/00 10:30 AM

Recurrence: (none)

Meeting Status: Meeting organizer

Required Attendees: Dragan, Dan; Collins, John; Orphan, Paul; Tissier, Jeffery; Evans, Ed

Humboldt Drilling Senf me a letter stating that they had "concerns" regarding drilling so close to our existing Spring Creek No. 5 well. After the letter, they had difficulty keeping the borehole open because of caving sands. They sent me another letter outlining additional costs they feel were due to the close proximity of the old well. Those costs are $9,600 for rig time and $6,400 for 800 bags of drilling mud they used to stabilize the well. Then I discussed the operation with Gary Thompkins of Humboldt this weekend and he said the hole had already taken 3 times the projected volume of gravel anticipated for the borehole. He feels this is more evidence to state his case that the nearby well had created a "cavity" that had caused the drilling problems.

I also wanted to discuss with you some of the cost overruns we will have on this well. First, we originally told them they could use water from a hydrant on the Spring Creek system. However, because of the hot weather and high demand, we had them switch to a temporary pump setup in the unequipped Spring Creek No. 6, about 2500 feet away. The cost for this work and temporary equipment is $9,450.00.

Additionally, because the drilling did not show clear indications of whether or not it would be a good producer below the 500 ft level, we asked them to run a geophysical log. The log clearly showed we had a good fracture zone from 520 feet to 320 feet. The cost to run the log is $2,200.00.

The gravel cost is per yard installed, and we are currently at three times the anticipated borehole volume. A preliminary estimate is that it will take at least 4 times the calculated volume. At $225 per yard and 22 yards the original estimated volume, the additional cost will be 66ydsx $225 per yard= $14,850.

So, if we take the additional costs that are justified, the total is:

gravel	$14,850	—WILL PAY CONTRACTED
Log	$ 2,200	—
Water source	$ 9,450	
total	$26,500	

The additional cost for debate is the $16,000 they are requesting for the drilling problems. The good news is that we may save money on the Spring Creek 7 job because it is such a good well that we may not run the pumping test as long as we requested in the specifications.

Washoe County
Department of
Water Resources
4930 Energy Way
Reno, NV 89502-4106
Tel: (775) 954-4600
Fax: (775) 954-4610

August 23, 2000

Gary Tompkins
Humboldt Drilling and Pump Co. Inc.
4675 W. Winnemucca Blvd.
Winnemucca, NV 89445

SUBJECT: Letter dated 8/17/00 regarding Well Caving problems & E-log

Dear Mr. Tompkins:

In regards to the above referenced letter, our office would like clarification on what is being requested. Our review of your letter suggests you are seeking additional payment for certain items. Please identify those items, and the section of the contract that provides for the payment, and detail justification. We are processing change orders for the $2,200.00 to pay you for the E-Log, and $9,450.00 for the temporary water source connection, both of which were done at our request.

Your request for two days extension of the contract time is denied. You left the job for a week during "Hot August Nights," and did not provide any indication that the contract time would be a problem. If you had worked during that period of time, time would not currently be an issue. Please call me at (775) 954-4653 if you have any questions or comments.

Sincerely,

Dan Dragan

Dan Dragan

DD/pt

c: John M. Collins, P.E., Manager, Utility Services Division
Paul C. Orphan, P.E., Senior Utility Engineer

Ed E.

September 21, 2000

Washoe County Department of Water Resources
4930 Energy Way
Reno, NV 89502-4106
Tel: (775) 954-4600
Fax: (775) 954-4610

Gary Tompkins
Humboldt Drilling and Pump Co., Inc.
4675 W. Winnemucca Blvd.
Winnemucca, NV 89445

SUBJECT: Well Caving Problems, E-Log, and Plumbness and Alignment Test

Dear Gary,

In regards to your letter dated 26 August 2000, we are processing change orders for the following items:

1. $9,450.00 For conversion to a new water source for drilling at the request of the County. This includes the labor costs and equipment necessary to use an existing County well located about 2,500 feet from the drill site.

2. $2,200.00 For conducting an electric log of the bore hole at the Request of the County.

3. $7,264.00 For equipping the new well to the system, utilizing the existing pump in the old Well nearby.

Your request for a change order for the additional gravel required to gravel pack the well is not necessary. Gravel installed is a per unit cost in the contract and you will be paid the per unit cost for the amount of gravel the job required.

In regards to the standby and drilling mud costs requested to regain hole stabilization, the County contracts and specifications are written such that it is the responsibility of the bidder to familiarize themselves with the conditions at the site prior to bidding. Your concerns about the closeness of the existing well should have been addressed at the pre-bid conference and site visit. You chose to waive a site visit at the pre-bid conference. The County therefore denies the request for payment of standby time and drilling mud based on drilling difficulties.

In regards to the standby time waiting for gravel, the contract is written as per unit cost for gravel installed. Delivery costs are a natural component of installing the gravel in the well. The fact that the delivery coincided with a weekend does not justify the additional standby request. You chose to leave the job site for a week during the Hot August Nights event in Reno. Had you not chosen to do so, the gravel delivery may not have coincided with a weekend.

A final consideration for the County is to assess the potential impact due to the fact that the well does not meet plumbness and alignment specifications. The contract states that "Failure to pass the Gyroscopic Deviation survey plumbness and alignment test shall result in rejection of the subject well." The decision as to whether or not the well will be rejected will be based on recommendations from pump manufacturers as to the impact the deviation will have on the performance and life expectancy of pumps installed in the well.

Sincerely

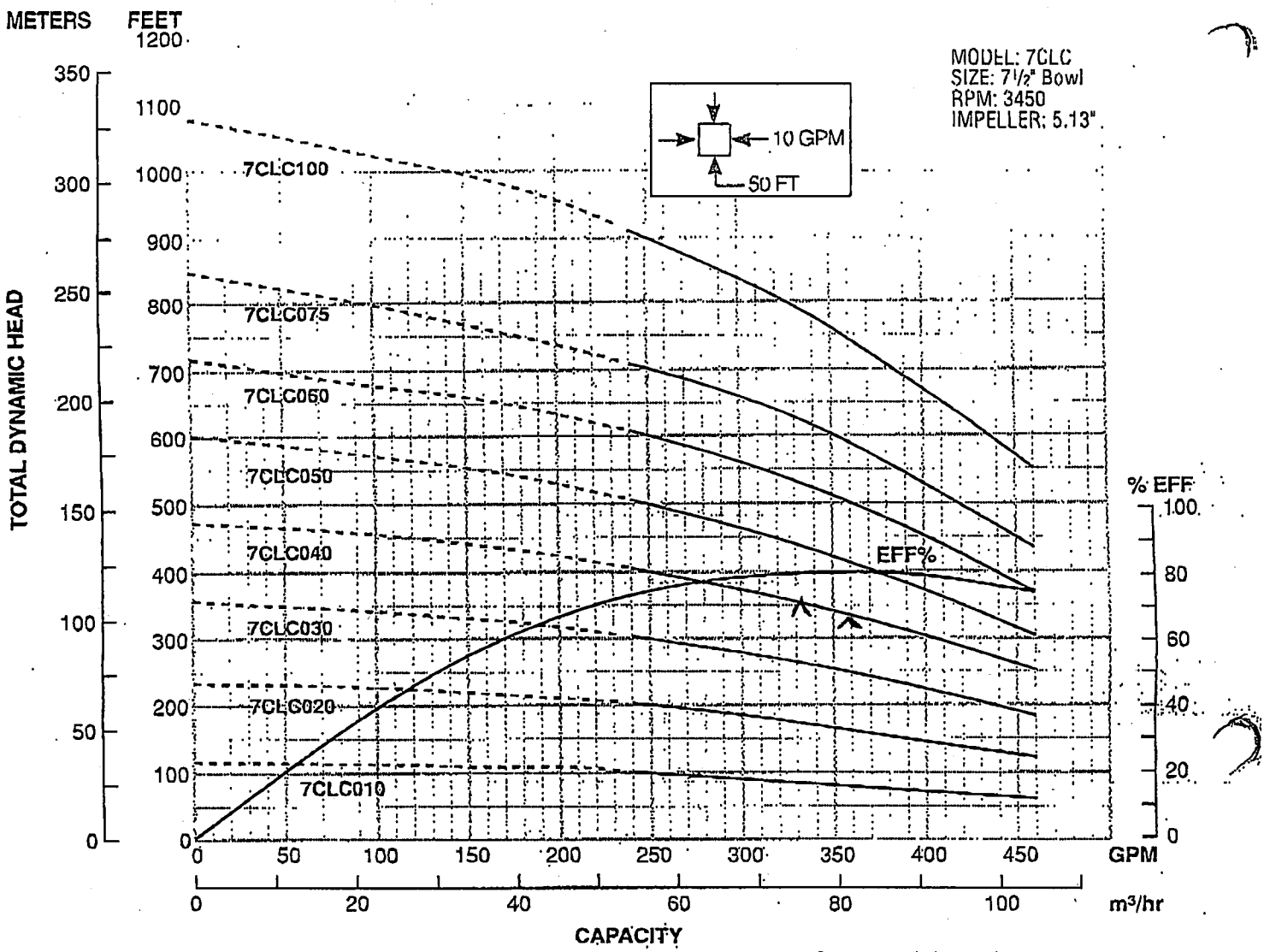
Dan Dragan
Senior Hydrogeologist

DD/pt

c: John M. Collins, P.E., Manager, Utility Services Division
Paul C. Orphan, P.E., Senior Utility Engineer
Jeff Tissier, Senior Accountant
Ed Evans, Environmental Engineer

Model 7CLC 350 GPM

New Pump

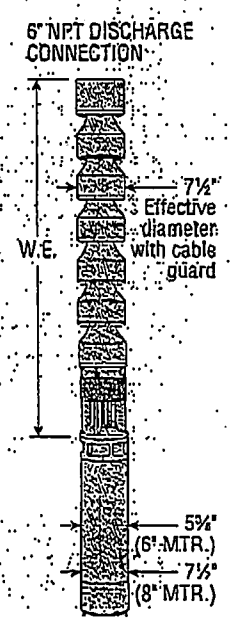


DIMENSIONS AND WEIGHTS

HP	Stages	W.E. Order Number	W.E. Length	W.E. Wt. (lbs.)
10	1	7CLC01066ATS	22⅞	75
20	2	7CLC02066ATS	29⅜	103
30	3	7CLC03066ATS	35½	131
40	4	7CLC04066ATS	41²⁵⁄₃₂	159
50	5	7CLC05066ATS	48¾	187
60	6	7CLC06066ATS	54⅞	215
75	7	7CLC07586ATS	60¹¹⁄₁₆	243
100	9	7CLC10086ATS	73½	299

(All dimensions in inches and weights in lbs. Do not use for construction purposes.)

PLEASE NOTE:
- Order motors separately.
- For intermediate horsepower pumps consult factory.
- Solid line is recommended operating range. The dotted line (– – – –) signifies an alternate pump selection is available.
- Please specify all options changes in W.E. order number.



MATERIALS OF CONSTRUCTION

Part Name	Material
Shaft	ASTM A582 TYPE 416
Coupling	ASTM A582 S41600 CD
Suction Adapter	ASTM A48 CL 40
Discharge Bowl	ASTM A48 CL 30B
Rubber Bearings	RUBBER
Optional Bronze Bearings	ASTM B584
Discharge Bowl Bearing	ASTM B584
Taperlocks	ASTM A108 GR 101B
Glassed Bowl	ASTM A48 CL 30B
Upthrust Collar	ASTM A276 S41400
Impeller	ASTM B584
Fasteners	SAEJ429 GR 8
Cable Guard	ASTM A240 S 30400
Suction Strainer	ASTM A240 S 30400

Humboldt Drilling and Pump Co. Inc.
4675 W. Winnemucca Blvd. Winnemucca, NV 89445
Ph 775-623-5259 Fax 775-623-0307
E-mail HDP@the-onramp.net

Sept. 28, 2000
Dan Dragon
Washoe County Utility Services
P.O. Box 11130
Reno, NV 89520
Ph 775-954-4600 Fax 775-954-4610
Re: New pump

Dear Dan:

The old pump is worn beyond repair.

If we use the 40 hp 8" motor and figure 120ft lift and 100 psi pressure a Goulds 7LCL 4 stage pump will produce 330 gpm at 120ft lift and 100 psi 351ft TDH.

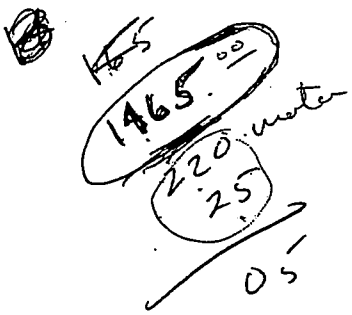
This bowl will cost 2,571.00 Frt. is included in this cost.

Please find Goulds pump curve.

Thank you. If you have any questions please call.

Sincerely,

Gary Tompkins



3331

ATTN: GARY

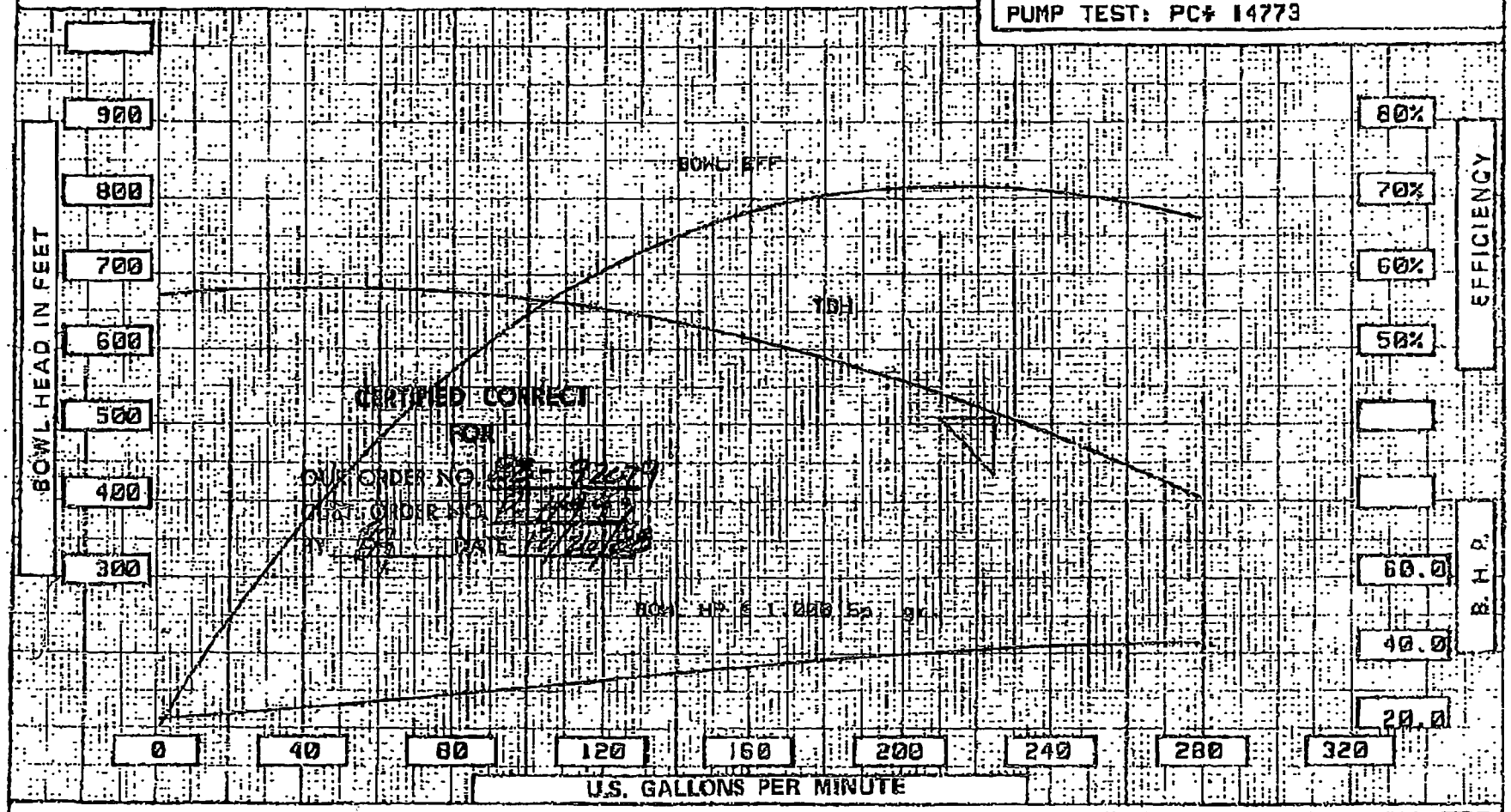
OLD PUMP - COULD NOT BE REBUILT

Performance shown is the result of a test conducted in accordance with latest Hydraulic Institute Standards. Other Standards applicable when mutually agreed upon.

WESTERN NEVADA

40HP SUBMERSIBLE WELL PUMP

PUMP TEST: PC# 14773



Peabody Floway

TYPE	8XKH
NO. OF STAGES	5
R.P.M.	3520
PUMP SERIAL NO.	88-32079

DWG. NO. 88-32079

"There's a Difference..."

DWN. BY R.M.G. DATE 10/21/88

PF-552-1

KENNY C. GUINN
Governor

STATE OF NEVADA

R. MICHAEL TURNIPSEED, P.E.
Director

HUGH RICCI, P.E.
State Engineer

DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
DIVISION OF WATER RESOURCES
123 W. Nye Lane, Suite 246
Carson City, Nevada 89706-0818
(775) 687-4380 • Fax (775) 687-6972
http://ndwr.state.nv.us

September 13, 2000

Dan Dragan
Washoe County Department of Water Resources
4930 Energy Way
Reno NV 89502-4106

Re: Request to waive plugging requirements for Spring Creek Well No. 5 in Washoe County, Nevada

Dear Mr. Dragan:

In response to your request dated September 12, 2000 in the above-referenced matter, please be advised the state engineer finds no grounds to waive the requirements at this time and the request is herewith denied. The wells must be perforated and plugged with neat cement or bentonite grout as required by Nevada Administrative Code (NAC) Section 534.420. Your request does not satisfy the provisions of Section 534.450 of the regulation.

If you have any questions, please call me at 775-687-3861, or send a fax to 775-687-1393.

Sincerely,

Tim Wilson
Staff Engineer II

cc: Nevada Division of Environmental Protection
Nevada Division of Water Resources, Thomas K. Gallagher, P.E.

Washoe County
Department of
Water Resources
4930 Energy Way
Reno, NV 89502-4106
Tel: (775) 954-4600
Fax: (775) 954-4610

September 12, 2000

Tim Wilson, P.E.
Hydraulic Engineer
Nevada Division of Water Resources
123 West Nye Lane, Suite 246
Carson City, NV 89706-0818

Subject: Abandonment of Spring Creek Well No. 5

Dear Mr. Wilson,

Washoe County recently drilled a new well to replace our old Spring Creek Well No. 5. The old well (log attached) began pumping sand and silt, and could no longer be used for municipal supply.

The new well was drilled about 20 feet away from the old well (log attached). During construction, the new well took over five times the calculated volume of gravel pack to fill the annular space. In one instance, 17 cubic yards of gravel did not show any measurable difference in the gravel pack. The large amount of gravel used and the fact the old well pumped sand suggest to us that there may have been significant voids underground around the old and new well.

We are concerned that a typical abandonment process in the old well may negatively influence the new well. Specifically, we are worried that neat cement may migrate from the old well to the new well.

We would like to request a waiver in the abandonment process to allow one of the following alternatives:

1. Convert the old well to a monitoring well. This would include installing a 2-inch diameter steel pipe with a "basket" at the bottom at least 50 feet down the well. We would then fill the annular space between the 2-in pipe and the well casing with cement. The "basket" would prevent cement from going below the 2-inch pipe.

   The monitoring well would be enclosed in a fenced compound and would be within the wellhead protection program for the new municipal well. We would also sign an affidavit of intent to abandon such that if the new well were ever abandoned we would also abandon the old well. Drilling out the 2-inch and following regular abandonment procedures would complete that process.

Ed Schmidt
Director

John M. Collins
Utility Services
Manager

Leonard E. Crowe, Jr.
Water Resources
Planning Manager

Department of
Water Resources

2. Allow a cement/sand mix in the abandonment process. We believe the addition of sand would reduce the migration potential of pure neat cement.

3. Use of bentonite pellets instead of cement.

We appreciate your consideration of this matter. Please let us know if you have any alternative suggestions, as we would be open to other considerations as well. Please call me at 954-4653 to discuss this matter further.

Sincerely,

Dan Dragan

Dan Dragan
Senior Hydrogeologist

DD:stw

Encl.

c: Ed Schmidt, Director, Dept. of Water Resources
John M. Collins, P.E., Manager, Utility Services Division
Vahid Behmaram, Water Rights Technician Supervisor

WHITE—DIVISION OF WATER RESOURCES
CANARY—CLIENT'S COPY
PINK—WELL DRILLER'S COPY

STATE OF NEVADA
DIVISION OF WATER RESOURCES

Figure 2

Spring Creek #5
APN 84-270-31

WELL DRILLERS R Existing Well SC5

Please complete this form in i

1. OWNER David Frey, Trustee ADDRESS 1658 Bradley Sparks, Nev.

2. LOCATION ¼ ¼ Sec. 6 T. 20 N/S R. 21 E. Washoe Coun
PERMIT NO. 26715

3. TYPE OF WORK
New Well ☐ Recondition ☐
Deepen ☐ Redrilled ☑

4. PROPOSED USE
Domestic ☐ Irrigation ☑ Test ☐
Municipal ☐ Industrial ☐ Stock ☐

5. TYPE WELL
Cable ☐ Rotary ☐
Other ☐

6. LITHOLOGIC LOG

Material	Water Strata	From	To	Thickness
Sandy clay		0	4	
Rock		4	30	
Sandy Clay		30	220	
fractured Rock	220	220	301	
hard Rock		301	342	
fractured Rock		342	349	
hard rock		349	400	
gravel packed inside from 300 to 400'				

Date started 12-24, 19 79
Date completed 12-30, 19 79

7. WELL TEST DATA

Pump RPM	G.P.M.	Draw Down	After Hours Pump
1800	400	245	5

BAILER TEST
G.P.M. ..... Draw down ..... feet ..... hours
G.P.M. ..... Draw down ..... feet ..... hours
G.P.M. ..... Draw down ..... feet ..... hours

8. WELL CONSTRUCTION
Diameter hole 10 inches Total depth 403 fe
Casing record
Weight per foot 29 Thickness .25

Diameter		From		To	
10 3/4	inches	0	feet	300	fe
	inches		feet		fe
9 5/8	inches	300	feet	400	fe
	inches		feet		fe
	inches		feet		fe
	inches		feet		fe

Surface seal: Yes ☑ No ☐ Type Cement
Depth of seal 80 f
Gravel packed: Yes ☑ No ☐
Gravel packed from 60 feet to f

Perforations:
Type perforation 3/32 X 2½
Size perforation Factory cut
From 228 feet to 300
From feet to
From feet to
From feet to
From feet to

9. WATER LEVEL
Static water level 50 Feet below land surface
Flow G.P.M. 400
Water temperature cold F. Quality clear

10. DRILLERS CERTIFICATION
This well was drilled under my supervision and the report is tru the best of my knowledge.
Name Paul Williams
Address 22 South Pollasky Sparks, Nv
Nevada contractor's license number 1448 3
Nevada driller's license number 957
Signed Paul Williams
Date 12-30-79

NEW WELL SUMMER 00

WASHOE COUNTY

DEPARTMENT OF PUBLIC WORKS
UTILITY DIVISION

PUMPING TEST DATA

WELL SPRING CREEK #5
PUMPING/OBSERVATION WELL
PUMPING/RECOVERY DATA
PAGE 1 OF _____

TYPE of PUMPING TEST SPECIFIC CAPACITY TO SEE IF ABANDONMENT OF OLD WELL IMPACTED NEW WELL
HOW Q MEASURED _____ M.P. for WL's _____ elev. _____
HOW WL's MEASURED _____ DEPTH of PUMP/AIRLINE _____ wrt _____
PUMPED WELL NO. _____ % SUBMERGENCE: initial _____ ; pumping _____
RADIUS of PUMPED WELL _____ PUMP ON: date 29NOV00 time _____
DISTANCE from PUMPED WELL _____ PUMP OFF: date _____ time _____

TIME t = at t'=0					WATER LEVEL DATA STATIC WATER LEVEL 49.25					WATER PRODUCT.		COMMENTS
CLOCK TIME	ELAPSED TIME mins/hrs	t	t'	t / t'	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	S or S'		S/Q	Q	(NOTE ANY CHANGES IN OBSERVERS)
		0					49.25	0		gpm/ft		Ed Evans / Dan Dragon
		5					78.48	29.23		11.63	340gpm	
		10					78.92	29.67		11.45		

UTIL-16

Gary-

WASHOE COUNTY

DEPARTMENT OF WATER RESOURCES
UTILITY SERVICES DIVISION

Department of Water Resources

WELL Spring Creek 5
(PUMPING) / OBSERVATION WELL
(PUMPING) / RECOVERY DATA
PAGE 1 OF 2

PUMPING TEST DATA

TYPE OF PUMPING TEST Constant Q
HOW Q MEASURED Orifice Weir
HOW WL's MEASURED Hermit 3000 w/ 100psi Xducer
PUMPED WELL NO. _____
RADIUS of PUMPED WELL _____
DISTANCE from PUMPED WELL _____

M.P. for WL's Top of tube elev. _____
DEPTH of PUMP/AIRLINE _____ wrt _____
% SUBMERGENCE: initial _____ pumping _____
PUMP ON: date 9/5/00 time 0930
PUMP OFF: date 9/7/00 time 1030

TIME t = at t'=O					WATER LEVEL DATA STATIC WATER LEVEL 49.75					WATER PRODUCT		COMMENTS
CLOCK TIME	ELAPSED TIME mins/hrs	t	t'	t /t'	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	(S) or S'			Q	(NOTE ANY CHANGES IN OBSERVERS)
0931	/	1			137.84			88.09			25 3/4"	=800 gpm
2	/	2			141.68			91.93				
3	/	3			145.00			95.25				
4	/	4			146.10			96.35				
5	/	5			146.39			96.64				
6	/	6			146.56			96.81				
7	/	7			147.30			97.55				
8	/	8			147.12			97.37				
9	/	9			148.15			98.40				
0940	/	10			148.12			98.37				SC=8.16
	/	12			148.67			98.92				≈no sand
	/	14			149.00		sounder	99.25				
	/	16			148.79		148.28	99.04				
	/	18			149.31			99.56				
0950	/	20			149.84			100.09				
	/	25			150.48			100.73				
1000	/	30			151.19							
1008	/	38			150.60*			100.85				1008=150.60=sounder
1012	/	42			150.83*	—		101.08		⊗	⊗	start new test
1015	/	45			150.93			101.18				=Extra 2
1020	/	50			151.74			101.99				
1022	/	52			151.87			102.12				
1025	/	55			152.10			102.35				
1030	— / 1	60			152.49			102.74				152.25=sounder* 1030
1040	10 / 1	70			152.41			102.66				
1050	20 / 1	80			153.13			103.38				152.94=sounder 1055
1100	30 / 1	90			152.81			103.06				
1110	40 / 1	100			153.06			103.31				
1130	— / 2	120			153.03			103.28				153.29=sounder 1130
1150	20 / 2	140			153.39			103.64				153.10=sounder
1210	40 / 2	160			153.38			103.63				
1230	— / 3	180			153.22			103.47				
1250	20 / 3	200			153.71			103.96				153.37=sounder 1240
1310	40 / 3	220			153.81			104.06				1300- Humbolt Δ'd flow,
1330	— / 4	240			153.69			103.94				readjusted
1350	20 / 4	260			154.21			104.46				
1410	40 / 4	280			154.16			104.41				153.84=sounder 1310
1430	— / 5	300			154.07			104.32				
1450	20 / 5	320			153.59			103.84				
1510	40 / 5	340			154.16			104.41				
1530	— / 6	360			154.21			104.46				
1600	30 / 6	390			153.94			104.19				154.34=sounder 1600
1630	— / 7	420			154.72			104.97				
1700	30 / 7	450			154.50			104.75			Q ok	154.52=sounder
1730	— / 8	480			154.60			104.65				

UTIL-16

WASHOE COUNTY

DEPARTMENT OF WATER RESOURCES
UTILITY SERVICES DIVISION

Department of Water Resources

WELL SPRING CREEK 5
(PUMPING) / OBSERVATION WELL
(PUMPING) / RECOVERY DATA
PAGE 2 OF 2

PUMPING TEST DATA

TYPE OF PUMPING TEST Constant Q
HOW Q MEASURED orifice Weir
HOW WL's MEASURED Hermit 3000 w/100 psi xducer
PUMPED WELL NO.
RADIUS of PUMPED WELL
DISTANCE from PUMPED WELL

M.P. for WL's Top of PVC elev.
DEPTH OF PUMP/AIRLINE wrt
% SUBMERGENCE: initial pumping
PUMP ON: date 9/5/00 time 0930
PUMP OFF: date 9/7/00 time 1030

TIME t = at t'=O					WATER LEVEL DATA STATIC WATER LEVEL 49.75					WATER PRODUCT		COMMENTS
CLOCK TIME	ELAPSED TIME mins/hrs	t	t'	t/t'	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	S or S'		S/Q	Q	(NOTE ANY CHANGES IN OBSERVERS)
1800	30/8	510			154.89			105.14			800gpm	154.46 w/sounder
1900	30/9	570			154.98			105.23		7.6		Q↑
2000	30/10	630			154.43			104.68				
2100	30/11	690			155.08			105.33			✓	
2200	30/12	750			154.56			104.81			800	154.85 w/SOUNDER @ 2210
2300	30/13	810			154.30			104.55				
2400	30/14	870			154.75			105.00				155.02 w/SOUNDER 0015
0200	30/16	990			154.92			105.17				
0350	20/18	1100			155.23			105.48				155.34 w/SOUNDER @ 0420
0536	0/20	1200			155.36			105.61		7.6		
0710	40/21	1300			155.67			105.92				
0850	20/23	1400			155.88			106.13				Q↑ @ 0800 155.78 @ 0845
1030	0/25	1500			156.29			106.54			800	155.80 @ 1030
1210	40/26	1600			155.52			105.77				Q↓ @ 1210 155.78 @ 1210
1350	20/28	1700			156.00			106.25			800	155.74 w/Sounder @ 1350
1530	0/30	1800			155.31			105.56			Q OK	155.52 " " 1530
1710	40/31	1900			155.18			105.43			Q OK	DAN
1850	20/33	2000			155.62			105.87				
2030	-/35	2100			156.12			106.37			Q OK	
2200	30/36	2190			156.42			106.67			Q OK	MW
2400	30/38	2310			155.86			106.11			Q OK	
0200	30/40	2430			156.34			106.59			Q OK	
0400	30/42	2550			156.15			106.40			Q OK	155.88 @ 0400
0600	30/44	2670			156.45			106.70			Q↑	156.60 w/Sounder
0810	40/46	2800			156.41			106.66				
0950	/	2900			155.69			105.94				
1030	/	2940			156.27			106.52				

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SC5 PUMPINI

WASHOE COUNTY

DEPARTMENT OF WATER RESOURCES
UTILITY SERVICES DIVISION

Department of Water Resources

WELL Spring Creek 5 MW
PUMPING / OBSERVATION WELL
(PUMPING) / RECOVERY DATA
PAGE 1 OF 2

PUMPING TEST DATA

TYPE OF PUMPING TEST Constant Q
HOW Q MEASURED _____
HOW WL's MEASURED Sounder
PUMPED WELL NO. SC 5
RADIUS of PUMPED WELL _____
DISTANCE from PUMPED WELL _____

M.P. for WL's Top of well elev. _____
DEPTH OF PUMP/AIRLINE _____ wrt _____
% SUBMERGENCE: initial _____ pumping _____
PUMP ON: date 9/5/00 time 0930
PUMP OFF: date 9/7/00 time 1030

TIME t = at t'=O					WATER LEVEL DATA STATIC WATER LEVEL 51.50						WATER PRODUCT	COMMENTS
CLOCK TIME	ELAPSED TIME mins/hrs	t	t'	t/t'	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	S or S'			Q	(NOTE ANY CHANGES IN OBSERVERS)
	/	1			55.20			3.70			800	
	/	2			57.93			6.43				
	/	3			61.15			9.65				
	/	4			64.22			12.72				
	/	5			67.18			15.68				
	/	6			70.16			18.66				
	/	7			72.76			21.26				
	/	8			75.40			23.90				
	/	9			77.89			26.39				
	/	10			80.17			28.67				
	/	12			85.32			33.87				
	/	14			89.16			37.66				
	/	16			91.42			39.92				
	/	18			98.38			46.88				
	/	20			101.02			49.52				
	/	25			102.55			51.05				
	/	30			106.44			54.94				
	/	35			109.47			57.97				
	/	40			111.27			59.77				
	/	45			112.95			61.45				
	/	50			114.16			62.66				
1030	— / 1	60			115.80			64.30				
1040	10 / 1	70			116.86			65.36				
1050	20 / 1	80			117.43			65.93				
1100	30 / 1	90			117.90			66.40				
1110	40 /	100			118.19			66.69				
1130	— / 2	120			118.65			67.15				
1150	20 / 2	140			119.04			67.54				
1210	40 / 2	160			119.30			67.80				
1230	— / 3	180			119.57			68.07				
1250	20 / 3	200			119.65			68.15				
1310	40 / 3	220			119.71			68.21				
1330	— / 4	240			120.03			68.53				
1350	20 / 4	260			120.10			68.60				
1410	40 / 4	280			120.14			68.64				
1430	— / 5	300			120.27			68.77				
1520	50 / 5	350			120.47			68.97				
1530	— / 6	360			120.51			69.01				
1600	30 / 6	390			120.60			69.10				
1630	0 / 7	420			120.66			69.16				
1700	30 / 7	450			120.83			69.33				
1730	— / 8	480			120.94			69.44				
1800	30 / 8	520			121.53			70.03				
1900	30 / 9	570			121.60			70.10				
2000	30 / 10	630			121.69			70.19				

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WASHOE COUNTY

DEPARTMENT OF WATER RESOURCES
UTILITY SERVICES DIVISION

Department of Water Resources

WELL SPRING CREEK 5 MW
PUMPING / OBSERVATION WELL
(PUMPING) / RECOVERY DATA
PAGE 2 OF 2

PUMPING TEST DATA

TYPE OF PUMPING TEST CONSTANT Q
HOW Q MEASURED
HOW WL's MEASURED Sounder
PUMPED WELL NO. SC 5 (replacement)
RADIUS of PUMPED WELL
DISTANCE from PUMPED WELL 18.5 ft

M.P. for WL's Top of well elev.
DEPTH OF PUMP/AIRLINE wrt
% SUBMERGENCE: initial pumping
PUMP ON: date 9/5/00 time 0930
PUMP OFF: date 9/7/00 time 1030

TIME t = at t'=O					WATER LEVEL DATA STATIC WATER LEVEL 51.50					WATER PRODUCT		COMMENTS
CLOCK TIME	ELAPSED TIME mins/hrs	t	t'	t /t'	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	(S) or S'			Q_{gpm}	(NOTE ANY CHANGES IN OBSERVERS)
2100	30/11	690			121.74			70.24			800	DM
2200	30/12	750			121.81			70.31			800	EE
2300	30/13	810			121.82			70.32				
0010	40/14	880			121.83			70.33				
0210	40/16	1000			121.86			70.36				
0410	40/18	1120			122.28			70.78				
0610	40/20	1240			122.26			70.76				
0810	40/22	1360			122.56			71.06				
0930	0/24	1440			122.59			71.09				
1030	0/25	1500			122.57			71.07				
1210	40/26	1600			122.59			71.09				
1350	20/28	1700			122.61			71.11				
1530	0/30	1800			122.79			71.29				
1710	4/31	1900			122.82			71.32				DAN
1850	20/33	2000			122.94			71.44				
2030	-/35	2100			122.97			71.47				
2206	30/36	2190			123.03			71.53				MW onsite 2100
2400	30/38	2310			122.82			71.42				
0200	30/40	2430			123.14			71.64				
0400	30/42	2550			122.85			71.45				
0600	30/44	2670			122.83			71.33				
0810	40/46	2800			123.10			71.60				
0950	20/48	2900			123.02			71.52				
1030	-/49	2940			123.03			71.53				

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SC5 OBS WEL

WASHOE COUNTY

DEPARTMENT OF WATER RESOURCES
UTILITY SERVICES DIVISION

Department of Water Resources

WELL Spring Creek #5
(PUMPING) / OBSERVATION WELL
PUMPING / (RECOVERY) DATA
PAGE 1 OF ____

PUMPING TEST DATA

TYPE OF PUMPING TEST Recovery
HOW Q MEASURED ____
HOW WL's MEASURED ____
PUMPED WELL NO. ____
RADIUS of PUMPED WELL ____
DISTANCE from PUMPED WELL ____

M.P. for WL's ____ elev. ____
DEPTH OF PUMP/AIRLINE ____ wrt ____
% SUBMERGENCE: initial ____ pumping ____
PUMP ON: date 9/5/00 time 0930
PUMP OFF: date 9/7/00 time 1030

TIME: t = 2940 at t'=0

WATER LEVEL DATA: STATIC WATER LEVEL 49.75; total DD = 106.52

CLOCK TIME	ELAPSED TIME mins/hrs	t	t'	t/t'	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	S or (S')		WATER PRODUCT	Q	COMMENTS (NOTE ANY CHANGES IN OBSERVERS)
1031	1 / 49	2941	1	2941	64.16			14.41				
1032		2942	2	1471	58.43			8.68				
1033		2943	3		57.17			7.42				
1034		2944	4	736	56.47			6.72				56.86 = sounder
1035		2945	5	589	56.02			6.27				
		2946	6	491	55.67			5.92				
		2947	7		55.38			5.63				
		2948	8	369	55.16			5.41				
		2949	9		54.91			5.16				
1040		2950	10	295	54.65			4.90				95.4% recovery
		2952	12	246	54.30			4.55				
		2954	14	211	53.94			4.19				
		2956	16	185	53.59			3.84				
		2958	18	164	53.37			3.62				
1050		2960	20	148	53.14			3.39				53.60 = sounder
1055		2965	25	119	52.75			3.00				97.2% recovery
1100	30 / 49	2970	30	99	52.40			2.65				
1105		2975	35	85	52.11			2.36				
1110		2980	40	75	51.93			2.18				
1115		2985	45	66	51.74			1.99				
1120		2990	50	60	51.60			1.85				
1130	– / 50	3000	60	50	51.38			1.63				98.5%
1140		3010	70	43	51.17			1.42				
1150		3020	80	38	51.03			1.28				51.50 = sounder
1200		3030	90	33.7	50.91			1.16				
1210		3040	100	30.4	50.80			1.05				51.18 = sounder @ 1225
1230	– / 51	3060	120	25.5	50.67	This is not the lowest + measured in Hermit [?] ~ barometric change?		0.92				99.14% recovery
1300	30 / 51	3090	150	20.6	50.46			0.71				
8/00 1130	– / 74	4,440	1,500	2.96	50.27			0.52				50.80 = Sounder

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WASHOE COUNTY

DEPARTMENT OF WATER RESOURCES
UTILITY SERVICES DIVISION

Department of Water Resources

WELL SC5 WELL (ORIGINAL) MW
PUMPING (OBSERVATION WELL)
PUMPING (RECOVERY DATA)
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PUMPING TEST DATA

TYPE OF PUMPING TEST Recovery
HOW Q MEASURED _____
HOW WL's MEASURED _____
PUMPED WELL NO. _____
RADIUS of PUMPED WELL _____
DISTANCE from PUMPED WELL _____

M.P. for WL's _____ elev. _____
DEPTH OF PUMP/AIRLINE _____ wrt _____
% SUBMERGENCE: initial _____ pumping _____
PUMP ON: date 9/5/00 time 0930
PUMP OFF: date 9/7/00 time 1030

TIME t = 2940 at t'=0					WATER LEVEL DATA STATIC WATER LEVEL 51.50 total DD= 71.53					WATER PRODUCT		COMMENTS
CLOCK TIME	ELAPSED TIME mins/hrs	t	t'	t/t'	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	S or (s')			Q	(NOTE ANY CHANGES IN OBSERVERS)
1031		2941	1	2941	118.73			67.23				123.03 @ 1029
		2942	2	1471	113.80			62.30				
1033		2943	3		109.35			57.9				
		2944	4	736	106.08			54.58				
1035		2945	5	589	102.10			50.60				
		2946	6	491	98.35			46.90				
		2947	7		94.90			43.40				
		2948	8	369	91.65			40.15				
		2949	9		88.53			37.03				
1040		2950	10	295	85.75			34.25				
1042		2952	12	246	80.68			29.18				
1044		2954	14	211	76.42			24.92				
1046		2956	16	185	72.80			21.30				
1048		2958	18	164	70.05			18.55				
1050		2960	20	148	67.35			15.85				
1055		2965	25	119	—			—				
1100		2970	30	99	59.36			7.86				89% recovery
1110		2980	40	75	56.39			4.89				
1120		2990	50	60	55.24			3.74				
1130		3000	60	50	54.60			3.10				
1140		3010	70	43	54.25			2.75				
1150		3020	80	38	53.95			2.45				96.6% recovery
1210	40/50	3040	100	30.4	53.59			2.09				
1230	—/51	3060	120	25.5	53.34			1.84				97.4% recovery
1300	30/51	3090	150	20.6	53.04			1.54				97.8% "
9/7/00 1130	—/74	4,440	1,500	2.96	52.26			0.76				98.9% "

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