

**Spring Creek Well #7
Well Construction & Test Pumping
Summary Report**



**WASHOE COUNTY
DEPARTMENT OF WATER RESOURCES**

4930 ENERGY WAY RENO, NEVADA 89502



**Spring Creek Well #7
Well Construction & Test Pumping
Summary Report**

Prepared by:
Washoe County Department of Water Resources
Water Resources Planning Division
February 2007

TABLE OF CONTENTS

Table of Contents.....	i
Tables and Figures.....	ii
1.0 Summary and Conclusions.....	1
1.1 Results.....	1
1.2 Recommendations.....	1
2.0 Location.....	1
3.0 Well Construction and Testing.....	3
3.1 Construction Summary.....	3
3.2 Gravel Pack and Sanitary Seal.....	3
3.3 Airlift and Pumping Development.....	5
4.0 Aquifer Testing.....	5
4.1 Step Drawdown Test.....	6
4.2 Constant Discharge Test.....	6
4.3 Transmissivity and Storativity.....	6
4.4 Recovery Test.....	9
5.0 Down Hole Surveys.....	9
6.0 Water Quality.....	15
7.0 Design Recommendations.....	15
Appendix.....	17
1.0 Bid Results and Final Project Cost	
2.0 Well Driller's Report	
3.0 Water Quality Analyses	
4.0 Gyroscopic Survey	
5.0 Pumping Test Field Data Sheets	

TABLES AND FIGURES

TABLES

1	Well Location and Distances.....	3
2	Well Construction Summary.....	3
3	Pumping Tests Performed.....	5
4	Step Drawdown Test Summary.....	6
5	Predicted Drawdown.....	15

FIGURES

1	Location Map.....	2
2	Well Design.....	4
3	Step Drawdown Test, Total Drawdown Graph.....	7
4	Spring Creek Well 7 Constant Discharge Test.....	8
5	SSP2 Monitoring Well Drawdown.....	10
6	SSP2A Monitoring Well Drawdown.....	11
7	Spring Creek Well 7 Recovery Test.....	12
8	SSP2 Monitoring Well Recovery	13
9	Gyroscopic Survey Plot.....	14
10	Predicted Drawdown.....	16

1.0 Summary and Conclusions

A new municipal supply well was drilled for the Spring Creek Water System in the summer of 2000. The well was designed to increase system capacity in anticipation of new subdivisions for Spanish Springs Valley. The well location was selected based on information obtained from the drilling program for the 1993 Spanish Springs Water Resources study. The well was expected to be completed in the same tertiary volcanic aquifer as Spring Creek Well 6. In April 2000, the bid for construction and testing of a 16-inch diameter production well was awarded to Lang Exploratory Drilling of Salt Lake City, UT. The contractor started the drilling project on June 25, 2000 and completed well construction and development on July 3, 2000.

1.1 Results

A 16-inch diameter production well was constructed to a total depth of 710 feet by the dual-tube reverse circulation method. A 7-hour step test consisting of four steps at the pumping rates of 1000, 1500, 2000 and 2500 gallons per minute (gpm) was conducted with well efficiency staying above 95% for each pumping rate. A 7-day constant discharge test was conducted from August 21-28, 2000. Static water level in the well was measured at 135.60 feet below ground level prior to start of testing. An average aquifer transmissivity of 290,000 gallons per day per foot (gpd/ft) and a horizontal hydraulic conductivity of 97 feet per day were calculated for the production well from the constant discharge test data. An aquifer storativity of 2.5×10^{-4} was determined from observation well data collected during the test.

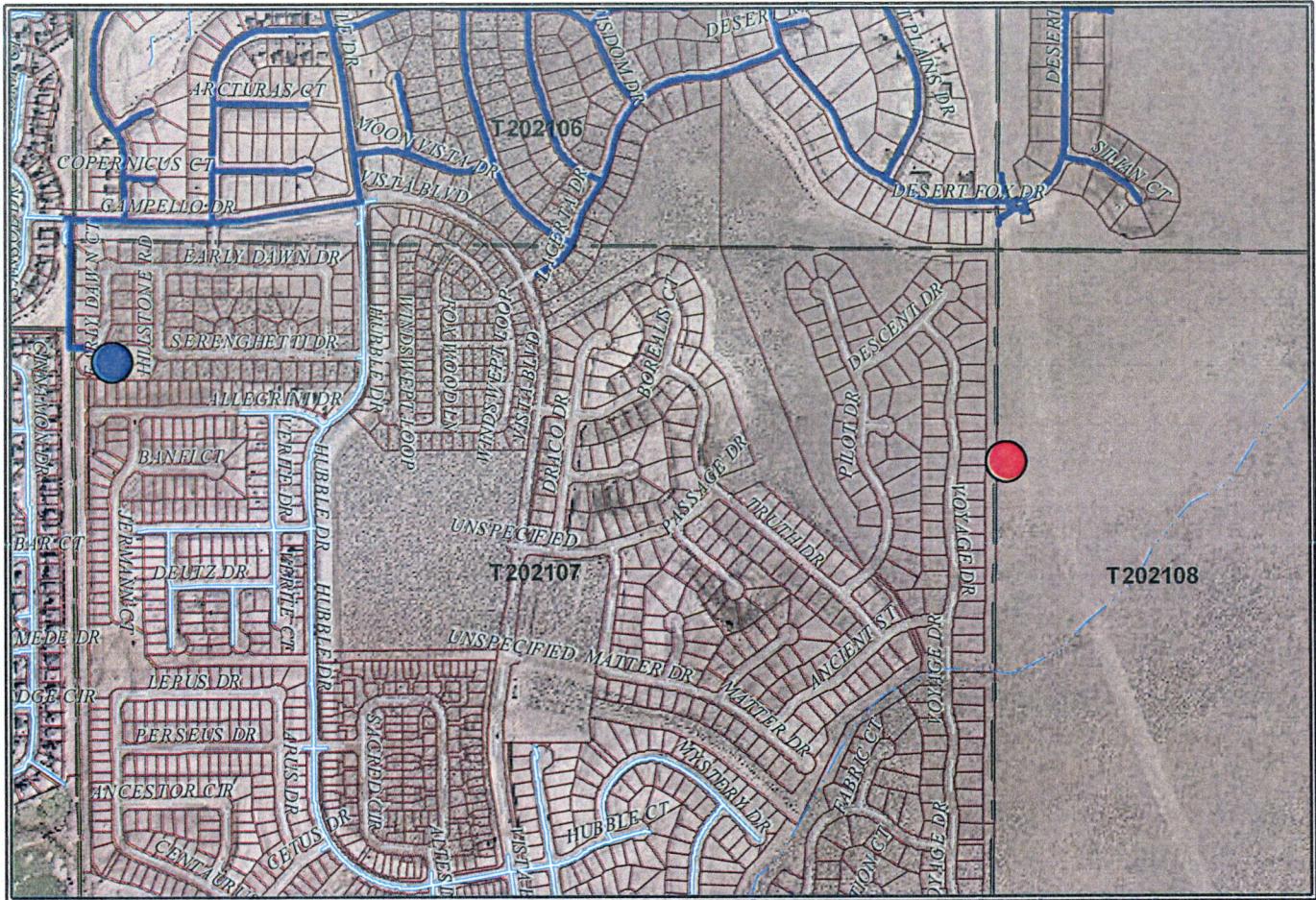
Sand content measured during constant discharge testing was <5 parts per million (ppm) immediately after start of pumping and remained below 5 ppm for the remainder of the test. Water quality samples were collected after 24 hours of pumping and prior to test shut off by department staff for complete organic and inorganic compound testing. The test analyses show Spring Creek Well 7 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 Recommendations

The Spring Creek Well 7 can be equipped to pump at 2000 gpm. A pumping level of approximately 177 feet with 27 feet of drawdown after 30 days of continuous pumping is predicted with reference to a static water level of 150 feet. It is recommended that the pump be set in blank casing at 300 feet.

2.0 Location

Figure 1 is a map showing the location of Spring Creek Well 7 within the eastern portion of the Spring Creek Water System. Location coordinates in Nevada State Plane Coordinate System, West Zone, NAD 83 for wells used during aquifer testing are found in Table 1. Distance between the test well and observation wells is also included.



LEGEND



Spring Creek Well 6



County Water Line



Spring Creek Well 7



TMWA Water Line



N.T.S.

SCALE: 1" = 1,050'



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



Spring Creek Well 7
Final Design

Figure 1

Well	Northing	Easting	Distance from Spring Creek Well 7
SSP2 & SSP2A Monitoring Wells	14898155.00	2320883.96	75 Feet
Spring Creek Well 6	14898710.83	2316597.84	4265 Feet
Spring Creek Well 7	14898212.46	2320835.77	0 Feet

Table 1-Well Location and Distances

3.0 Well Construction and Testing

The 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. Potable water with polymer and bentonite additives was used as a drilling fluid with fluid properties routinely documented by the drilling crew. A portable mud tank with shaker and 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 is a well construction summary for Spring Creek Well 7 with the final as-built design of the well shown in Figure 2. A copy of the well driller's report is found in the appendix.

Construction Item	Diameter	Interval	Length
Conductor Casing Borehole	29 Inches	0 to 100 feet	100 feet
Conductor Casing	24 Inches	+1 to 99 feet	100 feet
Production Casing Borehole	22 Inches	100 to 620 feet	520 feet
Blank Production Casing	16 Inches	+2 to 390 feet	388 feet
Blank Production Casing	16 Inches	530 to 550 feet	20 feet
Wire Wrap Well Screen, 80 slot (0.80")	16 Inches	390 to 530 feet	140 feet
Wire Wrap Well Screen, 80 slot (0.80")	16 Inches	550 to 710 feet	160 feet
Sanitary Surface Seal	Annulus	0 to 100 feet	100 feet

Table 2-Well Construction Summary

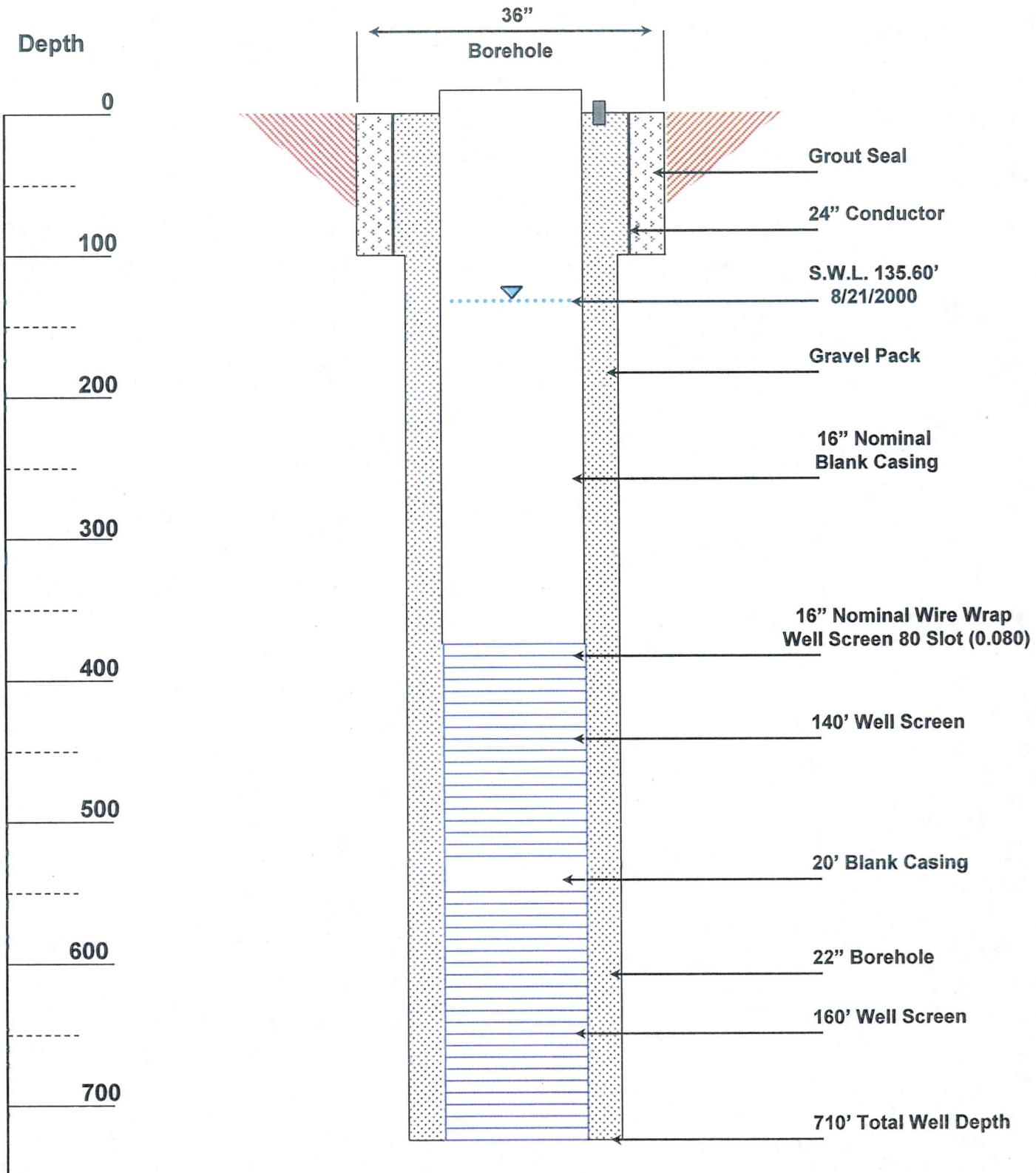
3.2 Gravel Pack and Sanitary Seal

The production well was installed with a gravel envelope consisting of 39-yds³ 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. A steel, sanitary doughnut seal with a two-inch diameter gravel access cap was welded between the 24-inch conductor casing and 16-inch production well casing.

Spring Creek Well 7

Figure 2

Final Design



a sanitary surface seal was installed using positive displacement with no additives added to the grout slurry to accelerate cure time. The sanitary seal remain undisturbed for 24-hours after placement of the first tank of grout. Casing centralizers were welded every 60 feet.

3.3 Airlift and Pumping Development

The production well was developed for 20-hours using an isolation tool constructed of a short section of perforated pipe separated by tight fitting rubber packers that combined mechanical surging with airlifting. The use of the chemical dispersant product NU-Well 220(US Filter) was applied during swabbing to enhance development by facilitating the removal of drilling fluid remaining in the gravel pack. The screen was then airlifted in 20-foot intervals until the discharge water was relatively clear of suspended material. The well was subsequently developed by pumping for 18 hours with the pumping rate incrementally increased from 1000 to 1500 gpm and shut off periodically to surge or rawhide the well.

4.0 Aquifer Testing

A 13-inch pump bowl was installed at a setting of 360 feet for development, step drawdown and aquifer testing. Power to the pump was supplied by a Lang 6-cylinder, diesel power plant. A gate valve installed at the discharge head was used to maintain a constant flow rate during testing. The discharge rate was measured using a 10-inch x 8-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 traveled over open ground for approximately one mile until joining a major drainage channel at the eastern edge of the Wingfield Springs subdivision.

In-Situ pressure transducers were installed in the pumping well and SSP2 monitoring well and connected to a Hermit 3000TM data logger to collect measurements during step and constant discharge testing. Water levels in the shallow SSP2A monitoring well were manually measured using an electric water level indicator. Water levels were also hand measured periodically in the test well 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	8/20/00	0835	1515	400(6.5 hrs)	1000, 1500 2000, 2500
Constant Discharge	8/21/00	0930			
	8/28/00		0930	10,080(7 days)	2000
Recovery	8/28/00	0930			
	8/30/00		1530	3,240(54 hrs)	0

Table 3-Pumping Tests Performed

4.1 Step Drawdown Test

A step drawdown test was performed to determine pumping level, specific capacity, and well efficiency at different pumping rates. The discharge rate for the aquifer stress test was selected from these results. The >95% well efficiency shows the well was fully developed and is atypically high for a fractured rock well. Drawdown is essentially due to formation loss since the basalt aquifer formation is composed of interstitial vesicles, "clinker zones" and fractures. Well efficiency (E) was calculated using the formula:

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

The step drawdown test data was analyzed with the AquiferWin32 software package using the Eden & Hazel, 1973 method. A summary of the step test analysis is found in Table 4. A total drawdown and well loss graph is shown in Figure 3

Step (n)	Pumping Rate (gpm)	Drawdown (ft.) @ 100 minutes	Spec. Capacity (gpm/foot)	Spec. Drawdown (feet/gpm)	Well Efficiency (%)
1	1000	10.93	92	0.011	99
2	1500	17.12	88	0.011	98
3	2000	25.75	78	0.013	97
4	2500	31.67	79	0.013	96

Table 4-Step Drawdown Test

4.2 Constant Discharge Test

A constant discharge test was conducted for 7 days at a constant pumping rate of 2000 gpm. The well was essentially sand free immediately upon start-up and remain that way throughout the test. A maximum drawdown of 25.10 feet at a pumping level of 160.70 feet was measured at the end of testing.

Aquifer parameters from the aquifer stress testing were graphically determined 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):

$$\text{Transmissivity}(T) = \frac{2640}{\Delta s} \quad \text{Storativity}(S) = \frac{0.3 T t_0}{r^2}$$

Final determination of aquifer parameters for all wells included in aquifer testing and all predicted drawdown was calculated using the AquiferWIN32 computer program.

4.3 Transmissivity and Storativity

Transmissivity from the constant discharge and recovery tests in the test well were estimated using the Theis (1935) model for a well completed in a confined aquifer. A respective transmissivity of approximately 320,000 gal/day/ft and 254,000 gal/day/ft were determined for the new municipal well and the SSP2 observation well from the constant discharge test. Figure 4 shows the observed and simulated drawdown versus time plot from the constant discharge test for Spring Creek Well 7

Figure 3
Spring Creek Well 7
Step Drawdown Test, Total Drawdown Graph

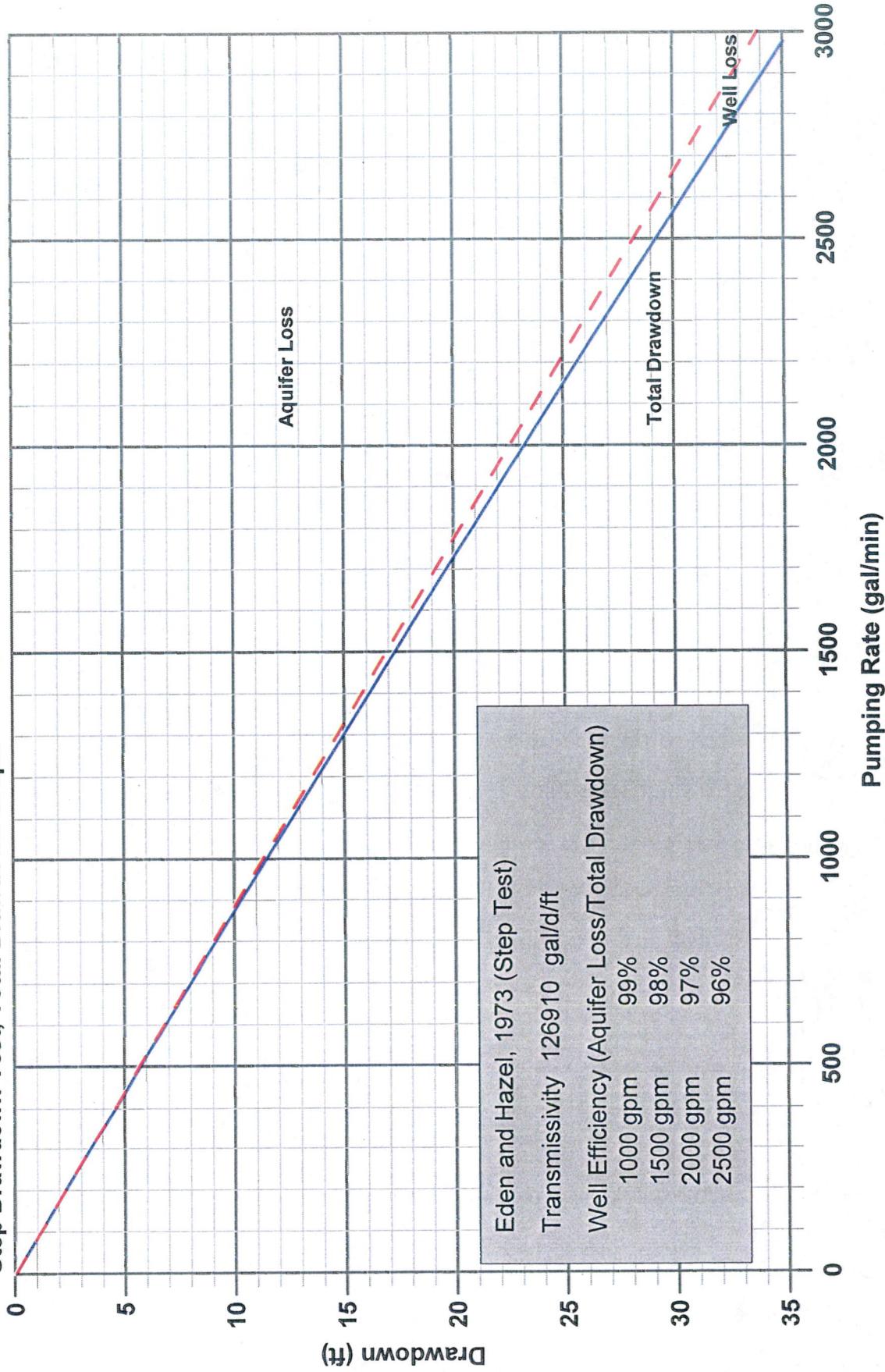
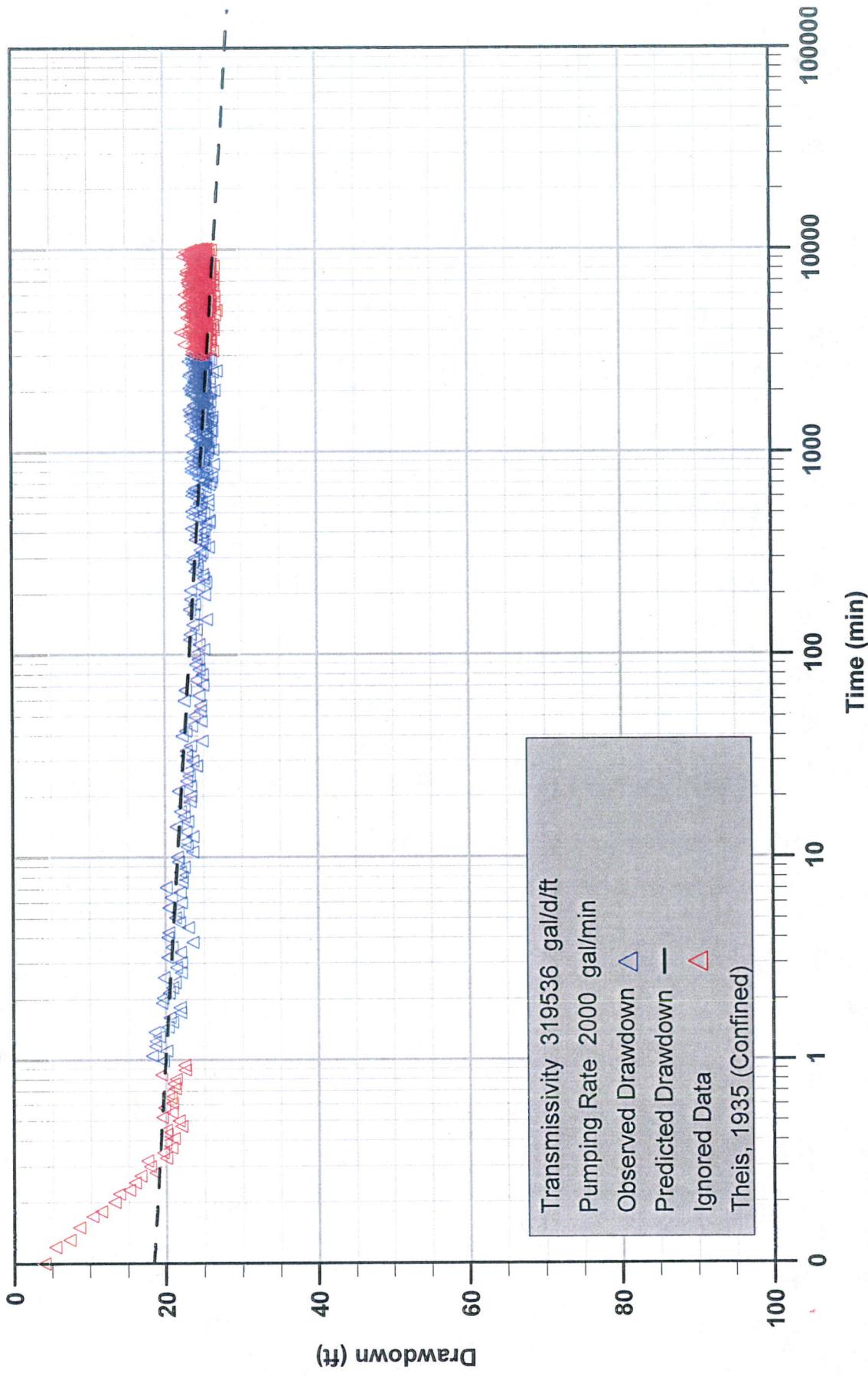


Figure 4
Spring Creek Well 7
Constant Discharge Test



and simulated drawdown versus time plot from the constant discharge test for Spring Creek Well 7 and Figure 5 shows the observed and simulated drawdown for the SSP2 observation well.

Figure 6 shows the observed and simulated drawdown for the SSP2A monitoring well. The well was constructed above the volcanic aquifer to determine depth to the alluvial aquifer water table in the 1993 drilling program. The water level decline observed during testing indicates some leakage occurs from the shallow aquifer into the thin aquitard above the volcanic aquifer or directly to the volcanics once the head gradient is changed due to pumping. The high transmissivity of 400,000 gal/day/ft further supports leakage and that if the pumping duration was longer the well would eventually respond similar to that of a well partially penetrating the fractured volcanic aquifer.

An average aquifer transmissivity of 290,000 gal/day/ft was determined from the individual values for each well. A horizontal hydraulic conductivity of 97 feet per day was determined by dividing the average transmissivity by the estimated total volcanic aquifer thickness of 400 feet (based on SC6 & SC7 Driller's Reports). A storativity of 2.5×10^{-4} was determined from the SSP2 observation well constant discharge test data. This value indicates a confined aquifer and is consistent with storativity typically attributed to fractured rock formations.

4.5 Recovery Test

Recovery test analysis yielded a transmissivity of approximately 250,000 gal/day/ft in Spring Creek Well 7 and a transmissivity of 240,000 gal/day/ft was determined for the SSP2 observation well. A storativity is not calculated in the computer program with this analysis. Water levels recovered to within 95% of the pre-test static water level within 30 minutes after constant test shut off and eventually recovered above the pre-test static water level. This indicates that not enough time was allowed for the well's water level to recover after development and before start of testing. The rapid recovery further shows that most of the drawdown in the well is due to the fractured nature of the aquifer and well construction. The recovery test graph for Spring Creek Well 7 is shown in Figure 7 and the graph for SSP2 is shown in Figure 8.

The high average aquifer transmissivity of 250,000-320,000 gpd/ft, high horizontal hydraulic conductivity and storativity indicate the formation penetrated by the production well is confined, laterally extensive and highly permeable.

5.0 Down Hole Surveys

Directional and video surveys were done on the well upon completion of testing. The directional survey was used to measure vertical deviation to verify that the well met the contract specifications. A vertical deviation of not more than 0.9 feet per 100 feet or a cumulative total of 3.47 feet at the end of the 390-foot blank casing interval is required for acceptance. The well has a deviation of <1.0 foot at this depth therefore meeting plumbness requirements. A directional survey graph is shown in Figure 9. A detailed copy of the directional survey is found in the appendix. A video survey was also conducted to document final construction and condition.

Figure 5
SSP2 Monitoring Well
SC7 Constant Discharge Test

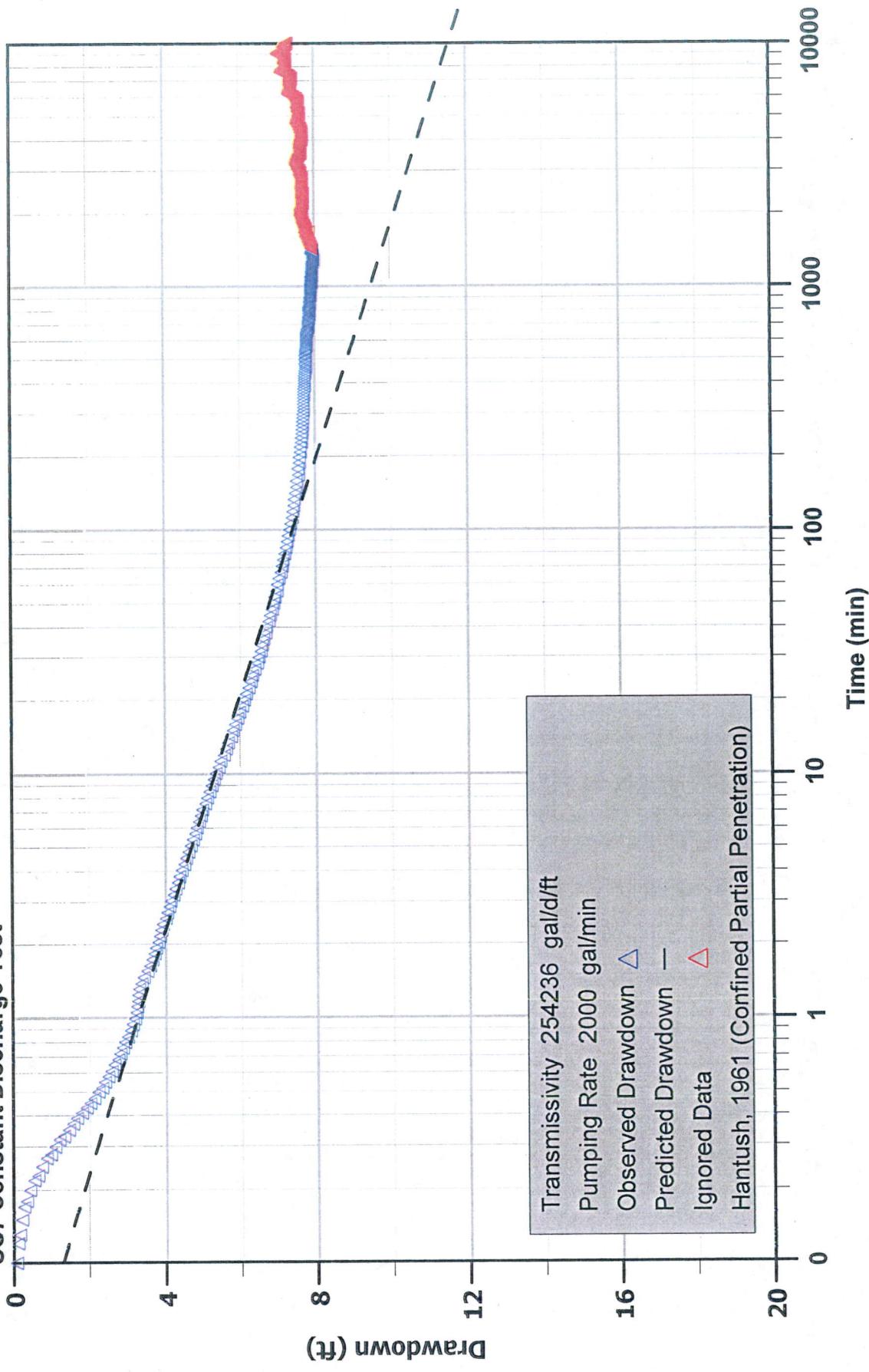


Figure 6
SSP2A Monitoring Well Drawdown
SC7 Constant Discharge Test

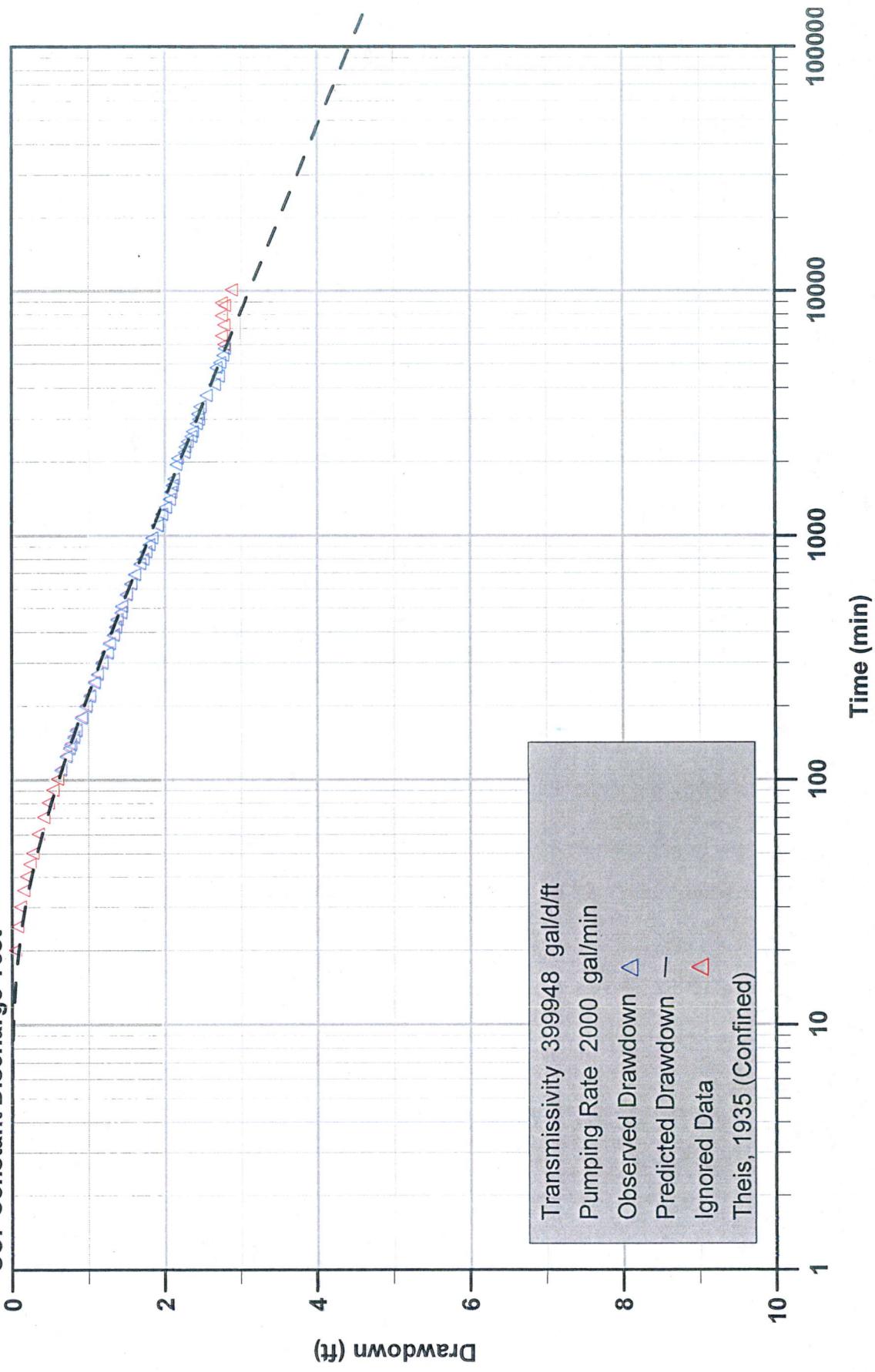


Figure 7
Spring Creek Well 7
Recovery Test

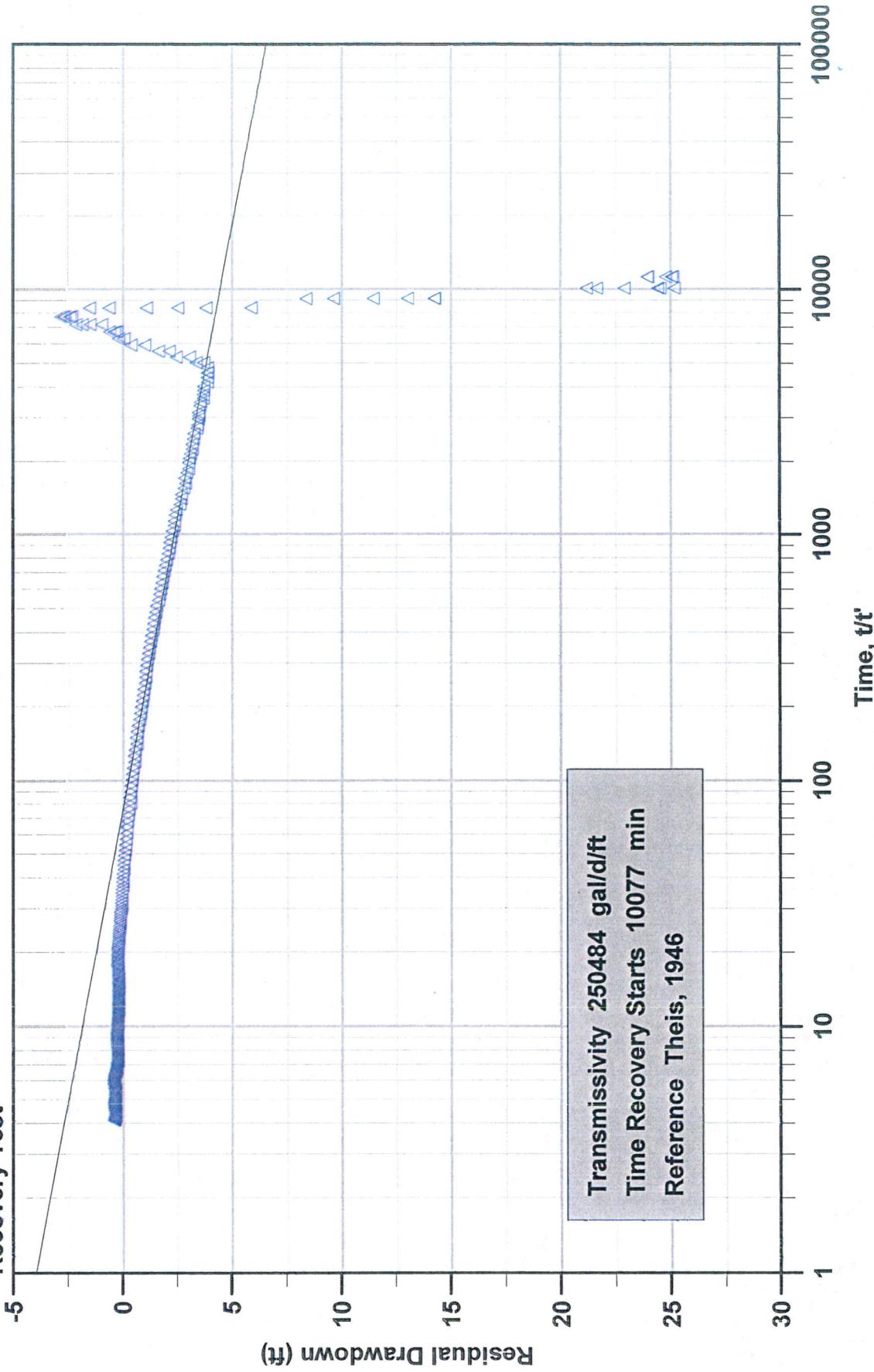


Figure 8
SSP2 Monitoring Well
SC7 Recovery Test

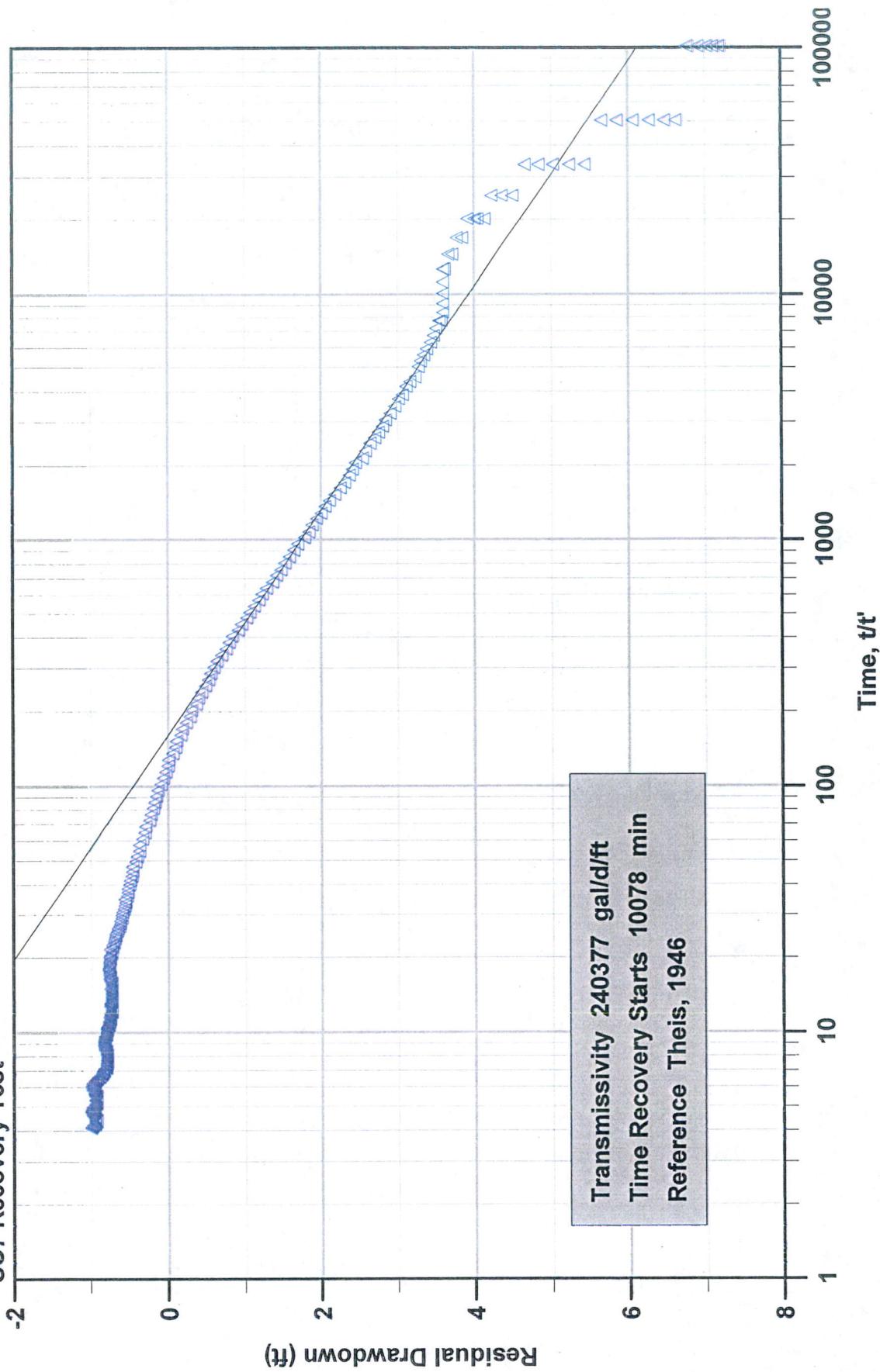
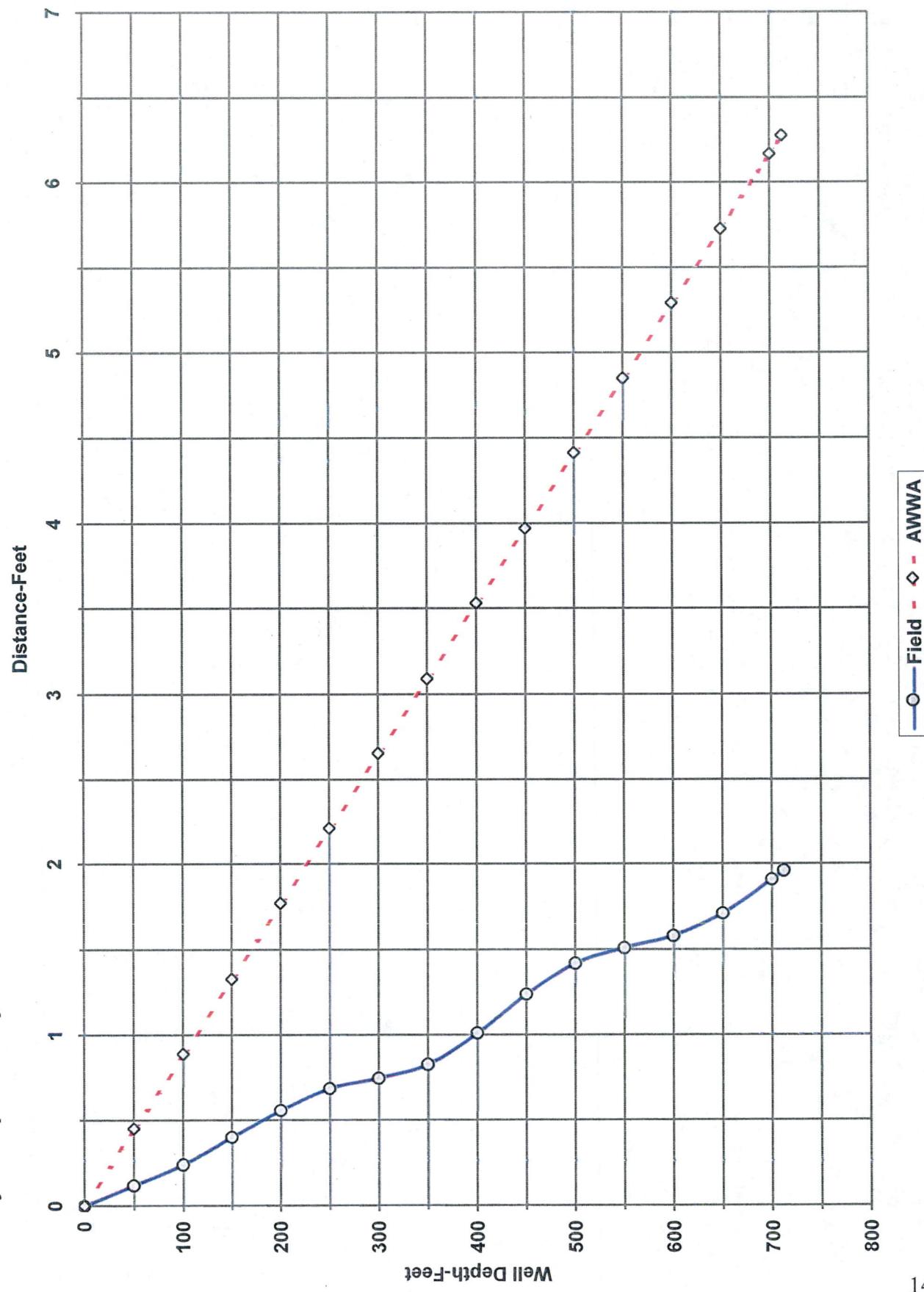


Figure 9
Spring Creek Well 7
Gyroscopic Survey



6.0 Water Quality

Water quality samples for inorganic compounds, volatile organic compounds and synthetic organic compounds were collected 24 hours after start of testing and immediately prior to test shut off. The well meets State of Nevada primary and secondary drinking water standards for all parameters tested. A complete water quality analyses for the well is found in the appendix.

7.0 Design Recommendations

The aquifer parameters from the constant discharge test were used to predict drawdown in the new well at various pumping rates after 30 days of continuous pumping. A summary of predicted pumping results for sequential pumping rates are found in Table 5 with the design rate bold highlighted. The results are also shown graphically in Figure 10.

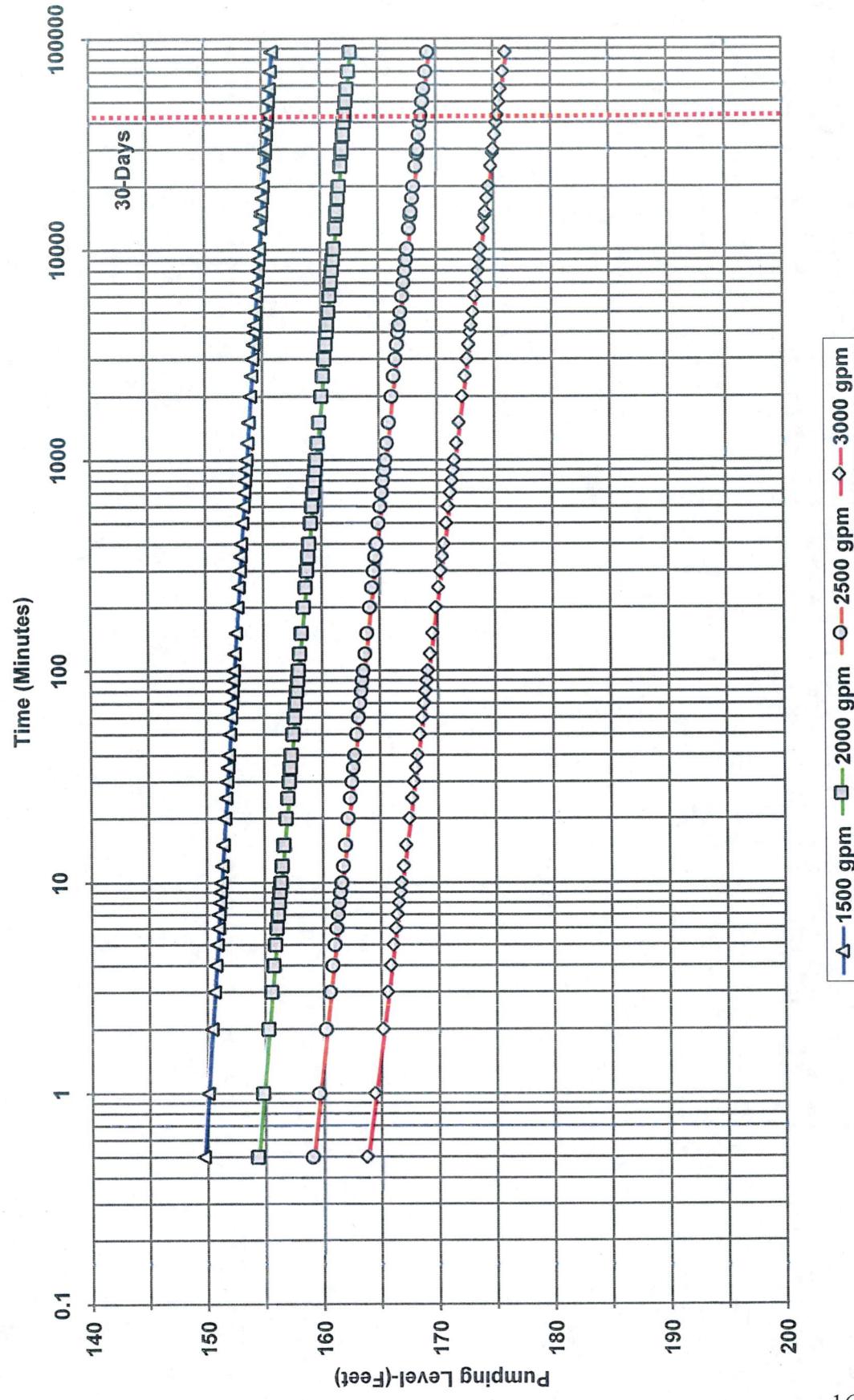
Pumping Rate GPM	30 Day Drawdown (Feet)	30 Day Pumping Level (Feet)
1500	20	156
2000	27	163
2500	33	169
3000	40	176

Table 5-Predicted Pumping Results

Staff recommends and anticipates the following when equipping the well:

Projected Static Water Level:	150 Feet
Pump Capacity:	2000 GPM
Pump Intake Setting:	300 Feet
Drawdown:	27 Feet
Pumping Level:	180 Feet
Pump Submergence:	120 Feet
Well Efficiency:	96 %

Figure 10
Predicted Pumping Level
Spring Creek Well 7



APPENDIX

IN TRIPPLICATE
PLEASE PRINT OR TYPE)

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

SPRING CREEK 7A

147259+A

WATER CHEMISTRY ANALYSIS:

At fees may apply to some types of samples.

RECEIVED

00 AUG 28 PM 3:37

OCT 16 2000

TYPE OF ANALYSIS:

Check here for ROUTINE DOMESTIC ANALYSIS
 Circle the constituents needed for PARTIAL ANALYSIS
WASHOE COUNTY DEPT. OF WATER RESOURCES

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 E.D. EVANS Date 8/28/00
Owner WASHOE COUNTY Phone 954-4636
Address 4930 ENERGY WAY
City RENO State NV

REPORT TO:

Name E.D. EVANS - DEPT. OF WATER RESOURCES
Address 4930 ENERGY WAY
City RENO
State NEVADA Zip 89502

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

State NEVADA County WASHOE
Township ZON Range ZIE Section 8
General Location EAST SPANISH SPRINGS VALLEY
Source Address 1 MILE EAST OF SPANISH SPRINGS ROAD

REASON FOR ANALYSIS:

- Loan
 Personal health reasons
 Purchase of the property
 Rental or sale of property
 Subdivision approval
 Other MUNICIPAL WATER WELL Initials SPRING CREEK 7A

USE OF WATER:

- Domestic drinking water
 Geothermal
 Industrial or mining
 Irrigation
 Other MUNICIPAL SUPPLY

SOURCE OF WATER:

Filter Yes No Type
Public Yes No Name
Spring Surface
Well Depth 713 ft. Casing diameter 16 in.
Hot Cold Casing depth 710 ft.
IN USE: Yes No

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

FOR LABORATORY USE ONLY

PRINT OTHER DESIRED CONSTITUENTS BELOW

Constituent	ppm	Constituent	ppm	Constituent	ppm	S.U.	Constituent	ppm
T.D.S. @ 180° C.	142	Chloride	6	Iron	0.02	Color	3	
Hardness	36	Nitrate - N	1.9	Manganese	0.00	Turbidity	0.3	
Calcium	8	Alkalinity	80	Copper	0.00	pH	8.69	
Magnesium	4	Bicarbonate	88	Zinc	0.00	EC	229	
Sodium	32	Carbonate	5	Barium	0.00	SI@20C	-0.00	
Potassium	5	Fluoride	0.18	Boron	0.0			RECEIVED
Sulfate	10	Arsenic	0.005	Silica	40			SEP 20 2000
Fee		Remarks						

Collected by

USE PO # 191226

PWS I.D.

Si Pri. Sec.

1st 2nd 3rd

Date Rec'd Init.

ppm = parts per million, milligrams per liter; S.U. = Standard Units

RESULTS REPORTED

SEP 19 2000

PLEASE PRINT OR TYPE)

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

147173

WATER CHEMISTRY ANALYSIS:

Fees may apply to some types of samples.

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

DD AUG 22

State: Nevada

County: Washoe

Township

Range

Section

General Location

Spanish Springs

Source Address

Spring Creek East #7

(pump test)

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

Type

Public Yes No

Name ... Spring Creek East #7

Spring

Surface

Well Depth ft. Casing diameter in.

Hot Cold Casing depth ft.

IN USE: Yes No

Sampled by John Bulett Date 8-22-00
 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

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

FOR LABORATORY USE ONLY

PRINT OTHER DESIRED CONSTITUENTS BELOW

Constituent	Constituent	Constituent	Constituent	Constituent	Constituent	Constituent	Constituent
Chloride	Iron	Color	Cd				
Nitrate -N	Manganese	Turbidity	Cr				
Alkalinity	Copper	pH	Hg				
Bicarbonate	Zinc	EC	Se				
Carbonate	Barium	SIE20C -0.05	Sh				
Fluoride	Boron		Be				
Arsenic	Silica		Ni				
NO ₂	<0.01 gross α	Pb	Tl				
Ammonia	gross β						

Fee Remarks
 Collected by New well - samples collected during pump test
 PWS I.D. SPH
 S.P.MA — Pri. Sec.
 1st 2nd 3rd
 Date Rec'd Init.
 ppm = parts per million, milligrams per liter; S.U. = Standard Units

(Rev. 6/99)


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: WCW00082225-01A
Client I.D. Number: Spring Creek East #7

Sampled: 08/22/00
Received: 08/22/00
Analyzed: 08/22/00

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

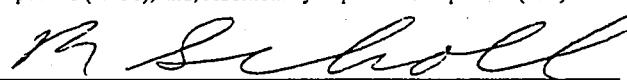
Compound	Concentration µg/L	Reporting Limit	Compound	Concentration µg/L	Reporting Limit
1 Benzene	ND	0.500 µg/L	38 trans-1,3-Dichloropropene	ND	0.500 µg/L
2 Vinyl chloride	ND	0.500 µg/L	39 2,2-Dichloropropane	ND	0.500 µg/L
3 Carbon tetrachloride	ND	0.500 µg/L	40 1,1,1,2-Tetrachloroethane	ND	0.500 µg/L
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:



Date:

9/1/00

Roger L. Scholl, Ph.D.
Laboratory Director



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: Spring Creek East #7

Lab Sample ID: 00082225-01A

Date Sampled: 8/22/00

Date Received: 8/22/00

Matrix: Aqueous

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	Analyte	Result	R.L.	Units	Date Analyzed
ES04.1 EDB AND DBCP					ES25.2 SVOCs BY GCMS				
1,2-Dibromoethane	ND	0.010	µg/L	8/25/00	Propachlor	ND	1.0	µg/L	8/28/00
1,2-Dibromo-3-chloropropane	ND	0.020	µg/L	8/25/00	Simazine	ND	0.070	µg/L	8/28/00
ES05 ORGANOHALIDE PESTICIDES AND PCBs					Atrazine	ND	0.10	µg/L	8/28/00
Hexachlorocyclopentadiene	ND	0.10	µg/L	8/25/00	Metribuzin	ND	1.0	µg/L	8/28/00
Hexachlorobenzene	ND	0.10	µg/L	8/25/00	Alachlor	ND	0.20	µg/L	8/28/00
gamma-BHC	ND	0.020	µg/L	8/25/00	Metolachlor	ND	1.0	µg/L	8/28/00
Alachlor	ND	0.20	µg/L	8/25/00	Butachlor	ND	1.0	µg/L	8/28/00
Heptachlor	ND	0.040	µg/L	8/25/00	bis(2-Ethylhexyl)adipate	ND	0.60	µg/L	8/28/00
Aldrin	ND	0.20	µg/L	8/25/00	bis(2-Ethylhexyl)phthalate	ND	0.60	µg/L	8/28/00
Heptachlor epoxide	ND	0.020	µg/L	8/25/00	Benzo(a)pyrene	ND	0.020	µg/L	8/28/00
Dieldrin	ND	0.20	µg/L	8/25/00	ES31.1 CARBAMATES				
Endrin	ND	0.010	µg/L	8/25/00	Aldicarb sulfoxide	ND	0.50	µg/L	8/24/00
Methoxychlor	ND	0.10	µg/L	8/25/00	Aldicarb sulfone	ND	0.80	µg/L	8/24/00
Chlordane	ND	0.20	µg/L	8/25/00	Oxamyl	ND	2.0	µg/L	8/24/00
Toxaphene	ND	1.0	µg/L	8/25/00	Methomyl	ND	1.0	µg/L	8/24/00
Aroclor 1016	ND	0.080	µg/L	8/25/00	3-Hydroxycarbofuran	ND	1.0	µg/L	8/24/00
Aroclor 1221	ND	20	µg/L	8/25/00	Aldicarb	ND	0.50	µg/L	8/24/00
Aroclor 1232	ND	0.50	µg/L	8/25/00	Carbofuran	ND	0.90	µg/L	8/24/00
Aroclor 1242	ND	0.30	µg/L	8/25/00	Carbaryl	ND	1.0	µg/L	8/24/00
Aroclor 1248	ND	0.10	µg/L	8/25/00	E547 GLYPHOSATE				
Aroclor 1254	ND	0.10	µg/L	8/25/00	Glyphosate	ND	6.0	µg/L	8/29/00
Aroclor 1260	ND	0.20	µg/L	8/25/00	E548.1 ENDOTHALL				
ES15.1 CHLORINATED ACID HERBICIDES					Endothall	ND	9.0	µg/L	8/27/00
Dalapon	ND	1.0	µg/L	8/31/00	E549.2 DIQUAT/PARAQUAT				
Dicamba	ND	0.50	µg/L	8/31/00	Diquat	ND	0.40	µg/L	8/30/00
2,4-D	ND	0.10	µg/L	8/31/00					
PCP	ND	0.040	µg/L	8/31/00					
2,4,5-TP	ND	0.20	µg/L	8/31/00					
Dinoseb	ND	0.20	µg/L	8/31/00					
Pichloram	ND	0.10	µg/L	8/31/00					

ND = Not Detected

Approved By:


Walter Hinchman
Quality Assurance Officer

Date: 9/15/00


Alpha Analytical, Inc.
255 Glendale Ave • Suite 21 • Sparks, Nevada 89431-5778
(775) 355-1944 • (775) 355-0406 FAX • 1-800-283-1183

CASE NARRATIVE
September 15, 2000

One sample was received on 08/22/00 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
WCW00082225-01	Spring Creek East #7	08/22/00	11:00	

METHOD 504.1:

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

METHOD 505:

All QC criteria were met with no abnormalities.

METHOD 515.1:

All 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.

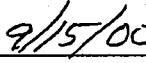
METHOD 548.1:

All QC criteria were met with no abnormalities.

METHOD 549.2:

All QC criteria were met with no abnormalities.


Walter J. Hinchman
Quality Assurance Officer


Date

STMGID WELL #10 & SPRING CREEK WELL #7

BID OPENING MARCH 31, 2000

ITEM	Quantity	Units	Engineers Estimate		Humboldt Drilling		Lang Drilling	
			Price	Total	Price	Total	Price	Total
STMGID MON. WELL 10								
1 Mobilization-Demobilization	1	L.S.	4000.00	4000.00	19366.00	19366.00	4000.00	4000.00
2 Drill 6" Borehole	750	L.F.	28.00	21000.00	45.00	33750.00	26.00	19500.00
3 Geophysical Logs	1	L.S.	4500.00	4500.00	4000.00	4000.00	4050.00	4050.00
4 2 Inch Blank Steel Pipe	450	L.F.	16.00	7200.00	6.00	2700.00	8.50	3825.00
5 2 Inch Slotted Steel Pipe	300	L.F.	19.00	5700.00	9.59	2877.00	15.00	4500.00
6 Gravel Pack	6	Cu. Yds	390.00	2340.00	350.00	2100.00	345.00	2070.00
7 Grout Sanitary Seal	100	Feet	11.00	1100.00	10.00	1000.00	10.00	1000.00
8 Air Development	12	Hrs.	300.00	3600.00	300.00	3600.00	275.00	3300.00
9 Protective Well Cap	1	Each	560.00	560.00	475.00	475.00	500.00	500.00
			SUB-TOTAL	50000.00	SUB-TOTAL	69868.00	SUB-TOTAL	42745.00
STMGID WELL 10								
1 Mobilization-Demobilization	1	Each	23000.00	23000.00	29522.00	29522.00	18500.00	18500.00
2 Drill 28" Borehole	100	L.F.	175.00	17500.00	200.00	20000.00	188.00	18800.00
3 22" Conductor Casing	101	L.F.	65.00	6565.00	58.70	5928.70	69.00	6969.00
4 Grout Sanitary Seal	100	Feet	45.00	4500.00	93.60	9360.00	59.00	5900.00
5 Drill 20" Borehole	650	L.F.	90.00	58500.00	175.00	113750.00	92.00	59800.00
6 14" Blank Casing	430	L.F.	35.00	15050.00	26.50	11395.00	36.00	15480.00
7 14" Well Screen	320	L.F.	55.00	17600.00	47.50	15200.00	47.00	15040.00
8 Gravel Pack	33	Cu. Yds	400.00	13200.00	225.00	7425.00	345.00	11385.00
9 Air Development	36	Hrs.	375.00	13500.00	280.00	10080.00	375.00	13500.00
10 Install Pump	600	L.F.	18.00	10800.00	15.00	9000.00	18.00	10800.00
11 Pump Development	24	Hrs.	180.00	4320.00	350.00	8400.00	160.00	3840.00
12 Pumping Test	80	Hrs.	180.00	14400.00	350.00	28000.00	160.00	12800.00
13 Video Survey	1	L.S.	1225.00	1225.00	1200.00	1200.00	1200.00	1200.00
14 Plumbness Test	1	L.S.	1900.00	1900.00	2000.00	2000.00	1700.00	1700.00
15 Disinfect & Capping	1	L.S.	850.00	850.00	1000.00	1000.00	1125.00	1125.00
16 Standby	24	Hrs.	240.00	5760.00	200.00	4800.00	240.00	5760.00
			SUB-TOTAL	208670.00	SUB-TOTAL	277060.70	SUB-TOTAL	202599.00
SPRING CREEK #7								
1 Mobilization-Demobilization	1	Each	23000.00	23000.00	29610.00	29610.00	18500.00	18500.00
2 Drill 30" Borehole	100	L.F.	200.00	20000.00	150.00	15000.00	192.00	19200.00
3 24" Conductor Casing	101	L.F.	75.00	7575.00	60.00	6060.00	74.00	7474.00
4 Grout Sanitary Seal	100	Feet	45.00	4500.00	65.00	6500.00	59.00	5900.00
5 Drill 22" Borehole	600	L.F.	95.00	57000.00	95.00	57000.00	82.00	49200.00
6 16" Blank Casing	400	L.F.	46.00	18400.00	30.16	12064.00	39.60	15840.00
7 16" Well Screen	300	L.F.	57.00	17100.00	52.00	15600.00	54.00	16200.00
8 Gravel Pack	35	Cu. Yds	400.00	14000.00	225.00	7875.00	345.00	12075.00
9 Air Development	36	Hrs.	375.00	13500.00	250.00	9000.00	375.00	13500.00
10 Install Pump	400	L.F.	18.00	7200.00	15.00	6000.00	18.00	7200.00
11 Pump Development	24	Hrs.	180.00	4320.00	185.00	4440.00	160.00	3840.00
12 Pumping Test	250	Hrs.	180.00	45000.00	185.00	46250.00	160.00	40000.00
13 Video Survey	1	L.S.	1225.00	1225.00	1200.00	1200.00	1200.00	1200.00
14 Plumbness Test	1	L.S.	1900.00	1900.00	2000.00	2000.00	1700.00	1700.00
15 Disinfect & Capping	1	L.S.	850.00	850.00	1000.00	1000.00	1125.00	1125.00
16 Standby	24	Hrs.	240.00	5760.00	200.00	4800.00	240.00	5760.00
			SUB-TOTAL	241330.00	SUB-TOTAL	224399.00	SUB-TOTAL	218714.00
			TOTAL	500000.00	TOTAL	571327.70	TOTAL	464058.00

CONTRACTOR
DANG EXPLORATORY DRILLING
P.O. BOX 5279
ELKO, NEVADA 89802

STMGGD WELL NO.10 & SPRING CREEK WELL NO. 7

PAYMENT ESTIMATE NO. 2

ITEM NO.	DESCRIPTION	UNITS	UNIT PRICE	COMPLETED TO DATE			PREVIOUSLY BILLED	AMOUNT	UNITS	COMPLETED THIS PERIOD	AMOUNT	JOB COMPLETE	CONTRACT AMOUNT	PREVIOUS PAYMENTS		TOTAL DUE	\$25,809.40	PREVIOUS PAYMENTS								
				PREVIOUS PAYMENTS		TOTAL DUE		TOTAL DUE											PREVIOUS PAYMENTS							
	STGMID MONITORING WELL			CONTRACT AMOUNT	UNITS	DATE	AMOUNT	UNITS	DATE	AMOUNT	UNITS	AMOUNT	COMPLETED	PREVIOUS PAYMENTS	TOTAL DUE	\$232,284.60	\$188,518.32	PREVIOUS PAYMENTS	\$20,946.46							
	NOMILIZATION	1 LS	\$ 4,000.00	\$4,000.00	1		\$4,000.00	1		\$4,000.00	0	\$0.00	100%	100%				\$0.00	\$0.00							
	DRILL 6" BOREHOLE	750 LF	\$ 26.00	\$19,500.00	705		\$16,350.00	705		\$16,350.00	0	\$0.00	94%	94%												
	GEOPHYSICAL LOG	1 LS	\$ 4,050.00	\$4,050.00	1		\$4,050.00	1		\$4,050.00	0	\$0.00	100%	100%												
	2" BLANK STEEL CASING	450 LF	\$ 6.50	\$3,625.00	300		\$2,550.00	300		\$2,550.00	0	\$0.00	67%	67%												
	2" SLOTTED STEEL	300 LF	\$ 15.00	\$4,500.00	300		\$4,500.00	300		\$4,500.00	0	\$0.00	100%	100%												
	GRAVEL PACK	6 CY	\$ 345.00	\$2,070.00	4.8		\$1,656.00	4.8		\$1,656.00	0	\$0.00	80%	80%												
	SANITARY SEAL	100 FT	\$ 10.00	\$1,000.00	105		\$1,050.00	105		\$1,050.00	0	\$0.00	105%	105%												
	AIR DEVELOPMENT	12 HR	\$ 275.00	\$3,300.00	10		\$2,750.00	10		\$2,750.00	0	\$0.00	83%	83%												
	WELL CAP	1 EA	\$ 500.00	\$500.00	1		\$500.00	1		\$500.00	0	\$0.00	100%	100%												
	CHANGE ORDER NO. 1	1 LS	\$ 13,650.00	\$13,650.00	1		\$13,650.00	1		\$13,650.00	0	\$0.00	100%	100%												

ט' ט' ט' ט' ט' ט' ט' ט' ט'

SUBTOTAL MOUNTING WELL		ITEM NO.	DESCRIPTION	UNITS	STMDG WELL 11
1	2	3	MOBILIZATION	1	
DRILL 20" BOREHOLE	100		CONDUCTOR CASING	101	
SANITARY SEAL	100		DRILL 20" BORE-HOLE	650	
BLANK CASING	430		WELL SCREEN	320	
WELL SCREEN	33		GRAVEL PACK	36	
AIR DEVELOPMENT	36		INSTALL PUMP	600	
PUMP DEVELOPMENT	24		TEST PUMPING	80	
VIDEO SURVEY	1		PLUMBNESS TEST	1	
DISINFECT AND CAP	1		STANDBY	1	
CHANGE ORDER NO. 1	1		SUBTOTAL WELL 11	1	

TOTAL FOR STMGID CONTRACT

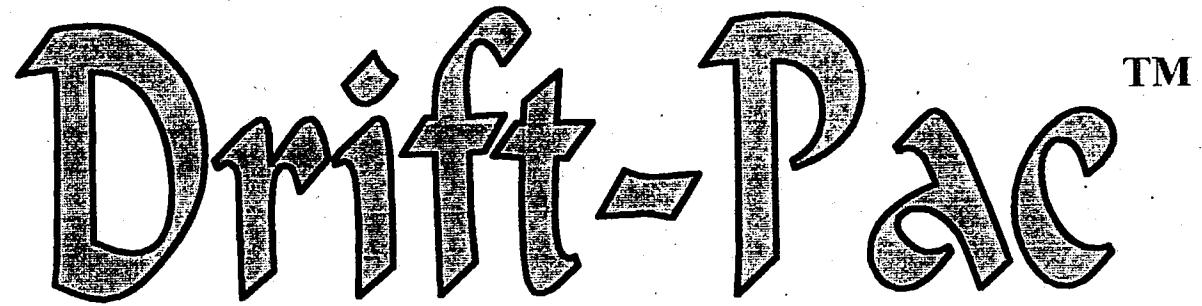
ITEM NO.	DESCRIPTION	UNITS	UNIT PRICE	COMPLETED THIS PREVIOUSLY BILLED			UNITS	COMPLETED THIS PERIOD	JOB COMPLETE AMOUNT	CONTRACT AMOUNT	MATERIAL STORED
				CONTRACT AMOUNT	UNITS	AMOUNT					
1	MOBILIZATION	1 LS	\$ 18,500.00	\$ 18,500.00	1	\$ 18,500.00		0	\$ 0.00	\$ 0.00	
2	DRILL 30' BOREHOLE	100 LF	\$ 192.00	\$ 19,200.00	100	\$ 19,200.00		0	\$ 0.00	\$ 0.00	
3	CONDUCTOR CASING	101 LF	\$ 74.00	\$ 7,474.00	101	\$ 7,474.00		0	\$ 0.00	\$ 0.00	
4	SANITARY SEAL	100 LF	\$ 59.00	\$ 5,900.00	100	\$ 5,900.00		0	\$ 0.00	\$ 0.00	
5	DRILL 22' BOREHOLE	600 LF	\$ 82.00	\$ 49,200.00	610	\$ 50,020.00		0	\$ 0.00	\$ 0.00	
6	BLANK CASING	400 LF	\$ 39.60	\$ 15,840.00	413	\$ 16,354.80		0	\$ 0.00	\$ 0.00	
7	WELL SCREEN	300 LF	\$ 54.00	\$ 16,200.00	300	\$ 16,200.00		0	\$ 0.00	\$ 0.00	
8	GRAVEL PACK	35 CY	\$ 12,075.00	\$ 13,553.00	39.4	\$ 13,553.00		0	\$ 0.00	\$ 0.00	
9	AIR DEVELOPMENT	36 HR	\$ 375.00	\$ 13,500.00	36	\$ 13,500.00		0	\$ 0.00	\$ 0.00	
10	INSTALL PUMP	400 LF	\$ 18.00	\$ 7,200.00	381	\$ 6,858.00		0	\$ 0.00	\$ 0.00	
11	PUMP DEVELOPMENT	24 HR	\$ 160.00	\$ 3,840.00	24	\$ 3,840.00		0	\$ 0.00	\$ 0.00	
12	TEST PUMPING	250 LF	\$ 160.00	\$ 40,000.00	176.5	\$ 26,240.00		0	\$ 0.00	\$ 0.00	
13	VIDEO SURVEY	1 LS	\$ 1,200.00	\$ 1,200.00	1	\$ 1,200.00		0	\$ 0.00	\$ 0.00	
14.	PLUMBERS TEST	1 LS	\$ 1,700.00	\$ 1,700.00	1	\$ 1,700.00		1	\$ 1,700.00	\$ 0.00	
15	DISINFECT AND CAP	1 LS	\$ 1,125.00	\$ 1,125.00	1	\$ 1,125.00		1	\$ 1,125.00	\$ 0.00	
16	STANDBY	24 HR	\$ 240.00	\$ 5,760.00	24	\$ 5,760.00		0	\$ 0.00	\$ 0.00	

TOTAL WELL

5218.714.00

\$209,464.80 \$0.00

50.00



Deviation and Directional Interpretation Package

Prepared Especially For

Lang Exploratory Drilling

7 Spanish Springs

Thursday, September 7, 2000

welenco

Drift-Pac

Wellbore Deviation and Directional Interpretation

Wellenco

Company	Lang Exploratory Drilling	County	Washoe	State	NV
Well Number	7 Spanish Springs	Date of Survey	Thursday, September 7, 2000	Declination Used	16 East
Field	Sparks	Recorded By	Dan Ihde		
Equipment No.	L-17	Tool Type	Gyroscopic		
Location	End of Vista Blvd	Tool Type	Balanced Tangential Method		
Remarks	Gyro Zeroed at top of Casing	Tool Type	Gyroscopic	Witness	Darrin Howard
Directional Calculation	Balanced Tangential Method	Tool Type	Dogleg Calculation	Tool Number	Lubinski Method

Measured Depth, Feet	Measured Information			Closure Calculations			Rectangular Coordinates			Dogleg Severity Calculations		
	Inclination, Degrees	Azimuth True	Course Deviation, Feet	True Vertical Depth, Feet	Closure Distance, Feet	Closure Bearing Degrees, True	Latitude, Feet	Departure, Feet	Total Latitude, Feet	Departure, Feet	Dogleg Severity, Degs/20 Feet	Dogleg Severity, Degs/100 Feet
0.00	0.20	314										
50.00	0.10	273	0.12	49.99	0.12	300.60	0.06	-0.11	0.06	-0.11	0.04	0.20
100.00	0.20	326	0.12	99.98	0.24	303.60	0.07	-0.09	0.13	-0.20	0.05	0.25
150.00	0.20	279	0.16	149.97	0.40	302.80	0.09	-0.13	0.22	-0.33	0.06	0.32
200.00	0.20	299	0.17	199.96	0.56	299.30	0.06	-0.16	0.28	-0.49	0.03	0.14
250.00	0.10	263	0.13	249.95	0.69	297.50	0.04	-0.12	0.32	-0.61	0.03	0.17
300.00	0.10	237	0.09	299.94	0.75	292.90	-0.03	-0.08	0.29	-0.69	0.02	0.09
350.00	0.20	236	0.13	349.93	0.83	285.20	-0.07	-0.11	0.22	-0.80	0.00	0.00
400.00	0.30	262	0.21	399.92	1.01	278.70	-0.07	-0.20	0.15	-1.00	0.04	0.22
450.00	0.30	238	0.26	449.91	1.24	272.90	-0.09	-0.24	0.06	-1.24	0.05	0.25
500.00	0.20	233	0.22	499.90	1.42	267.50	-0.12	-0.18	-0.06	-1.42	0.01	0.04
550.00	0.10	192	0.12	549.89	1.51	264.10	-0.10	-0.08	-0.16	-1.50	0.04	0.20
600.00	0.20	209	0.13	599.88	1.58	259.80	-0.12	-0.05	-0.28	-1.55	0.02	0.08
650.00	0.20	224	0.17	649.87	1.71	255.80	-0.14	-0.10	-0.42	-1.65	0.02	0.10
700.00	0.30	251	0.21	699.86	1.91	254.00	-0.11	-0.18	-0.53	-1.83	0.05	0.23
712.00	0.20	234	0.05	711.85	1.96	253.60	-0.02	-0.05	-0.55	-1.88	0.12	0.60

TVD in Feet 711.85

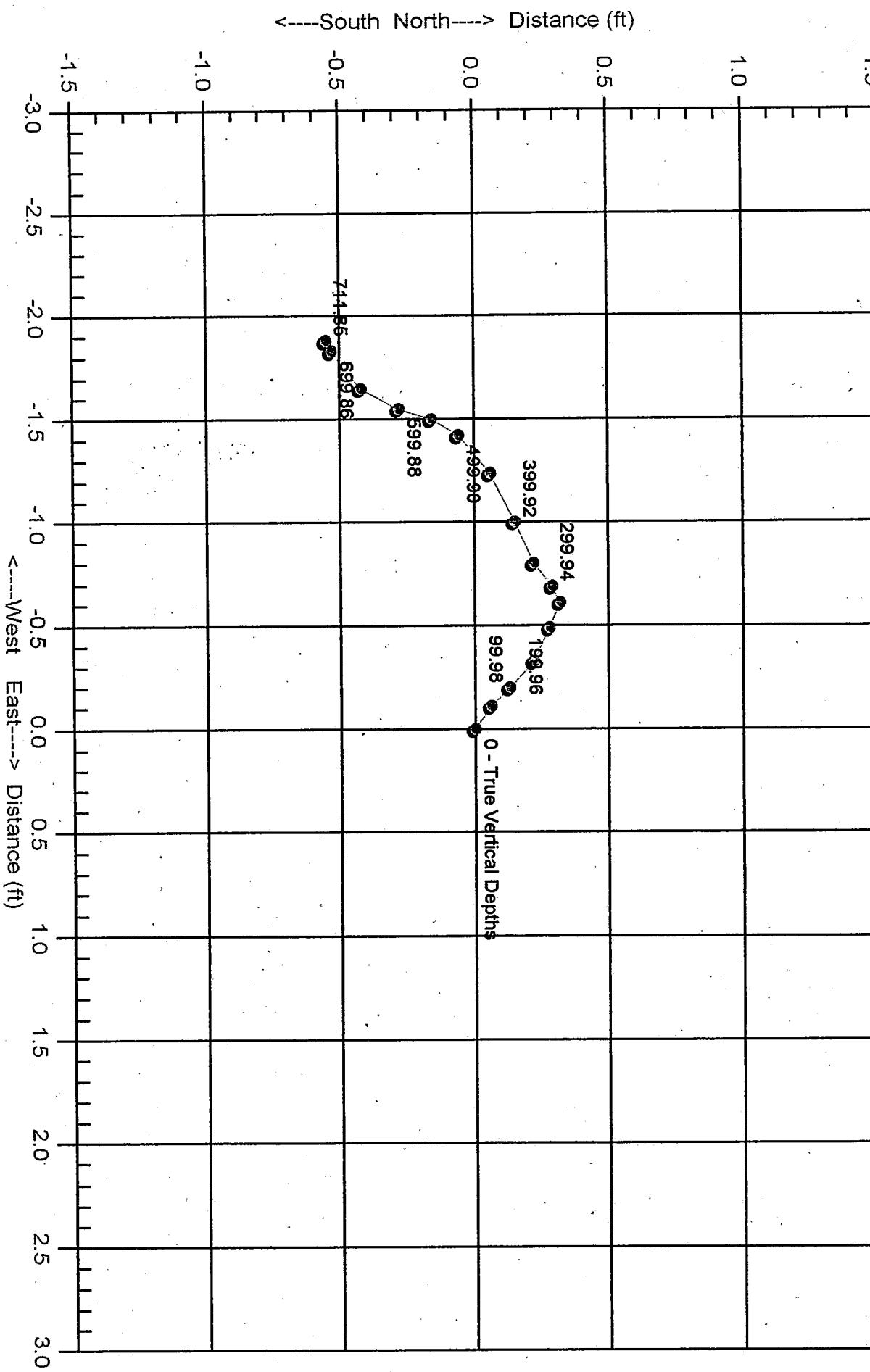
Final Closure Distance Feet 1.96

Final Closure Bearing in Degrees 25°

Lang Exploratory Drilling

7 Spanish Springs
Drift-Pac Plan View

Closure Distance = 1.96 Feet Closure Bearing = 253.6 Degrees True Vertical Depth = 711.85 Feet



Date of Survey: Thursday, September 7, 2000

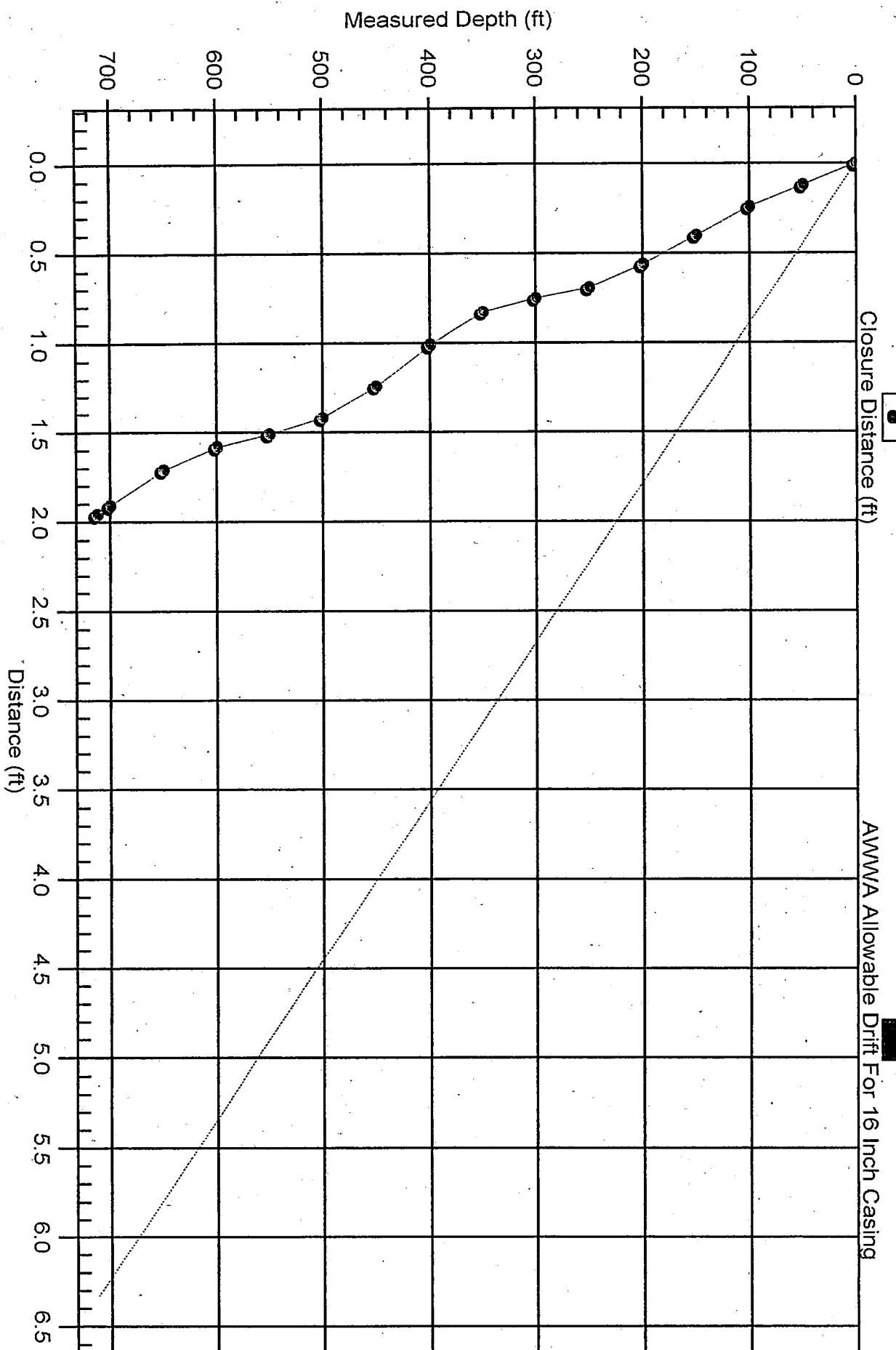
Welenco, Inc. (8 445-9914

Balanced Tangential Calculation Method

Lang Explora ry Drilling

7 Spanish Springs

Drift-Pac Closure Distance and AWWA Standard A-100 Plot
Maximum AWWA Allowable = 6.33 Feet for 16 Inch Casing



Date of Survey: Thursday, September 7, 2000

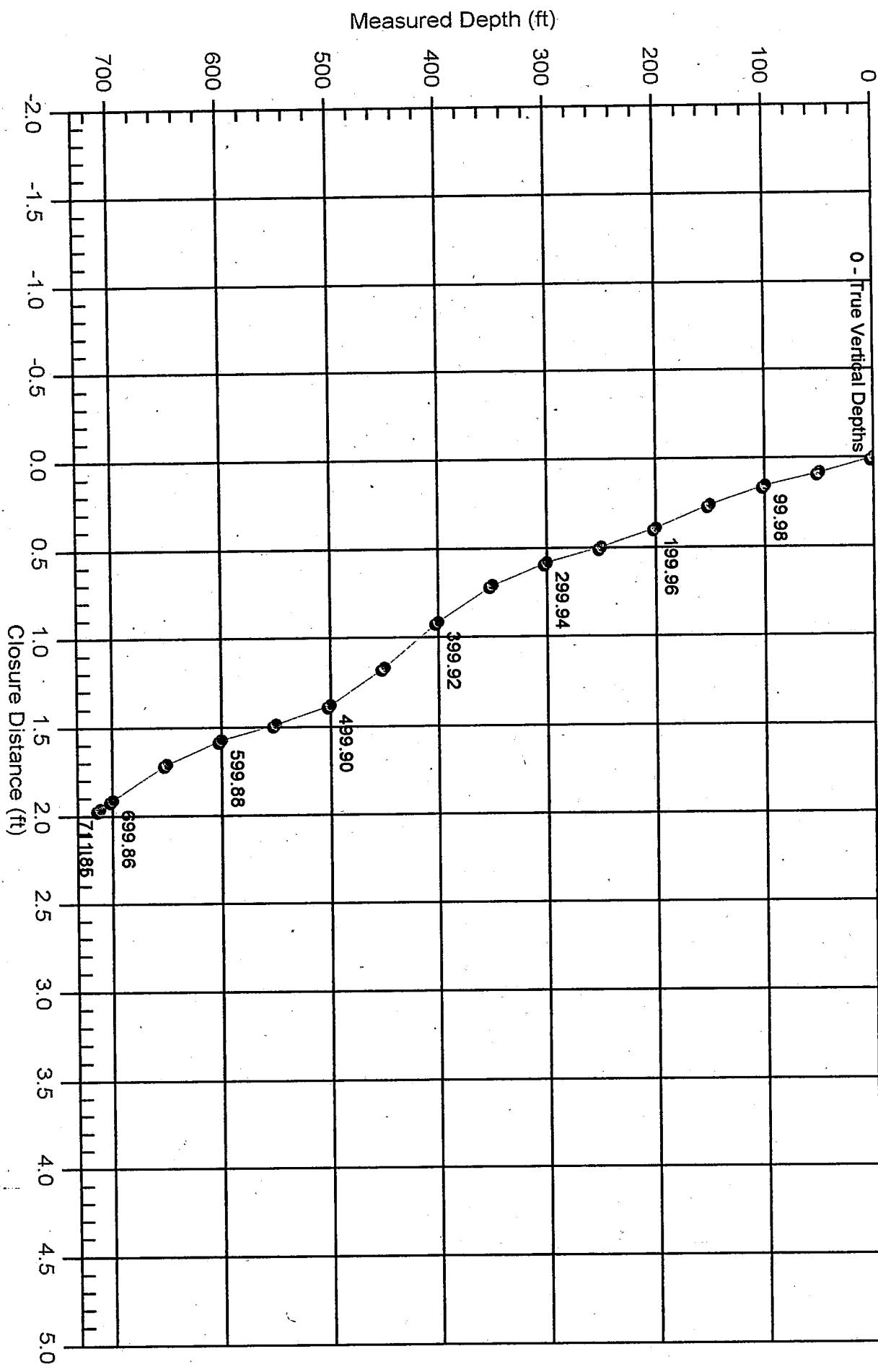
Welenco, Inc. (800) 445-9914

Balanced Tangential Calculation Method

Lang Exploratory Drilling

7 Spanish Springs
Drift-Pac Plan of Closure View

Closure Distance = 1.96 Fcct Closure Bearing = 253.6 Degrees True Vertical Depth = 711.85 Fcct



Date of Survey: Thursday, September 7, 2000

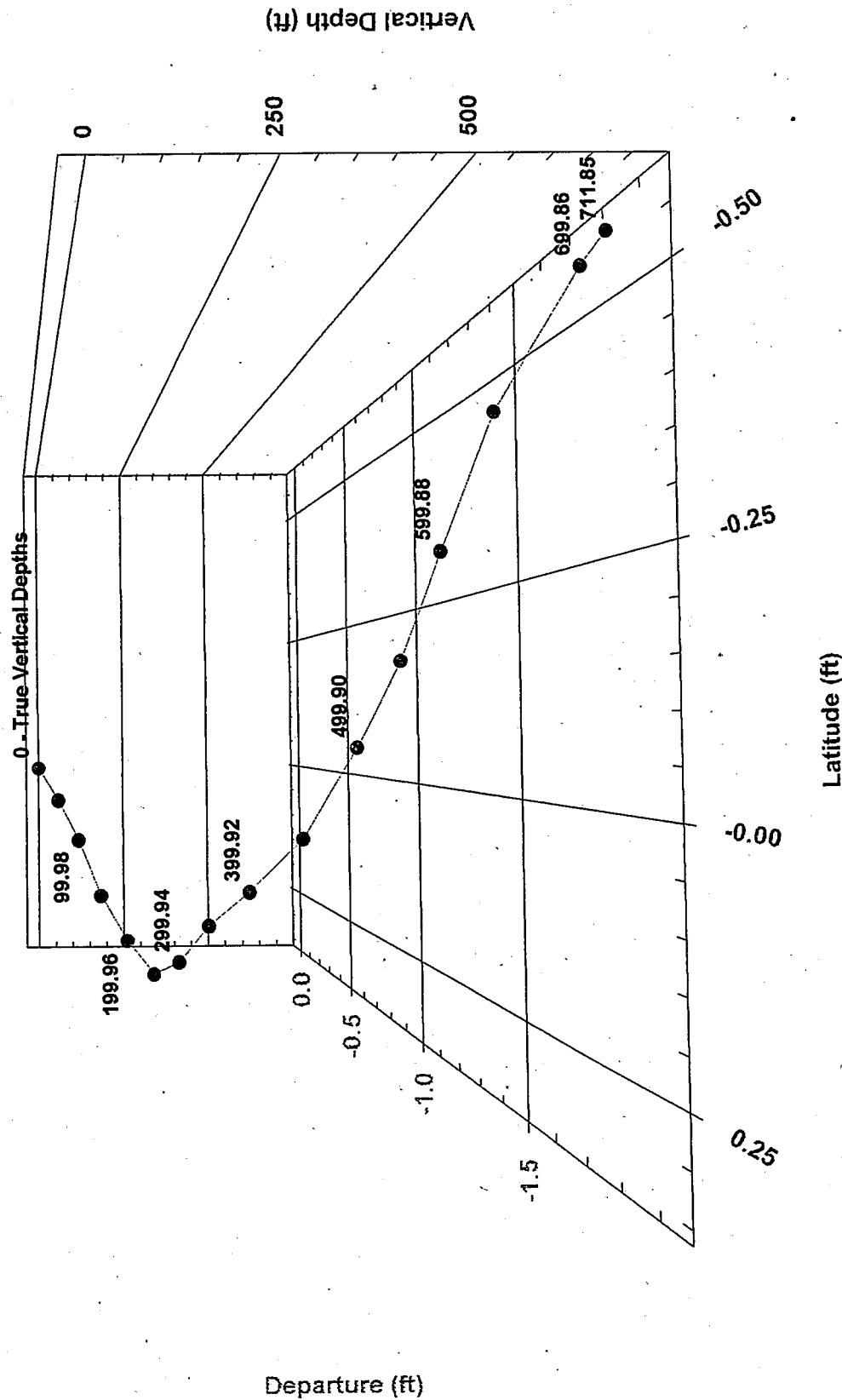
Welenco, Inc. (8) 445-9914

Balanced Tangential Calculation Method

Lang Exploratory Drilling
7 Spanish Springs
Drift-Pac 3D Projection View

Closure Distance = 1.96 Feet Closure Bearing = 253.6 Degrees True Vertical Depth = 711.85 Feet

89.0



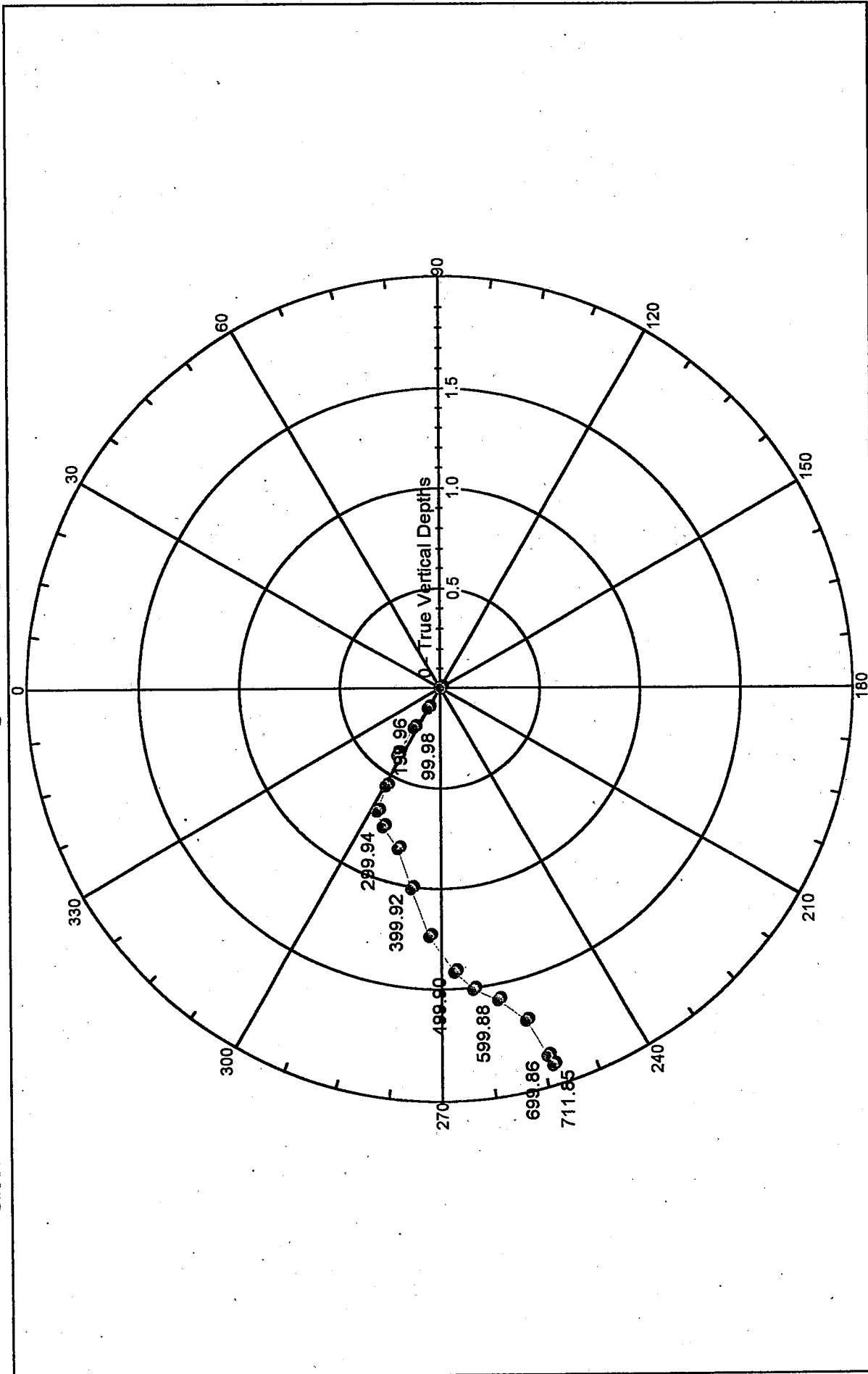
Date of Survey: Thursday, September 7, 2000

Wellenco, Inc. (800) 445-9914

Balanced Tangential Calculation Method

Lang Exploration Drilling
7 Spanish Springs
Drift-Pac Polar View

Closure Distance = 1.96 Fcct Closure Bearing = 253.6 Degrees True Vertical Depth = 711.85 Fcct



Date of Survey: Thursday, September 7, 2000

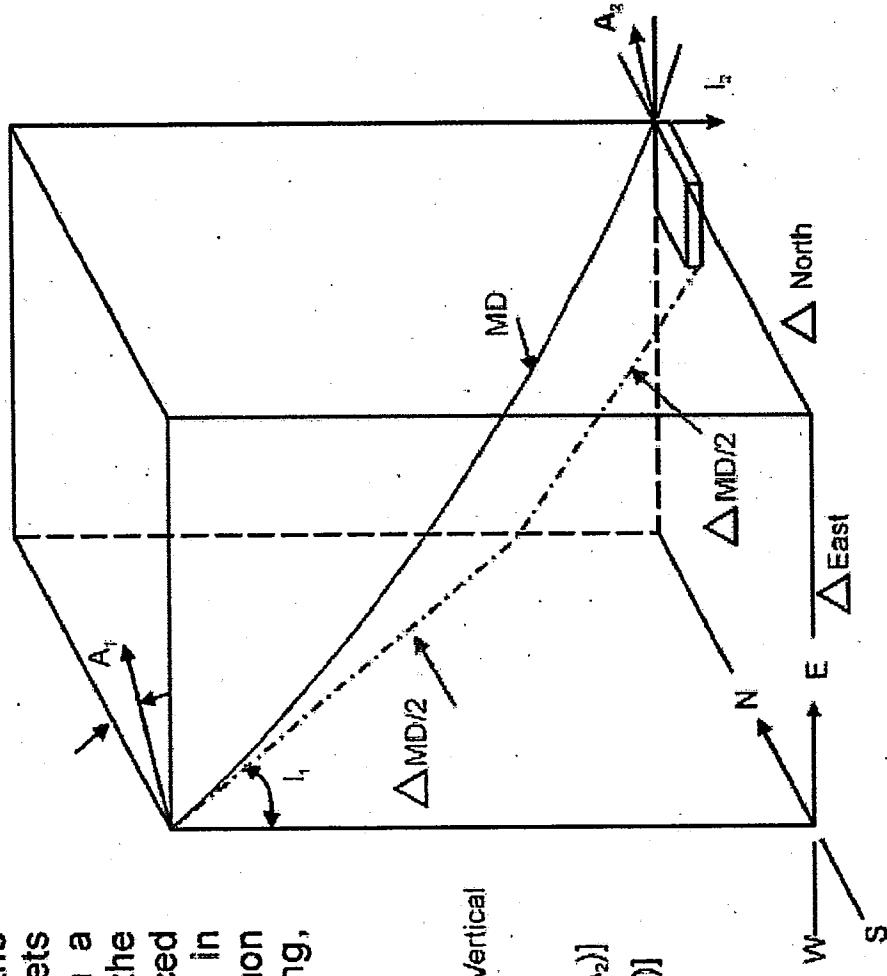
Welenco, Inc. (800) 445-9914

Balanced Tangential Calculation Method

Balanced Tangential Method

The Balanced Tangential Method uses the inclination and direction angles at the upper and lower ends of the course length in a manner so as to balance the two sets of measured angles over a course length. From a theoretical standpoint, this method combines the trigonometric functions to provide the average balanced inclination and direction angles, which are used in standard computational procedures. Other common names for this method are Vector Averaging, Acceleration, and Trapezoidal.

----- Calculated Wellbore Path
----- Actual Wellbore Path



$$\Delta \text{North} = [\Delta \text{MD}/2] \times [\sin(I_1) \times \cos(A_1) + \sin(I_2) \times \cos(A_2)]$$

$$\Delta \text{East} = [\Delta \text{MD}/2] \times [\sin(I_1) \times \sin(A_1) + \sin(I_2) \times \sin(A_2)]$$

$$\Delta \text{Vertical} = [\Delta \text{MD}/2] \times [\cos(I_1) + \cos(I_2)]$$



WASHOE COUNTY

DEPARTMENT OF WATER RESOURCES
UTILITY SERVICES DIVISION

Department of
Water Resources

PUMPING TEST DATA

WELL SPRING CREEK WELL 7

(PUMPING) / OBSERVATION WELL

(PUMPING) / RECOVERY DATA

PAGE 1 OF

TYPE OF PUMPING TEST CONSTANT Q TEST

HOW Q MEASURED 10" X 8" ORIFICE WEIR

HOW WL'S MEASURED HEMIT 3000, TD

PUMPED WELL NO.

RADIUS of PUMPED WELL

DISTANCE from PUMPED WELL

M.P. for WL's TOP OF 1 1/2" STILL WELL elev.

DEPTH OF PUMP/AIRLINE wrt

% SUBMERGENCE: initial pumping

PUMP ON: date 8/21/00 time 0930

PUMP OFF: date time

TIME $t =$ at $t=0$			WATER LEVEL DATA STATIC WATER LEVEL 135.60					WATER PRODUCT		COMMENTS	
CLOCK TIME	ELAPSED TIME mins hrs	t	t/t'	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	(S or S')	Q/S	h"	Q	(NOTE ANY CHANGES IN OBSERVERS)
0931		1		155.55		19.95			44"	1999	
		2		155.10		19.50					
		3		157.51		21.91					
		4		155.77		20.17					
0935		5		157.31		21.71					
		6		157.56		21.96					Manual = 157.06
		7		157.40		21.80					
		8		157.66		22.06					
		9		157.47		21.87					
0940		10		157.22		21.62					
		12		158.34		22.74					
		14		158.21		22.61					
		16		158.43		22.83					
		18		157.50		21.90					
50		20		158.74		23.14					
		22		157.25		21.65					
		24		158.82		23.22					
		26		158.65		23.05		44 1/2"		QL	
		28		158.40		22.80					
1000	30	30		159.62		24.02		44"			
1005	35	35		158.31		22.71					
1010	40	40		160.40		24.80					
1015	45	45		158.26		22.66					
1020	50	50		160.25		24.65	81				Q & ADJUST ENGINE RPM
1030	1	60		160.19		24.59					
1040	1	70		158.22		22.62		44 1/2"			
1050	20	80		159.54		23.94					
1100	30	90		160.03		24.43					
1110	40	100		159.93		24.33					
1120	50	110		160.65		25.05	79				
1130	2	120		160.03		24.43					
1140	10	130		158.90		23.30					
1150	20	140		159.70		24.10					
1200	30	150		159.25		23.65		44-44 1/2"			
1210	40	160		161.02		25.42					
1230	3	180		158.85		23.25		44-44 1/4"			WIND INCREASES - MANOMETER 304
1250	20	200		159.01		23.41		44 1/8-44 1/4"			
1310	40	220		158.98		23.38		44 1/4"			
1330	-4	240		160.98		25.38					
400	30	270		159.57		23.97					
50	-5	300		159.30		23.70					
1500	30	330		160.47		24.81					
1530	-6	360		160.85		25.25		44"			
1600	30	390		160.58		24.98					
1630	-7	420		160.76		25.16		44 1/4"			



WASHOE COUNTY

DEPARTMENT OF WATER RESOURCES
UTILITY SERVICES DIVISION

Department of
Water Resources

PUMPING TEST DATA

WELL SPRING CREEK WELL 7

(PUMPING) OBSERVATION WELL

(PUMPING) RECOVERY DATA

PAGE 2 OF

TYPE OF PUMPING TEST CONSTANT Q TEST

HOW Q MEASURED 10" X 8" ORIFICE WEIR

M.P. for WL's TOP OF STUWWELL elev.

HOW WL'S MEASURED HERMIT 3000

DEPTH OF PUMP/AIRLINE 200' wrt

PUMPED WELL NO.

% SUBMERGENCE: initial pumping

RADIUS of PUMPED WELL

PUMP ON: date 8/21/00 time 0930

DISTANCE from PUMPED WELL

PUMP OFF: date time

TIME $t =$ at $t'=0$			WATER LEVEL DATA STATIC WATER LEVEL 135.60					WATER PRODUCT		COMMENTS	
CLOCK TIME	ELAPSED TIME mins hrs	t	t'	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	(S) or S'	Q/S	h"	Q	(NOTE ANY CHANGES IN OBSERVERS)
1700	30 7	450		160.80		25.20					
1730	7 8	480		160.15		24.55					
1800	30 8	510		160.73		25.13					
1900	30 9	570		160.15		24.55					
2000	30 10	630		159.93		24.37					
2100	30 11	690		160.57		24.97					
2205	35 12	755		161.82		26.22					
2305	35 13	815		159.61		24.01					
0005	35 14	875		162.07		26.47					
0100	30 15	930		160.06		24.46					
0150	20 16	980		160.95		25.35					
0350	20 18	1100		160.27		24.67					
0530	20 19	1200		161.17		25.57					
0710	40 21	1300		159.78		24.18					
150	20 23	1400		159.57		23.97					
1030	25 25	1500		161.36		25.76					
1210	40 26	1600		159.16		23.56					
1350	30 28	1700		160.66		25.06					
1530	30 30	1800		159.							
1800	30 32	1950		160.51		24.91					
2000	30 34	2070		160.14		24.54					
2200	30 36	2190		160.00		24.40					
2400	30 38	2310		160.11		24.51					
0200	30 40	2430		160.51		24.91					
0400	30 42	2550		160.95		25.38					
0600	30 44	2670		160.38		24.78					
0930	0 48	2880		161.75		26.15					
1130	0 50	3000		159.55		23.95					
1400	30 52	3150		161.98		26.38					
1740	10 56	3370		160.99		25.39					
2400	30 62	3750		158.87		23.27					
0200	30 64	3870		161.10		25.50					
0400	30 66	3990		159.95		24.35					
0600	30 68	4170		160.53		24.93					
1200	30 75	4530		159.81		24.21					
1810	40 81	4900		160.70		25.10					
2207		5137		159.57		23.97					
0407				160.37							
1000		5790		160.98							
030	-100	6000		160.21	5760+240	24.61					
030	-108	6480		161.60		26.00					
1000	30 120	7230		160.35		25.05					
2107		7957		161.18		25.58					



WASHOE COUNTY

**DEPARTMENT OF WATER RESOURCES
UTILITY SERVICES DIVISION**

Department of
Water Resources

PUMPING TEST DATA

WELL SPRING CREEK WELL 7

PUMPING / OBSERVATION WELL

PUMPING / RECOVERY DATA

PAGE 3 OF

TYPE OF PUMPING TEST CONSTANT Q TEST

HOW Q MEASURED 10" x 8" ORIFICE

HOW WL's MEASURED HERTZIT 3000 - TR

PUMPED WELL NO.

RADIUS of PLUMPED WELL

DISTANCE from BLIMBERD WELL

M.P. for WL's TOP OF STILLWELL elev.

DEPTH OF PUMP/AIRLINE 200' WT

% SUBMERGENCE: initial

PLUMP ON: date 8/31/09 time 0938

PLUMB OFF: date _____ time _____

FORM OFF. date _____ time _____

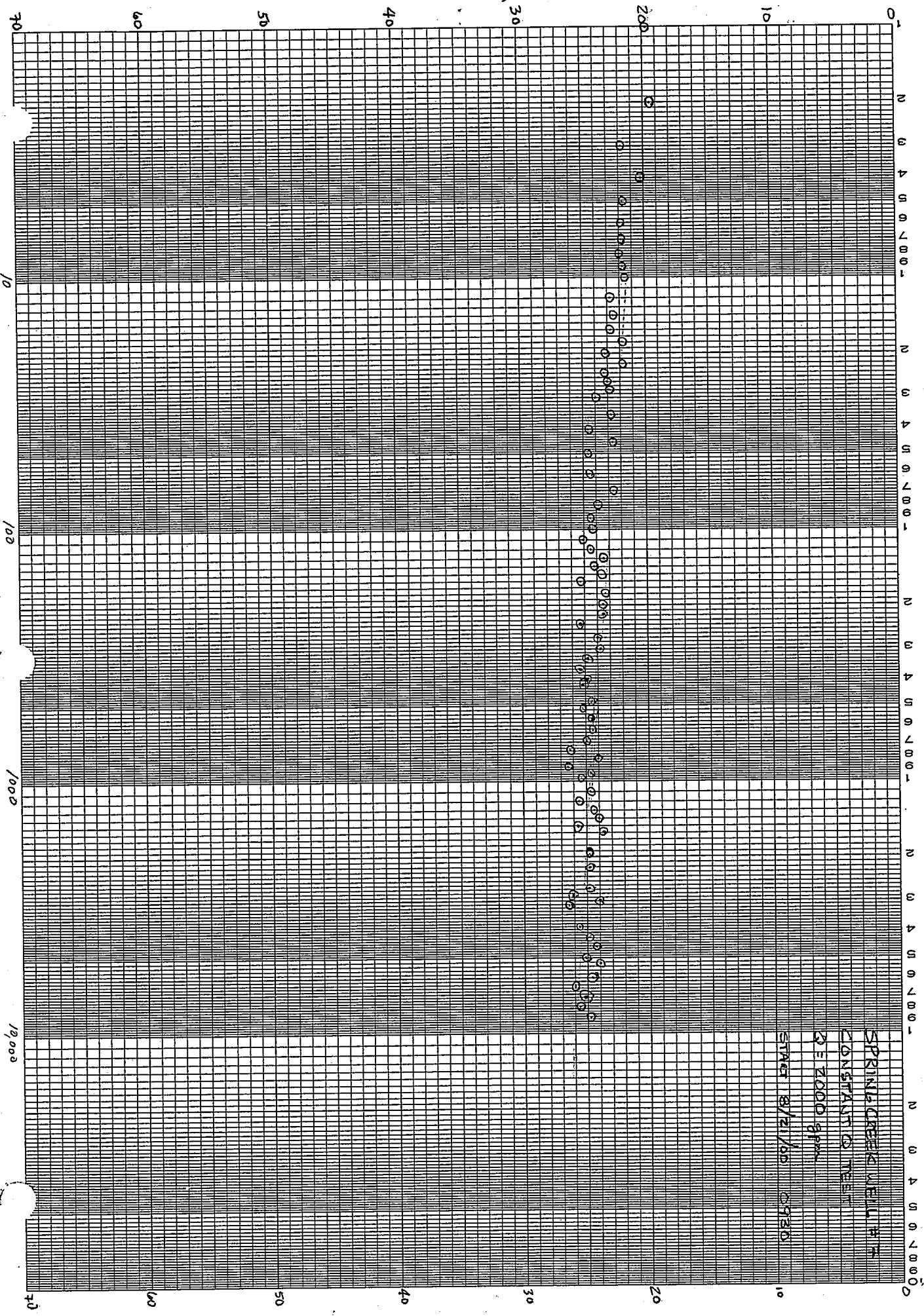
NO. 340-L510 DIETZGEN GRAPH PAPER

SEMI-LOGARITHMIC

5 CYCLES X 10 DIVISIONS PER INCH.

DIETZGEN CORPORATION
MADE IN U.S.A.

DRAWDOWN (ft.)





WASHOE COUNTY

DEPARTMENT OF WATER RESOURCES

UTILITY SERVICES DIVISION

Department of
Water Resources

TYPE OF PUMPING TEST CONSTANT Q TEST

HOW Q MEASURED _____ M.P. for WL's T.O.C. elev. _____

HOW WL's MEASURED SOLINST SOUNDER 300 DEPTH OF PUMP/AIRLINE _____ wrt _____

PUMPED WELL NO. SC7 % SUBMERGENCE: initial _____ pumping _____

RADIUS of PUMPED WELL _____ PUMP ON: date 8/21/00 time 0930

DISTANCE from PUMPED WELL _____ PUMP OFF: date _____ time _____

WELL SSPZA

PUMPING OBSERVATION WELL

PUMPING RECOVERY DATA

PAGE 1 OF _____

PUMPING TEST DATA

CLOCK TIME	TIME		WATER LEVEL DATA					WATER PRODUCT	COMMENTS
	mins	hrs	t	t'	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL		
0933			3		131.44			0.00	
0935			5		131.43			+0.01	
0937			7		131.41			+0.03	
0940	10	-	10		131.42			+0.02	
0943			13		131.43			+0.01	
0946			16		131.44			0.00	
0950			20		131.46			0.02	
0955			25		131.49			0.05	
1000	30	-	30		131.53			0.09	
1005			35		131.57			0.13	
1010			40		131.61			0.17	
1015			45		131.65			0.21	
1020			50		131.69			0.25	
1030	-	1	60		131.76			0.32	
1040			70		131.83			0.39	
1050	20	1	80		131.89			0.45	
1100	30	1	90		131.95			0.51	
1110	40	1	100		132.01			0.57	
1120	50	1	110		132.06			0.62	
1135	5	2	125		132.13			0.69	
1145	15	2	135		132.17			0.73	
1150	20	2	140		132.19			0.75	
1200	30	2	150		132.23			0.79	
1210	40	2	160		132.26			0.82	
1230	-	3	180		132.33			0.89	
1250	20	3	200		132.39			0.95	
1310	30	3	220		132.44			1.00	
1340	10	4	250		132.50			1.06	
1400	30	4	270		132.54			1.10	
1430	-	5	300		132.60			1.16	
1500	30	5	330		132.67			1.23	
1530	-	6	360		132.70			1.26	
1600	30	6	390		132.75			1.31	
1630	-	7	420		132.78			1.34	
1700	30	7	450		132.80			1.36	
1730	-	8	480		132.85			1.41	
1800	30	8	510		132.86			1.42	DAN
1900	30	9	570		132.92			1.48	
2000	30	10	630		132.98			1.54	
2000	30	11	690		133.03			1.59	
2115	45	12	765		133.10			1.66	EE
2250	20	13	800		133.14			1.70	
2350	20	14	860		133.18			1.74	
0050	20	15	920		133.22			1.78	



WASHOE COUNTY

**DEPARTMENT OF WATER RESOURCES
UTILITY SERVICES DIVISION**

Department of
Water Resources

PUMPING TEST DATA

WELL SSP2A
PUMPING / OBSERVATION WELL
PUMPING / RECOVERY DATA
PAGE 2 OF

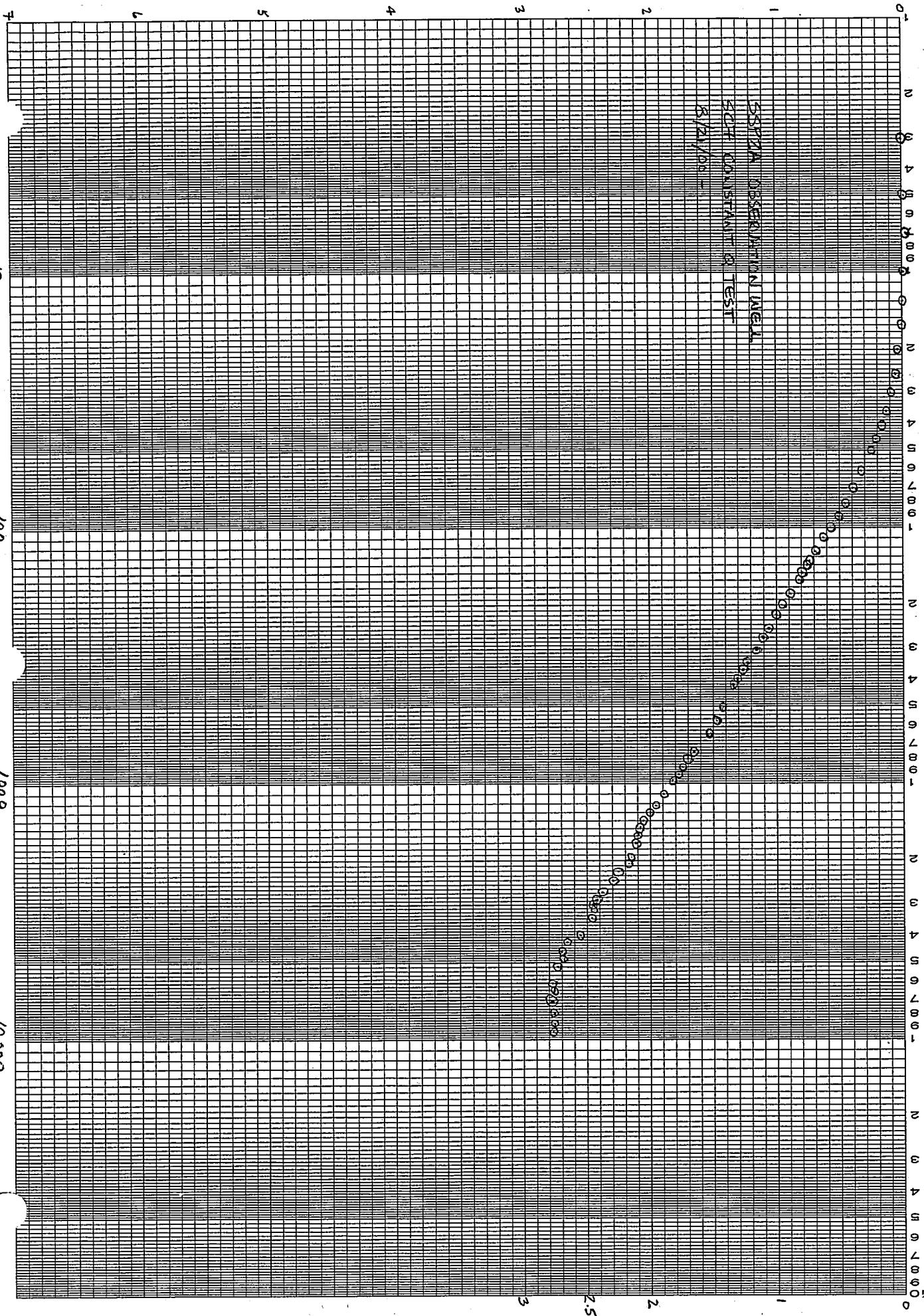
TYPE OF PUMPING TEST CONSTANT Q TEST
HOW Q MEASURED
HOW WL's MEASURED SOLINST SOUNDER MODEL 300
PUMPED WELL NO. SC7
RADIUS of PUMPED WELL
DISTANCE from PUMPED WELL

M.P. for WL's TOP OF Z" elev. 32.5
DEPTH OF PUMP/AIRLINE _____ wrt _____
% SUBMERGENCE: initial _____ pumping _____
PUMP ON: date 8/21/00 time 0930
PUMP OFF: date _____ time _____

NO. 340-L510 DIETZGEN GRAPH PAPER
SEMI-LOGARITHMIC
5 CYCLES X 10 DIVISIONS PER INCH

DIETZGEN CORPORATION
MADE IN U.S.A.

DRAWDOWN (ft)





WASHOE COUNTY

DEPARTMENT OF WATER RESOURCES
UTILITY SERVICES DIVISION



PUMPING TEST DATA

WELL SSP2

PUMPING / OBSERVATION WELL

(PUMPING) RECOVERY DATA

PAGE 1 OF 1TYPE OF PUMPING TEST CONSTANT Q TESTHOW Q MEASURED _____ M.P. for WL's T.O.C elev. _____HOW WL's MEASURED HERMIT 3000 TD DEPTH OF PUMP/AIRLINE _____ wrt _____PUMPED WELL NO. SC7 % SUBMERGENCE: initial _____ pumping _____RADIUS of PUMPED WELL _____ PUMP ON: date 8/21/00 time 0930

DISTANCE from PUMPED WELL _____ PUMP OFF: date _____ time _____

TIME $t =$ at $t=0$			WATER LEVEL DATA					WATER PRODUCT	COMMENTS
CLOCK TIME	ELAPSED TIME mins hrs	t	t'/t'	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	(S) or S'	Q	(NOTE ANY CHANGES IN OBSERVERS)
0931		1		137.95			3.23		
		2		138.51			3.79		
		3		138.85			4.13		
		4		139.14			4.42		
0935		5		139.32			4.60		
		6		139.54			4.72		
		7		139.65			4.83		
		8		139.77			5.05		
		9		139.88			5.16		
0940		10		140.00			5.28		
		12		140.18			5.46		
		14		140.38			5.66		
		16		140.51			5.79		
		18		140.63			5.91		
450		20		140.76			6.04		
		22		140.86			6.14		
		24		140.93			6.21		
		26		141.03			6.31		
		28		141.09			6.37		
1000	30	30		141.16			6.44		
1005		35		141.29			6.57		
1010		40		141.39			6.67		
1015		45		141.47			6.75		
1020		50		141.56			6.84		
1030	-1	60		141.69			6.97		
1040		70		141.80			7.08		
1050		80		141.86			7.14		
1100	30	90		141.95			7.23		
1110	40	100		141.99			7.27		
1120	50	110		142.06			7.34		
1130	-2	120		142.10			7.38		
1140	10	130		142.15			7.43		
1150	20	140		142.16			7.44		
1200	30	150		142.19			7.47		
1210	40	160		142.23			7.51		
1230	-3	180		142.28			7.56		
1250	20	200		142.30			7.58		
1310	40	220		142.33			7.61		
1330	0	240		142.36			7.64		
1400	30	270		142.37			7.65		
1430	-5	300		142.40			7.68		
1500	30	330		142.42			7.70		
1530	-6	360		142.42			7.70		
1600	30	390		142.43			7.71		
1630	-7	420		142.45			7.73		



WASHOE COUNTY

**DEPARTMENT OF WATER RESOURCES
UTILITY SERVICES DIVISION**

Department of
Water Resources

TYPE OF PUMPING TEST CONSTANT Q TEST

WELL SSPZ
PUMPING /OBSERVATION WELL
PUMPING/ RECOVERY DATA
PAGE 3 OF 3

PUMPING TEST DATA

TYPE OF PUMPING TEST CONSTANT Q TEST

HOW Q MEASURED 10" x 8" ORIFICE M.P. for WL's TOP OF CASING elev.

HOW WL'S MEASURED HELIUM IT 3000, PRESSURE TD

PUMPED WELL NO. SC7 % SUBMERGENCE: initial pumping

RADIUS OF PLUMPED WELL

DISTANCE from PLUMBED WELL PUMP ON date start time 0:00

DISTANCE FROM PUMPED WELL

TIME WATER LEVEL DATA



WASHOE COUNTY

DEPARTMENT OF WATER RESOURCES
UTILITY SERVICES DIVISION

Department of
Water Resources

PUMPING TEST DATA

WELL SSPZ

PUMPING (OBSERVATION WELL)

PUMPING (RECOVERY DATA)

PAGE 2 OF _____

TYPE OF PUMPING TEST CONSTANT Q TEST

HOW Q MEASURED _____ M.P. for WL's T.O.C. elev. _____

HOW WL's MEASURED HELMIT 3000, TD DEPTH OF PUMP/AIRLINE _____ wrt _____

PUMPED WELL NO. SC7 % SUBMERGENCE: initial _____ pumping _____

RADIUS of PUMPED WELL _____ PUMP ON: date 8/21/00 time 0930

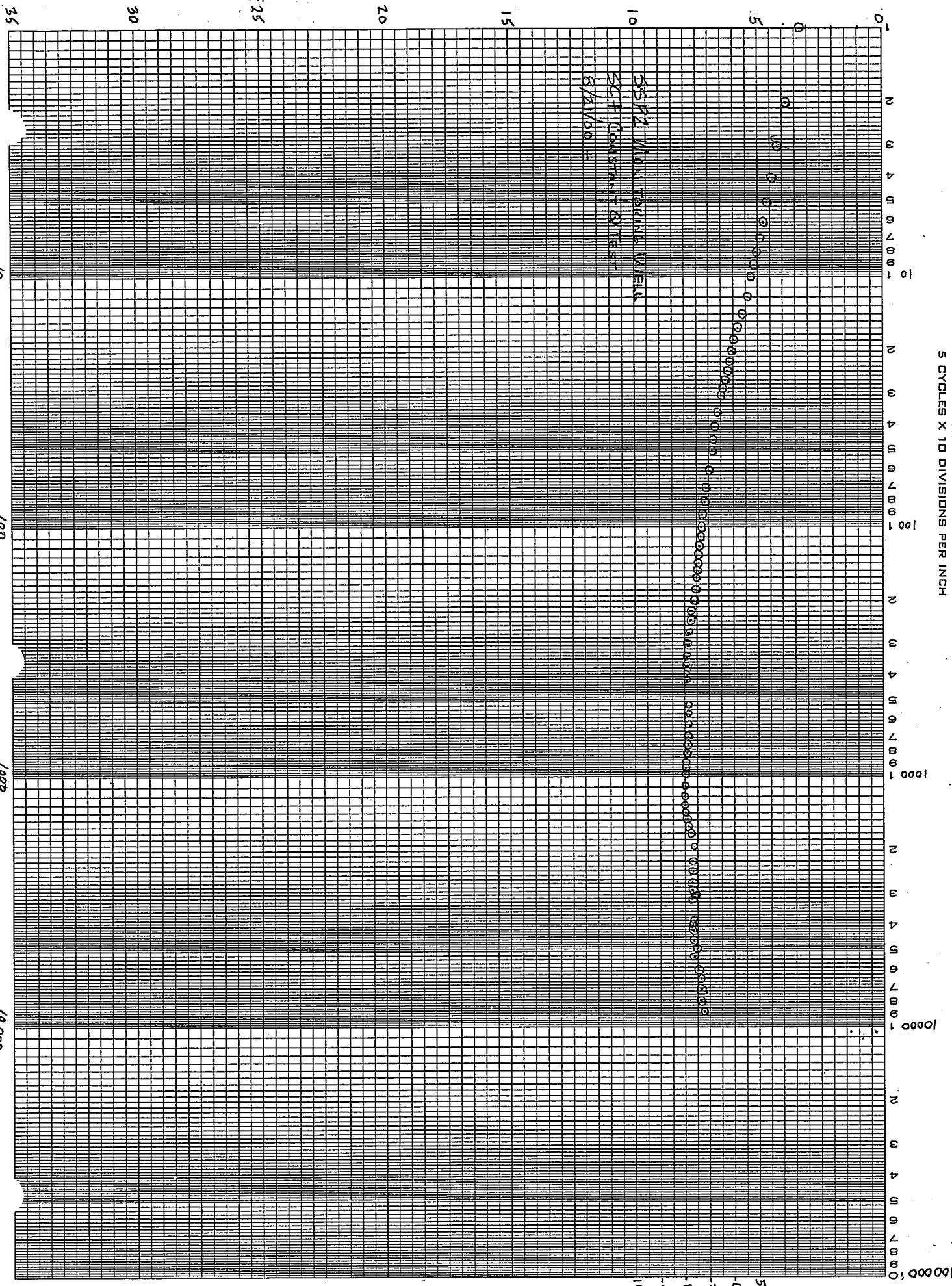
DISTANCE from PUMPED WELL _____ PUMP OFF: date _____ time _____

CLOCK TIME	TIME			WATER LEVEL DATA					WATER PRODUCT	COMMENTS
	CLOCK TIME	ELAPSED TIME	t = at t=0	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	(S) or S'	Q		
		mins	hrs	t	t'					(NOTE ANY CHANGES IN OBSERVERS)
1700	30	7		142.46		7.74				
1730	-	8		142.47		7.75				
1800	30	8	510	142.46		7.74				
1900	30	9	560	142.49		7.77				
2000	30	10	630	142.50		7.78				
2100	30	11	690	142.55		7.83				
2205	35	12	755	142.56		7.84				
2305	35	13	815	142.58		7.86				
0005	35	14	875	142.59		7.87				
0100	30	15	930	142.62		7.90				
0150	20	16	980	142.62		7.90				
0350	20	18	1100	142.63		7.91				
0530	-	20	1200	142.66		7.94				
0710	40	21	1300	142.69		7.97				
0850	20	23	1400	142.65		7.93				
1030	-	25	1500	142.59		7.87				
1210	20	26	1600	142.52		7.80				
1350	40	28	1700	142.47		7.75				
1530	-	30	1800							
1710										
1800	30	32	1950	142.38		7.66				DAN
2000	30	34	2070	142.36		7.64				
2200	30	36	2190	142.40		7.68				MW
2400	30	38	2310	142.42		7.70				
0200	30	40	2430	142.39		7.67				
0400	30	42	2550	142.38		7.66				
0600	30	44	2670	142.39		7.67				
0930	0	48	2800	142.36		7.64				708
1130	-	50	3000	142.32		7.60				
1400	30	52	3150	142.26		7.64				DD
1740	10	56	3370	142.28		7.66				"
2400	30	58	3770 3750	142.22		7.60				Ford
0200			3870	142.33		7.61				
0400			3990	142.38		7.66				
0600	30	60	4170	142.39		7.67				
1200	30	75	4530	142.35		7.63				EE
1810	40	81	4900	142.26		7.54				
2207			5137	142.32		7.60				MW
0407				142.26						
				142.29						DAN
	30	-100	6000	142.14		7.42				
2130	-	103	6480	142.08		7.36				EE
1000	30	120	7230	142.09		7.34				JDS
2107			7457	142.18		7.46				S

NO. 340-L510 DIETZGEN GRAPH PAPER
SEMI-LOGARITHMIC
5 CYCLES X 10 DIVISIONS PER INCH

DIETZGEN CORPORATION
MADE IN U.S.A.

DRAWDOWN (ft)





WASHOE COUNTY

**DEPARTMENT OF WATER RESOURCES
UTILITY SERVICES DIVISION**

Department of
Water Resources

PUMPING TEST DATA

WELL SPRING CREEK 7

PUMPING / OBSERVATION WELL

PUMPING RECOVERY DATA

PAGE 1 OF 1

TYPE OF PUMPING TEST CONSTANT Q RECOVERY

M.P. for WL's **TOP OF STILL WELL** elev.

HOW WLs MEASURED HERMIT 3000 DEPTH OF PUMP/AIRLINE wrt

PUMPED WELL NO. _____ DEPT. OF COMPANIE RE. _____ WIT. _____ % SURMERSION: initial _____ pumping _____

RADIUS OF PUMPED WELL % SUBMERGENCE, Initial PUMP ON: date 8/21/100 time 0930

DISTANCE from PLUMBED WELL FOMI ON date 3/21/00 time 08:30
PLUMB OFF date 3/22/00 time 08:30

DISTANCE FROM PUMPED WELL _____ PUMP OFF: date 8/26/00 time 0730



WASHOE COUNTY

**DEPARTMENT OF WATER RESOURCES
UTILITY SERVICES DIVISION**

Department of
Water Resources

PUMPING TEST DATA

TYPE OF PUMPING TEST CONSTANT Q RECOVERY

HOW Q MEASURED _____

HOW WL's MEASURED HERMIT 3000

PUMPED WELL NO. _____

RADIUS of PUMPED WELL

DISTANCE from PUMPED WELL

WELL SSP2
PUMPING /OBSERVATION WELL
PUMPING /RECOVERY DATA
PAGE 1 OF 1



WASHOE COUNTY

**DEPARTMENT OF WATER RESOURCES
UTILITY SERVICES DIVISION**

PUMPING TEST DATA

WELL SSPZA
PUMPING /OBSERVATION WELL
PUMPING /RECOVERY DATA
PAGE 1 OF 1

TYPE OF PUMPING TEST CONSTANT Q RECOVERY

HOW Q MEASURED _____

M.P. for WL's T.O.C. elev.

HOW WL'S MEASURED SOLINST 300 SOUNDER

DEPTH OF PUMP/AIRLINE _____ wrt _____

PUMPED WELL NO. SC7

% SUBMERGENCE: initial _____ pumping _____

RADIUS of PUMPED WELL _____

PUMP ON: date 8/21/00 time 0930

DISTANCE from PUMPED WELL _____

PUMP OFF: date 8/23/00 time 0930

WASHOE COUNTY

DEPARTMENT OF PUBLIC WORKS
UTILITY DIVISION

PUMPING TEST DATA

TYPE of PUMPING TEST Step Test - 10" x 8"

HOW Q MEASURED orifice

HOW WL's MEASURED Head + 300-100 psi xducer

PUMPED WELL NO. SC# 7

RADIUS of PUMPED WELL

DISTANCE from PUMPED WELL

WELL Spring Creek #7

PUMPING/OBSERVATION WELL

PUMPING/RECOVERY DATA

PAGE 1 OF _____

M.P. for WL's Top of Tube elev.

DEPTH of PUMP/AIRLINE wrt

% SUBMERGENCE: initial ; pumping

PUMP ON: date time 0835

PUMP OFF: date time

TIME $t =$ at $t' = 0$				WATER LEVEL DATA STATIC WATER LEVEL 135.77				WATER PRODUCT.	COMMENTS
CLOCK TIME	ELAPSED TIME mins hrs	t	t'	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	(S)ors'	Q	(NOTE ANY CHANGES IN OBSERVERS)
0836		1		146.35		10.58			11" = 999 gpm
		2		144.55		8.78			
		3		145.28		9.51			Manual @ 0843 = 145.40
		4		144.58		8.81			
		5		144.70		8.93			
		6		145.79		10.02			
		7		145.47		9.70			
		8		145.57		9.80			
		9		145.82		10.05			
		10		145.41		9.67			
		12		146.23		10.46			
		14		145.43		9.66			
		16		145.78		10.01			
		18		146.08		10.31			
0855	20	20		145.82		10.05			Manual @ 0855 = 145.95
0857	22			146.59		10.82			
0859	24			145.60		9.83			
0901	26			145.47		9.70			
0903	28			145.41		9.64			
0905	30			146.51		10.70			Manual @ 30min = 146.12
0910	35			145.40		9.63			
0915	40			146.84		11.07			
0920	45			146.08		10.31			
0925	50			145.79		10.02			Manual = 146.08
0930	55			146.20		10.43			
0935	60			145.24		9.47			
0945	70			145.97		10.20			
0955	80			146.62		10.85			
1005	90			147.00		11.23			Manual = 146.23
1015	100			146.87		11.10			25" = 1507 gpm
1016	101			151.08		15.31			
1017	102			151.80		16.03			
1018	103			151.88		16.11			
1020	105			151.96		16.19			
1025	110			152.60		16.83			Manual = 152.12
1030	115			152.95		17.08			
1035	120			152.98		17.21			SC = 88.23
1040	125			151.93		16.16			Manual = 152.40
1045	130			152.41		16.64			
1055	140			153.30		17.53			

WASHOE COUNTY

DEPARTMENT OF PUBLIC WORKS
UTILITY DIVISION

PUMPING TEST DATA

WELL Spring Creek #7

PUMPING / OBSERVATION WELL

PUMPING / RECOVERY DATA

PAGE 2 OF _____

TYPE of PUMPING TEST Step Test

HOW Q MEASURED 10" X 8" Orifice

M.P. for WL's _____ elev. _____

HOW WL's MEASURED Therm + 3000 - 100 psi; Xducer

DEPTH of PUMP/AIRLINE _____ wrt _____

PUMPED WELL NO. SC #7

% SUBMERGENCE: initial _____ ; pumping _____

RADIUS of PUMPED WELL _____

PUMP ON: date 8/20/00 time 0835

DISTANCE from PUMPED WELL _____

PUMP OFF: date 8/20/00 time 1515

TIME $t =$ at $t' = 0$			WATER LEVEL DATA STATIC WATER LEVEL / 35.77				WATER PRODUCT.		COMMENTS	
CLOCK TIME	ELAPSED TIME mins hrs		t/t'	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	(Sps')	Q/s	Q	(NOTE ANY CHANGES IN OBSERVERS)
1105		150		152.77		17.00		83	25"	152.77 gpm
1115		160		152.47		16.70				
1125		170		153.00		17.23				
1135	-	180		152.20		16.43				Manual = 152.72
1145	10	190		153.37		17.60				
1155	20	200		153.92		18.15				
1156		201	1	157.19	STEP III	21.42		44"	Manual @ 200 = 158.63	
1157		202	2	159.54	$Q = 2,000$	23.77				2000 gpm
1200		205	5	159.31		23.54				
1205		210	10	159.47		23.70		44-44 1/2		
1210		215	15	159.50		23.73				
1215		220	20	160.17		24.40				
1220		225	25	159.28		23.51				
1225		230	30	161.07		25.30				
1230		235	35	160.00		24.23				
1235		240	40	159.53		23.76		44-44 1/2		
1245		250	50	160.01		24.24				
1255		260	60	159.67		23.90		44-44 1/4		
1305		270	70	160.42		24.65				
1315		280	80	158.04		22.27		81		
1325		290	90	160.90		25.13				SOUNDEX 159.70 @ 1328
1335	-	300	100	158.52		22.75				
1340		305	5	167.86	STEP IV	32.09		69"	2500 gpm	
1345		310	10	167.16	$Q = 2,503$	31.40		68 3/4"	165.73 R.L @ 133L QT	
1350		315	15	167.11		31.34				
1355		320	20	166.97		31.20		80	QT	
1400		325	25	166.75		30.98		69-69 1/8		
1405		330	30	167.92		32.15				
1415		340	40	167.60		31.83		69 1/8		
1425		350	50	167.25		31.48				
1435		360	60	168.37		32.60		69 1/8		
1445		370	70	168.53		32.76				
1455		380	80	169.15		33.38		75	69"	
1505		390	90	167.90						
1515		400	100							