

**WELL COMPLETION REPORT FOR NEARBY PRODUCTION WELL:  
APPLICABLE FOR ARROWCREEK 2 MWA**

**SOUTHWEST POINTE EXPLORATION AND WELL CONSTRUCTION REPORT**

60

Dragan

1506-00047

**SOUTHWEST POINTE EXPLORATION  
AND WELL CONSTRUCTION REPORT**

**SEPTEMBER - DECEMBER 1995**

**WASHOE COUNTY**

**DEPARTMENT OF PUBLIC WORKS**

**UTILITY DIVISION**

**P.O. BOX 11130 RENO, NEVADA 89520**



**SOUTHWEST POINTE EXPLORATION  
AND WELL CONSTRUCTION REPORT**

**SEPTEMBER - DECEMBER 1995**

by  
**Michael C. Widmer**

**WASHOE COUNTY UTILITY DIVISION  
DEPARTMENT OF PUBLIC WORKS  
1195-B CORPORATE BLVD.  
PO BOX 11130  
RENO, NEVADA 89520**



# WASHOE COUNTY

"To Protect and To Serve"



UTILITY DIVISION  
DEPARTMENT OF PUBLIC WORKS  
John M. Collins, Chief Sanitary Engineer

1195-B CORPORATE BOULEVARD  
POST OFFICE BOX 11130  
RENO, NEVADA 89520-0027  
PHONE: (702) 856-7300  
FAX: (702) 856-7310

Feb. 21, 1996

TO: Paul Orphan  
FROM: Michael Widmer *MW*  
SUBJECT: Well Capacity at SW Pointe

I have finished the analysis of the SW Pointe wells and have the following recommendations on the pump sizes and settings.

<u>Specification</u>	<u>Well #1</u> <u>(Lower)</u>	<u>Well #2</u> <u>(Upper)</u>
Well Casing Diameter (inches)	10	12
Pump Capacity (gpm)	350	750
Pump Intake Setting (feet below top of casing)	380	410
Pumping Level (feet below land surface)	320	260
Top of Casing Elevations (feet above sea level)	5,107	5,419

*draft* These pumping levels are based on 48 hours of continuous pumping. The pump intake settings are in twenty foot, blank sections of casing within the well screen intervals. The final report on this drilling project will be routed to you for review and comment as soon as the figures are complete. The elevations of the Top of Casing should be accurate to two feet (GPS survey), but I would like to resurvey them next week.

If you have any questions, please do not hesitate to see me.

c: John Collins  
Dan Dragan

*Mike -  
what happens if one of the  
wells shuts down and the other  
pumps longer than 48 hrs. -  
Should they be designed with  
automatic shutoffs @ certain pumping levels?  
Dan*



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## **EXECUTIVE SUMMARY**

During the Autumn of 1995, the Washoe County Utility Division contracted with Sargent Irrigation to drill and construct two production wells and one exploration well in the South Truckee Meadows (see Figure 1). Drilling operations commenced on September 5 and were completed November 12, 1995. Testing began December 3 and were completed December 19, 1995.

Exploration efforts at the Upper Well site gave evidence of a relatively thick sequence of saturated, poorly to moderately sorted sediments and warranted production well construction. Saturated sediments were encountered from 100 feet to 710 feet with the Truckee Formation below 610 feet. A 6-inch exploration well was completed in the test hole. An exploration phase at the Lower Well site at depths below previous exploration efforts (Widmer, 1992) proved to be disappointing. The lithology below 500 feet to a depth of 765 feet consisted mostly of altered andesite and/or volcanic breccia with fairly competent andesite from 734 to 765 feet. Static water levels are approximately 100 feet below land surface at the Upper site and approximately 220 feet at the Lower site. It is postulated that the Serendipity Fault, which is mapped between the two sites, is a hydraulic barrier to ground water and that the lithology at the Lower site has been uplifted relative to the Upper site.

At the Lower site, SW Pointe Well # 1 was constructed to a depth of 510 feet with 80 slot Johnson screen from 320 feet to 500 feet and blank casing from 370 to 390 feet. After the step test, a 72 hour constant discharge test (400 gpm) was conducted. The transmissivity was estimated at 5,900 gpd/ft of drawdown. An impermeable boundary was encountered during testing which reduced the effective transmissivity to 3,000 gpd/ft of drawdown. No storativity coefficient was calculated as the monitor well was found to be plugged. The well capacity is rated at 350 gpm with a pumping level estimated at 320 feet below land surface. The pump intake should be set at 380 feet below land surface.

At the Upper site, SW Pointe Well # 2 was constructed to a depth of 610 feet with 80 slot Johnson screen from 260 feet to 600 feet and blank casing from 400 to 420 feet. After the step test, a 72 hour constant discharge test (846 gpm) was conducted. The transmissivity was estimated at 6,200 gpd/ft of drawdown. A storativity coefficient of 0.001 was calculated using WHIP (Hydro Geo Chem, 1988). The well capacity is rated at 750 gpm with a pumping level estimated at 260 feet below land surface. The pump intake should be set at 410 feet below land surface.

## **DRILLING OPERATIONS**

Through a low bid process, Sargent Irrigation was awarded a contract to drill one production well and one exploratory well with the option of constructing a second production well. The Washoe County Board of County Commissioners awarded this contract at their August 22, 1995 meeting. Drilling operations began September 5, 1995



and concluded November 12, 1995. Testing began December 3, 1995 and was completed December 19, 1995. Washoe County personnel supervised the drilling operations and conducted the well testing. At the Lower Site, an exploratory phase of drilling was conducted below 580 feet in order to determine lithology and potential water bearing formations, which proved to be disappointing.

Sargent Irrigation employed a Speedstar 22 mud rotary drill rig to do the exploratory drilling at the Upper Site. The borehole was drilled with a nominal 11 inch tricone drill bit. Mud viscosity was maintained at approximately 35 seconds (Marsh Funnel). The drilling fluid was continuously recycled through mechanical desanders. Washoe County staff lithologically logged the borehole cuttings. After the total depth was drilled, Geo-Hydro-Data successfully logged and provided a standard electric log (see appendix).

The production boreholes were drilled with Sargent's prefabricated, reverse rotary drill rig. The drilling fluid was water mixed with minor amounts of bentonite such that the viscosity was maintained at 31 seconds. Mechanical shakers and desanders were employed. The Lower Site borehole was not E-logged as it was assumed to be the same as the observation well drilled in 1992 (see appendix).

## **DESCRIPTION OF LITHOLOGY**

Table 1 shows the lithology encountered in the exploratory borehole drilled at the Upper Site (Southwest Pointe No. 2). The unconsolidated to semi-consolidated sediments appear to extend to a depth of 610 feet. From 610 feet to 690 feet the cuttings appear to be a weathered and clay altered andesite. At 690 feet to 710 feet (total depth), the Hunter Creek Member of the Truckee Formation appeared with the distinct "Oily" marker bed discovered from previous drilling programs (Widmer, 1992). This marker bed is probably a siltstone with carbonaceous material. The drilling was terminated at this point because of budget constraints and that the Hunter Creek Member could extend to a depth of hundreds of feet.

Table 2 shows the lithology encountered at the Lower Site (Southwest Pointe No. 1). A section of the Hunter Creek Member was found at 210 feet below unconsolidated sediments. This 100 foot section can be described as a diatomaceous siltstone. From 360 feet to 500 feet there were more sediments that could represent a "dirty" sandstone and probably the Lower Hunter Creek Member (Widmer, 1992). At 500 feet a weathered and clay altered andesite was drilled to 580 feet. A five foot section drilled very hard and competent to 585 feet. From 585 to 673 the andesite was "soft" with significant alteration to clay. More competent, but still with significant alteration clay, andesite was encountered to 734. From this depth to 765 feet, hard, fractured andesite was drilled. The drilling was halted at this point due to budgetary and time constraints.

Table 1  
Upper Site Lithology

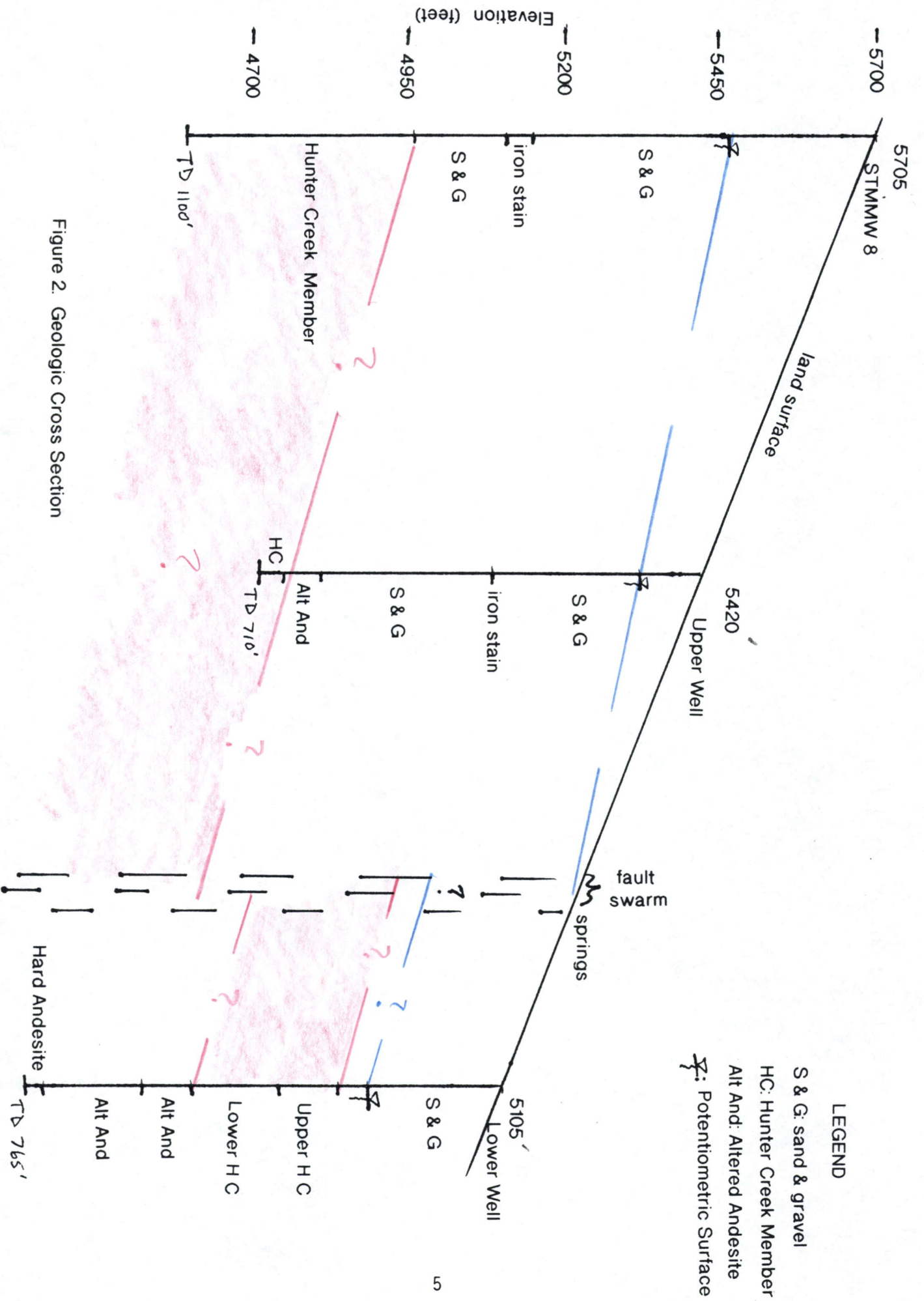
<u>Footage</u>	<u>Description</u>
000-220	silt, sand, gravel, cobbles and boulders
220-240	silty, sandy, gravelly clay
240-342	coarse sand and silt, occasional gravel
342-355	iron stained med. grained sand, distinct, mostly granitic detritus
355-445	clayey, sandy silt
445-485	clayey, silty sand
485-580	clayey, silty, sandy gravel, well rounded to semi-rounded
580-610	fine to coarse sand with clayey or gravelly stringers
610-615	distinct, gray-green, silty, clay w/ andesite fragments
615-620	same with lite brown clay balls
620-670	gray-green, sandy silt with increasing grit
670-690	weathered andesitic cuttings with poor return
690-710	clay or Hunter Creek siltstone, "Oily" marker bed.

Table 2  
Lower Site Lithology

<u>Footage</u>	<u>Description</u>
000-180	silt, sand, gravel and cobbles
180-223	silty, sandy gravels
223-260	sandy, clayey silt
260-360	Upper Hunter Creek Member of Truckee Formation
260-270	creme or yellow, plastic clay
270-360	brown or gray-green diatomaceous siltstone, increasing gravel with depth
360-500	Lower Hunter Creek Member of Truckee Formation
360-420	grades to pebbly, sandy, silty clay; brown
420-500	minor lost circulation, then sandy, silty gravel
500-580	clay altered, purplish andesite
580-585	hard andesite
585-673	soft andesite w/alteration clay, smooth drilling
673-734	clay altered, broken andesite
734-765	hard, fractured andesite with minor alteration clay.

### Geologic Cross Section

Figure 2 illustrates a geologic cross section as indicated in figure 1. This section is from STMMW 8 and crosses northeasterly through the Upper well site to the Lower well site. From STMMW 8 the alluvial section is uniform in thickness until the Serendipity



Fault Swarm is encountered. The alluvial section is comprised of silts, sands, gravels and boulders. An iron stained stringer is found at both well sites and may be continuous. A small lens of volcanic flow was encountered in the Upper wellbore (670-690 ft) and may be localized. Beneath this alluvial section is the Hunter Creek Member of the Truckee Formation. The Hunter Creek Member appears to be uplifted on the east side of the Serendipity Fault relative to the west side.

The water table elevations also appear to be affected by the Serendipity Fault whereby the water level on the east side is approximately 250 feet lower than on the west side. This would indicate that the fault swarm acts as a barrier to flow, probably from fault gouge. Further, south of the cross section and along the fault trace, springs can be found.

## **EXPLORATION WELL CONSTRUCTION**

Figure 3 shows the construction of the exploration well completed at the Upper Site. The borehole was drilled at a nominal diameter of 12 inches to a depth of 710 feet. Perforated casing, (double mill slot, 3" x 3/8") extended from 250 feet to 710 feet. Blank casing extended from 250 feet to surface. Six inch casing was used in order to better determine the production capability at this site. Local 1/8 inch x 1/4 inch "pea" gravel was installed by the flooded reverse method. A fifty foot seal was then installed via tremmie pipe and pump.

Seven and one half hours of air lift development occurred. The well was then equipped with a submersible pump and pumped in excess of 250 gpm for several hours. The exploration well was then further completed with twenty one feet of two inch casing grouted inside the six inch casing with locking cap. The recovered static water level was measured at 95.4 feet below land surface on September 19, 1995.

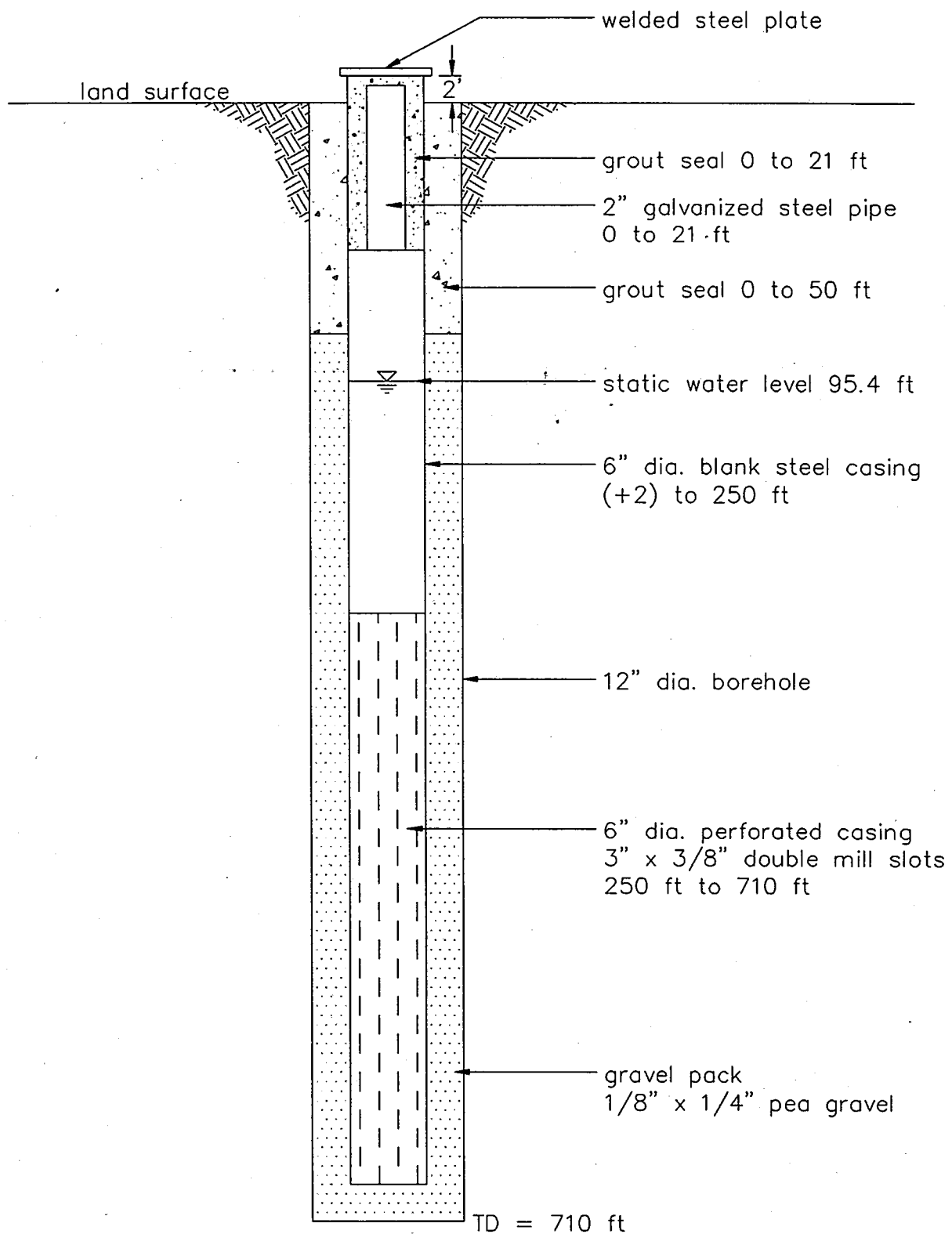
## **PRODUCTION WELL CONSTRUCTION**

### **Southwest Pointe Well No. 1**

Drilling for this production well began October 19, 1995 and was completed November 12, 1995. A 20 inch conductor pipe was installed in a 24 inch diameter borehole to a depth of 100 feet and sealed via tremmie pipe and pump. A 16 borehole was drilled to a depth of 515 feet. Ten inch diameter, 80 slot, Johnson Wire Wound Hi-Cap™ screen was implaced from 500 feet to 320 feet with blank sections from 510 to 500 feet, 370 to 390 feet and from 320 to +2 feet above surface. "Chevreaux", washed, 1/8 x 1/4 gravel was implaced via the flooded reverse method to surface. See figure 4.

Initial development was by air jetting for 36 hours which resulted in fairly clean discharge. Surge pumping occurred for 28 hours. Sand production was measured at less than 1 ppm after initial start up after development.





**FIGURE 3:  
MONITORING WELL  
CONSTRUCTION DIAGRAM**

COUNTY OF WASHOE  
DEPARTMENT OF PUBLIC WORKS



UTILITY DIVISION  
P.O. BOX 11130  
RENO, NEVADA 89520  
(702) 856-7300

c:\jenni\wellinfo\SWPT-1.dwg revised 4-11-96

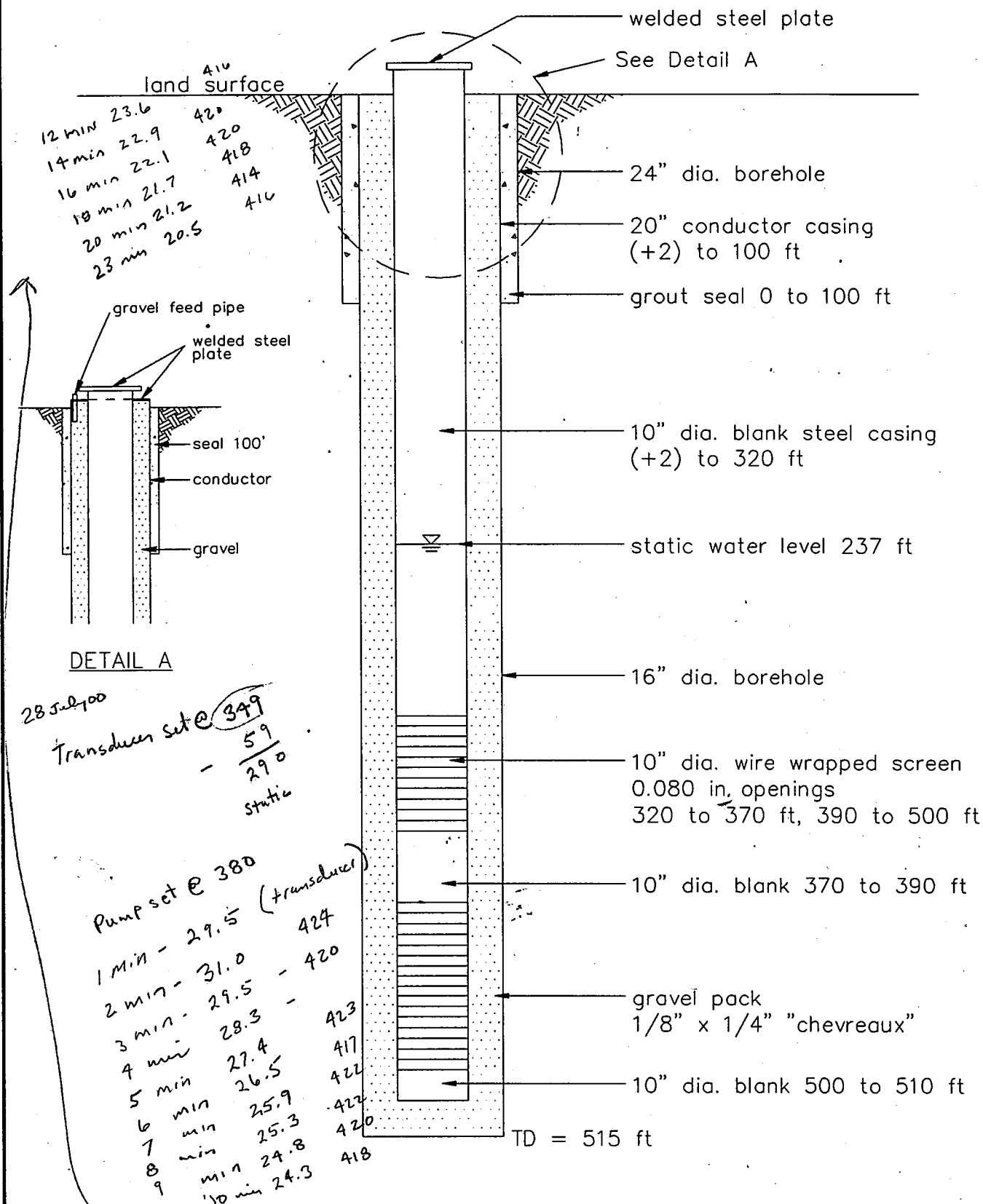
Valved Back @ 24 min.	20.9	417
25 min	20.5	405
27 min	19.8	419

20 Aug 02 - Pump out - flow had dropped  
to 70 gpm from 330

STATIC 290.93 - Top of concrete

21 Aug 02 (Am) 289.07 -

22 Aug 02 (Am) 287.95



**FIGURE 4.**  
**SOUTHWEST POINT WELL #1**  
**CONSTRUCTION DIAGRAM**

COUNTY OF WASHOE  
DEPARTMENT OF PUBLIC WORKS



UTILITY DIVISION  
P.O. BOX 11130  
RENO, NEVADA 89520  
(702) 856-7300

c:\jenni\wellinfo\SWPT-1.dwg revised 4-11-95

### **Southwest Pointe Well No. 2**

Drilling for this production well began September 25, 1995 and was completed October 7, 1995. A 22 inch conductor pipe was installed in a 26 inch diameter borehole to a depth of one hundred feet and sealed via tremmie and pump. An 18 inch borehole was drilled to a depth of 614 feet. Twelve inch diameter, 80 slot, Johnson Wire Wound Hi-Cap™ screen was implaced from 600 feet to 260 feet with a blank section from 602 to 612, 402 to 422 feet and then blank to surface. "Chevreaux", washed, 1/8 x 1/4 gravel was implaced via the flooded reverse method to surface. The construction of the well was completed October 9, 1995. See Figure 5.

Initial development was by air jetting for 37 hours which resulted in fairly clean discharge. Surge pumping occurred for 20 hours. Sand production was measured at less than 1 ppm after initial start up after development.

## **WELL TESTING**

### **Southwest Pointe Well No. 1**

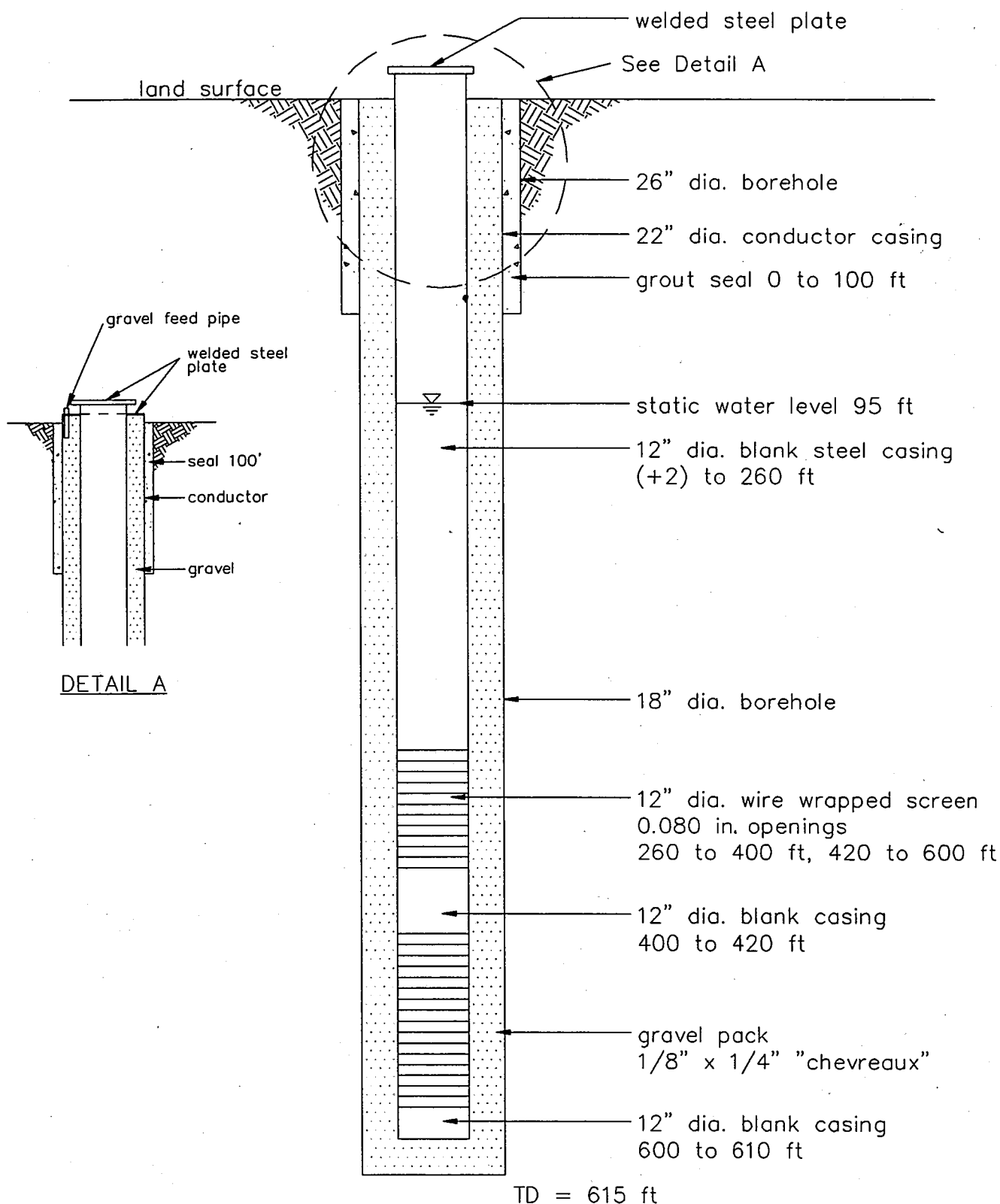
A step test was conducted December 11, 1995. Pumping rates were held for 100 minutes at 367, 416, 467 and 519 gpm. The results of the testing are shown in the appendix. At 400 gpm the well efficiency is 65 percent.

A 72 hour constant discharge test was commenced on December 13, 1995. The discharge was held at 400 gpm. The adjacent monitor well, completed in July of 1992, was not monitored as it was discovered that the well was muddied either through vandalism or inadequate development. The results of the test are illustrated in the drawdown curve shown in Figure 6. The results of the recovery test are shown in the appendix. At the end of the discharge test, the pumping level was 340 feet, 20 feet below the top of the screened interval (320 feet).

Using the well hydraulics program WHIP (Hydro Geo Chem, 1988) and assuming that the aquifer is 1) semi-confined, 2) an impermeable boundary is located 1000 feet to the west (Serendipity fault), and 3) Dupuit conditions exist; the transmissivity is estimated at 6,700 gpd/ft of drawdown. No storage coefficient could be determined from the testing because of the monitor well's condition.

### **Southwest Pointe Well No. 2**

A step test was conducted December 3, 1995. Pumping rates were held for 100 minutes at 419, 634, 846 and 1057 gpm. The results are shown in the appendix. At 750 gpm the well efficiency is 78 percent.



**FIGURE 5:  
SOUTHWEST POINTE WELL #2  
CONSTRUCTION DIAGRAM**

COUNTY OF WASHOE  
DEPARTMENT OF PUBLIC WORKS



UTILITY DIVISION  
P.O. BOX 11130  
RENO, NEVADA 89520  
(702) 856-7300

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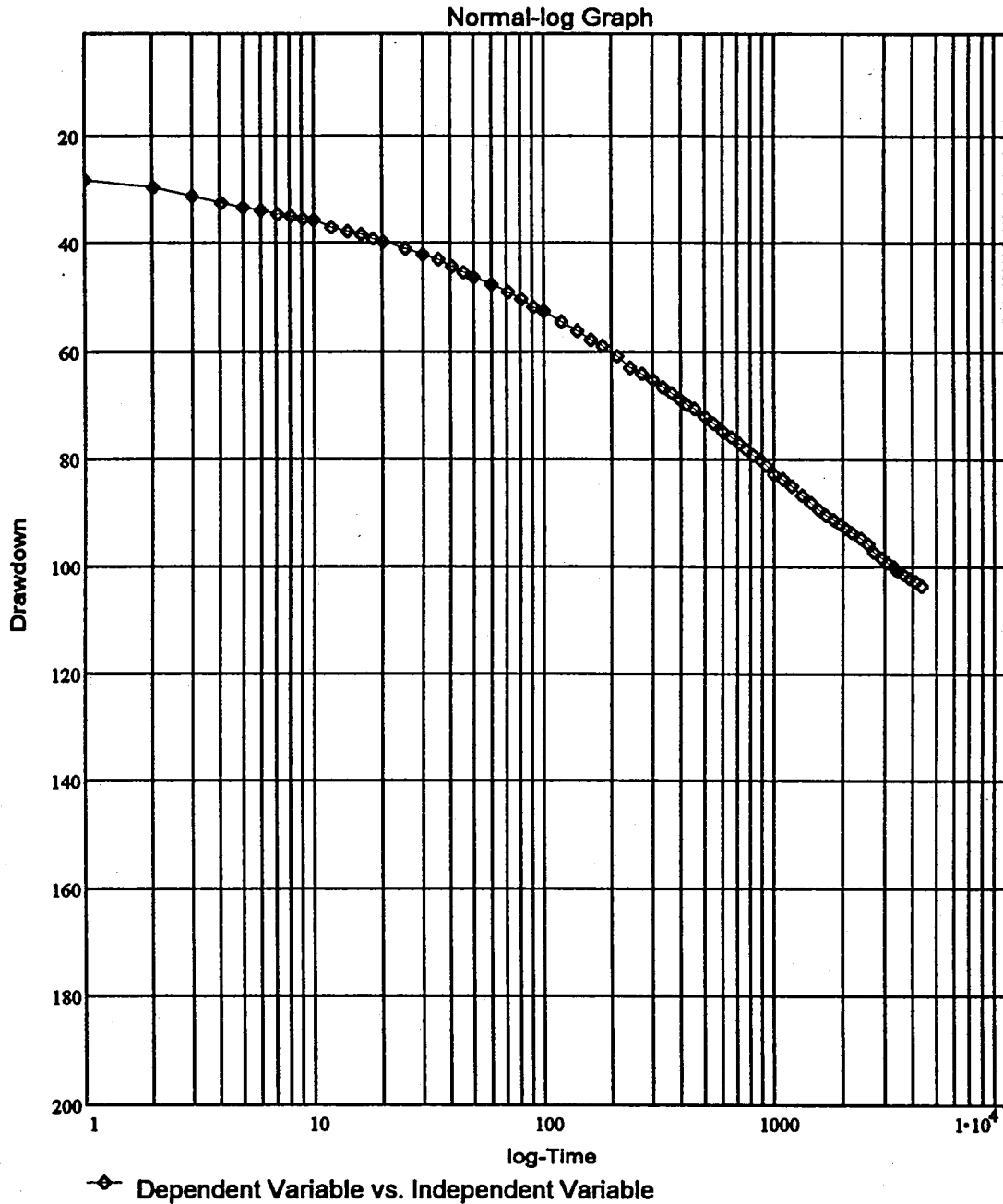


Figure 6. Drawdown vs. Time, Constant Discharge Test, Southwest Pointe Well No.1

A 72 hour constant discharge test was commenced on December 4, 1995. The discharge was held at 845 gpm. The results of the test are illustrated in the drawdown curves shown in Figures 7 and 8. The recovery test curves are in the appendix. It is interesting to note in Figures 7 and 8 that while the production well's drawdown curve is essentially a straight line, the monitor well response showed a recharge boundary at about 600 minutes. It is assumed that the monitor well response is due to delayed yield. At the

production well, vertical and perhaps turbulent flow conditions may have masked the delay yield phenomena. At the end of the discharge test, the pumping level in the production well was 290 feet, 30 feet below the top of the screened interval (260 feet).

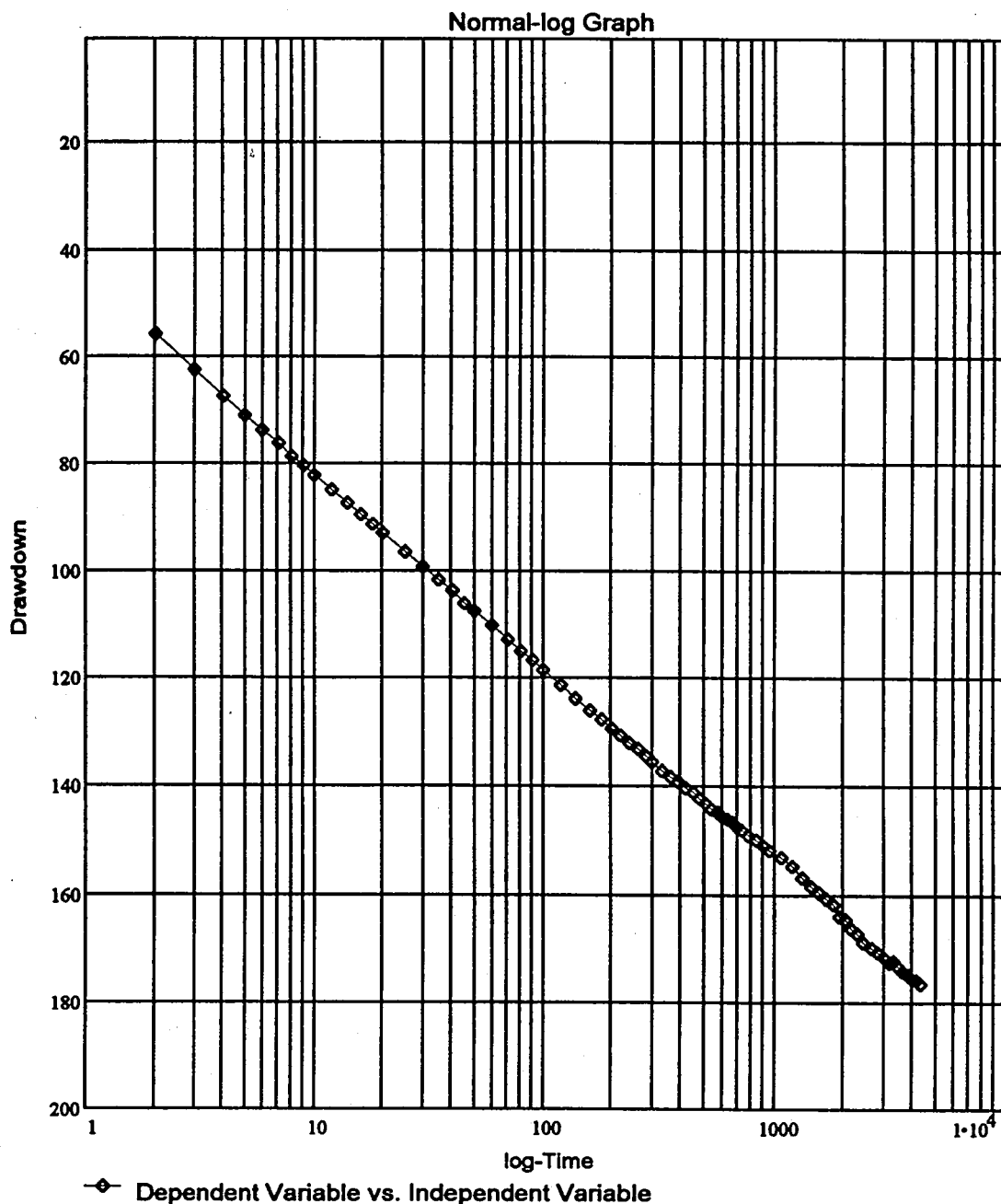
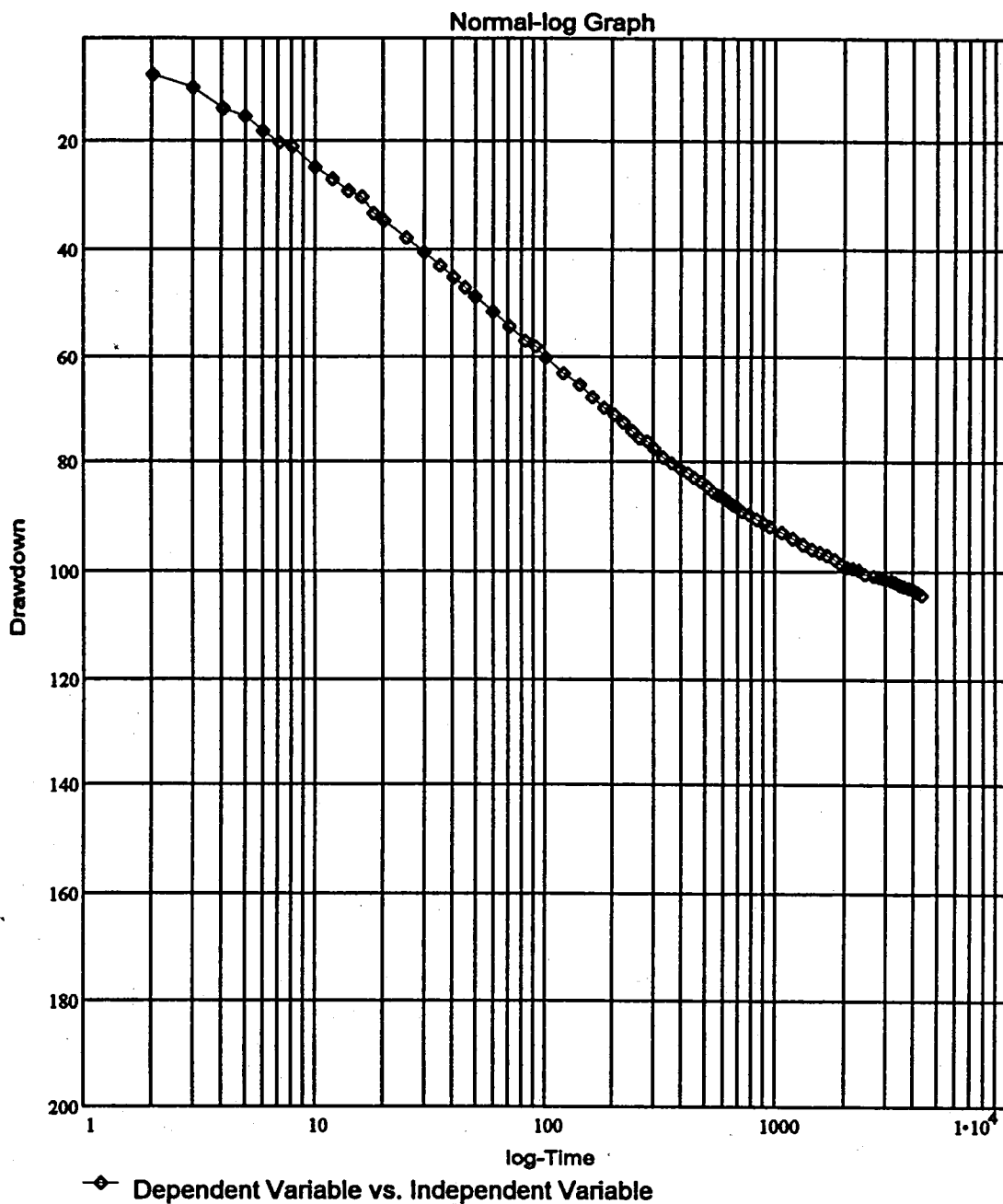


Figure 7. Drawdown vs. Time, Constant Discharge Test, Southwest Pointe Well No. 2.



**Figure 8. Drawdown vs. Time, Constant Discharge Test, Southwest Pointe Upper Monitor Well.**

Using the well hydraulics program WHIP (Hydro Geo Chem, 1988) and assuming that the aquifer is semi-confined and that Dupuit conditions exist, the transmissivity is estimated at 6200 gpd/ft of drawdown. A storage coefficient is estimated at 0.001. Additional WHIP details are listed in the appendix.



## **WATER QUALITY**

Table 3 shows the major ion chemistry for both production wells. Copies of the full analysis, including organic and inorganic are in the appendix. This water chemistry meets all State and Federal drinking water standards.

**Table 3**  
**Major Ion Chemistry**  
**(ppm)**

Well	Ca	Mg	Na	K	SO4	Cl	NO3-N	HCO3	As	Fe	B	pH
Upper	19	13	11	5	2	1	0.6	151	0.004	0.02	0	7.79
Lower	18	13	13	5	3	1	0.4	149	<0.003	0.11	0	7.95

## **CONCLUSIONS AND RECOMMENDATIONS**

Both wells were drilled and completed in poorly to moderately sorted alluvial materials. The transmissivity of this portion of the regional aquifer is comparable to that found at STM Production wells 1, 2 and 3. Because of the relatively thin, saturated alluvium and the presence of the Serendipity Fault at the location of SW Pointe Well 1, water production at this site is marginal with respect to municipal supply. Conversely, at SW Pointe Well 2, the saturation of the alluvium is nearly twice that at SW Pointe Well 1 and therefore the corresponding water production capacity is double that of SW Pointe Well #1. These wells should be equipped and operated such that pumping levels will not drawdown too far into the screened intervals of the wells. Otherwise there is the potential of cascading water, causing air entrainment and sand production.

SW Pointe Well #1 should be equipped to pump 350 gpm. At this production level the well is 68% efficient (at 80% efficiency the production is 200 gpm). After 48 hours of pumping at 350 gpm, the pumping level would be 320 feet below land surface. The pump intake should be set at 380 feet which is in a blank section of the well screen.

SW Pointe Well #2 should be equipped to pump 750 gpm. At this production level the well is 80% efficient. After 48 hours of pumping at 750 gpm, the pumping level would be 260 feet below land surface. The pump intake should be set at 410 feet below land surface which is in a blank section of the well screen.

## REFERENCES

Driscoll, Fletcher, 1989. *Groundwater and Wells*. Johnson Filtration Systems, Inc., St. Paul, Minnesota. 1089p.

Hydro Geo Chem, 1988. *Well Hydraulics Interpretation Program*. PC Version 3.2. Hydro Geo Chem, Inc., Tucson, Arizona. 161 p.

Levy, Benjamin, 1995. *ADEPT (A Program for Aquifer Data Evaluation)*. C.H.E.S.S. 67 p.

Widmer, Michael C, 1992. *MT ROSE FAN EXPLORATORY DRILLING*. Washoe County Department of Public Works, Utility Division. 15 p.

## **APPENDICES**

1.     **Geophysical Logs**
2.     **Well Drillers Reports**
3.     **Water Quality Reports**
4.     **Pumping Test Data**
5.     **Bid Documents**

# GEO-HYDRO-DATA

INCORPORATED

## ELECTRIC WELL LOG

OTHER SERVICES:  
INVOICE  
9767  
388-D

COMPANY : WASHOE COUNTY  
WELL : SARGENT TEST HOLE  
LOCATION/FIELD : RENO  
COUNTY : WASHOE  
STATE : NV.  
SECTION : N/A

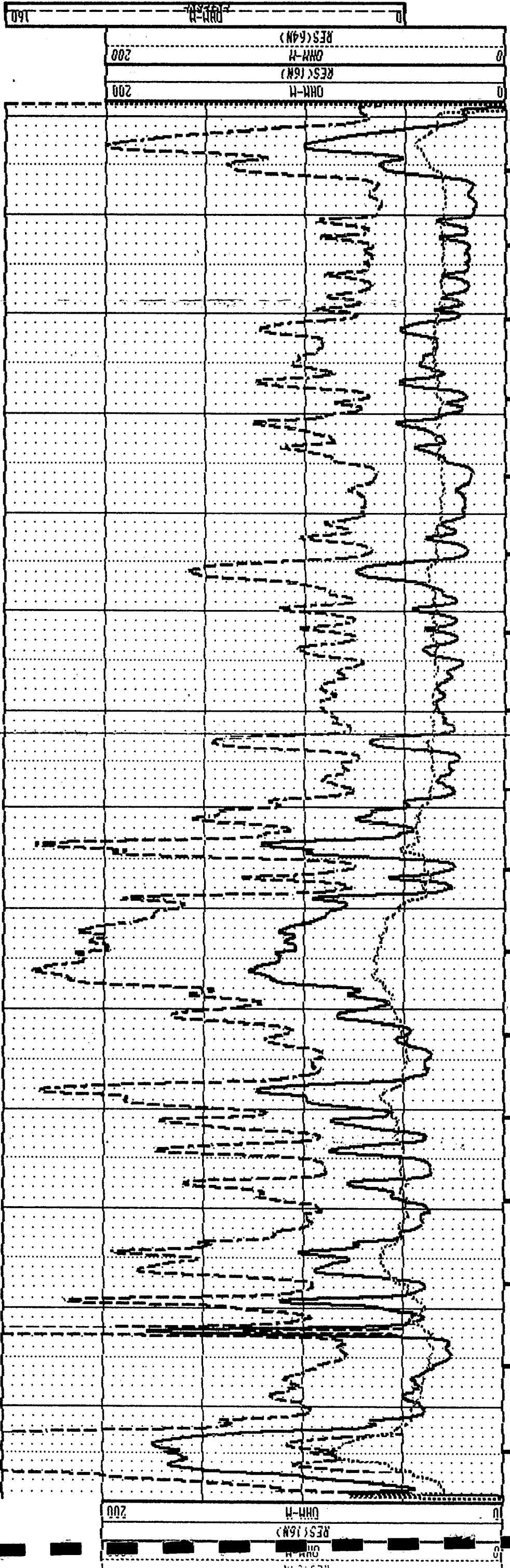
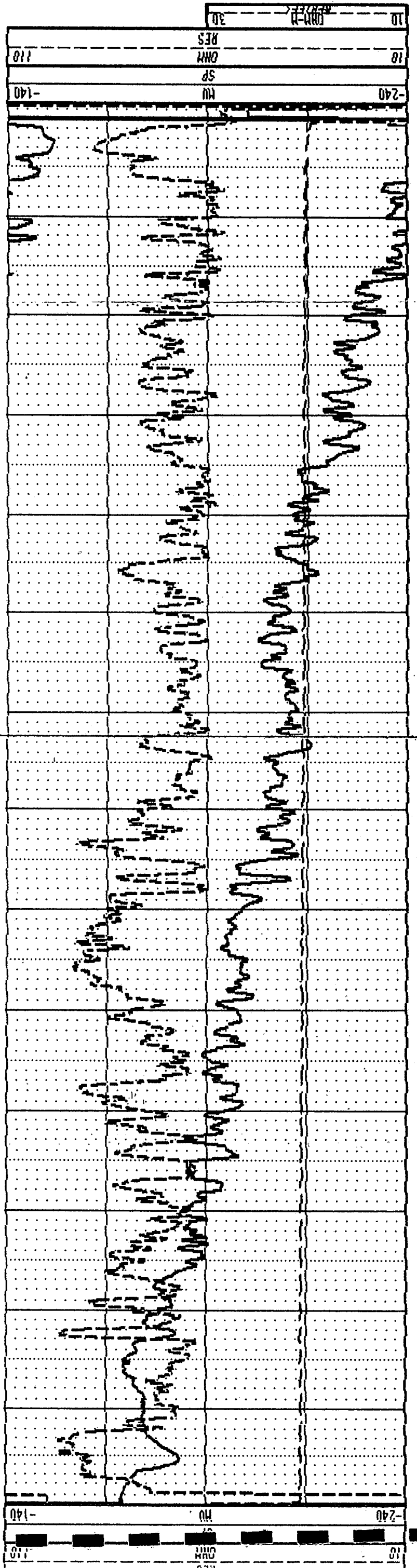
TOWNSHIP : N/A RANGE : N/A

DATE : 09/12/95  
DEPTH DRILLER : 716 FEET  
LOG BOTTOM : 787.30  
LOG TOP : 0.40  
PERMANENT DATUM : G.L.  
ELEV. PERM. DATUM: N/A  
LOG MEASURED FROM: G.L.  
DEL MEASURED FROM: G.L.

CASING DRILLER : -  
CASING TYPE : -  
CASING THICKNESS: -  
LOGGING UNIT : 10  
FIELD OFFICE : CLEMENTS, CAL  
RECORDED BY : D. SHAWWOLTER

BIT SIZE : 12  
MAGNETIC DECL. : -  
MATRIX DENSITY : -  
FLUID DENSITY : -  
NEUTRON MATRIX : N/A  
FILE : ORIGINAL  
TYPE : 9041A  
LOG : 6  
PLOT : CHB 11  
THRESH: 2000

REMARKS :  
DRILL-SARGENT  
WASHOE COUNTY



PRINT OR TYPE ONLY  
DO NOT WRITE ON BACK

# WELL DRILLER'S REPORT

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

Log No. ....  
Permit No. ....  
Basin WV1

NOTICE OF INTENT NO. 31944

1. OWNER WASHOE COUNTY UTILITY DIVISION  
MAILING ADDRESS P.O. BOX 11130  
RENO, NV. 89520-0027

ADDRESS AT WELL LOCATION  
LOWER WELL

2. LOCATION NW 1/4 NW 1/4 Sec. 24 T 18 N/S R 19 E WASHOE County  
PERMIT NO. 57160

Issued by Water Resources

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	Thick-ness
HARD BLACK FINE ROCK		0	11	11
HARD BLACK BASALT COBBLES		11	55	44
SAND BLACK ROCK COBBLES		55	100	45
SAND ROCK GRAVEL COBBLES		100	180	80
BROKEN ROCK CLAY		180	200	20
BROKEN ROCK SAND GRAVEL		200	217	17
CLAY		217	220	3
GRAVEL ROCK SAND		220	230	10
CLAY ROCK		230	235	5
GRAY SAND		230	250	15
BROWN CLAY ROCK		250	295	45
CLAY W/ SAND LAYERS		295	340	45
SAND GRAVEL CLAY LAYERS		340	500	160
SAND GRAVEL BROKEN ROCK		500	585	85
PURPLE CLAY ROCK		585	605	20
GRAY CLAY ROCK		605	703	98
GRAY CLAY ROCK		703	730	27
HARD ROCK W/ SAND		730	755	25
GRAY CLAY		755	765	10

8. WELL CONSTRUCTION

Depth Drilled 765 Feet Depth Cased 765 Feet

HOLE DIAMETER (BIT SIZE)

From To  
28 Inches 0 Feet 100 Feet  
Inches Feet 510 Feet  
12 1/2 Inches 510 Feet 765 Feet

CASING SCHEDULE

Size O.D. (Inches)	Weight/Ft. (Pounds)	Wall Thickness (Inches)	From (Feet)	To (Feet)
20"	78.60	.375	0	100
10"	28.04	.250	0	320
10"	28.04	.250	370	390
10"	28.04	.250	500	510
Type perforation <u>HI-CAP</u>				
Size perforation <u>80 SLOT</u>				
From 320	feet to 370	feet		
From 390	feet to 500	feet		
From	feet to	feet		
From	feet to	feet		

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

Gravel Packed: ☒ Yes ☐ No  
From 0 feet to 765 feet

9. WATER LEVEL

Static water level: 220 feet below land surface  
Artesian flow G.P.M. P.S.I.  
Water temperature COOL °F Quality GOOD

10. DRILLER'S CERTIFICATION

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

Name SARGENT IRRIGATION COMPANY  
Contractor

Address 9955 N. VIRGINIA ST.  
Contractor

RENO, NV. 89506

Nevada contractor's license number  
issued by the State Contractor's Board: 0021246

Nevada driller's license number issued by the  
Division of Water Resources, the on-site driller: 1789

Signed [Signature]  
By [Signature] performing actual drilling on site or contractor

Date 12-21-95

Date started 10-21, 19 95  
Date completed 12-21, 19 95

7. WELL TEST DATA

TEST METHOD: ☐ Bailer ☒ Pump ☐ Air Lift

G.P.M.	Draw Down (Feet Below Static)	Time (Hours)
400	103	72

RECEIVED

1660 N. Virginia Street  
Reno, Nevada 89503  
(702) 688-1335

125227

995 DEC 18 AM 9:47

## WATER CHEMISTRY ANALYSIS:

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.

## TYPE OF ANALYSIS:

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

State NEVADA County WASHOE  
Township 18 Range 19 Section 24  
General Location MT ROSE FAN  
Source Address SOUTHWEST POINTE LOWERC  
#1

## 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 T. SVETICH Date 12/15/95  
Owner WASHOE COUNTY Phone 8567200  
Address PO BOX 11130  
City RENO State NV

## 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 PUMP TEST

Initials ES  
**POTENTIAL FUTURE PUBLIC WATER SUPPLY**

## SOURCE OF WATER:

- Filter ☐ Yes ☒ No  
Public ☐ Yes ☒ No  
Spring ☒  
Well ☒ Depth 510 ft.  
Hot ☐ Cold ☒  
IN USE ☐ Yes ☒ No

Type GW  
Name SUN POINTE LOWER  
Surface ☐  
Casing diameter 10" in.  
Casing depth 510 ft.

**END OF 72 HR PUMP TEST**

## REPORT TO:

Name TERRI SVETICH / WCVD  
Address PO BOX 11130  
City RENO  
State NV Zip 89520

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	Constituent	ppm
0.1005 T.D.S. @ 103° C.	184	28.2 Chloride	1	0.0 Iron	0.11	125227 Color	5
Hardness	98	Nitrate -N	0.4	Manganese	0.00	Turbidity	0.4
Calcium	18	Alkalinity	122	Copper	0.00	pH	7.95
Magnesium	13	Bicarbonate	149	Zinc	0.00	EC	238
Sodium	13	Carbonate	0	Barium	0.07	SI@20C -0.23	
Potassium	5	Fluoride	0.07	Boron	0.0		
Sulfate	3	Amenic < 0.003		Silica	60		
MPAS <0.1				GROSS ALPHA		BERRIUM	0.001
				GROSS BETA		THALLIUM	
						NICKEL	<0.005
						ANTIMONY	

Fee \_\_\_\_\_

Collected by \_\_\_\_\_

PWS I.D. N/A

SDWA—Pri \_\_\_\_\_

1st \_\_\_\_\_ 2nd \_\_\_\_\_

Date Rec'd \_\_\_\_\_ Init \_\_\_\_\_

ppm = parts per million  
S.U. = Standard Units

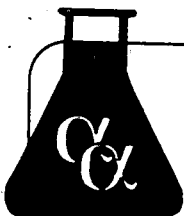
Remarks \_\_\_\_\_

*fu*  
*ES 1/5/96*  
*Tu*

RESULTS REPORTED

JAN - 9 1996 1251 Rev. 6-90

TOTAL P.06



# Alpha Analytical, Inc.

255 Glendale Avenue, Suite 21  
Sparks, Nevada 89431  
(702) 355-1044  
FAX: 702-355-0406  
1-800-283-1183

Boise, Idaho  
(208) 336-4145

Las Vegas, Nevada  
(702) 386-6747

## ANALYTICAL REPORT

Washoe County Utility Division  
P.O. Box 11130  
Reno, NV 89520  
Attn: Terry Svetich

Client ID: SW Point Lower Well  
Lab ID: WCU121595-01  
Sampled: 12/15/95  
Received: 12/15/95

### National Primary Drinking Water Phase II and Phase V Regulated and Unregulated Synthetic Organic Compounds (SOC's)

EPA		Concen	Det	EPA		Concen	Det
Method	Contaminant	ug/L	Limit	Method	Contaminant	ug/L	Limit
Analyzed: 12/21/95				Analyzed: 12/27/95			
504	1. 1,2-Dibromo-3-Chloropropane (DBCP)	ND	0.02	515.1	1. Dalapon	ND	1.00
504	2. 1,2-Dibromoethane (EDB)	ND	0.01	515.1	2. Dicamba	ND	1.00
Analyzed: 12/20/95				515.1	3. Dinoseb	ND	0.20
505	1. Alachlor	ND	0.20	515.1	4. 2,4-D	ND	0.10
505	2. Aldrin	ND	0.20	515.1	5. Pichloram	ND	0.10
505	3. Chlordane (Technical)	ND	0.20	515.1	6. Pentachlorophenol	ND	0.04
505	4. Dieldrin	ND	0.20	515.1	7. 2,4,5-TP (Silvex)	ND	0.20
505	5. Endrin	ND	0.01	Analyzed: 12/21/95			
505	6. Heptachlor	ND	0.04	525	1. Benzo(a)pyrene	ND	0.02
505	7. Heptachlor Epoxide	ND	0.02	525	2. Bis(2-ethylhexyl) phthalate	ND	0.60
505	8. Hexachlorobenzene	ND	0.10	525	3. Bis(2-ethylhexyl) adipate	ND	0.60
505	9. Hexachlorocyclopentadiene	ND	0.10	Analyzed: 12/27/95			
505	10. Lindane	ND	0.02	531.1	1. Aldicarb	ND	0.50
505	11. Methoxychlor	ND	0.10	531.1	2. Aldicarb Sulfoxide	ND	0.50
505	12. Aroclor-1016 (Screen)	ND	0.08	531.1	3. Aldicarb Sulfone	ND	0.80
505	13. Aroclor-1221 (Screen)	ND	20.0	531.1	4. Carbaryl	ND	1.00
505	14. Aroclor-1232 (Screen)	ND	0.50	531.1	5. Carbofuran	ND	0.90
505	15. Aroclor-1242 (Screen)	ND	0.30	531.1	6. 3-Hydroxycarbofuran	ND	1.00
505	16. Aroclor-1248 (Screen)	ND	0.10	531.1	7. Methomyl	ND	1.00
505	17. Aroclor-1254 (Screen)	ND	0.10	531.1	8. Oxamyl	ND	2.00
505	18. Aroclor-1260 (Screen)	ND	0.20				
505	19. Toxaphene	ND	1.00				
Analyzed: 01/04/96				Analyzed: 12/21/95			
507	1. Atrazine	ND	0.10	547	1. Glyphosate	ND	6.00
507	2. Butachlor	ND	1.00	Analyzed: 12/20/95			
507	3. Metolachlor	ND	1.00	548	1. Endothall	ND	9.00
507	4. Metribuzin	ND	1.00	Analyzed: 12/22/95			
507	5. Propachlor	ND	1.00	549	1. Diquat	ND	0.40
507	6. Simazine	ND	0.07				

ND - Not Detected

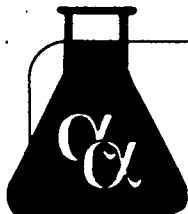
Approved By:

*Roger L. Scholl*  
Roger L. Scholl, Ph.D  
Laboratory Director

Date:

*1/8/96*



**Alpha Analytical, Inc.**

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(208) 336-4145

Las Vegas, Nevada  
(702) 386-6747

**ANALYTICAL REPORT**

Washoe County Utility Division  
P.O. Box 11130  
Reno, NV 89520

Job #:  
Phone: (702) 856-7300  
Attn: Terri Svetich

Sampled: 12/15/95 Received: 12/15/95 Analyzed: 12/21/95  
Alpha Analytical Number: WCU121595-01  
Client I.D.: SW Point Lower Well

Report of GC/MS Analysis for  
SDWA VOLATILES PLUS LISTS 1 AND 3  
UNREGULATED COMPOUNDS  
EPA 524.2

Compound	Concentration ug/L	Detection Limit	Compound	Concentration ug/L	Detection Limit
8 Regulated Volatile Organic Compounds (VOC's) (Phase I)			28. Chloroform	ND	0.50 ug/L
1. Benzene	ND	0.50 ug/L	29. Chloromethane	ND	0.50 ug/L
2. Vinyl Chloride	ND	0.50 ug/L	30. o-Chlorotoluene	ND	0.50 ug/L
3. Carbon tetrachloride	ND	0.50 ug/L	31. p-Chlorotoluene	ND	0.50 ug/L
4. 1,2-Dichloroethane	ND	0.50 ug/L	32. Dibromomethane	ND	0.50 ug/L
5. Trichloroethylene	ND	0.50 ug/L	33. m-Dichlorobenzene	ND	0.50 ug/L
6. p-Dichlorobenzene	ND	0.50 ug/L	34. 1,1-Dichloroethane	ND	0.50 ug/L
7. 1,1-Dichloroethylene	ND	0.50 ug/L	35. 1,1-Dichloropropene	ND	0.50 ug/L
8. 1,1,1-Trichloroethane	ND	0.50 ug/L	36. 1,3-Dichloropropane	ND	0.50 ug/L
10 Regulated Volatile Organic Compounds (VOC's) (Phase II)			37. e, z-1,3-Dichloropropane	ND	0.50 ug/L
9. cis-1,2-Dichloroethylene	ND	0.50 ug/L	38. 2,2-Dichloropropane	ND	0.50 ug/L
10. 1,2-Dichloropropane	ND	0.50 ug/L	39. 1,1,1,2-Tetrachloroethane	ND	0.50 ug/L
11. Ethylbenzene	ND	0.50 ug/L	40. 1,1,2,2-Tetrachloroethane	ND	0.50 ug/L
12. Monochlorobenzene	ND	0.50 ug/L	41. 1,2,3-Trichloropropane	ND	0.50 ug/L
13. o-Dichlorobenzene	ND	0.50 ug/L	List 3 - Monitoring Required at State Discretion		
14. Styrene	ND	0.50 ug/L	42. Bromochloromethane	ND	0.50 ug/L
15. Tetrachloroethylene	ND	0.50 ug/L	43. n-Butylbenzene	ND	0.50 ug/L
16. Toluene	ND	0.50 ug/L	44. Dichlorodifluoromethane	ND	0.50 ug/L
17. trans-1,2-Dichloroethylene	ND	0.50 ug/L	45. Fluorotrichloromethane	ND	0.50 ug/L
18. Xylenes (total)	ND	0.50 ug/L	46. Hexachlorobutadiene	ND	0.50 ug/L
3 Regulated Volatile Organic Compounds (VOC's) (Phase V)			47. Isopropylbenzene	ND	0.50 ug/L
19. Dichloromethane	ND	0.50 ug/L	48. p-Isopropyltoluene	ND	0.50 ug/L
20. 1,1,2-Trichloroethane	ND	0.50 ug/L	49. Naphthalene	ND	0.50 ug/L
21. 1,2,4-Trichlorobenzene	ND	0.50 ug/L	50. n-Propylbenzene	ND	0.50 ug/L
List 1 - Unregulated Compounds - All Systems			51. sec-Butylbenzene	ND	0.50 ug/L
22. Bromobenzene	ND	0.50 ug/L	52. tert-Butylbenzene	ND	0.50 ug/L
23. Bromodichloromethane	ND	0.50 ug/L	53. 1,2,3-Trichlorobenzene	ND	0.50 ug/L
24. Bromoform	ND	0.50 ug/L	54. 1,2,4-Trimethylbenzene	ND	0.50 ug/L
25. Bromomethane	ND	0.50 ug/L	55. 1,3,5-Trimethylbenzene	ND	0.50 ug/L
26. Chlorodibromomethane	ND	0.50 ug/L			
27. Chloroethane	ND	0.50 ug/L			

ND - Not Detected

Approved By:

*Roger L. Scholl*  
Roger L. Scholl, Ph.D.  
Laboratory Director

Date:

*1/8/96*

FD-627

RECEIVED

1995 DEC -7 PM 4:33

## WATER CHEMISTRY ANALYSIS:

Attn: Fees may apply to some types of samples.

## 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 TSVETICH Date 12/7/95  
Owner WASHOE CO Phone 856 7300  
Address 11950 CORONADO BLVD  
City RENO State NV

## REPORT TO:

Name TERI SVETICH / WCUD  
Address PO BOX 11130  
City RENO  
State NV Zip 89520

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

State NEVADA County WASHOE  
Township 18 Range 19 Section 22  
General Location MT ROSE FAN  
Source Address 3W POINTE UPPER WELL #2  
ON PROPERTY OF SW POINTE SUBDIVISION  
REASON FOR ANALYSIS: USE OF WATER:  
☐ Loan ☒ Domestic drinking water  
☐ Personal health reasons ☐ Geothermal  
☐ Purchase of the property ☐ Industrial or mining  
☐ Rental or sale of property ☐ Irrigation  
☐ Subdivision approval ☐ Other  
☒ Other SDWA Initials \_\_\_\_\_

## FUTURE PUBLIC WATER SUPPLY

## SOURCE OF WATER:

Filter ☐ Yes ☒ No Type GW  
Public ☐ Yes ☒ No Name 3W POINTE UPPER WELL  
Spring \_\_\_\_\_ Surface \_\_\_\_\_  
Well \_\_\_\_\_ Depth 600 ft. Casing diameter 12 in.  
Hot \_\_\_\_\_ Cold \_\_\_\_\_ Casing depth \_\_\_\_\_ ft.  
IN USE ☐ Yes ☒ No  
END OF 3 DAY PUMP TEST

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	S.U.	Constituent	ppm
0.0295 T.D.S. @ 103° C.	203	0.69 Chloride	29.0	0.02 Iron	1411	125008 Color	7
Hardness	101	Nitrate -N	0.6	Manganese	0.00	Turbidity	0.3
Calcium	19	Alkalinity	124	Copper	0.00	pH	7.79
Magnesium	13	Bicarbonate	151	Zinc	0.00	EC	236
Sodium	11	Carbonate	0	Barium	0.09	SI@20C	-0.35
Potassium	5	Fluoride	0.08	Boron	0.0		
Sulfate	2	Arsenic	0.004	Silica	62		
MBAS	<0.1	NO <sub>2</sub> <sup>-</sup>	<0.01	GROSS ALPHA		CYANIDE	<0.01
				GROSS BETA		NICKEL	<0.005
						ANTHRACENE	<0.001
						THALLIUM	<0.0005
						BERRILIUM	<0.001

Fee \_\_\_\_\_

Collected by \_\_\_\_\_

PWS I.D. N/A

SDWA—Pri. \_\_\_\_\_

1st \_\_\_\_\_ 2nd \_\_\_\_\_ 3rd \_\_\_\_\_

Date Rec'd \_\_\_\_\_ Init. \_\_\_\_\_

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

Remarks \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

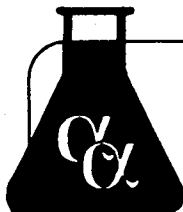
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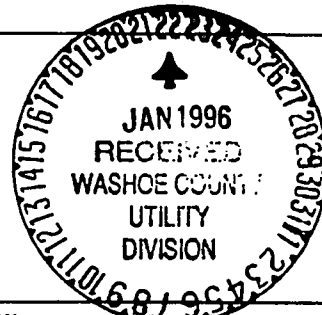
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# Alpha Analytical, Inc.

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Las Vegas, Nevada  
(702) 386-6747

## ANALYTICAL REPORT

Washoe County Utility Division  
P.O. Box 11130  
Reno, NV 89520  
Attn: Terry Svetich

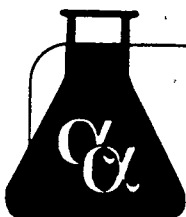
Client ID: SW Point Upper Well  
Lab ID: WCU120795-04  
Sampled: 12/07/95  
Received: 12/07/95

### National Primary Drinking Water Phase II and Phase V Regulated and Unregulated Synthetic Organic Compounds (SOC's)

EPA Method	Contaminant	Concen ug/L	Det Limit	EPA Method	Contaminant	Concen ug/L	Det Limit
Analyzed: 12/12/95				Analyzed: 12/13/95			
504	1. 1,2-Dibromo-3-Chloropropane (DBCP)	ND	0.02	515.1	1. Dalapon	ND	1.00
504	2. 1,2-Dibromoethane(EDB)	ND	0.01	515.1	2. Dicamba	ND	1.00
Analyzed: 12/13/95				515.1	3. Dinoseb	ND	0.20
505	1. Alachlor	ND	0.20	515.1	4. 2,4-D	ND	0.10
505	2. Aldrin	ND	0.20	515.1	5. Pichloram	ND	0.10
505	3. Chlordane (Technical)	ND	0.20	515.1	6. Pentachlorophenol	ND	0.04
505	4. Dieldrin	ND	0.20	515.1	7. 2,4,5-TP (Silvex)	ND	0.20
505	5. Endrin	ND	0.01	Analyzed: 12/13/95			
505	6. Heptachlor	ND	0.04	525	1. Benzo(a)pyrene	ND	0.02
505	7. Heptachlor Epoxide	ND	0.02	525	2. Bis(2-ethylhexyl) phthalate	ND	0.60
505	8. Hexachlorobenzene	ND	0.10	525	3. Bis(2-ethylhexyl) adipate	ND	0.60
505	9. Hexachlorocyclopentadiene	ND	0.10	Analyzed: 12/14/95			
505	10. Lindane	ND	0.02	531.1	1. Aldicarb	ND	0.50
505	11. Methoxychlor	ND	0.10	531.1	2. Aldicarb Sulfoxide	ND	0.50
505	12. Aroclor-1016 (Screen)	ND	0.08	531.1	3. Aldicarb Sulfone	ND	0.80
505	13. Aroclor-1221 (Screen)	ND	20.0	531.1	4. Carbaryl	ND	1.00
505	14. Aroclor-1232 (Screen)	ND	0.50	531.1	5. Carbofuran	ND	0.90
505	15. Aroclor-1242 (Screen)	ND	0.30	531.1	6. 3-Hydroxycarbofuran	ND	1.00
505	16. Aroclor-1248 (Screen)	ND	0.10	531.1	7. Methomyl	ND	1.00
505	17. Aroclor-1254 (Screen)	ND	0.10	531.1	8. Oxamyl	ND	2.00
505	18. Aroclor-1260 (Screen)	ND	0.20	Analyzed: 12/11/95			
505	19. Toxaphene	ND	1.00	547	1. Glyphosate	ND	6.00
Analyzed: 12/26/95				Analyzed: 12/14/95			
507	1. Atrazine	ND	0.10	548	1. Endothall	ND	9.00
507	2. Butachlor	ND	1.00	Analyzed: 12/19/95			
507	3. Metolachlor	ND	1.00	549	1. Diquat	ND	0.40
507	4. Metribuzin	ND	1.00				
507	5. Propachlor	ND	1.00				
507	6. Simazine	ND	0.07				

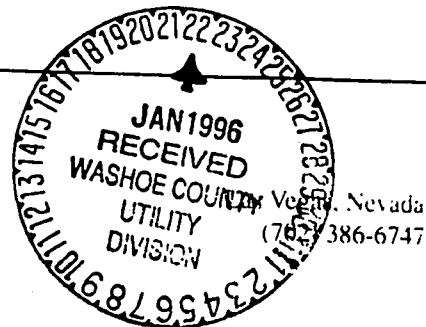
ND - Not Detected

Approved By: Roger L. Scholl Date: 12/27/95  
Roger L. Scholl, Ph.D  
Laboratory Director

**Alpha Analytical, Inc.**

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Boise, Idaho  
(208) 336-4145

**ANALYTICAL REPORT**

Washoe County Utility Division  
P.O. Box 11130  
Reno, NV 89520

Job #:  
Phone: (702) 856-7300  
Attn: Terry Svetich

Sampled: 12/07/95 Received: 12/07/95 Analyzed: 12/12/95  
Alpha Analytical Number: WCU120795-04  
Client I.D.: SW Point Upper Well

Report of GC/MS Analysis for  
SDWA VOLATILES PLUS LISTS 1 AND 3  
UNREGULATED COMPOUNDS  
EPA 524.2

Compound	Concentration ug/L	Detection Limit
8 Regulated Volatile Organic Compounds (VOC's) (Phase I)		
1. Benzene	ND	0.50 ug/L
2. Vinyl Chloride	ND	0.50 ug/L
3. Carbon tetrachloride	ND	0.50 ug/L
4. 1,2-Dichloroethane	ND	0.50 ug/L
5. Trichloroethylene	ND	0.50 ug/L
6. p-Dichlorobenzene	ND	0.50 ug/L
7. 1,1-Dichloroethylene	ND	0.50 ug/L
8. 1,1,1-Trichloroethane	ND	0.50 ug/L
10 Regulated Volatile Organic Compounds (VOC's) (Phase II)		
9. cis-1,2-Dichloroethylene	ND	0.50 ug/L
10. 1,2-Dichloropropane	ND	0.50 ug/L
11. Ethylbenzene	ND	0.50 ug/L
12. Monochlorobenzene	ND	0.50 ug/L
13. o-Dichlorobenzene	ND	0.50 ug/L
14. Styrene	ND	0.50 ug/L
15. Tetrachloroethylene	ND	0.50 ug/L
16. Toluene	ND	0.50 ug/L
17. trans-1,2-Dichloroethylene	ND	0.50 ug/L
18. Xylenes (total)	ND	0.50 ug/L
3 Regulated Volatile Organic Compounds (VOC's) (Phase V)		
19. Dichloromethane	ND	0.50 ug/L
20. 1,1,2-Trichloroethane	ND	0.50 ug/L
21. 1,2,4-Trichlorobenzene	ND	0.50 ug/L
List 1 - Unregulated Compounds - All Systems		
22. Bromobenzene	ND	0.50 ug/L
23. Bromodichloromethane	ND	0.50 ug/L
24. Bromoform	ND	0.50 ug/L
25. Bromomethane	ND	0.50 ug/L
26. Chlorodibromomethane	ND	0.50 ug/L
27. Chloroethane	ND	0.50 ug/L

Compound	Concentration ug/L	Detection Limit
28. Chloroform	ND	0.50 ug/L
29. Chloromethane	ND	0.50 ug/L
30. o-Chlorotoluene	ND	0.50 ug/L
31. p-Chlorotoluene	ND	0.50 ug/L
32. Dibromomethane	ND	0.50 ug/L
33. m-Dichlorobenzene	ND	0.50 ug/L
34. 1,1-Dichloroethane	ND	0.50 ug/L
35. 1,1-Dichloropropene	ND	0.50 ug/L
36. 1,3-Dichloropropene	ND	0.50 ug/L
37. cis-1,3-Dichloropropene	ND	0.50 ug/L
38. 2,2-Dichloropropane	ND	0.50 ug/L
39. 1,1,1,2-Tetrachloroethane	ND	0.50 ug/L
40. 1,1,2,2-Tetrachloroethane	ND	0.50 ug/L
41. 1,2,3-Trichloropropane	ND	0.50 ug/L
List 3 - Monitoring Required at State Discretion		
42. Bromochloromethane	ND	0.50 ug/L
43. n-Butylbenzene	ND	0.50 ug/L
44. Dichlorodifluoromethane	ND	0.50 ug/L
45. Fluorotrichloromethane	ND	0.50 ug/L
46. Hexachlorobutadiene	ND	0.50 ug/L
47. Isopropylbenzene	ND	0.50 ug/L
48. p-Isopropyltoluene	ND	0.50 ug/L
49. Naphthalene	ND	0.50 ug/L
50. n-Propylbenzene	ND	0.50 ug/L
51. sec-Butylbenzene	ND	0.50 ug/L
52. tert-Butylbenzene	ND	0.50 ug/L
53. 1,2,3-Trichlorobenzene	ND	0.50 ug/L
54. 1,2,4-Trimethylbenzene	ND	0.50 ug/L
55. 1,3,5-Trimethylbenzene	ND	0.50 ug/L

ND - Not Detected

Approved By:

*Roger L. Scholl*  
Roger L. Scholl, Ph.D.  
Laboratory Director

Date:

*12/27/95*



# WASHOE COUNTY

DEPARTMENT OF PUBLIC WORKS  
UTILITY DIVISION

## PUMPING TEST DATA

WELL SW. POINTE (LOWER WELL)

PUMPING/OBSERVATION WELL

PUMPING/RECOVERY DATA

PAGE 1 OF 2

TYPE of PUMPING TEST STEP DRAWDOWN

HOW Q MEASURED ORIFICE WEIR 6.249" x 4 3/8"

M.P. for WL's \_\_\_\_\_ elev. \_\_\_\_\_

HOW WL's MEASURED Electric Sounder

DEPTH of PUMP/AIRLINE \_\_\_\_\_ wrt \_\_\_\_\_

3 PUMPED WELL NO. \_\_\_\_\_

% SUBMERGENCE: initial \_\_\_\_\_; pumping \_\_\_\_\_

RADIUS of PUMPED WELL \_\_\_\_\_

PUMP ON: date 11 Dec 95 time 9:30 AM

DISTANCE from PUMPED WELL \_\_\_\_\_

PUMP OFF: date \_\_\_\_\_ time \_\_\_\_\_

TIME					WATER LEVEL DATA					WATER PRODUCT.	COMMENTS
t = at t' = 0					STATIC WATER LEVEL 238.57						
CLOCK TIME	ELAPSED TIME		t / t'		READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	S or S'		Q	(NOTE ANY CHANGES IN OBSERVERS)
	mins	hrs	t	t'							
	/				264.45			25.83		21 360	mw 210.01 static
	2				268.05			29.48		367	
	3				269.35			30.78			
	4				270.76			32.17			
	5				271.71			33.14			
	6				272.27			33.70			
	7				272.89			34.32			
	8				273.54			34.97			
	9				274.10			35.53			
	10				274.57			36.02			
	12				275.28			36.81			
	14				276.28			37.71			
	16				276.93			38.41			
	18				277.70			39.13			
	20				278.23			39.66			
	25				279.61			41.04			
	30				280.84			42.27			
	35				281.98			43.41			
	40				282.92			44.35			
	45				283.74			45.17			
	50				284.42			45.85			
	60				285.81			47.24			
	70				287.40			48.33			
	80				288.53			49.76			
	90				289.53			50.96			
	100				290.50			51.93			SP CAP 6.35 gpm/H
						STEP II				27 416	
	/				294.45			55.88			
	3				295.57			57.00			
	5				296.06			57.49			
50	1	10			296.95			58.38			
20	2	20			298.45			59.88			
20	2	40			300.71			62.14			
40	2	60			302.43			63.86			
0	3	80			303.97			65.40			Sp Cap 6.42 gpm/H
20	3	100			305.38			66.91			5.61
						STEP III				34 467	
	/				308.45			69.88			
	5				309.67			71.10			
	10				310.28			71.71			

## PUMPING TEST DATA

WELL S.W. Pointe (Lower Well)

PUMPING/OBSERVATION WELL

**PUMPING/RECOVERY DATA**

PAGE 2 OF 2

TYPE of PUMPING TEST Step Drawdown

HOW Q MEASURED orifice. W<sub>2</sub> 6.249" x 4 3/8"

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 11 Dec 95 time 9:30

DISTANCE from PUMPED WELL \_\_\_\_\_

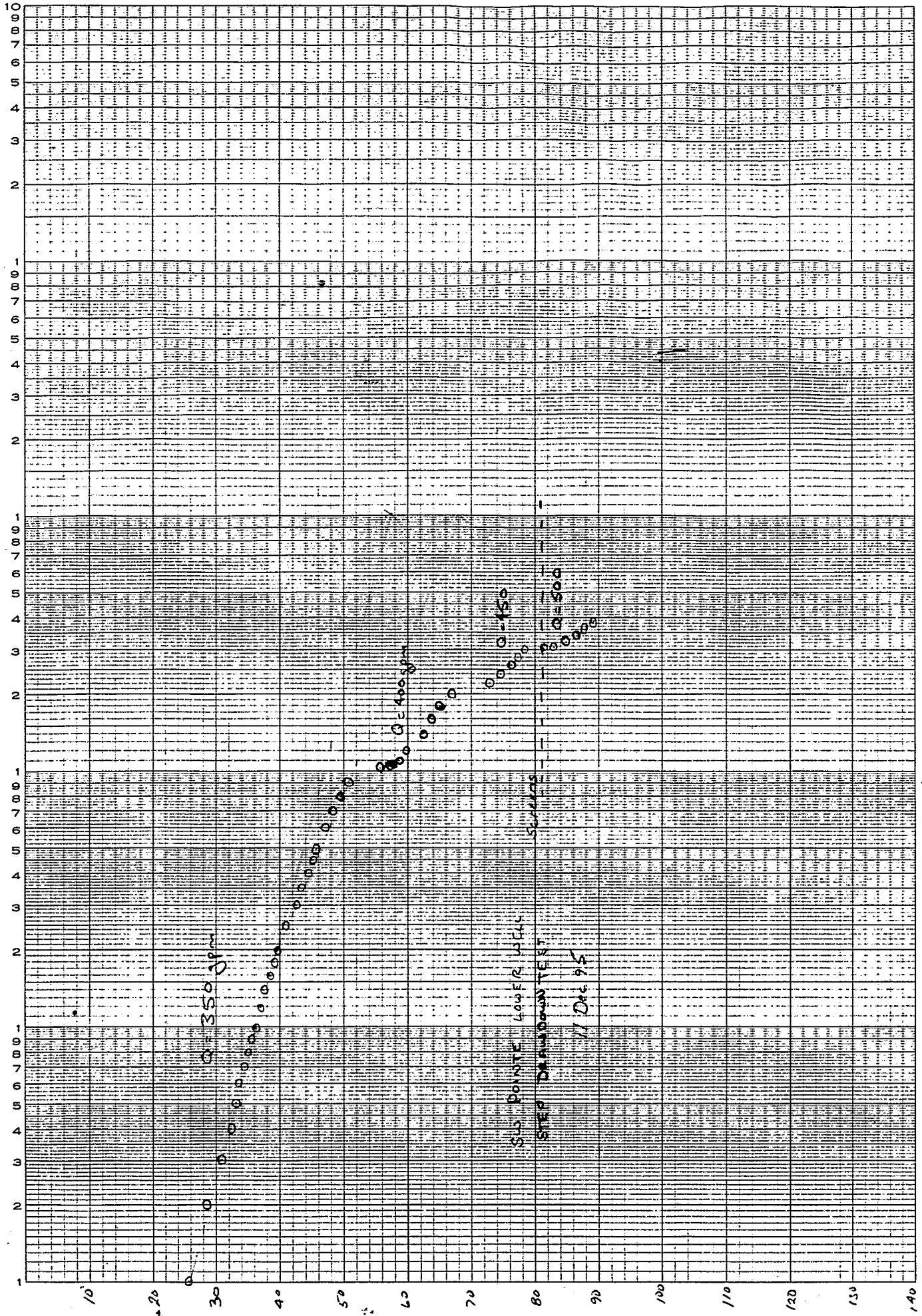
PUMP OFF : date \_\_\_\_\_ time \_\_\_\_\_

**UTIL-18**

DIETZEN CORPORATION  
MADE IN U.S.A.

NO. 340-LS10 DIETZEN GRAIN PAPER  
SEMI-LOGARITHMIC

5 CYCLES X 10 DIVISIONS PER INCH



100,000

10,000

1,000

100

10

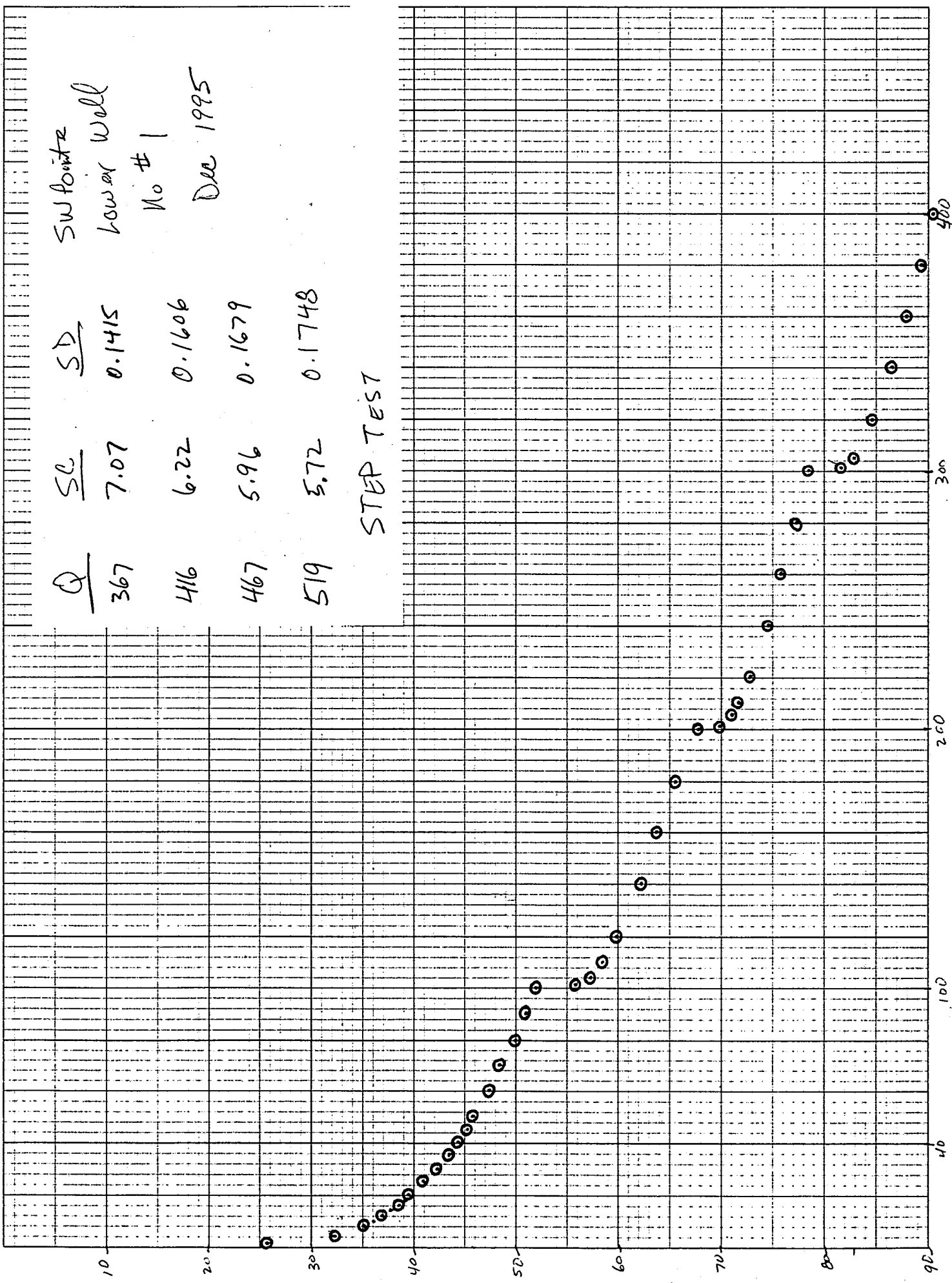
*t / minutes since pump is started*



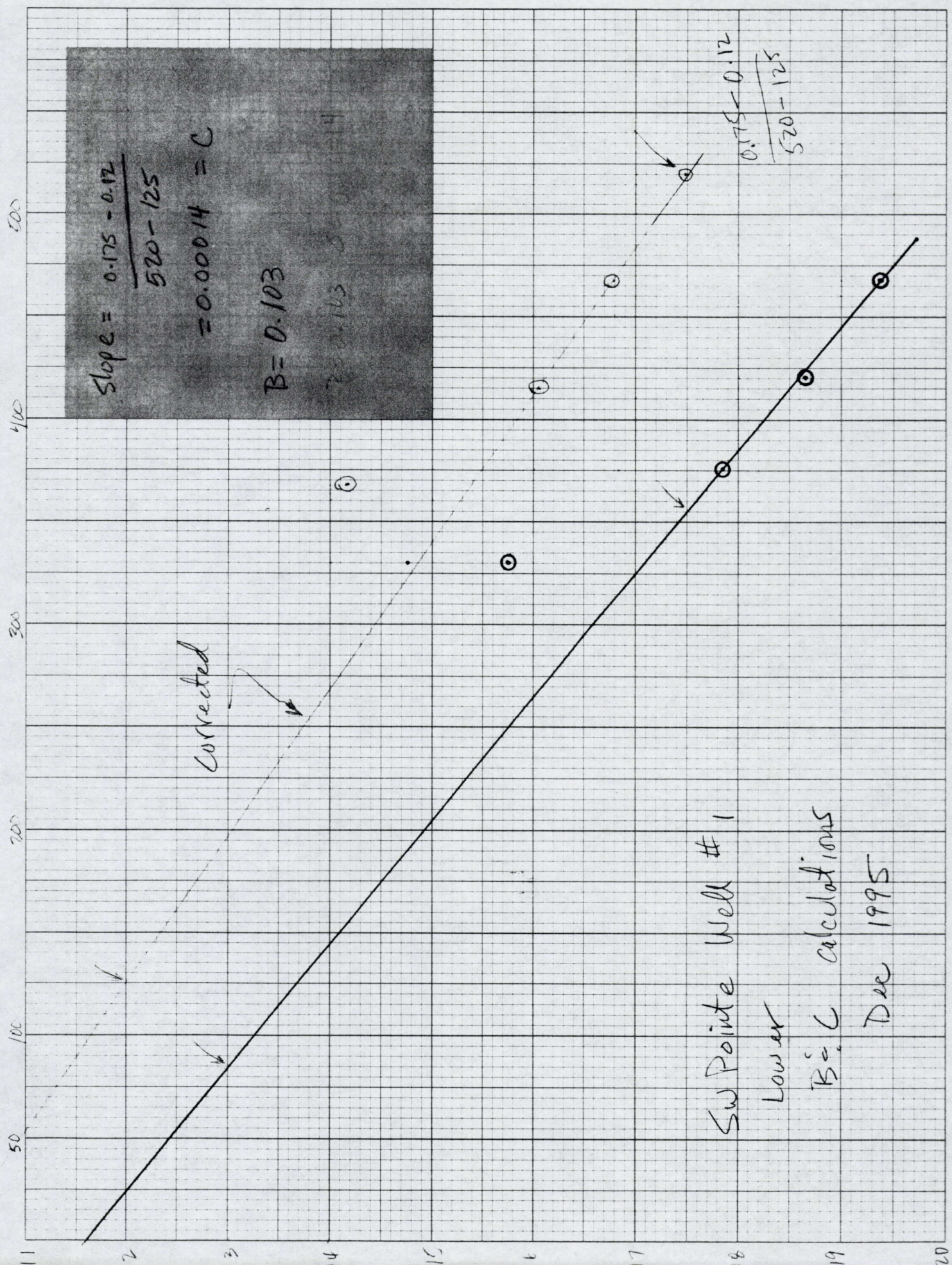
Sw Pointe  
lower well  
No #1  
Dec 1995

$\frac{Q}{SD}$	$\frac{SC}{SD}$
367	7.07
416	6.22
467	5.96
519	5.72
	0.1748

STEP TEST







Sw Pointe Well # 1

Lower

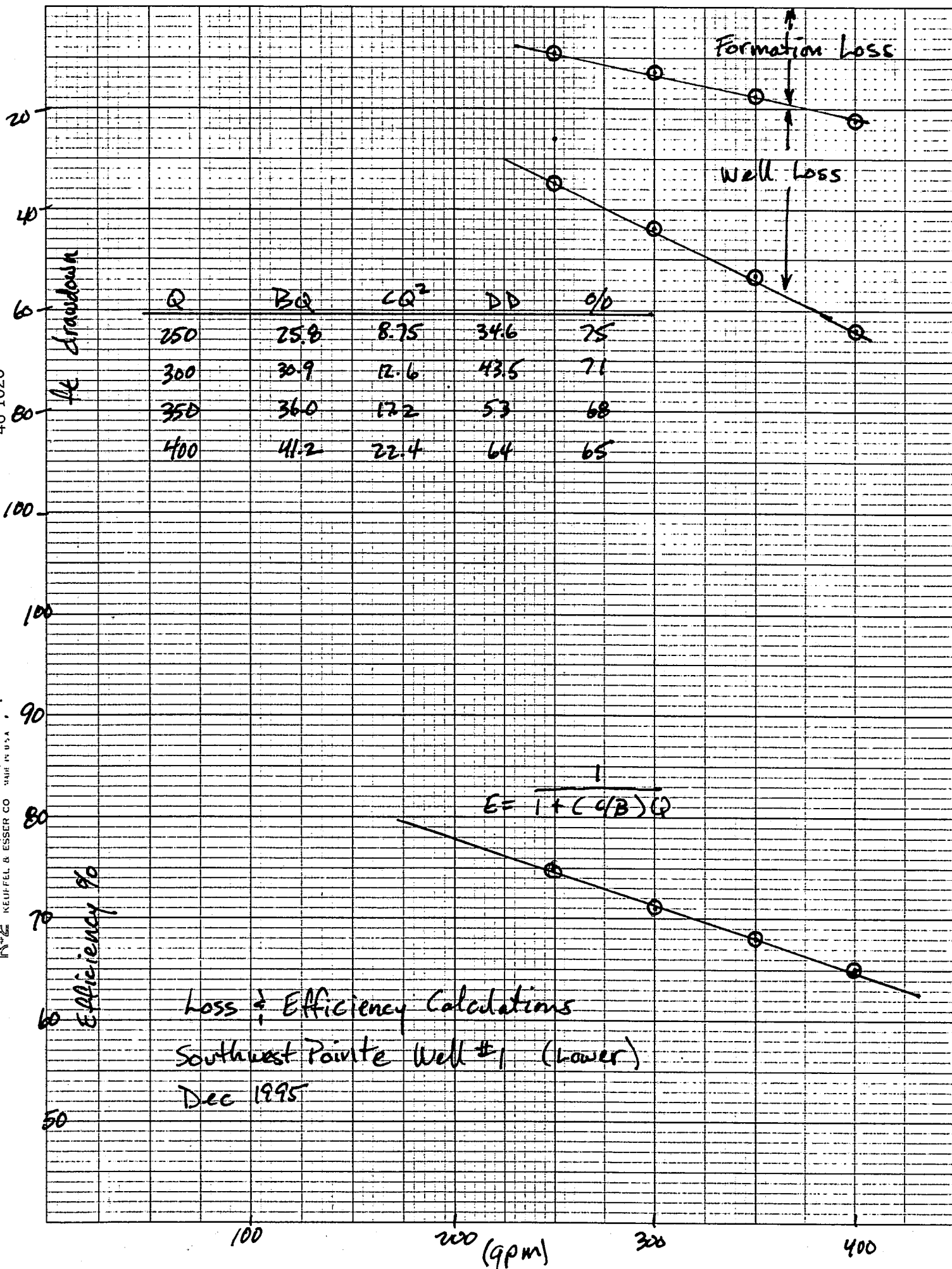
B<sub>0</sub>C calculations

Dec 1995



46 1020

10 X 10 TO 5/8 INCH • 1/2" X 10 PCH'S  
KEUFFEL & ESSER CO. MADE IN U.S.A.





# WASHOE COUNTY

DEPARTMENT OF PUBLIC WORKS  
UTILITY DIVISION

## PUMPING TEST DATA

WELL SW Pointe Lower well

☒ PUMPING OBSERVATION WELL  
☒ PUMPING RECOVERY DATA

PAGE 1 OF 2

TYPE of PUMPING TEST Constant Q

HOW Q MEASURED 4x6 orifice

HOW WL's MEASURED solinst

PUMPED WELL NO. Lower SW Pointe

RADIUS of PUMPED WELL 5'

DISTANCE from PUMPED WELL \_\_\_\_\_

M.P. for WL's top of 1" PVC elev. \_\_\_\_\_

DEPTH of PUMP/AIRLINE 408' wrt to c

% SUBMERGENCE: initial \_\_\_\_\_; pumping \_\_\_\_\_

PUMP ON: date 12/13/95 time 1030

PUMP OFF: date 12-16-95 time 1030

TIME					WATER LEVEL DATA					WATER PRODUCT.		COMMENTS
t = at t' = 0					STATIC WATER LEVEL 236.70							
CLOCK TIME	ELAPSED TIME			t / t'	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	S or S'		gpm	in.	(NOTE ANY CHANGES IN OBSERVERS)
	mins	hrs	t									
1031	/		1		264.84			28.14		400	25 in.	17370000
	/		2		266.22			29.52				
	/		3		267.95			31.25				
	/		4		269.30			32.60				
	/		5		270.13			33.43				
	/		6		270.80			34.10				
	/		7		271.40			34.70				
	/		8		271.85			35.15				
	/		9		272.23			35.53				
	/		10		272.71			36.01				
	/		12		273.98			37.28				
	/		14		274.78			38.08				
	/		16		275.44			38.74				
	/		18		276.08			39.38				
1050	20	0	20		276.65			39.95				
	/		25		277.94			41.24				
	/		30		279.05			42.35				
	/		35		280.05			43.35				
	/		40		281.39			44.69				
	/		45		282.35			45.65				
	/		50		283.18			46.48				
	/		60		284.62			47.92				
	/		70		286.00			49.30				
	/		80		287.28			50.58				
	/		90		288.55			51.85				
	/		100		289.55			52.85				
1230	/		120		291.42			54.72				
	/		140		293.14			56.44				
	/		160		294.60			57.90				
	/		180		295.90			59.20				
1400	/		210		297.75			61.05				
1430	/		240		299.73			63.03				
	/		270		300.90			64.20				
1530	/		300		302.15			65.45				
1600	/		330		303.29			66.59				
1630	0	6	360		304.62			67.92				Q ok
1700	/		390		305.67			68.97				Q ok
1730	0	7	420		306.60			69.90				Q ↑
1800	30	7	450		307.46			70.76				Q OK
1850	20	8	500		308.87			72.17				Q ↑



# WASHOE COUNTY

DEPARTMENT OF PUBLIC WORKS  
UTILITY DIVISION

## PUMPING TEST DATA

WELL SW Pointe Lower Well

PUMPING OBSERVATION WELL

PUMPING RECOVERY DATA

PAGE 2 OF 2

TYPE of PUMPING TEST Constant Q

HOW Q MEASURED 4x6 orifice

HOW WL's MEASURED Solinst

PUMPED WELL NO. Lower

RADIUS of PUMPED WELL 10 5"

DISTANCE from PUMPED WELL 53'

M.P. for WL's 1"

DEPTH of PUMP/AIRLINE 408 elev. 40c

% SUBMERGENCE: initial           ; pumping           

PUMP ON: date 12/13/95 time 1030

PUMP OFF: date 12-16-95 time 1030

TIME					WATER LEVEL DATA					WATER PRODUCT.		COMMENTS
t = at t' = 0					STATIC WATER LEVEL 236.70							
CLOCK TIME	ELAPSED TIME			t / t'	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	S or S'		Q	(NOTE ANY CHANGES IN OBSERVERS)	
	mins	hrs	t									
1940	10	9	550		310.26			73.56		25"	400	
2030	0	10	600		311.56			74.86				Q↑
2120	50	10	650		312.71			76.01				QOK
2210	40	11	700		313.67			76.97				Q↑ EE
2300	30	12	750		314.78			78.08				
2400	30	13	810		315.89			79.19				GENERATOR FILLED @ 12:30
0100	30	14	870		316.88			80.18				Q↑
0200	30	15	930		317.90			81.20				
0310	40	16	1000		318.91			82.21				Q↑
0450			1100		320.35			83.65				
0630			1200		321.62			84.92				Q↑ @ 0730
0830			1320		323.41			86.71				
1030			1440		324.68			87.98	25"		MW	
1230			1560		325.94			89.24				
1430			1680		326.99			90.29	25"			
1630			1800		327.90			91.20	25"			
1830			1920		328.77			92.07			ML	
2030			2040		329.10			92.90				
2230			2160		330.32			93.12				
0130			2340		331.36			94.66				
0430			2520		332.50			95.80				
0730			2706		334.28			97.58				Q↑ ? Roh?
1030			2880		335.35			98.65	25 1/4		MW	
1330			3060		336.10			99.40	25 1/4			
1630	5+		3240		336.86			100.16			EE	
1930	5+		3420		337.62			100.92				
2230			3600		338.20			101.50	25 1/4		MW	
0230			3840		339.09			102.39				
0630			4000		339.70			103.00	25 1/4			
1030			4320		340.35			103.65	25 1/4		MW	



# WASHOE COUNTY

DEPARTMENT OF PUBLIC WORKS  
UTILITY DIVISION

## PUMPING TEST DATA

TYPE of PUMPING TEST Constant Q Recovery  
HOW Q MEASURED 4x6 orifice  
HOW WL's MEASURED to Solinst  
PUMPED WELL NO. Lower SW Pointe  
RADIUS of PUMPED WELL 5"  
DISTANCE from PUMPED WELL \_\_\_\_\_

WELL Lower SW Pointe  
PUMPING/OBSERVATION WELL  
PUMPING/RECOVERY DATA  
PAGE 1 OF 2

M.P. for WL's top of 1" PVC elev. \_\_\_\_\_  
DEPTH of PUMP/AIRLINE \_\_\_\_\_ wrt \_\_\_\_\_  
% SUBMERGENCE: initial \_\_\_\_\_; pumping \_\_\_\_\_  
PUMP ON: date 12-13-95 time 1030  
PUMP OFF: date 12-16-95 time 1030

TIME t = at t' = 0					WATER LEVEL DATA STATIC WATER LEVEL 236.70				WATER PRODUCT.		COMMENTS
CLOCK TIME	ELAPSED TIME			t / t'	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	S or S'		Q	(NOTE ANY CHANGES IN OBSERVERS)
	mins	hrs	t								
1030			4320	0	00	240.35		103.65		25 1/4 400	mm
1031				1	4321	304.80		68.10			
				2	216.1	301.75		65.05			
				3	144.1	301.14		64.44			
				4	108.1	301.73		65.03			
				5	86.5	303.50		66.80			
				6	72.1	303.37		66.67			
				7	61.8	303.07		66.37			
				8	54.1	302.56		65.86			
				9	48.1	302.16		65.46			
			4330	10	433	301.89		65.19			
				12	36.1	300.90		64.20			
				14	31.0	300.25		63.55			
				16	27.1	299.34		62.64			
				18	24.1	298.91		62.21			
			4340	20	217	298.18		61.48			
				25	174	296.74		60.04			
1100			4350	30	145	295.54		58.84			
				35	124	294.45		57.75			
			4360	40	109	293.35		56.65			
				45	97	292.47		55.77			
			4370	50	87	291.60		54.90			
1130			4380	60	73	290.03		53.33			
			4390	70	63	288.60		51.90			
			4400	80	55	287.10		50.40			
12:00			4410	90	49	286.15		49.45			
			4420	100	44	285.40		48.70			DAN
1230			4440	120	37	283.61		46.91			
1:00			4470	150	29	280.95		44.25			
1:30			4500	180	25	278.61		41.91			
2:00			4530	210	21.6	276.81		40.11			
2:30			4560	240	19.0	274.98		38.28			
3:00			4590	270	17.0	273.49		36.79			
3:30			4620	300	15.4	272.22		35.52			
4:00			4650	330	14.1	271.03		34.33			
5:00			4710	390	12.1	268.96		32.26			
6:30			4800	480	10.0	266.70		30.60			
8:10			4900	580	8.4	263.90		27.20			
10:30			5040	720	7.0	261.23		24.53			16 Dec
0630			5540	1220	4.5	254.72		18.02			17 Dec

# WASHOE COUNTY

**DEPARTMENT OF PUBLIC WORKS  
UTILITY DIVISION**

## PUMPING TEST DATA

WELL Lower SW Pointe

~~PUMPING~~ OBSERVATION WELL

~~PUMPING/RECOVERY DATA~~

PAGE 2 OF 2

TYPE of PUMPING TEST Recovery

### 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

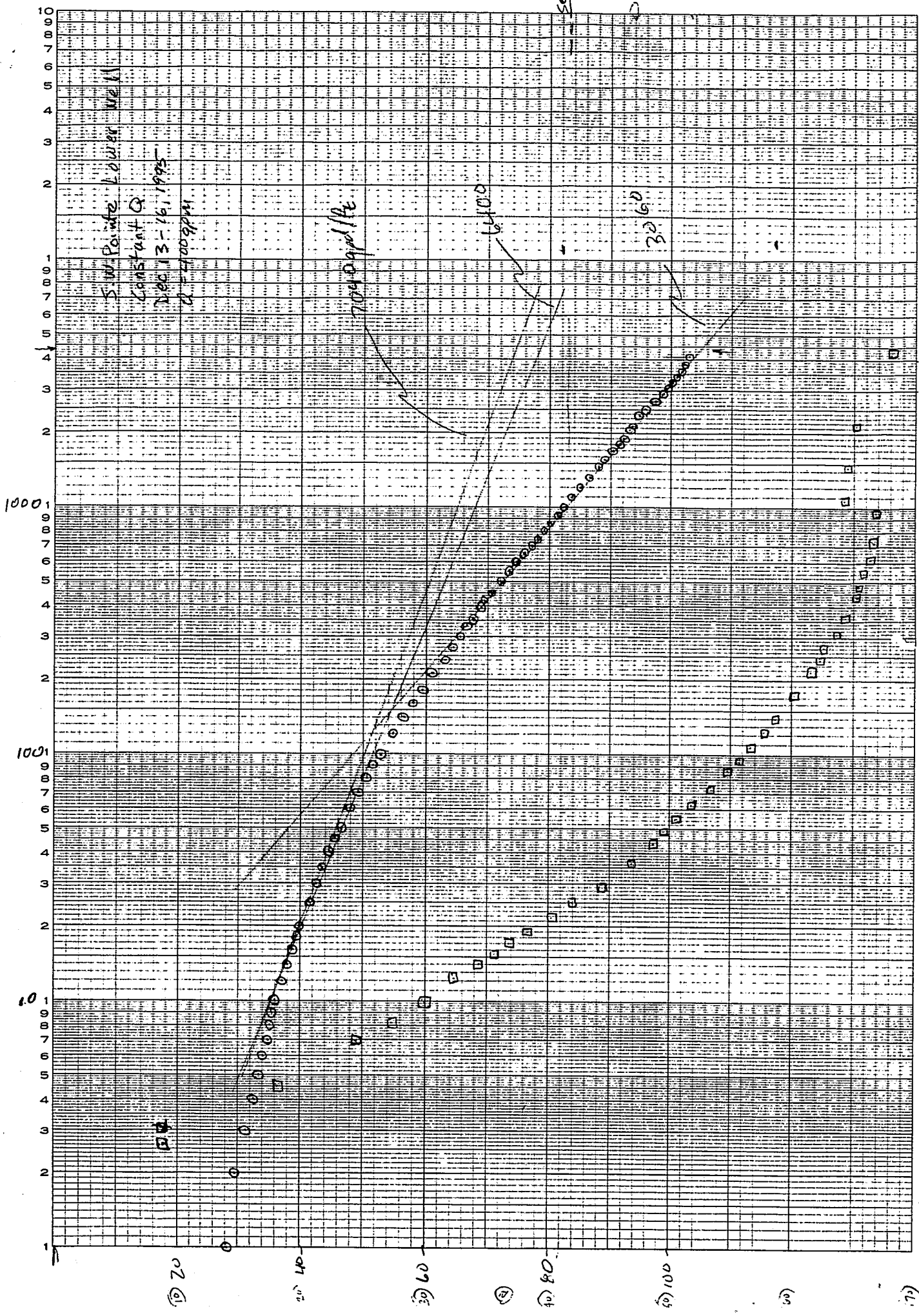
PUMP ON: date 12-13-95 time 1030

DISTANCE from PUMPED WELL

PUMP OFF: date 12-16-95 time 1030

[illegible]

340-1573 DIET GRAPHER  
 SEMI-LOGARITHMIC  
 5 CYCLES X 10 DIVISIONS PER INCH  
 GENERAL CORPORATION  
 MADE IN U.S.A.



5692-29  
 5/1/81  
 O'Donoghue  
 B. Brown





# WASHOE COUNTY

DEPARTMENT OF PUBLIC WORKS  
UTILITY DIVISION

## PUMPING TEST DATA

WELL SW. POINTE UPPER WELL

PUMPING/OBSERVATION WELL

PUMPING/RECOVERY DATA

PAGE 1 OF       

TYPE of PUMPING TEST Step Drawdown

HOW Q MEASURED ORIFICE well 8.299 ID x 6"

HOW WL's MEASURED Electric Sounder

PUMPED WELL NO.                     

RADIUS of PUMPED WELL                     

DISTANCE from PUMPED WELL                     

M.P. for WL's                      elev.                     

DEPTH of PUMP/AIRLINE 412 wrt                     

% SUBMERGENCE: initial                     ; pumping                     

PUMP ON: date Dec 3, 95 time 0805

PUMP OFF: date                      time                     

TIME					WATER LEVEL DATA					WATER PRODUCT.		COMMENTS
t =	at t' = 0				STATIC WATER LEVEL 111.58							
CLOCK TIME	ELAPSED TIME				READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	S or S'		Q	(NOTE ANY CHANGES IN OBSERVERS)	
	mins	hrs	t	t'								
			1		138.40			26.82		7"	419	
			2		142.91			31.33				
			4		145.73			34.15				Not enough back
			5		146.92			35.34				pressure to run
			7		148.92			37.34				Sand test
			9		150.39			38.81				
			10		151.30			39.72				
			12		152.87			41.29				
			15		154.23			42.65				
			17		154.18			42.60				
			20		156.07			44.49				
			25		157.82			46.24				
			30		158.53			46.95				
			35		159.03			47.45				
			40		161.10			49.52				
			45		162.06			50.48				
			50		162.80			51.22				
			60		163.90			52.38				
			70		164.85			53.27				
			80		165.68			54.10				
			90		166.48			54.70				
			100		167.16	Sp Cap 7.20		55.58	2.			Sp Cap 7.20 gpm/ft
						STEP 2						
			2		181.57			69.99	16"	16"	634	
			5		185.90			74.32				
			12		190.18			78.60				Mon. well 193.15
			16		191.86			80.28				
			24		193.95			82.37				
			30		195.10			83.52				
			40		196.90			85.32				2.1 cc sand
			50		198.55			86.97				mon. well 150.81
			65		200.30			88.72				
			80		201.69			90.11				mon. well 155.01
			100		203.01	Sp Cap 6.56		91.43				Sp Cap 6.56 gpm/ft
						STEP 3						
			5		221.75			110.17	28.5"	846		NO SAND
			10		225.52			113.94				
			20		229.28			117.70				pumping SAND mon. well 167.58
			35		232.85			121.27				0.1 cc / 2 min
			50									0.2 cc @ 4 min



# WASHOE COUNTY

DEPARTMENT OF PUBLIC WORKS  
UTILITY DIVISION

## PUMPING TEST DATA

WELL S.W. Point upper Well

PUMPING / OBSERVATION WELL

PUMPING / RECOVERY DATA

PAGE 2 OF 2

TYPE of PUMPING TEST Step Drawdown

HOW Q MEASURED \_\_\_\_\_

M.P. for WL's \_\_\_\_\_ elev. \_\_\_\_\_

HOW WL's MEASURED \_\_\_\_\_

DEPTH of PUMP/AIRLINE \_\_\_\_\_ wrt \_\_\_\_\_

PUMPED WELL NO. \_\_\_\_\_

% SUBMERGENCE: initial \_\_\_\_\_; pumping \_\_\_\_\_

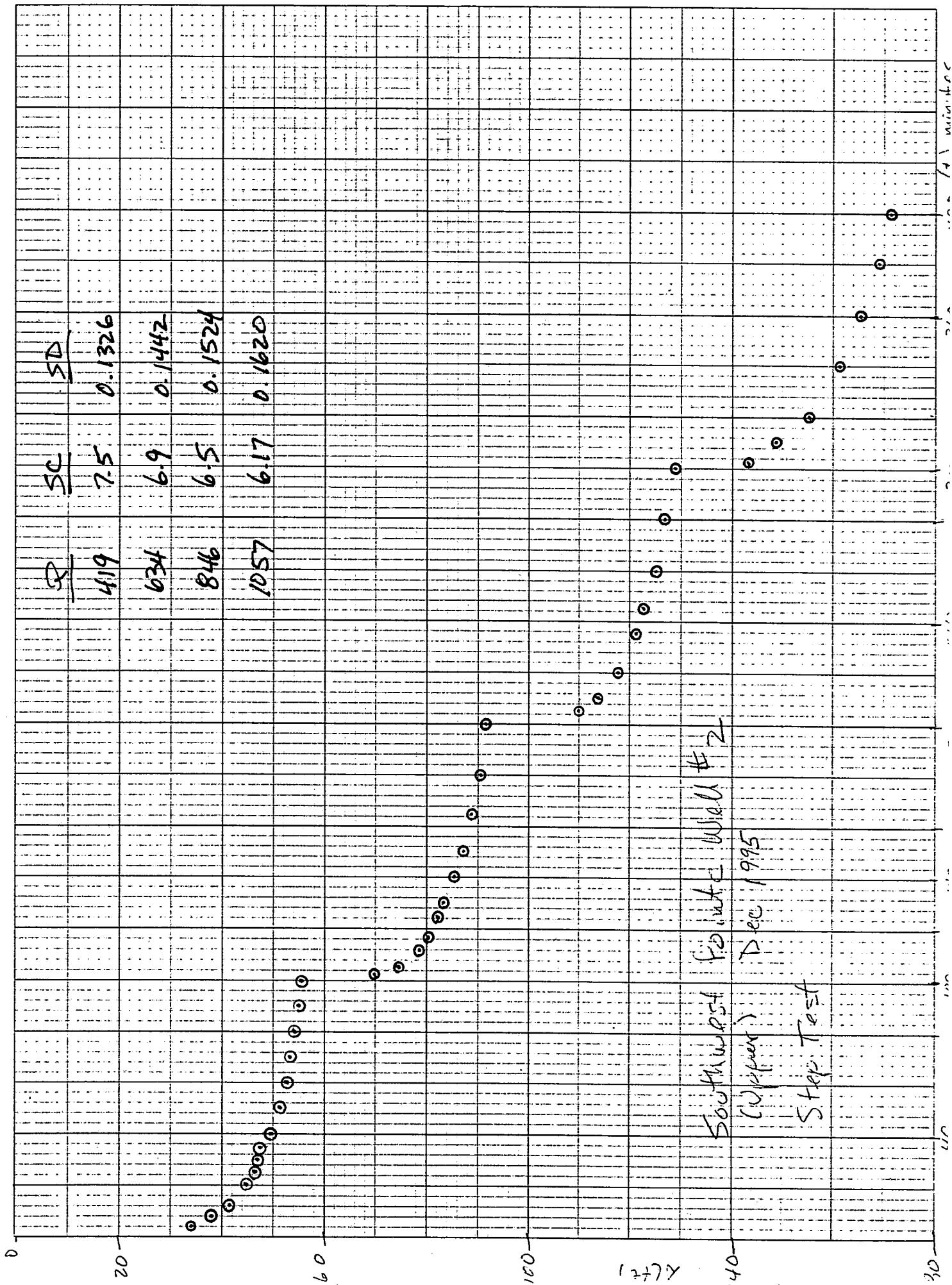
RADIUS of PUMPED WELL \_\_\_\_\_

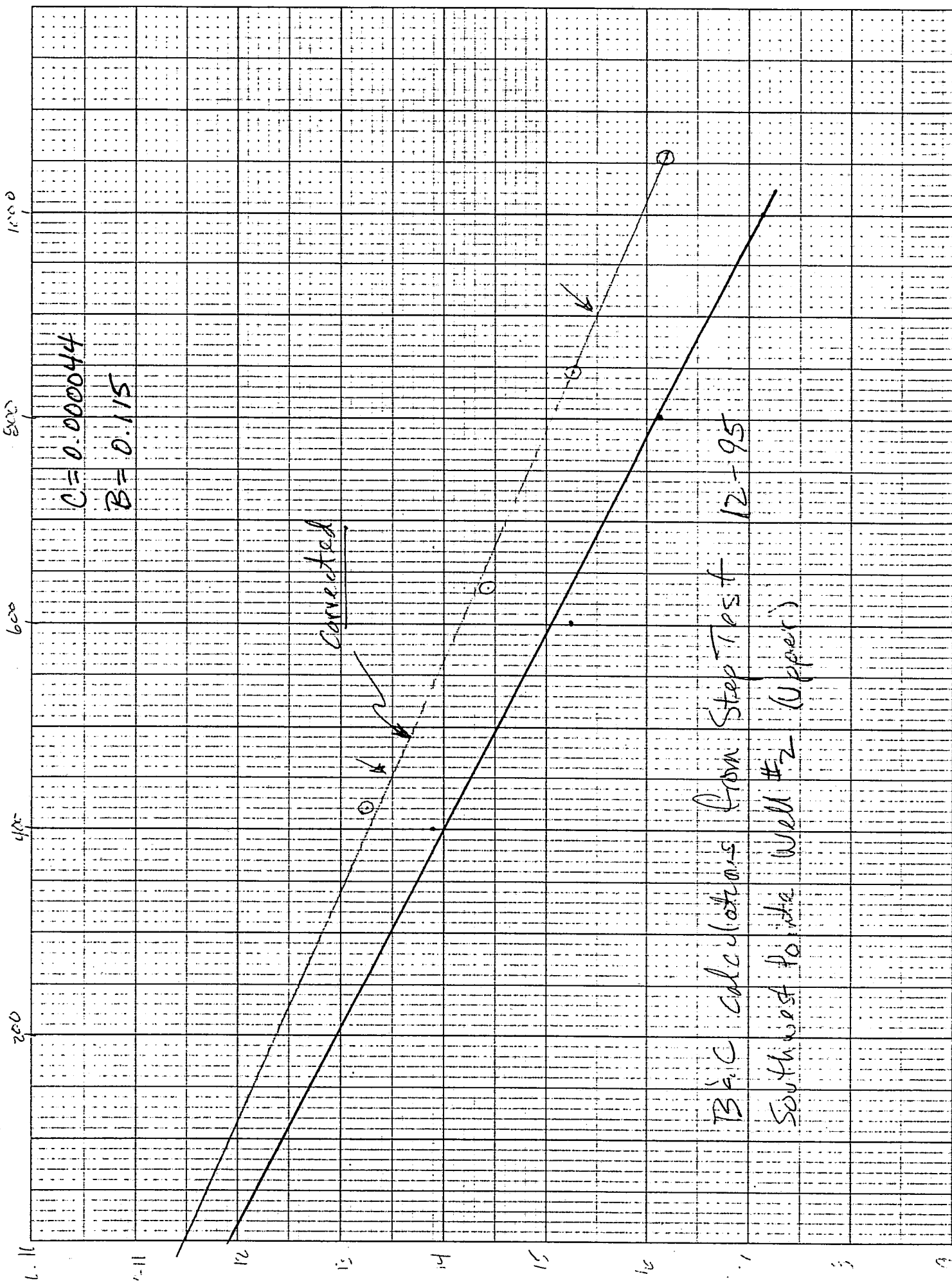
PUMP ON: date 30 Dec 95 time 0805

DISTANCE from PUMPED WELL \_\_\_\_\_

PUMP OFF: date \_\_\_\_\_ time \_\_\_\_\_

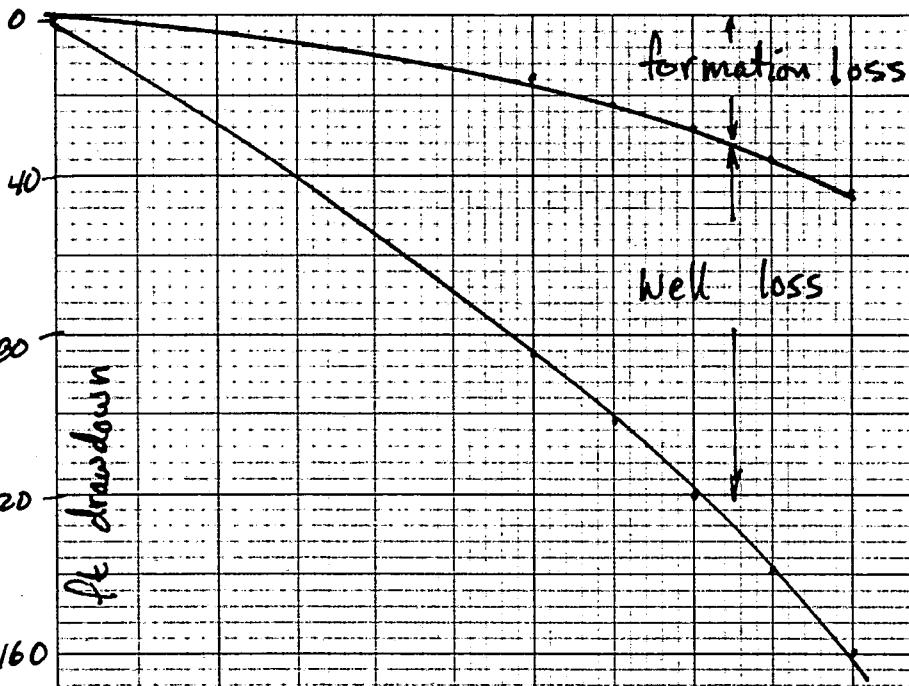
TIME					WATER LEVEL DATA					WATER PRODUCT.		COMMENTS
t =	at t' = 0				STATIC WATER LEVEL <u>///. 50</u>							
CLOCK TIME	ELAPSED TIME		t	t'	t / t'	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	S or S'		Q	(NOTE ANY CHANGES IN OBSERVERS)
	mins	hrs										
			45			234.08			122.50		846	Flow / 5 gal / 7.5 min 0.3 cc Sand @ 6 min
			60			236.81			125.23			0.48 cc @ 10 min
			80			238.70			127.12			5 gal 50:30 shut 04:30 =
			100			240.51	Sp cap 6.20		128.93			0.6 cc @ 16 min
							Reset Sand Test					0.78 cc @ 30 min
							STEP IV					0.85 cc @ 50 min
			2			255.0			143.42		1057	Mon well 178 @ 20 min
			5			260.02			148.44			
							Sand .08 @ 6 min					5 gal 7 min
			20			267.30	Sand .35 @ 21 min		155.72			
			40			273.00	.75 @ 31 min		161.42			
			60			277.03	1.1 @ 60 min		165.45			
			80			280.46	1.5 @ 80 min		168.88			Mon well - 202.07
			100			282.78	1.75 @ 100 min		171.20			
							Sp cap 5.84					1. Sounder for lower well
												2. Small Tape measure
												3.





46 1020

K&amp;S 10 X 10 TO 1/6 INCH • 12" • 16" • 20" • 24" • 30" • 36" • 42" • 48" • 54" • 60" • 66" • 72" • 78" • 84" • 90" • 96" • 102" • 108" • 114" • 120" • 126" • 132" • 138" • 144" • 150" • 156" • 162" • 168" • 174" • 180" • 186" • 192" • 198" • 204" • 210" • 216" • 222" • 228" • 234" • 240" • 246" • 252" • 258" • 264" • 270" • 276" • 282" • 288" • 294" • 300" • 306" • 312" • 318" • 324" • 330" • 336" • 342" • 348" • 354" • 360" • 366" • 372" • 378" • 384" • 390" • 396" • 402" • 408" • 414" • 420" • 426" • 432" • 438" • 444" • 450" • 456" • 462" • 468" • 474" • 480" • 486" • 492" • 498" • 504" • 510" • 516" • 522" • 528" • 534" • 540" • 546" • 552" • 558" • 564" • 570" • 576" • 582" • 588" • 594" • 600" • 606" • 612" • 618" • 624" • 630" • 636" • 642" • 648" • 654" • 660" • 666" • 672" • 678" • 684" • 690" • 696" • 702" • 708" • 714" • 720" • 726" • 732" • 738" • 744" • 750" • 756" • 762" • 768" • 774" • 780" • 786" • 792" • 798" • 804" • 810" • 816" • 822" • 828" • 834" • 840" • 846" • 852" • 858" • 864" • 870" • 876" • 882" • 888" • 894" • 900" • 906" • 912" • 918" • 924" • 930" • 936" • 942" • 948" • 954" • 960" • 966" • 972" • 978" • 984" • 990" • 996" • 1000"



<u>Q</u>	<u>BQ</u>	<u>CQ<sup>2</sup></u>	<u>DD</u>	<u>%</u>
600	69	16	85	81
700	80	22	102	79
800	92	28	120	76
900	104	36	139	74
1000	115	44	159	72

$$E = \frac{1}{1 + (C/B)Q}$$

Efficiency %

Loss & Efficiency Calculations  
 SW Pointe Well #2 Upper  
 Dec 95

(gpm)

200

400

600

800

1000



# WASHOE COUNTY

DEPARTMENT OF PUBLIC WORKS  
UTILITY DIVISION

## PUMPING TEST DATA

WELL SOUTHWEST POINT UPPER WELL  
PUMPING/OBSERVATION WELL  
PUMPING/RECOVERY DATA  
PAGE 2 OF 2

TYPE of PUMPING TEST CONSTANT Q

HOW Q MEASURED 8.249" x 6"

HOW WL's MEASURED SOLINET SOUNDER

PUMPED WELL NO. SOUTHWEST POINT UPPER WELL

RADIUS of PUMPED WELL \_\_\_\_\_

DISTANCE from PUMPED WELL \_\_\_\_\_

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

DEPTH of PUMP/AIRLINE \_\_\_\_\_ wrt \_\_\_\_\_

% SUBMERGENCE: initial \_\_\_\_\_; pumping \_\_\_\_\_

PUMP ON: date 4 DEC 95 time 1000

PUMP OFF: date \_\_\_\_\_ time \_\_\_\_\_

TIME					WATER LEVEL DATA					WATER PRODUCT.		COMMENTS
t = _____ at t' = 0					STATIC WATER LEVEL 113.27					Q	Q	(NOTE ANY CHANGES IN OBSERVERS)
CLOCK TIME	ELAPSED TIME	t	t'	t/t'	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	Sors'	2			
1230	30	7	450		254.45			141.31				
1300	30	8	450		255.35			142.33	5.6			
1330	30	8	510		256.18			142.91				
1400	30	9	540		257.30			144.03				Q↑
1430	30	9	570		257.93	SAND 0.15 @ 1435		144.66				Q↑
2000	30	10	600		258.72			145.45	5.5			
2030	30	10	630		259.32			146.05				
2100	30	11	660		259.95			146.68	5.5			
2130	30	11	690		260.57			147.30				
2200	30	12	720		261.20			147.93				Q ↓
2300	30	13	780		262.25			148.98				Q ↓
2400	30	14	840		263.08			149.81	5.3			Q↑
0100	30	15	900		264.20			150.93				
0200	30	16	960		265.01			151.71				
0400	30	18	1080		266.30			152.22				Q↑
0600	30	20	1200		268.01			154.80				Q↑
0800	30	22	1320		270.25	SAND 0.25 @ 8:00 START 0.00 @ 8:00		156.93	5.1			
1000	30	24	1440		271.70	SAND 0.09 @ 1110		158.43	5.0			Q↑ @ 1045
1200	30	26	1560		272.98			159.71	5.0			
1400	30	28	1680		274.12	SAND 0.20 @ 1400		160.85	4.9			Q↑ Q 1300
1600	30	30	1800		275.31			161.86				DAN Q↑
1800	30	32	1920		277.24	SAND 0.40		163.97				
2000	30	34	2040		277.83	0.40		164.56				
2200	30	36	2160		279.56	0.50		166.29				Q OK RV
0020	30	38	2300		280.28	0.70		167.01				Q↑
0240	30	40	2440		281.85	0.90		168.58				Q OK (e 0315 too)
0600	30	44	2640		283.09	1.50		169.82				Q OK (e 0645 too)
0900	30	47	2820		283.70	2.20 @ 800		170.43				Q ↓ e 0815 EE
1200	30	50	3000		284.52	SAND 0.00 @ 8:30 0.55 @ 11:30		171.25				Q↑ @ 1100
1500	30	53	3180		285.79	SAND 0.90 @ 13:00 1.50 @ 1500		172.52				Q↑ @ 1330 DAN
1700	30	55	3300		285.58			172.26	?			Sqal 17min for sand test cases
1910	30	57	3430		286.66	SAND 2.1 @ 1910		173.39				Q↑
2200	30	60	3600		287.40			174.13				EE
0100	30	63	3780		287.93			174.66				Q↑
0400	30	66	3960		288.60			175.33				
0700	30	69	4140		289.10			175.83				Q↑
1000	30	72	4320		289.96			176.69				



# WASHOE COUNTY

DEPARTMENT OF PUBLIC WORKS  
UTILITY DIVISION

## PUMPING TEST DATA

WELL SW. POINTE UPPER WELL

PUMPING/OBSERVATION WELL

PUMPING/RECOVERY DATA

PAGE 1 OF 2

TYPE of PUMPING TEST Constant Q

HOW Q MEASURED Orifice Weir 8.249" x 6"

HOW WL's MEASURED Electric Sounder

PUMPED WELL NO. \_\_\_\_\_

RADIUS of PUMPED WELL 12"

DISTANCE from PUMPED WELL \_\_\_\_\_

M.P. for WL's top of stilling well elev. \_\_\_\_\_

DEPTH of PUMP/AIRLINE 470 wrt loc

% SUBMERGENCE: initial \_\_\_\_\_; pumping \_\_\_\_\_

PUMP ON: date 4 Dec 95 time 1000

PUMP OFF: date 7 Dec 95 time 1000

TIME t = _____ at t' = 0					WATER LEVEL DATA STATIC WATER LEVEL 113.27					WATER PRODUCT.		COMMENTS
CLOCK TIME	ELAPSED TIME				READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	S or S'	Sp cap ft	Q	(NOTE ANY CHANGES IN OBSERVERS)	
	mins	hrs	t	t'								
			2		169.42			56.15	14.3	28.5"	800	
			3		175.98	0.17 sand @ 3.		62.71	12.8			Ron-Sargent irrigation
			4		180.79			67.52	11.8			employee controls
			5		184.33	0.18		71.06				flow w/engine
			6		187.11			73.84				throttle.
			7		189.58			76.31				
			8		191.86	0.18		78.59				
			9		193.69			80.92				Good flow control
			10		195.97			82.20	9.7			
			12		198.18	0.18		84.91				
			14		200.74			87.47				
			16		202.97			89.67				
			18		204.84			91.57				
			20		206.42	cloudy		93.15	5.6			
			25		209.92	0.3 cc		96.65				cloudy more sand
			30		212.76	0.42 cc		99.49				
			35		215.26	0.51 cc		101.99				
			40		217.15	0.60		103.88	7.7			
			45		219.36	0.61		106.09				
			50		220.94			107.67				
			60		223.63	0.70		110.36				
			70		226.39	0.72		113.12	7.1			Sp Cap 7.07
			80		228.50			115.23				
			90		230.25	0.73		116.98				
			100		231.92	0.85		118.65	6.7			
			120		234.87	0.90		121.60				
			139		237.17			123.90				
			160		239.45			126.18	6.3			
1:00 PM			180		241.09	0.10 cc		127.82				
			200		242.69			129.42				
			219		244.13	0.10 cc		130.86	6.1			Sp Cap 6.11
			240		245.35			132.03				
			260		246.57			133.30	6.0			
			280		247.84	0.11 cc		134.57	5.9			
1500	-	5	300		248.87			135.60	5.9			
1530	30	5	330		250.49			137.22				EE
1600	-	6	360		251.58	SAND STRATUM 1605 0.0 cc		138.31	5.8			
1630	30	6	390		252.59	1635 0.05 cc		139.32	5.7			QT
1700	0	7	420		253.70			140.43	5.7			



# WASHOE COUNTY

DEPARTMENT OF PUBLIC WORKS  
UTILITY DIVISION

## PUMPING TEST DATA

WELL Sw. Pointe upper Non-Flowing Well

PUMPING/OBSERVATION WELL

PUMPING/RECOVERY DATA

PAGE 1 OF 2

TYPE of PUMPING TEST Constant Q

HOW Q MEASURED orifice weir

HOW WL's MEASURED electric sounder

PUMPED WELL NO. SOUTHWEST POINTE JACK WELL

RADIUS of PUMPED WELL \_\_\_\_\_

DISTANCE from PUMPED WELL \_\_\_\_\_

M.P. for WL's top of casing elev. \_\_\_\_\_

DEPTH of PUMP/AIRLINE \_\_\_\_\_ wrt \_\_\_\_\_

% SUBMERGENCE: initial \_\_\_\_\_; pumping \_\_\_\_\_

PUMP ON: date 4 Dec 95 time 1000

PUMP OFF: date 7 Dec 95 time 1000

TIME					WATER LEVEL DATA					WATER PRODUCT.		COMMENTS
t =	at t' = 0				STATIC WATER LEVEL 108.47							
CLOCK TIME	ELAPSED TIME		t	t'	t / t'	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	S or S'		Q	(NOTE ANY CHANGES IN OBSERVERS)
	mins	hrs										
	/		1			-						EE
	/		2			116.17			7.70			
	/		3			118.72	119-18		16.25			
	/		4			122.65			14.18			
1005	/		5			123.80			15.33			
	/		6			126.77			18.30			
	/		7			128.74			20.27			
	/		8			129.57			21.10			
	/		10			133.58			25.11			
1012	/		12			135.73			27.26			
1014	/		14			137.90			29.43			
1016	/		16			138.80			30.33			
	/		18			141.79			33.32			
1020	20	-	20			143.29			34.82			
1025	25	-	25			146.60			38.13			
1030	30	-	30			149.38			40.91			
1035	35	-	35			151.76			43.29			
1040	40	-	40			153.87			45.40			
1045	45	-	45			155.74			47.27			
1050	50	-	50			157.43			48.96			
1100	-	1	60			160.29			51.82			
1110	10	1	70			162.84			54.37			EE LEAIES
1120	/		82.5			165.51			57.04			DAN
	/		91			166.73			58.26			
	/		101.5			168.80			60.33			
	/		122			171.78			63.31			
	/		142			174.18			65.71			
	/		162			176.46			67.99			
	/		183			178.36			69.89			
	/		202			179.89			71.42			
	/		222			181.16			72.69			
	/		242			182.67			74.20			
	/		262			184.06			75.59			
	/		280			184.67			76.20			
	/		301			186.07			77.60			
1521	21	5	332			187.68			79.21			EE
1601	-	6	361			188.77			80.36			
1631	30	6	392			189.79			81.32			
1702	02	7	422			190.79			82.52			





# WASHOE COUNTY

DEPARTMENT OF PUBLIC WORKS  
UTILITY DIVISION

## PUMPING TEST DATA

WELL Sw Pointe No. Well  
PUMPING / OBSERVATION WELL  
PUMPING / RECOVERY DATA  
PAGE 2 OF 2

TYPE of PUMPING TEST CONSTRUCT

HOW Q MEASURED Orifice weir

HOW WL's MEASURED elec. sounder

PUMPED WELL NO. Upper well

RADIUS of PUMPED WELL \_\_\_\_\_

DISTANCE from PUMPED WELL \_\_\_\_\_

M.P. for WL's TOC elev. \_\_\_\_\_

DEPTH of PUMP/AIRLINE \_\_\_\_\_ wrt \_\_\_\_\_

% SUBMERGENCE: initial \_\_\_\_\_; pumping \_\_\_\_\_

PUMP ON: date 4 Dec time 1000

PUMP OFF: date 7 Dec 95 time 1000

TIME					WATER LEVEL DATA					WATER PRODUCT.	COMMENTS
t = _____ at t' = 0					STATIC WATER LEVEL <u>108.47</u>						
CLOCK TIME	ELAPSED TIME	t / t'			READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	S or S'		Q	(NOTE ANY CHANGES IN OBSERVERS)
	mins	hrs	t	t'							
			452		191.57			83.10		300	
			482		192.46			83.99			
			512		193.35			84.73			
			542		194.15			85.63			
			572		194.73			86.51			
			602		195.44			86.97			
			632		196.00			87.53			
			662		196.51			88.10			
			692		197.00			88.62			
			722		197.71			89.24			
			752		198.42			89.85			
			782		199.11			90.64			
			812		199.88			91.51			
			842		200.62			92.15			
			872		201.59			93.12			
			902		202.63			94.21			
			932		203.33			95.41			
			962		204.65			96.00			
			992		205.11			96.00			
			1022		205.78			97.51			
			1052		206.43			97.96			
			1082		207.22			98.75			
			1112		207.80			99.33			
			1142		208.20			99.73			
			1172		208.43			100.00			
			1202		209.20			100.73			
			1232		209.57			101.10			
			1262		209.85			101.38			
			1292		210.10			101.63			
			1322		210.39			101.92			DAJ
			1352		210.55			102.08			
			1382		211.08			102.61			
			1412		211.45			102.98			EE
			1442		211.75			103.28			
			1472		212.06			103.59			
			1502		212.49			104.02			
			1532		213.06			104.59			
			1562								
			1592								
			1622								
			1652								
			1682								
			1712								
			1742								
			1772								
			1802								
			1832								
			1862								
			1892								
			1922								
			1952								
			1982								
			2012								
			2042								
			2072								
			2102								
			2132								
			2162								
			2192								
			2222								
			2252								
			2282								
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			2552								
			2582								
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			2642								
			2672								
			2702								
			2732								
			2762								
			2792								
			2822								
			2852								
			2882								
			2912								
			2942								
			2972								
			3002								
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			4412								
			4442								
			4472								
			4502								
			4532								
			4562								
			4592								
			4622								
			4652								
			4682								
			4712								
			4742								
			4772								
			4802								
			4832								
			4862								
			4892								
			4922								
			4952								
			4982								
			5012								
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			5072								
			5102								
			5132								
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			5192								
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			5252								
			5282								
			5312								
			5342								
			5372								
			5402								
			5432								
			5462								
			5492								
			5522								
			5552								
			5582								
			5612								
			5642								
			5672								
			5702								
			5732								
			5762								
			5792								
			5822								
			5852								
			5882								
			5912								
			5942								
			5972								
			6002								
			6032								
			6062								

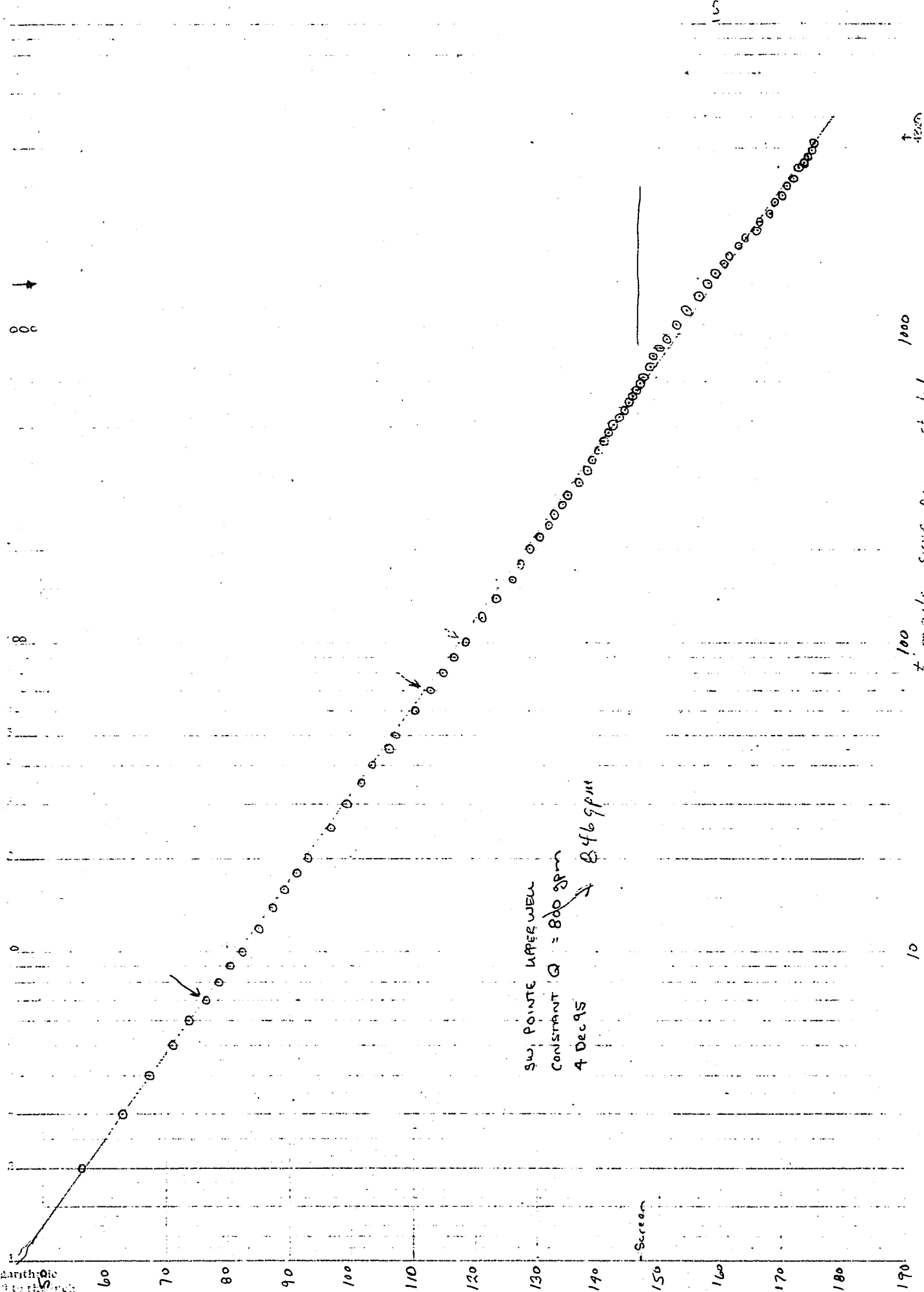


Semi-Logarithmic  
10 cycles x 10 to the inch

Pressure (psi)

Screen

SW, POINTE LAVERGNE  
CONSTANT Q = 800 gpm  
4 Dec 95  
Q 469 gpm



0.00

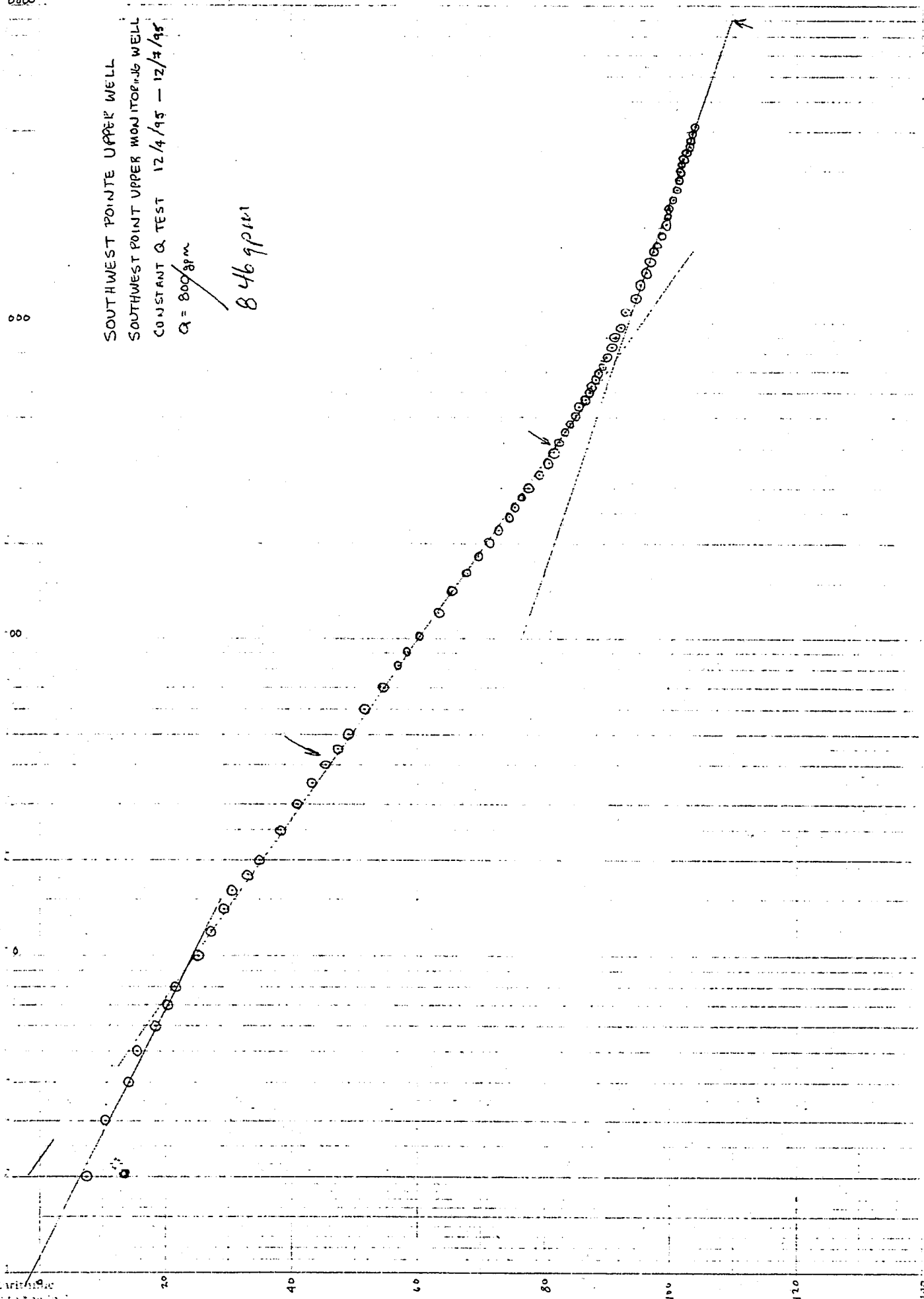
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SOUTHWEST POINTE UPPER WELL  
 SOUTHWEST POINT UPPER MONITORING WELL  
 CONSTANT Q TEST 12/4/95 - 12/7/95  
 $Q = 800 \text{ gpm}$

846 gpm



Drawdown (s)

Time (min)



# WASHOE COUNTY

DEPARTMENT OF PUBLIC WORKS  
UTILITY DIVISION

## PUMPING TEST DATA

WELL SW Pointe Upper Well

PUMPING/OBSERVATION WELL

PUMPING/RECOVERY DATA

PAGE 1 OF 2

TYPE of PUMPING TEST Constant Q

HOW Q MEASURED Orifice Weir

M.P. for WL's top of 1" tube elev. \_\_\_\_\_

HOW WL's MEASURED Electric Sounder

DEPTH of PUMP/AIRLINE \_\_\_\_\_ wrt \_\_\_\_\_

PUMPED WELL NO. \_\_\_\_\_

% SUBMERGENCE: initial \_\_\_\_\_; pumping \_\_\_\_\_

RADIUS of PUMPED WELL \_\_\_\_\_

PUMP ON: date 9 Dec 95 time 10:00 Am

DISTANCE from PUMPED WELL \_\_\_\_\_

PUMP OFF: date 7 Dec 95 time 10:00 Am

TIME					WATER LEVEL DATA				WATER PRODUCT.		COMMENTS
t = at t' = 0					STATIC WATER LEVEL 113.27						
CLOCK TIME	ELAPSED TIME			t / t'	READING	CONVERSIONS OF CORRECTIONS	WATER LEVEL	S or S'		Q	(NOTE ANY CHANGES IN OBSERVERS)
	mins	hrs	t								
10:00	72		4320	0		289.96	Sand 2.46		176.69		
			4321	1	4321	217.96			104.69		
			4322	2	2161	217.89			104.62		
			4323	3	1441	213.49			100.22		
			4324	4	1081	208.57			95.30		
			4325	5	865	206.33			93.06		
			4326	6	721	203.74			90.47		
			4327	7	618	201.37			88.10		
			4328	8	541	199.20			85.93		
			4329	9	481	197.17			83.90		
			4330	10	433	195.43			82.16		
				12	361	192.30			79.03		
				14	310	189.69			76.42		
				16	271	187.42			74.15		
				18	241	185.18			72.21		
			4340	20	217	183.80			70.53		
				25	174	180.05			66.78		
			4350	30	145	176.92			63.65		
				35	124	174.38			61.11		
			4360	40	109	172.33			59.06		
				45	97	170.26			56.99		
			4370	50	87	168.61			55.04		
			4375	55	80	167.08			53.81		
			4380	60	73	165.69			52.42		
			4391	71	62	162.94			49.67		
			4400	80	55	161.08			47.81		
			4410	90	49	159.19			45.92		
			4420	100	44	157.54			44.27		
			4440	120	37	154.68			41.41		
			4473	143	31	152.00			38.73		
			4390	160	27	150.35			37.08		
			4500	180	25	149.25			35.98		
			4530	210	22	146.31			33.04		
			4560	240	19	144.35			31.08		
			4590	270	17	142.73			29.46		
3:00 PM			4620	300	15.4	141.45			28.18		
3:40 P			4660	340	13.7	138.96			25.69		
4:30 P			4710	390	12.1	137.91			24.64		
2:10			4950	660	7.6	131.18			17.91		
			5160	910	5.1	122.11			15.12		

# WASHOE COUNTY

**DEPARTMENT OF PUBLIC WORKS  
UTILITY DIVISION**

## PUMPING TEST DATA

TYPE of PUMPING TEST CONSTANT Q RECOVERY

## HOW Q MEASURED

HOW WL's MEASURED ACTAT SOUNDER

PUMPED WELL NO.

RADIUS of PUMPED WELL

DISTANCE from PUMPED WELL

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

DEPTH of PUMP/AIRLINE \_\_\_\_\_ wrt

% SUBMERGENCE: initial \_\_\_\_\_; pumping \_\_\_\_\_

PUMP ON: date 12/4/95 time 1000

PUMP OFF: date 12/7/95 time 1000

WELL SW POINT UPPER WELL

PUMPING / OBSERVATION WELL

PUMPING/RECOVERY DATA

PAGE 2 OF 2

[illegible]



# WASHOE COUNTY

DEPARTMENT OF PUBLIC WORKS  
UTILITY DIVISION

## PUMPING TEST DATA

WELL SOUTHWEST POINT UPPER MONITORING WELL

PUMPING OBSERVATION WELL

PUMPING RECOVERY DATA

PAGE 1 OF 2

TYPE of PUMPING TEST CONSTANT Q RECOVERY TEST

HOW Q MEASURED \_\_\_\_\_

M.P. for WL's TOP OF CASING elev. \_\_\_\_\_

HOW WL's MEASURED ACTAT SOUNDER

DEPTH of PUMP/AIRLINE \_\_\_\_\_ wrt \_\_\_\_\_

PUMPED WELL NO. \_\_\_\_\_

% SUBMERGENCE: initial \_\_\_\_\_; pumping \_\_\_\_\_

RADIUS of PUMPED WELL \_\_\_\_\_

PUMP ON: date 12/4/95 time 1000

DISTANCE from PUMPED WELL \_\_\_\_\_

PUMP OFF: date 12/7/95 time 1000

TIME $t = 4320$ at $t' = 0$ $213.06'$					WATER LEVEL DATA STATIC WATER LEVEL <u>108.47</u>				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)
1001		4321	1	4321	208.25			99.78			
		4322	2	2161	203.19			94.72			
		4323	3	1441	200.20			91.73			
		4324	4	1081	197.77			89.30			
		4325	5	865	195.64			87.17			
		4326	6	721	193.66			85.19			
		4327	7	618	192.00			83.53			
		4328	8	541	190.52			82.05			
		4329	9	481	189.14			80.67			
1010		4330	10	433	187.83			79.36			
1012		4332	12	361	185.50			77.03			
1014		4334	14	310	183.44			74.97			
		4336	16	271	181.63			73.16			
		4338	18	241	179.98			71.51			
1020		4340	20	217	178.50			70.03			
1025		4345	25	174	175.28			66.81			
1030		4350	30	145	172.62			64.15			
		4355	35	124	170.28			61.81			
		4360	40	109	168.27			59.80			
		4365	45	97	166.42			57.95			
		4370	50	87	164.83			56.36			
		4375	55	80	163.65			55.18			
1100		4380	60	73	161.97			53.50			
		4392	72	61	159.16			50.69			
		4401	81	54	157.23			48.76			
		4411	91	48	155.43			46.96			
		4421	101	44	153.83			45.36			
		4441	121	37	151.03			42.56			
		4474	144	31	148.36			39.89			
		4481	161	28	146.71			38.24			
		4501	181	25	145.38			36.91			
		4531	211	21.5	142.55			34.08			
		4561	241	18.9	140.65			32.18			
		4591	271	16.9	138.98			30.51			
1501		4621	301	15.4	137.66			29.19			
1541		4661	341	13.7	135.94			27.47			
		4711	391	11.9	134.13			25.66			
2100		4980	660	7.55	127.22			18.75			
0000		5160	840	6.14	124.53			16.06			



**DEPARTMENT OF PUBLIC WORKS  
UTILITY DIVISION**

## PUMPING TEST DATA

SOUTHWEST POINT  
WELL UPPER MONITORING WELL  
PUMPING/OBSERVATION WELL  
PUMPING/RECOVERY DATA  
PAGE 2 OF 2

TYPE of PUMPING TEST CONSTANT Q RECOVERY

## HOW Q MEASURED

M.P. for WL's TOP OF CABIN elev. \_\_\_\_\_

HOW WL's MEASURED ACTAT SOUNDER

DEPTH of PUMP/AIRLINE \_\_\_\_\_ wrt \_\_\_\_\_

PUMPED WELL NO. SW POINT UPPER WELL

% SUBMERGENCE: initial \_\_\_\_\_; pumping \_\_\_\_\_

RADIUS of PUMPED WELL

PUMP ON: date 12/4/95 time 1000

DISTANCE from PUMPED WELL

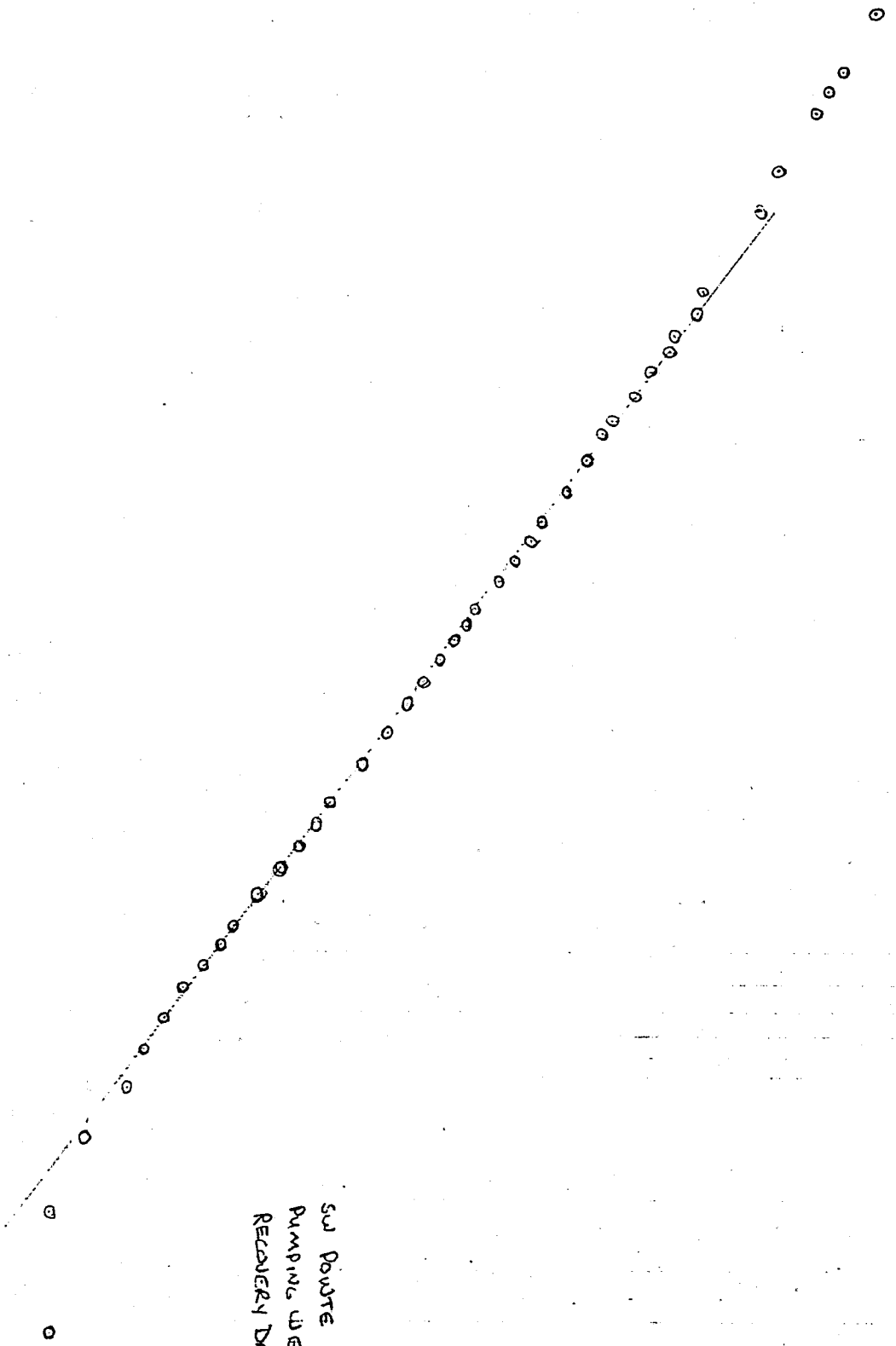
PUMP OFF: date 12/7/95 time 1000

[illegible]

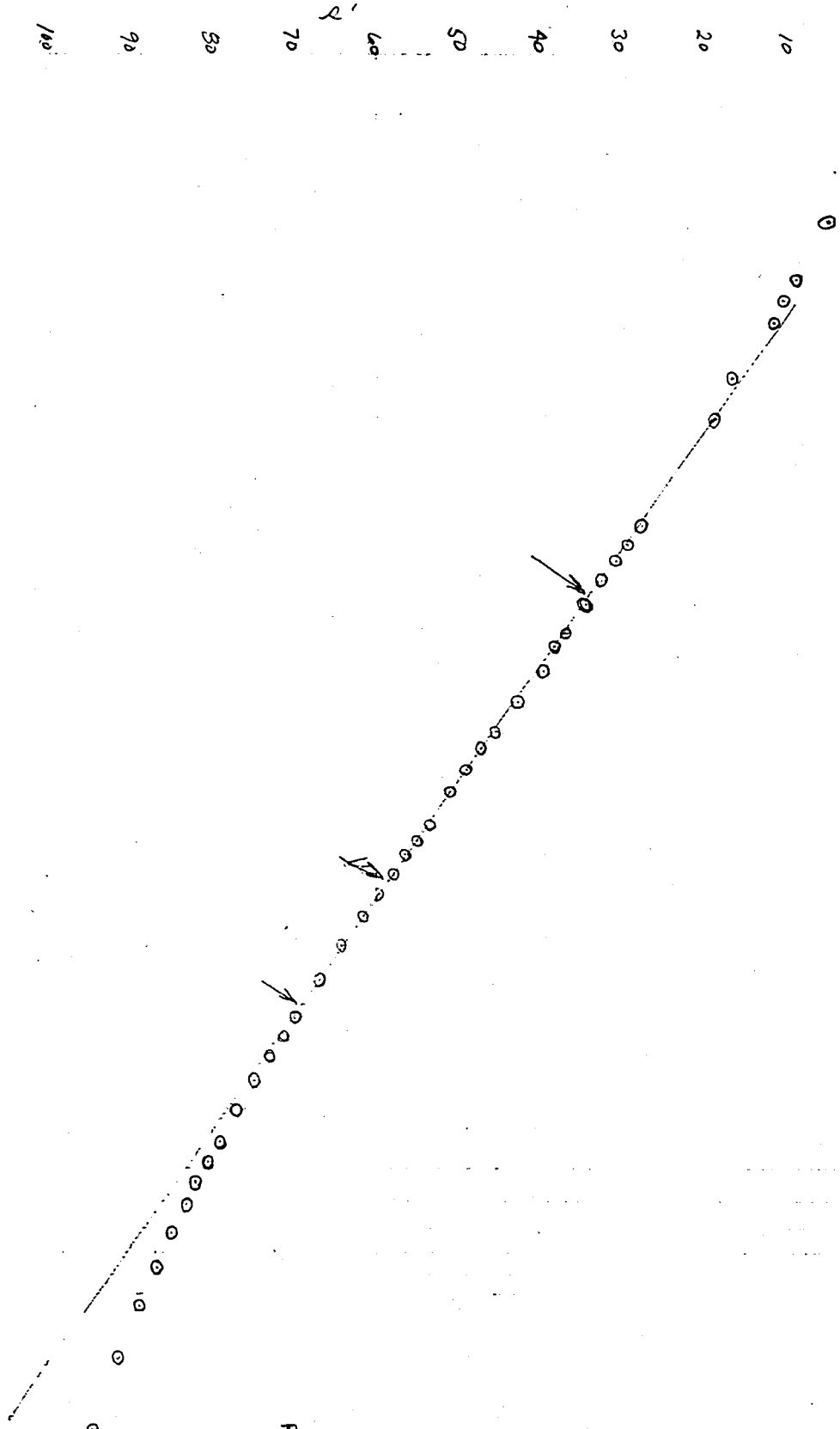


0  
10  
20  
30  
40  
50  
60  
70  
80  
90  
100

$t/t'$



SW POUDE  
PUMPING WELLS  
RECOVERY DATA



Recovery Data  
 S.W. Pointe  
 Upper Well (Monitoring)  
 Constant  $Q \approx 80 \text{ gpm}$   
 8469m

Contract Documents and Specifications  
Southwest Pointe Production and Exploration Wells

SCHEDULE OF ITEMS AND PRICES

ITEM NO.	APPROX. QUANTITY	DESCRIPTION OF ITEM WITH UNIT UNIT PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
<u>PRODUCTION WELL</u>				
1.	1 Ea.	Mobilization and Demobilization including all materials, labor, equipment for completion, testing and site rehabilitation for one production well as described in Specifications for the lump sum price of <u>Six Thousand and no cents</u>	<u>\$ 6,000.00/LS</u>	<u>\$ 6,000.00</u> ✓
2.	24 hrs.	Standby time at Owner's request approx. 24 hrs at <u>One Hundred Twenty and no cents</u> per hour.	<u>\$ 120.00/HR</u>	<u>\$ 2,880.00</u> ✓
3.	100 ft.	Drill 24 inch minimum diameter borehole to a depth of 100 feet at <u>One Hundred and no cents</u> per lineal foot.	<u>\$ 100.00/FT</u>	<u>\$10,000.00</u> ✓
4.	101 ft.	Provide and install 101 feet of nominal 20-inch diameter steel conductor pipe to a depth of 100 feet at <u>Fifty Three and no cents</u> per lineal foot.	<u>\$ 53.00/FT</u>	<u>\$ 5,353.00</u> ✓
5.	100 ft.	Provide and install 100 feet sanitary seal at lump sum of <u>Twenty Five Thousand and no cents.</u>	<u>\$ 2,500.00/LS</u>	<u>\$ 2,500.00</u>
6.	600 ft.	Drill nominal 7-inch diameter pilot borehole from 100 to approximately 700 feet at <u>Fifteen and no cents</u> per lineal foot.	<u>\$ 15.00/FT</u>	<u>\$9,000.00</u> ✓

ITEM NO.	APPROX. QUANTITY	DESCRIPTION OF ITEM WITH UNIT UNIT PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
7.	600 ft.	Drill 16-inch minimum diameter production borehole from 100 to approximately 700 feet at <u>Thirty and no cents</u> per lineal foot.	<u>\$30.00/FT</u>	<u>\$18,000.00</u> ✓
8.	360 Feet	Furnish & install 10-inch dia. wire wrap well screen, approx. 360 feet at <u>Thirty dollars and Fifty cents</u> per lineal ft.	<u>\$30.50/FT</u>	<u>\$10,980.00</u> ✓
9.	342 ft.	Furnish and install 10-inch diameter blank production casing, approximately 342 feet at <u>Seventeen dollars and Fifty cents</u> per lineal foot.	<u>\$17.50/FT</u>	<u>\$5,985.00</u> ✓
10.	35 Yards <sup>3</sup>	Furnish & install design gravel pack, estimated 35 yds <sup>3</sup> at <u>Two Hundred and no cents</u> per yd. <sup>3</sup>	<u>\$200.00/YD</u>	<u>\$7,000.00</u> ✓
11.	40 Hours	Development by jetting, estimated at 40 hours at <u>Two Hundred Forty and no cents</u> per hour.	<u>\$240.00/HR</u>	<u>\$9,600.00</u> ✓
12.	40 Hours	Development by pumping, estimated at 40 hours at <u>One Hundred Sixty and no cents</u> per hour.	<u>\$160.00/HR</u>	<u>\$6,400.00</u> ✓
13.	80 Hours	Furnish, install, operate & remove necessary equipment for test pumping, estimated at <u>One Hundred Sixty and no cents</u> per hour.	<u>\$160.00/HR</u>	<u>\$12,800.00</u> ✓
14.	1 Each	Well disinfection & capping at the lump sum price of <u>Four Hundred and no cents</u>	<u>\$400.00/LS</u>	<u>\$400.00</u> ✓
15.	1 Each	Video Camera Log at the lump sum price of <u>One Thousand and no cents</u>	<u>\$1,000.00/LS</u>	<u>\$1,000.00</u> ✓

Contract Documents and Specifications  
Southwest Pointe Production and Exploration Wells

ITEM NO.	APPROX. QUANTITY	DESCRIPTION OF ITEM WITH UNIT UNIT PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
<u>EXPLORATION WELL</u>				
16.	1 Ea.	Mobilization and Demobilization including all materials, labor, equipment for completion and site rehabilitation for one test well as described in Specifications for the lump sum price of <u>Four Thousand and no cents</u> .	<u>\$4,000.00/LS</u>	<u>\$4,000.00</u> ✓
17.	700 ft.	Drill nominal 8-inch diameter pilot hole to a depth of approximately 700 feet at <u>Twenty and no cents</u> per lineal foot.	<u>\$20.00/FT</u>	<u>\$14,000.00</u> ✓
18.	1 ea.	Provide a geophysical log of borehole at lump sum price of <u>Two Thousand and no cents</u> .	<u>\$2,000.00/LS</u>	<u>\$2,000.00</u> ✓
19.	460 ft.	Provide and install 4 inch diameter slotted steel casing, estimated at 460 feet at <u>Eighteen and no cents</u> per linear foot.	<u>\$18.00/FT</u>	<u>\$8,280.00</u> ✓
20.	240 ft.	Provide and install 4 inch diameter blank steel casing, estimated at 240 feet at <u>Seven and fifty cents</u> per linear foot.	<u>\$7.50/FT</u>	<u>\$1,800.00</u> ✓
21.	11 yds.	Furnish and install gravel pack estimated at 11 yards at <u>Two Hundred and no cents</u> per yard.	<u>\$200.00/YD</u>	<u>\$2,200.00</u> ✓
22.	1 ea.	Furnish and install 50 foot sanitary seal at lump sum price of <u>Twenty Five Hundred and no cents</u> .	<u>\$2,500.00/LS</u>	<u>\$2,500.00</u> ✓

Contract Documents and Specifications  
Southwest Pointe Production and Exploration Wells

ITEM APPROX. NO.	QUANTITY	DESCRIPTION OF ITEM WITH UNIT UNIT PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
23.	6 hrs. 7.5	Furnish, install, complete and remove necessary equipment for air lift development estimated at six hours at <u>Two Hundred Forty and no cents</u> per hour.	<u>\$240.00/HR</u>	<u>1,800</u> <u>\$1,440.00 /</u>
24.	1 each	Furnish and install vandal resistant, 6-inch wellhead protector and locking cap at the lump sum price of <u>Five Hundred and no cents</u> .	<u>\$500.00/LS</u>	<u>\$500.00 /</u>
PROPOSAL- BASE BID				<u>\$144,618.00 ✓</u>

BASE BID WRITTEN IN WORDS

One Hundred Forty Four Thousand, Six Hundred Eighteen and No Cents

Expl. well      36,720 + 360 + (      ) + 75  
                                          develop      blank  
                                          ↓  
                                          gravel

Contract Documents and Specifications  
Southwest Pointe Production and Exploration Wells

ITEM NO.	APPROX. QUANTITY	DESCRIPTION OF ITEM WITH UNIT UNIT PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL PRICE
<u>OPTIONAL PRODUCTION WELL</u>				
1.	1 Ea.	Mobilization and Demobilization including all materials, labor, equipment for completion, testing and site rehabilitation for one optional production well as described in Specifications for the lump sum price of <u>Three Thousand and no cents</u> .	<u>\$3,000.00/LS</u>	<u>\$3,000.00</u> ✓
2.	100 ft.	Drill 26-inch minimum diameter borehole to a depth of 100 feet at <u>One Hundred Five and no cents</u> per lineal foot.	<u>\$105.00/FT</u>	<u>\$10,500.00</u> ✓
3.	101 ft.	Provide and install 101 feet of nominal 22-inch diameter steel conductor pipe to a depth of 100 feet at <u>Fifty Eight and no cents</u> per lineal foot.	<u>\$58.00/FT</u>	<u>\$5,858.00</u> ✓
4.	100 ft.	Provide and install 100 feet sanitary seal at lump sum of <u>Three Thousand and no cents</u> .	<u>\$3,000.00/LS</u>	<u>\$3,000.00</u> ✓
5.	600 ft. 510	Drill 18-inch minimum diameter production borehole from 100 to approximately 700 feet at <u>Forty and no cents</u> per lineal foot.	<u>\$40.00/FT</u>	<u>\$24,000.00</u> ✓
6.	✓ 320 ft.	Furnish & install 12-inch diameter wire wrap well screen, approx. 320 feet at <u>Thirty five and Fifty cents</u> per lineal ft.	<u>\$35.50/FT</u>	<u>\$11,360.00</u> ✓ -3600

Contract Documents and Specifications  
Southwest Pointe Production and Exploration Wells

ITEM NO.	APPROX. QUANTITY	DESCRIPTION OF ITEM WITH UNIT UNIT PRICE WRITTEN IN WORDS	UNIT PRICE	TOTAL P R I C E
7.	382 ft. 290	Furnish and install 12-inch diameter blank production casing, approximately 382 feet at <u>Twenty and no cents</u> per lineal foot.	<u>\$20.00/FT</u>	<u>-1840</u> <u>\$7,640.00</u> ✓
8.	35 Yards <sup>3</sup> 36	Furnish & install design gravel pack, estimated 35 yds <sup>3</sup> at <u>Two Hundred and no cents</u> per yd. <sup>3</sup>	<u>\$200.00/YD</u>	<u>6,000</u> <u>\$7,000.00</u> ✓
9.	40 Hours	Development by jetting, estimated at 40 hours at <u>Two Hundred Forty and no cents</u> per hour.	<u>\$240.00/HR</u>	<u>\$9,600.00</u> ✓
10.	40 Hours	Development by pumping, estimated at 40 hours at <u>One Hundred Sixty and no cents</u> per hour.	<u>\$160.00/HR</u>	<u>\$6,400.00</u> ✓
11.	80 Hours	Furnish, install, operate & remove necessary equipment for test pumping, estimated at 80 hrs at <u>One Hundred Sixty and no cents</u> per hour.	<u>\$160.00/HR</u>	<u>\$12,800.00</u> ✓
12.	1 Each	Well disinfection & capping at the lump sum price of <u>Four Hundred and no cents</u>	<u>\$400.00/LS</u>	<u>\$400.00</u> ✓
13.	1 Each	Video Camera Log at the lump sum price of <u>One Thousand and no cents</u>	<u>\$1,000.00/LS</u>	<u>\$1,000.00</u> ✓



Contract Documents and Specifications  
Southwest Pointe Production and Exploration Wells

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PROPOSAL- OPTIONAL BID

\$101,558.00

OPTIONAL BID WRITTEN IN WORDS

102,558.00

One Hundred One Thousand, Five Hundred Fifty Eight and No Cents

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TOTAL BID SUMMARY

BID WILL BE AWARDED BASED ON THE LOWEST TOTAL BID.

BASE BID \$144,618.00

OPTIONAL BID \$101,558.00

TOTAL BID \$246,176.00

TOTAL BID WRITTEN IN WORDS

247,176

Two Hundred Forty Six Thousand, One Hundred Seventy Six and No Cents

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**SPECIAL CONDITIONS**

**1. GENERAL**

This section of the Specifications covers the Special Conditions applicable to the project, which are not covered by the General Provisions, or the Well Specifications.

**2. LIQUIDATED DAMAGES**

Should the Contractor fail to complete the work or any part thereof in the time agreed upon in the contract, the Contractor will be subject to liquidated damages of up to \$300 per calendar day for each day after the time has expired. In addition to other possible damages the Owner is authorized to use liquidated damages to pay additional costs for Resident Engineering and/or Inspection and such other costs as are incurred as a result of the delay in completion of this project within the specified time limit.

**3. COPIES OF DOCUMENTS**

The Owner will furnish to the Contractor up to six (6) copies of the Specifications and Drawings as are reasonably necessary for the execution of the work.

**4. WORKING HOURS**

The Contractor may, at his discretion, extend working hours to meet the requirements of the job. The Contractor must meet all State and Local requirements for noise levels and any other State or Local ordinance that may affect the performance of the work.

**5. AIR QUALITY-OPERATING PERMITS**

Before starting construction, the Contractor must submit and receive approval on a plan for controlling dust from excavation and stockpiling operations at:

Washoe County District Health Department  
1001 East Ninth Street  
P.O. Box 11130  
Reno, Nevada 89520

**6. SANITARY FACILITIES**

The Contractor shall provide sanitary facilities at each active job site.

**7. WARNING SIGNS AND BARRICADES**

The Contractor shall provide adequate barriers, warning signs, lights, temporary signals, and other protective devices. All warning devices shall conform with the Manual on Uniform Traffic Control Devices for Streets and Highways published by the U.S. Department of Transportation Federal Highway Administration, current edition.

**8. INTERFERING STRUCTURES AND UTILITIES**

The Contractor shall exercise all possible caution to prevent damage to existing structures and utilities whether above ground or underground. Notify Underground Service Alert at 1-800-227-2600 at least two working days prior to digging. The Contractor shall notify all utility offices concerned at least 48 hours in advance of construction operations in which a utility's facilities may be involved. This shall include, but not be limited to, irrigation, water, telephone, electric, oil, gas, and television sources.

It shall be the responsibility of the Contractor to locate and expose all existing underground structures and utilities in advance of the trench excavation. Any structure or utilities damaged by the work shall be repaired or replaced in a condition equal to or better than the condition prior to the damage. Such repair or replacement shall be accomplished at the Contractor's expense without additional compensation from the Owner.

The Contractor shall remove and replace such small miscellaneous structures as drain pipe, culverts, mailboxes, and sign posts at his own expense without additional compensation from the Owner. The Contractor shall replace these structures in a condition as good as or better than their original conditions.

If interfering power poles, telephone poles, guy wires, or anchors are encountered, the Contractor shall notify the Engineer at least seven (7) days in advance of construction to permit arrangements with the utility company for protection or relocation of the structure. Such structures will not be considered to interfere unless they are within five (5) feet of the trench center line.

If the Contractor encounters existing structures which will prevent the construction of the pipeline which are not properly shown on the Plans, he shall notify the Engineer before continuing with the construction in order that the Engineer may make such field revisions as necessary to avoid conflict with the existing

Contract Documents and Specifications  
Southwest Pointe Production and Exploration Wells

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structures. If the Contractor shall fail to so notify the Engineer when an existing structure is encountered, but shall proceed with the construction despite this interference, he shall do so at his own risk. In particular, when the location of the new construction as shown on the Plans, will prohibit the restoration of existing structures to their original conditions, he shall notify the Engineer so a field relocation may be made to avoid the conflict.

**9. CONTRACTOR'S RESPONSIBILITY FOR UTILITY PROPERTIES  
AND SERVICE**

At points where the contractor's operations are adjacent to or cross properties of railway, telegraph, telephone, irrigation or canal, power, oil, gas, water and petroleum companies or are adjacent to other property (damage to which might result in considerable expense, loss, and inconvenience) no work shall be started until all arrangements necessary for the protection thereof have been made. It shall be the Contractor's responsibility to protect from damage all power poles.

The Contractor shall be solely and directly responsible to the owners and operators of such properties for any damage, injury, expense, loss, inconvenience, delay, suits, actions, or claims of any character brought because of any injuries or damage which might result from the carrying out of the work to be done under the Contract.

In the event of interruption of either domestic or irrigation water or to other utility services as a result of accidental breakage or as a result of being exposed or unsupported, the Contractor shall promptly notify the proper authority. He shall cooperate with the said authority in restoration of service as promptly as possible and shall bear all costs or repairs. In no case shall interruption of any water or utility service be allowed to exist outside working hours unless prior approval is received.

Neither the Owner nor its officers or agents shall be responsible for damages to the Contractor as a result of the existence of utility lines not shown on the Plans.

**10. CLOSING STREETS AND DRIVEWAYS**

The Contractor shall obey all rules, laws, ordinances, and regulations of the state, county, and city authorities as to the closing or the barricading of public roads and streets.

The work shall be carried out so as to cause a minimum of

Contract Documents and Specifications  
Southwest Pointe Production and Exploration Wells

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dislocation of normal commercial procedures. Traffic must be kept open on those roads and streets where detour is possible. The Contractor shall, without further or other order, provide, erect, and maintain at all times during the progress of temporary suspension of the work, suitable barricades, fences, signs or other adequate protection and shall provide, keep, and maintain such danger lights, signals, and flagmen as necessary or ordered by the Engineer to insure the safety of the public as well as those engaged in connection with the work. All barricades and obstructions shall be protected by signal lights which shall be kept burning from one hour before sunset until one hour after sunrise and at such other times as vision is obscured by fog, smoke, or dust.

**11. PUBLIC SAFETY AND ACCESS**

During all construction operations, the Contractor shall construct and maintain such facilities as may be required to provide access of all property owners to their property. No person shall be cut off from access to his residence or place of business for a period exceeding eight (8) hours, unless the Contractor has made a special arrangement with the affected persons.

**12. WATER AND POWER**

The contractor shall be responsible for furnishing all required utilities for construction purposes, including but not limited to, water, electrical, power, gas, telephone, and sanitary facilities. The contractor shall pay all costs involved in securing and using such utilities.

**13. BURNING OF VEGETATION**

No burning of vegetation will be allowed.

Contract Documents and Specifications  
Southwest Pointe Production and Exploration Wells

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**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 10-inch diameter, steel cased, gravel envelope, production well approximately 700 feet deep; a 4-inch diameter, steel cased, gravel enveloped exploration well approximately 700 feet deep; and, at the Owner's option, a 12 inch diameter, steel cased, gravel enveloped, production well approximately 700 feet deep.

Payment for Mobilization and Demobilization will be 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 bid item.

**2. Contractor's Qualifications**

The Contractor shall have been engaged in the business of construction hydraulic rotary-drilled and reverse rotary drilled gravel envelope wells of diameter, depth, and capacity equivalent to the proposed wells for a period of not less than 5-years. The Owner may request the Contractor supply a reference list of at least three clients for which the Contractor has completed similar wells.

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

Contract Documents and Specifications  
Southwest Pointe Production and Exploration Wells

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**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. Preconstruction Conference**

Before starting the work, a conference will be held to review scheduling of work to establish procedures for handling shop drawings and other submissions and for processing applications for payment, and to establish a working understanding between the parties as to the project. Present at the conference will be the Engineer, Contractor and his Superintendent, and representatives of the Washoe County Utility Division. The Contractor shall provide at the preconstruction conference a list showing the names and responsibilities of personnel assigned to complete the project.

**5. Daily Logs**

Drillers Logs showing daily progress are to be kept at the job site and marked daily as the work proceeds. The logs shall be kept available for inspection by the Engineer at all times. At the completion of the work and before final payment, these logs shall be signed by the Contractor and returned to the Engineer.

**6. Location, Access and Drilling Conditions**

The wells are located in the South Truckee Meadows in Sections 23 and 24 of T18N R19E (see attached map). The site is open, sagebrush covered land with dirt road access. A Drillers Log from a test well (site of the production well) drilled in 1992 to a depth of 590 feet is attached. Please note that loss circulation zones existed in this test well at 177-180 and 420-460 feet. Competent volcanic rock was encountered at 580 feet. The Contractor shall familiarize himself with surface and subsurface conditions within the drill site prior to bidding.

**7. Equipment and Operating Requirements**

The Contractor has the option to drill with the flood reverse method or the mud rotary method. The equipment to be furnished shall be approved by the Owner and have excess capacity to construct the wells as specified herein. For the mud rotary drilling method, the following accessory equipment shall include:

Contract Documents and Specifications  
Southwest Pointe Production and Exploration Wells

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- a. Mud pit with operational desanders and shale-shaker. Pit shall have a volume capacity of at least 3X maximum anticipated borehole volume (700 feet, 16-inch diameter borehole: volume = approximately 22,000 gallons).
- b. Mud pressure gage.
- c. Approved equipment for measuring mud properties.
- d. Weight indicator.
- e. Drill collars for added weight during early stages of drilling.

8. Well Construction

- a. Boreholes - The boreholes for the wells shall be drilled to the depth specified by the Owner. The production borehole shall be a minimum diameter of 16 inches with an estimated depth of 700 feet. The borehole for the exploration well shall be a minimum of 8 inches in diameter to an estimated depth of 700 feet as directed by the owner. If the optional production well is drilled, the borehole shall be a minimum diameter of 18 inches to an estimated depth of 700 feet.

The borehole for conductor pipe shall be a minimum diameter of 24 inches to a depth of 100 feet for the production well and a minimum diameter of 26 inches to a depth of 100 feet for the optional well.

Payment for the boreholes 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 Engineer. No payment shall be made for overdrilling as desired by the Contractor.

Formation samples shall be taken at 10-foot intervals or at each change in formation. Samples shall be stored and clearly labeled in Ziploc freezer bags or approved equal. The Contractor shall have a grain size analysis performed on a minimum of two formation samples selected by the Owner. The results of the analyses, including recommendations for slot size openings, shall be delivered to the Owner for review within 72 hours of sample collection.

- b. Drilling Fluid - When it becomes necessary to add clays or



Contract Documents and Specifications  
Southwest Pointe Production and Exploration Wells

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chemicals to the drilling fluid, it must be borne in mind that it is desirable 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.

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. The mud engineer shall have the responsibility to maintain mud and loss-circulation properties in a manner meeting the goals of aquifer protection.

The Contractor shall monitor and maintain the fluid properties as outlined by the mud engineer. In the event the Contractor cannot attain these properties, the mud shall be replaced at no additional cost to the Owner.

- c. Geophysical Log - The Contractor shall provide a geophysical log of the monitor well borehole from a reputable Well Logging Services Contractor such as WELENCO, GEO-HYDRO-DATA or approved equal. The logs shall consist of Point, Long and Short Normal Resistivity and Spontaneous Potential. The Contractor shall make every reasonable effort to ensure logging of the entire borehole. Payment for the geophysical logging shall be at the price quoted in the "SCHEDULE OF ITEMS AND PRICES".
- d. Conductor and Well Casing - All production casing shall be of new, first quality materials and free of defects in workmanship and handling. No reject, subgrade or limited-use pipe is acceptable. Production and conductor casing shall be black steel pipe, welded or seamless. Either fabricated or mill-type pipe is acceptable. 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. For the production well, the outside diameter shall be 10 3/4-inches with a minimum wall thickness of 0.25 inches. For the production well conductor, the outside diameter shall be 20 inches with a minimum wall thickness of 0.375 inches. For the exploration well, the outside diameter shall be 4.50 inches

Contract Documents and Specifications  
Southwest Pointe Production and Exploration Wells

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with a minimum wall thickness of 0.188 inches. If the optional well is constructed, the conductor pipe shall have an outside diameter of 22 inches with a minimum wall thickness of 0.375 inches and the well casing shall have an outside diameter of 12.75 inches with a minimum wall thickness of 0.250 inches. The Contractor shall furnish the Owner with mill certification from the casing manufacturer prior to installation of the casing.

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

- e. Well Screen - Well screen shall be of the continuous slot design, wire wound Hi Cap (<sup>TM</sup>) as manufactured by UOP Johnson, Inc., or approved equal. Screen shall be of new, first quality material, free of defects in workmanship or handling. The screen shall be constructed of low carbon steel and have a wire size of sufficient strength for a depth setting 700 feet. The production well screen shall have an outside diameter of 10 3/4-inches. A blank casing sump, ten (10) feet in length shall be added to the well screen. The bottom of the sump shall be covered with a steel rounded bullnose plug fabricated of the same material as the 10 3/4-inch diameter production casing. If the optional well is constructed, the well screen shall have an outside diameter of 12.750 inches and meet similar construction standards as the 10 inch well. A 10 foot sump and cover will also be installed. The exploration well shall have, at a minimum, four slots/ft of perforations at 3 inches x 3/32 inches and end cap.

Final selection of 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 for both production wells.

Payment for Well Screen casing shall be at the per foot price for screen installed at the request and approval of the Engineer as stated under the "SCHEDULE OF ITEMS AND PRICES".

- f. Installation of Conductor Casing - The conductor casing borehole shall be a minimum 24 inch diameter (26 inch diameter for the optional well) and drilled to a depth of 100 feet.

Contract Documents and Specifications  
Southwest Pointe Production and Exploration Wells

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The conductor casing shall be equipped with centering guides, with the first ones located about 4 feet above the bottom of the casing and then approximately every 30 feet. The centering guides shall be approved by the geologist prior to installation. The top of the casing shall extend 1 foot above land surface. Payment for Conductor casing shall be at the per foot price for conductor installed at the request and approval of the Engineer as stated under the "SCHEDULE OF ITEMS AND PRICES".

- g. Installation of Grout Surface Seal - The grout surface seal shall be implaced through the use of a tremmie pipe with positive displacement. The grout shall be composed of a thoroughly mixed, free of lumps and stones, cement grout. The grout shall consist of a mixture of 5.2 gallons of clean water mixed with each sack (94 lbs.) of Portland type C cement. The slurry mix shall produce a slurry weight of 15.6 lbs/gal. The cement, after placement, shall be allowed to set up for a period of not less than 36 hours, after which drilling may proceed. Stand by time will not be paid during this set up period. A reserve of at least fifty percent (50%) over the calculated volume of cement required shall be stocked on location to allow for volume differences due to washouts. Payment shall be at the lump sum prices quoted in the "SCHEDULE OF ITEMS AND PRICES".
- h. Casing and Screen 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 boreholes shall be drilled to a minimum diameter of 16 inches for the production well and 18 inches for the optional well.

Casing and screen shall be installed using methods approved by the Owner. The 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 installation is complete.

The 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 fifty (50) feet apart.

Welders required for field assembly of well casing and screen shall be qualified in accordance with the latest revision of

Contract Documents and Specifications  
Southwest Pointe Production and Exploration Wells

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the section titled, "Welding Procedures" of the AWA Standard Qualification Procedure. All sections shall be joined by a watertight continuous, full fillet weld.

- g. Gravel - The gravel to be installed shall be composed of sound, durable, well-rounded particles containing no silt, clay, organic matter or deleterious materials. It shall be well-graded within limits as determined by the Owner, within two working days of receipt of grain size distribution curves from the Sieve Analysis. Gravel dumped on site shall be protected from contamination by covering with plastic sheeting or shall be delivered in protective bag containers. For bid purposes, Contractor shall anticipate a "design" gravel pack of "Chevreaux" 1/4 x 1/8 inch washed material or equivalent. Gravel for the monitor well shall be standard "pea" gravel, 1/4 x 1/8 inches.

Payment for gravel shall be at the per yard price for gravel installed under "SCHEDULE OF ITEMS AND PRICES". Contractor shall supply Engineer with gravel invoice, stating quantity of gravel delivered on site.

The contractor shall have the responsibility and shall determine when conditions with respect to drilling fluid and hole stability are satisfactory for gravel placement to begin without bridging. Placement of gravel shall be through a tremmie pipe installed to a depth as directed by the Owner.

Placement of gravel by end-dumping with a loader or shoveling directly into the hole will not be allowed. The Contractor shall be responsible for placing the gravel in the annulus without bridging. 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. Bridging of gravel pack shall be assumed if gravel packing does not utilize at least 90% of the calculated annular space volume.

- h. Exploration Well Sanitary Seal - The annular space between the borehole and the well casing shall be sealed in a manner by displacing drilling fluid from the top of the gravel pack to the ground surface through a tremmie pipe installed to a depth to within five (5) feet of the top of the gravel.

Contract Documents and Specifications  
Southwest Pointe Production and Exploration Wells

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Payment for sanitary seal shall be at the lump sum price as stated in the "SCHEDULE OF ITEMS AND PRICES" Contractor shall provide invoice showing quantity of grout pumped into the annular space.

Seal shall be composed of a thoroughly mixed, free of lumps and stones, cement grout. Grout shall consist of a mixture of 5.2 gallons of clean water mixed with each sack (94 lbs) of Portland type C cement. The slurry mix shall produce a slurry weight of 15.6 lbs./gal. Slurry mix shall be run through a protective strainer before entering the tank from which the grout is pumped into the well. The seal shall be placed in one continuous operation once the process begins. After installation, the sanitary grout seal shall be left undisturbed for a minimum 24 hours. No standby time shall be paid during this period.

9. Development

- a. Jetting - Initial development shall be by jetting. The Contractor shall provide an jetting tool approved by the Owner. The tool shall have horizontal nozzles so water or a mixture of air and water is directed directly into screen. The Contractor may suggest other methods of development, but must be approved by the Engineer before use. The compressor for jetting shall have a capacity to unload 700 feet of water and produce a minimum air volume of 400 cubic feet per minute. Contractor shall provide compressor specifications if requested by Owner.

Development by jetting shall begin at the top of the screen and shall move downward gradually to within five (5) feet of the bottom of the well. Once one complete pass of the well has been made, development by jetting shall continue at five (5) foot intervals, until it is the opinion of the Owner that the development is complete.

Payment shall be at the unit price per hour as described under "SCHEDULE OF ITEMS AND PRICES". Payment shall be for actual jetting time and shall not include setup or tripping in and out of well.

- b. Development Pumping - The Contractor shall furnish, install, operate and remove a pump for developing the well. The pump shall have a capacity in excess of 500 gallons per minute (gpm) against a total head of 320 feet, with an anticipated

Contract Documents and Specifications  
Southwest Pointe Production and Exploration Wells

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bowl setting of 325 feet. The pump shall not have a check valve at the bottom so water is allowed to free-fall back through the column pipe and pump when the pump is shut off.

The Contractor shall furnish and install discharge piping of sufficient size and length to conduct water to a point designated by the Owner. The discharge rate shall be measured using a properly constructed orifice weir. The weir dimensions shall include a 6-inch diameter pipe with two interchangeable orifice plates, one 3-inches in diameter and one 4-inches in diameter. The discharge piping shall also include an easily operable gate valve to control flow rates. All flow and flow rate monitoring equipment shall be approved by the Owner prior to installation.

The Contractor shall include with the pump installation, a one inch diameter PVC stilling well installed to a depth of five (5) feet above the pump intake. The PVC pipe shall be open at the bottom and shall provide easy access for measuring water levels during development and testing.

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 maximum rate will be determined by the Owner 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. While pumping and surging, the Contractor shall periodically measure the gravel level in the gravel feed tube and shall add gravel if necessary. The Owner shall determine when development is complete.

Payment for development pumping shall be at the per hour rate as described under "SCHEDULE OF ITEMS AND PRICES". Payment shall be for actual pumping and surging and shall not include time for installing and removing pumping equipment.

#### 10. Pumping Tests and Disinfection

Following development operations the Contractor shall perform a complete pumping test of the well. The test pumping equipment shall be a submersible pump with a capacity range between 200 and 500 gpm against a total head of 320 feet, with an anticipated pump

Contract Documents and Specifications  
Southwest Pointe Production and Exploration Wells

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intake setting of 325 feet. The Contractor shall furnish and install discharge piping for the pumping unit, of sufficient size and length to conduct the water to a point designated by the Owner. 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 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 to be provided by the Owner. The Owner shall operate the sand testing device.

The contractor shall provide a generator of sufficient capacity to run the pump. For bid purposes, the Contractor shall anticipate a "Wisper Watt" or "Aggreko", quiet running generator available through local generator rental agencies.

Test pumping shall be directed by the Owner. The anticipated pumping scenario to include, but not be limited to the following:

- 1) Step Test - Pumping at four different rates ranging between 200 and 500 gpm. Each rate will be pumped for a minimum of 100 minutes. After completion of the step test the well shall be allowed to recover for a minimum of 12 hours before beginning the Constant Q test. Equipment installation for the Step test shall be installed and ready to operate prior to 10:00 a.m. If equipment is not ready by 10:00 a.m., the test will be delayed until 8:00 a.m. the following morning and no standby time will be paid for the overnight delay.
- 2) Constant Q - Pumping at the design capacity + 15% or 500 gpm, whichever is less, for a minimum uninterrupted period of 72 hours. Pumping beyond 72 hours shall be at the discretion of the Owner but shall not exceed 240 hours. Equipment installation for the Constant Q test shall be installed and ready to operate prior to 10:00 a.m. If equipment is not ready by 10:00 a.m., start up of the test will be delayed until 8:00 a.m. the following morning and no standby time will be paid for the overnight delay.

Actual measurements taken while testing for yield and drawdown will be the responsibility of the Engineer. The Contractor shall maintain and operate all equipment and ensure its continuous uninterrupted operation as required. Tests must be continuous without interruption for a minimum of 72 hours. If the Constant Q test is interrupted before 72 hours of pumping have elapsed, the

Contract Documents and Specifications  
Southwest Pointe Production and Exploration Wells

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well shall be allowed to recover for at least the amount of time the pump ran before failure. No payment shall be made for a Constant Q test that does not extend for a minimum 72 hours or the time specified by the Owner.

At the end of the 72 hour pumping period the pump may not be removed for a period of 72 hours or until approved by the Engineer whichever is less. Before the pump is removed the well shall be disinfected by adding 20 pounds of approximately 70 percent calcium hypochlorite tablets. The pump shall be turned on and off several times to thoroughly mix the disinfection solution in the well.

At the completion of testing and disinfection the well shall be sounded for total depth and sand and debris shall be removed from the bottom of the well.

Payment for pump testing shall be at the hourly rate specified under "SCHEDULE OF ITEMS AND PRICES". The hourly rate does not include the time spent for equipment installation and removal.

#### 11. 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 10-inch diameter well casing. The

Contractor shall utilize a plumbness test approved by the Owner and the test shall be performed in the presence of the Owner.

Failure to pass plumbness or alignment tests shall result in a rejection of the subject well. In case of rejection, no payment shall be made for a well that fails plumbness or alignment tests.

#### 12. Video Log

The Contractor shall provide a VHS video format color camera log of the completed production well. The video log shall be accomplished by a logging company with equipment specifically designed to conduct video logs of water wells. The video log shall confirm the well to be in good condition, meeting all the requirements of these Specifications as to diameter, material settings, alignment and the like. The Owner will not be required to accept the well or pay the Contractor for it if it does not meet all these requirements or if any of the well's component parts are left in a damaged condition.



Contract Documents and Specifications  
Southwest Pointe Production and Exploration Wells

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Payment for the video log shall be at the lump sum price as stated under "SCHEDULE OF ITEMS AND PRICES".

**13. Well Capping**

After testing and after approval of the well by the Owner, the Production well shall be capped in a manner approved by the Engineer. The Production casing shall be capped with a 1/4-inch minimum thickness steel plate fully welded to the casing. The steel plate shall have a 1-inch diameter access port with a threaded nipple and cap welded to the plate. The exploratory well shall be equipped with a wellhead protector and locking cap as approved by the Engineer and can be field fabricated. Payment for the wellhead protector and locking cap shall be at the lump sum price as stated under "SCHEDULE OF ITEMS AND PRICES".

**14. Site Restoration**

Contractor shall restore site to original condition or better. Drilling fluids and cuttings shall be removed from pits. 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.

X Microsoft Excel - ARROW CK 2002.xls									
File Edit View Insert Format Tools Data Window Help									
Arial 10 B I U [bold] [italic] [underline] [bullet] [list] [link] [unlink] [table] [sum] [fx] [find] [replace] [print] [100%] [help]									
AJ10 =									
	A	B	AD	AE	AF	AG	AH	AI	AJ
1	ARROWCREEK WATER FLOW RECORD 2002		9-Jul-02	15-Jul-02	22-Jul-02	29-Jul-02	5-Aug-02	12-Aug-02	19-Aug-02
2	TOTAL OF WELLS		7,081,000	7,860,000	7,578,000	8,436,000	10,895,000	6,778,000	
3	DAYS		8	6	7	7	7	7	
4	AVG / GAL / DAY		885,125	1,310,000	1,082,571	1,205,143	1,556,429	968,286	
5	# OF CUSTOMERS		558	558	558	558	571	571	5
6	AVG / SVC / USE / DAY		1586	2348	1940	2160	2726	1696	
7	ACRE FEET		21.73	24.12	23.26	25.89	33.44	20.80	0.
8									
9	WELL 1								
10	WELL DEPTH		16.5	5.1	25	3.7	25.1	12.8	
11	PUMP RUNNING?		YES	YES	YES	YES	YES	YES	
12	TIME		8:15	2:15	2:00	10:30	8:35	3:00	
13	GPM		327	300	300	291	270	246	
14	METER READING		168,622,000	171,029,000	173,388,000	176,009,000	179,435,000	181,304,000	
15	FLOW IN GALLONS		2,223,000	2,407,000	2,359,000	2,621,000	3,426,000	1,869,000	
16	CL2 READING		31	28	148	142	140	139	
17	LBS CL2 GAS USED		19.00	3.00	30.00	6.00	2.00	1.00	0.
18									
19	WELL 2								
20	WELL DEPTH		137.2	128.2	126.7	128.3	124.5	125.6	
21	PUMP RUNNING?		YES	YES	YES	YES	YES	YES	
22	TIME		9:00	2:45	2:30	9:35	9:45	3:30	
FLOW & CL2 USE / WELL PRODUCTION PER MONTH									
Ready									
Start Inbox - Micros... MP2 MP2 Enterpris... RE: Crystal R... FreeCell Gam... Exploring - FL... Microsoft... 4:17 PM									

Mike -  
 They are having trouble with Arrowcreek #1  
 again - Look like the pumping level is getting  
 into the screens and pumping sand -



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Jess Coffman  
Washoe County Dept. of Water Resources  
4930 Energy Way  
Reno, NV. 89502

Dear Jess,

As you are aware of, we removed 390' of 6", water lubricated turbine pump from Arrowcreek Well #1. It was removed because of having a very severe vibration and pumping sand. After the pump was removed, we found that the bowl was severely damaged. I have sent this bowl to Goulds to see if they will warranty it since it was installed in February of 2001. On Friday the 23rd, we conducted a video of the well to see if we could determine where the sand was entering the casing at. As the camera was lowered through the blank casing, we could see minimal buildup on the sides of the casing. At a depth of 284', there was a crack in the seam of the casing where it was welded and water was entering through the separation. The camera touched static water level at 288'. As the camera continued down, we saw the top of the screen starting at 323'. The screen was approximately, 50% to 70% plugged with encrustations. At a depth of 338' to 340', there appeared that there was not any gravel around the screen. From 340' to 390' the screen was plugged anywhere from 50% to 75%. From 400' to 500' the screens were 60% to 90% plugged.

The pump bowl was setting at a depth of 390' to 405'. We could not see any damage caused by the bowl rubbing against the sides of the screen, even though there were substantial screen indentations on the bowl. Last year when the pump was removed, we found the same damage to the old bowl and that is why it was replaced. We conducted a deviation survey to the well and found it to be only 1 foot out of alignment, according to Welco. The separation in the casing at 284' could be from a faulty weld or stress to the casing from the pump. The crack can be repaired with a liner swedged into place.

I recommend that the well be rehabilitated, to remove the heavy buildup of iron manganese deposits. Most of this buildup can be removed with brushing and swabbing the casing. I am also including a cost for a chemical treatment of the well to remove any deposits on the outside of the screened areas. With the screens being plugged, the well has to draw water in from the open areas of the screen, which causes the water to enter the casing at a higher velocity which may carry sand with it. Also the plugged screen requires the well to drawdown further causing cascading water in the well. If you decide to chemically treat the well with acid, be aware that we will have to have a large holding tank delivered to the site to pump the acid into to be treated. You will also see on the cost estimate that I have included costs to pump swab the well to remove the acid and also develop the screened areas of the well. This tool is 10' long with a tight fitting rubber swab on each end and a 40 hp submersible pump inside the tool. We lower the tool to the screened areas on 4" drop pipe and pump and swab the well at the same time, isolating the 10' section of screen. This does develop out all the fines and debris from the screen. This may also determine where the sand is entering the well at.

Look this over and if you have any questions on this information or the well video, call me and I will be happy to discuss them with you.

Sincerely,

  
Dan Trampe



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

February 21, 2001

TO: Jess Coffman

FROM: Tom Kelly 

SUBJECT: ArrowCreek Well #1

I understand work done at ArrowCreek Well #1 included replacing the pump with 18 stages of Goulds Pumps Model 9RCLC, which was the original pump minus two stages. In addition, 40-ft of pump column were added. We ran the pump today to see where it is operating on the pump curve and estimate the pump capacity at the 30-day drawdown. After 20 minutes of pumping, the discharge was 350 gpm at TDH of 817 feet (See attached calculations and pump curves). If during summer pumping conditions, the pumping level approaches the estimated 30-day pumping of 327 feet, the discharge will drop to about 290 to 300 gpm. At this pumping level, air should not be pulled into the system. If air is introduced into the system, then will need to reduce the discharge with the rate of flow valve. Keep an eye on the pumping levels and let me know if we are approaching 327 feet.

For the long-term capacity of this well, it appears that 300 gpm is a good estimate. After a couple of summers of pumping, we may be able to refine this estimate.

C: Paul Orphan  
Terri Svetich  
John Hulett

Ed Schmidt  
Director

John M. Collins  
Utility Services  
Manager

Leonard E. Crowe, Jr.  
Water Resources  
Planning Manager

Department of



Water Resources

Test pumped Well #1

After 20 minutes of pumping conditions are:

- Tank Level: 20 ft.
- Transducer Reading: 40.5 ft.  
Set @ 334 ft. below surface.  
- 40.5

293.5 ft. is Pumping Level.

- Pressure at Pump Discharge: 225 psi.  
Pressure after ch. Valve & meter: 222 psi.  
Pressure Transducer Reading: 218 psi.
- $Q = 350$  gpm.

Pump Column.

6"  $\phi$  per specs.

380 ft. long.  
40 ft. added.  
420 ft. total.

TDH on Pump.

Disch. Press. = 225 psi,  $\rightarrow$  520 ft.

Pumping Level to surface  $\rightarrow$  294 ft.

Col. friction loss  $\rightarrow$  0.008 (420 ft)  $\rightarrow$  3 ft.  
817 ft.

At. 30 Day Pumping Level of 327 ft.

TDH = 520 + 327 + 3 = 850 ft. ( $\frac{850}{10} = 47.2$  ft/100 ft)

Per Pump Curve,  $Q \approx 290$  gpm

Option #2

**PUMP DATA SHEET**  
Goulds Turbine 60 Hz

Selection file: (untitled)  
Catalog: TURB60.MPC v 1.8.2

Curve: E6409CFPCO

Design Point: Flow: 300 US gpm  
Head: 825 ft

Pump: TURBINE - 1800  
Speed: 1770 rpm

Size: 9RCLC; (18 stages)  
Dia: 6.8125 in

Limits: Temperature: --- °F  
Pressure: 400 psig

Sphere size: 0.58 in  
Power: --- bhp

Fluid: Water

Temperature: 60 °F  
SG: 1

Viscosity: 1.122 cP  
Vapor pressure: 0.2568 psi<sub>a</sub>  
Atm pressure: 14.7 psi<sub>a</sub>

NPSHa: --- ft

Piping:

System: ---  
Suction: --- in  
Discharge: --- in

Specific Speed: Ns: 2290

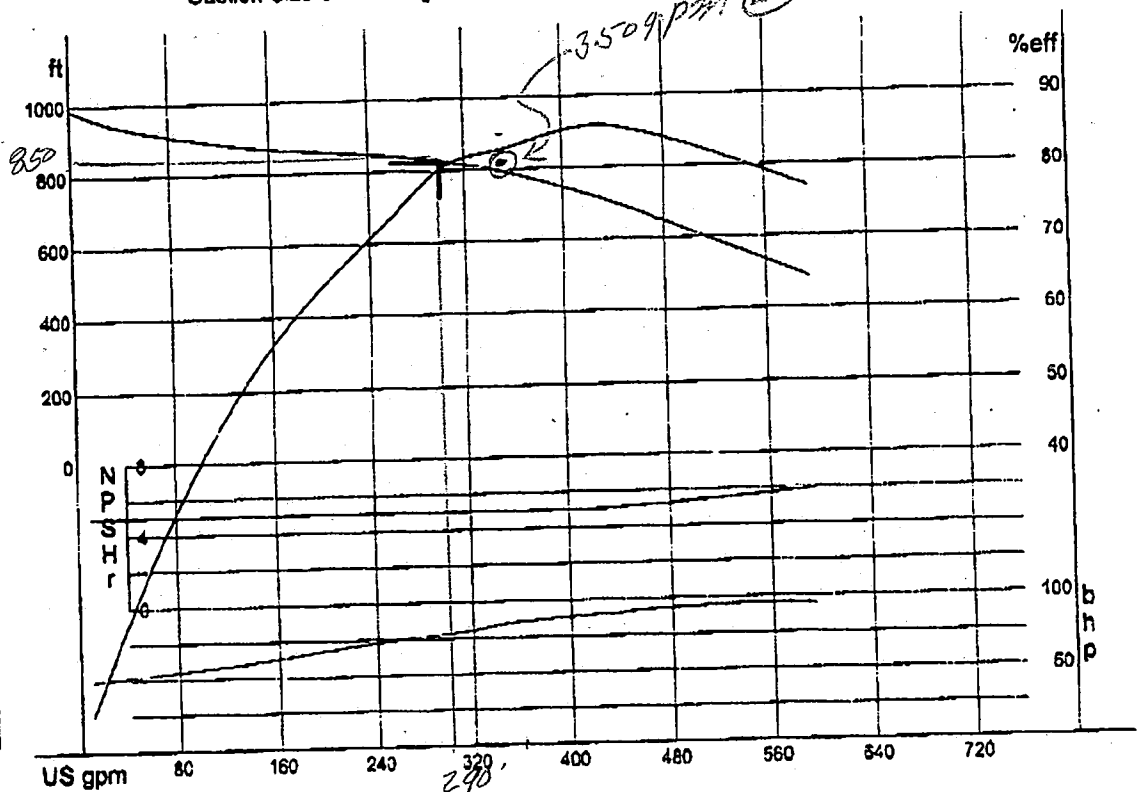
Nss: ---

Dimensions: Suction: --- in

Discharge: --- in

Vertical Turbine: Bowl Dia: 9.25 in Max Lateral: 0.88 in  
Thrust K Factor: 4.8

Suction Size-6" Discharge Sizes-5", 6", 8"



--- Data Point ---

Flow: 300 US gpm  
Head: 827 ft  
Eff: 80.1%  
Power: 78.1 bhp  
NPSHr: 5 ft

-- Design Curve --

Shutoff Head: 988 ft  
Shutoff dP: 428 psi  
Min Flow: - US gpm  
BEP: 85.9% eff  
@ 428 US gpm  
NOL Pwr: 95.4 bhp  
@ 548 US gpm

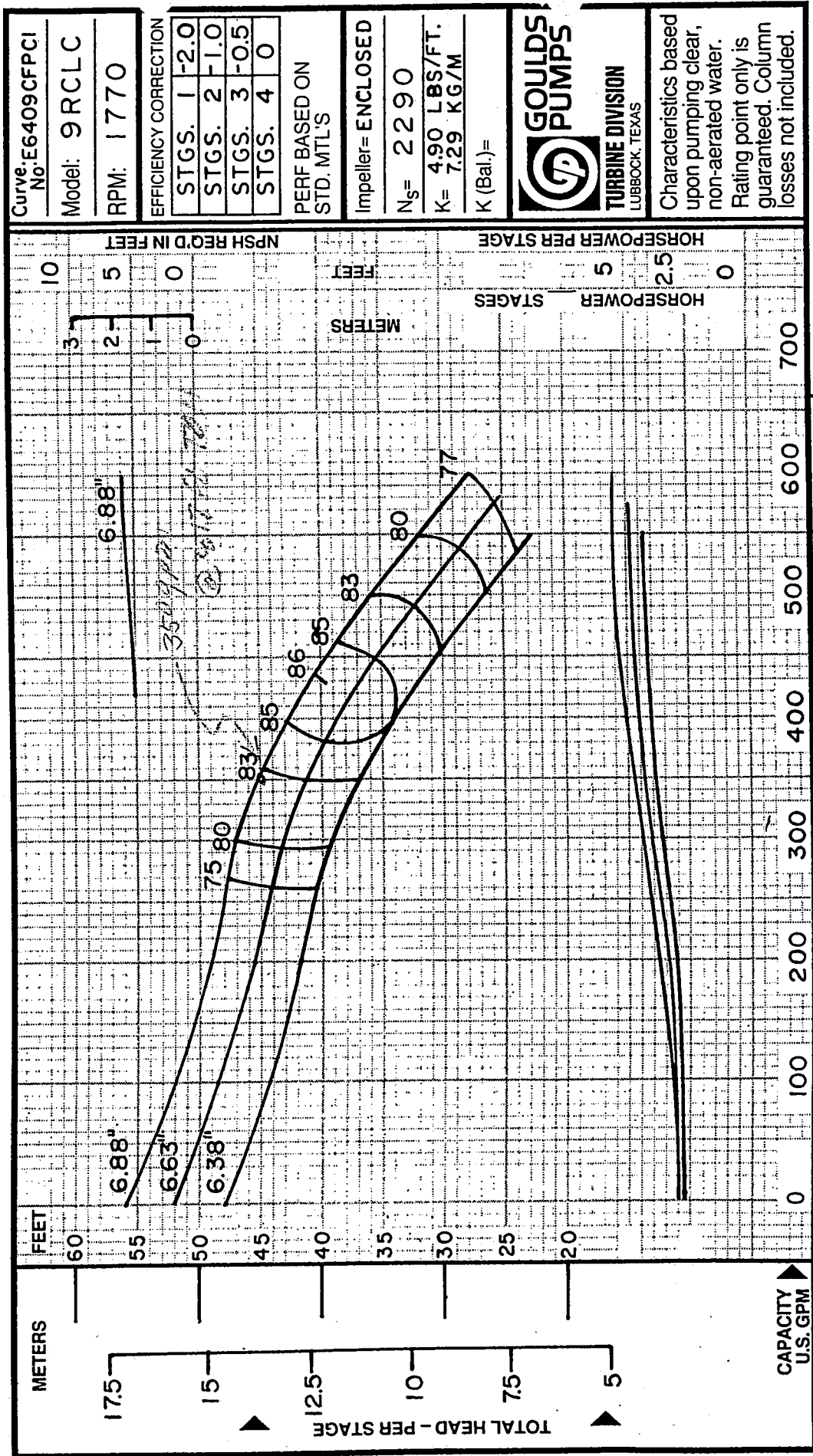
-- Max Curve --

Max Pwr: 98.7 bhp  
@ 551 US gpm

--- PERFORMANCE EVALUATION ---

Flow US gpm	Speed rpm	Head ft	Pump %eff	Power bhp	NPSHr ft	Motor %eff	Motor kW	Hrs/yr	Cost /kWh
360	1770	786	83.3	85.8	5				
300	1770	827	80.1	78.1	5				
240	1770	849	89.6	72.4	5				
180	1770	869	57.3	65.6	5				
120	1770	889	45	58.8	5				

GOULDS PROPOSAL NO.		GOULDS S.O. NO.		INQUIRY NO.		CUSTOMER P.O. NO.		P.O. DATE		ITEM NO.		CUSTOMER	
PROJECT				SERVICE				GPM CAPACITY		F.T. TDH		% EFFICIENCY	
												RPM	



MODEL  
**9RCLC**

DATE  
October 1998

SUPERCEDES  
August 1995



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## **Cost estimate to mechanically rehabilitate Arrowcreek #1**

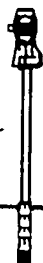
1. Mobilization and Demobilization of equipment & tools	\$800.00
2. Brush 10" well for 8 hrs. @\$150/hr.	\$1,200.00
3. Swab 10" well for 8 hrs. @\$150/hr.	\$1,200.00
4. Bail debris from well est. 2 hrs. @\$150/hr.	\$300.00
5. Disinfect well	\$200.00
<b>Total:</b>	<b>\$3,700.00</b>

## **Cost estimate to chemically treat Arrowcreek Well #1**

1. Install and remove 440' of 1-1/4" tremme pipe	\$500.00
2. 330 gallons of muratic acid with inhibitor @\$4/gal	\$1,320.00
3. 35 gallons of Johnson NW-310 @\$70/gal	\$2,450.00
4. Mix and inject acid at various levels	\$475.00
5. Pump and swab well screens est. 14 hrs @\$200/hr.	\$2,800.00
6. Supply holding tank and treat acid	\$2,100.00
7. Add in estimate #1	\$3,700.00*
<b>Total:</b>	<b>\$13,345.00</b>

\*We still have to add in this cost to complete the rehabilitation





# CARSON

## Pump

- Turbine and Submersible Sales & Service
- Complete Well Rehabilitations
- Aquifer Testing – Turbine or Submersible

P.O. BOX 20159 CARSON CITY, NV 89721 (775) 888-9926 FAX (775) 888-9928

### Option #1: Rebuild current Goulds bowl to 19 stage, model 9RCLC

1. 19 - 1.5"x1.875"x2.5" brass bowl bearings
- 14 - 9RCLC bowl cases
- 14 - Full trim impellers
- 1 - 210"x1.5" 416 stainless steel bowl shaft
- 8 hrs. shop labor

Total: \$10,197.00

Parts are 5 to 8 working days for delivery

### Option #2: New 19 stage 9RCLC bowl

1. New Goulds, model 9RCLC, 19 stage bowl
- 5 to 8 working days for delivery

Total: \$8,750.00

### Option #3: New 100 hp, submersible pump

1. New Goulds model 7CLC, 9stage submersible pump  
with a 100 hp Franklin motor \$12,100.00
2. 410' of #1/0 flat submersible cable \$2,665.00
3. 3 - Flomatic DI-80, 6" check valves \$1,390.00
4. 6" flanged discharge head \$700.00
5. Centralizers, splice kit and banding material \$390.00

Total: \$17,245.00\*

\*New 6" drop pipe @\$9.50/ft.  
4 to 5 working days for delivery

There is also another option that I suggest may be worth looking at. The submersible pump that we removed from the Cinder well located at Montreaux, was a Goulds model, 8ILC, 8 stage designed for 300 gpm with 880 tdh. If this pump is still available, we could remove two of the trimmed impellers and replace one of them with a impellar trimmed to meet the design condition of 300 gpm with 825 tdh. The cost to redesign this bowl, including the labor is \$900.00. You would still need the 100 hp motor and the wire, check valves, discharge head and the miscellaneous items from item #5. I suggest using the 6" pipe that we removed from the well for the drop pipe.



# CARSON

*Pump*

- Turbine and Submersible Sales & Service
- Complete Well Rehabilitations
- Aquifer Testing – Turbine or Submersible

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P.O. BOX 20159 CARSON CITY, NV 89721 (775) 888-9926 FAX (775) 888-9928

Jess Coffman  
Washoe County Dept. of Water Resources  
4930 Energy Way  
Reno, NV. 89520

Dear Jess,

After the removal of the pump from Arrowcreek #1, we found that the top bearing was damaged in the top of the bowl. We took the bowl back to our shop and dismantled it completely. Unfortunately, the bowl was damaged more severely than I thought. The top 15 stages and impellers are damaged beyond repair. The impeller skirts and the bowl cases have been worn to one side, indicating that the well is most likely out of alignment. The well is only 10" in diameter and the outside diameter of the bowl is 9.25", thus the well has to be straight to allow the proper alignment for a bowl of this size and length to operate properly. Also on the outside of the bowl cases we did notice that there are indentations of the wire screen which also indicates that the bowl is not centered in the casing. I am including prices on the cost of repairing the current bowl, the price for a new 19 stage bowl, and also a price for a new submersible pump. Look this information over and give me a call if you have any questions.

Sincerely,

Dan Trampe

# Drift-Pac<sup>TM</sup>

**Deviation and Directional Interpretation Package**

**Prepared Especially For**

**Washoe County**

**Arrow Creek #1**

**Thursday, December 21, 2000**

**welenco**

Company	Washoe County	County	Washoe	State	NV
Well Number	Arrow Creek #1	Date of Survey	Thursday, December 21, 2000	Declination	Used
Field	Arrow Creek	Recorded By	Dan Ihde	Witness	Mike Widmer
Equipment No.	L-10	Job Number	33719		
Location	Arrow Creek Subdivision	welenco Office	Bakersfield	Tool Number	2536
Remarks	Orientation is True North	Tool Type	Gyroscopic	Tool Number	2536
Directional Calculation	Balanced Tangential Method	Dogleg Calculation	Lubinski Method		

Measured Information			Closure Calculations				Rectangular Coordinates			Dogleg Severity Calculations		
Measured Depth, Feet	Inclination, Degees	Azimuth Degrees, True	Course Deviation, Feet	True Vertical Depth, Feet	Closure Distance, Feet	Closure Bearing Degrees, True	Latitude, Feet	Departure, Feet	Total Latitude, Feet	Total Departure, Feet	Dogleg Severity, 20 Feet	Dogleg Severity, Degs/100 Feet
0.00	0.00	219										
20.00	0.30	230	0.05	19.99	0.05	230.00	-0.03	-0.04	-0.03	-0.04	0.00	0.00
40.00	0.10	122	0.05	39.98	0.10	221.90	-0.04	-0.03	-0.07	-0.07	0.28	1.40
60.00	0.20	203	0.04	59.97	0.13	211.70	-0.04	0.00	-0.11	-0.07	0.18	0.92
80.00	0.10	191	0.05	79.96	0.18	208.60	-0.05	-0.02	-0.16	-0.09	0.03	0.15
100.00	0.20	226	0.05	99.95	0.23	210.50	-0.04	-0.03	-0.20	-0.12	0.09	0.43
120.00	0.40	129	0.07	119.94	0.28	198.70	-0.07	0.03	-0.27	-0.09	0.42	2.12
140.00	0.30	103	0.12	139.93	0.33	177.30	-0.06	0.11	-0.33	0.02	0.16	0.78
160.00	0.20	72	0.08	159.92	0.35	162.50	0.00	0.08	-0.33	0.10	0.13	0.65
180.00	0.10	60	0.05	179.91	0.34	154.50	0.02	0.05	-0.31	0.15	0.03	0.15
200.00	0.20	58	0.05	199.90	0.34	145.40	0.03	0.04	-0.28	0.19	0.00	0.02
220.00	0.20	28	0.07	219.89	0.33	134.30	0.05	0.05	-0.23	0.24	0.10	0.52
240.00	0.10	44	0.05	239.88	0.33	124.80	0.04	0.03	-0.19	0.27	0.04	0.20
260.00	0.20	352	0.05	259.87	0.31	117.30	0.05	0.01	-0.14	0.28	0.12	0.62
280.00	0.00	13	0.03	279.86	0.29	111.00	0.03	0.00	-0.11	0.28	0.00	0.00
300.00	0.30	332	0.05	299.85	0.26	104.00	0.05	-0.02	-0.06	0.26	0.00	0.00
320.00	0.30	305	0.10	319.84	0.19	85.20	0.08	-0.07	0.02	0.19	0.14	0.70
340.00	0.20	17	0.07	339.83	0.18	62.10	0.06	-0.03	0.08	0.16	0.29	1.44
360.00	0.10	39	0.05	359.82	0.22	55.00	0.05	0.02	0.13	0.18	0.05	0.27
380.00	0.30	326	0.06	379.81	0.25	40.90	0.06	-0.02	0.19	0.16	0.21	1.03
400.00	0.30	26	0.09	399.80	0.32	28.70	0.09	-0.01	0.28	0.15	0.30	1.50
420.00	0.20	28	0.09	419.79	0.40	27.90	0.08	0.04	0.36	0.19	0.01	0.04
440.00	0.20	339	0.06	439.78	0.47	24.60	0.06	0.00	0.42	0.19	0.17	0.83
460.00	0.20	279	0.06	459.77	0.48	17.30	0.04	-0.05	0.46	0.14	0.20	1.00
480.00	0.40	278	0.10	479.76	0.48	4.40	0.02	-0.10	0.48	0.04	0.01	0.03

TVD in Feet 503.74 Final Closure Distance in Feet 0.51 Final Closure Bearing in Degrees 358.30



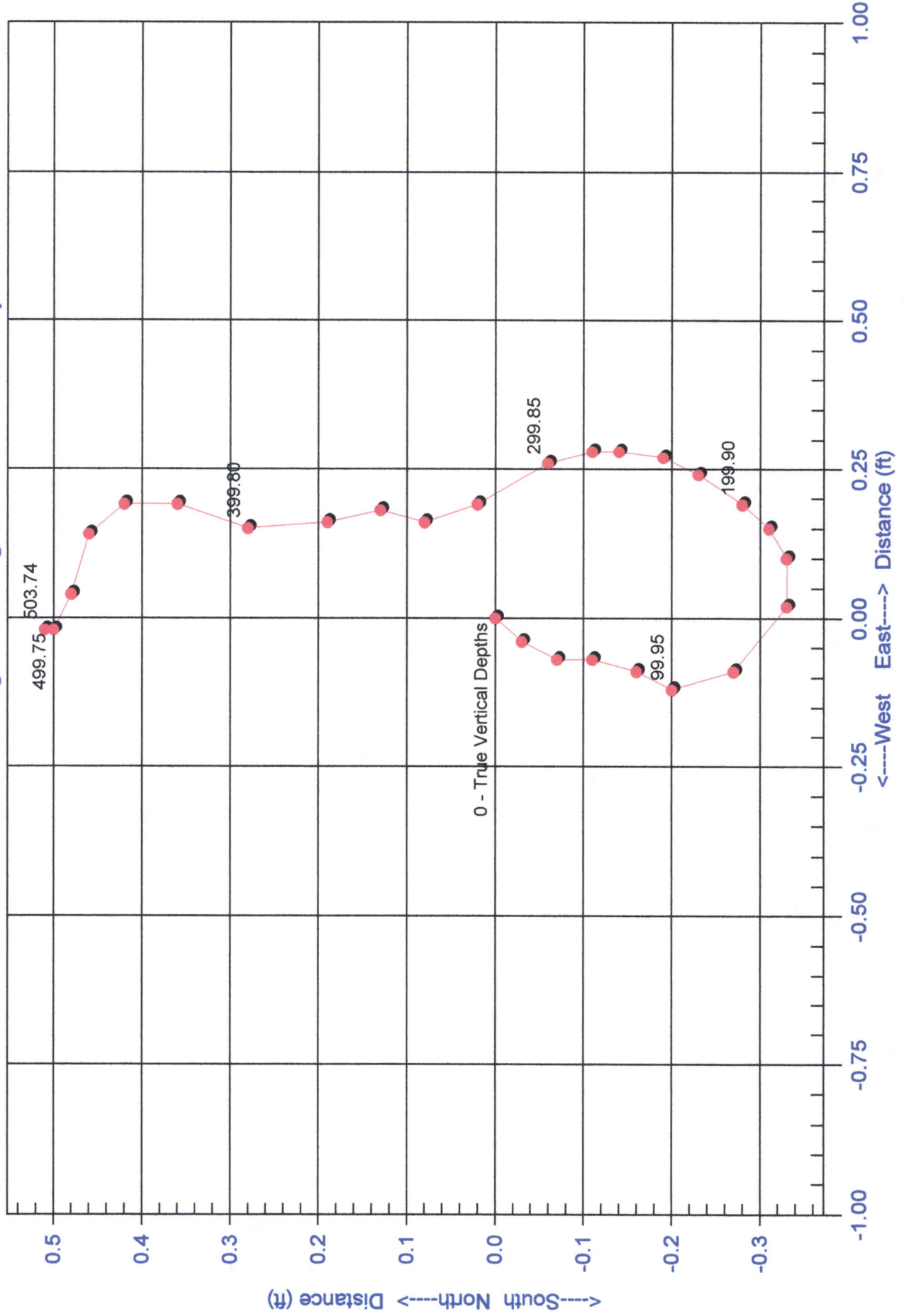
Measured Information			Closure Calculations				Rectangular Coordinates			Dogleg Severity Calculations		
Measured Depth, Feet	Inclination, Degees	Azimuth, Degrees, True	Course Deviation, Feet	True Vertical Depth, Feet	Closure Distance, Feet	Closure Bearing, Degrees, True	Latitude, Feet	Departure, Feet	Total Latitude, Feet	Total Departure, Feet	Dogleg Severity, 20 Feet	Dogleg Severity, Degees/100 Feet
500.00	0.10	46	0.06	499.75	0.50	358.10	0.02	-0.06	0.50	-0.02	0.36	1.80
504.00	0.10	36	0.01	503.74	0.51	358.30	0.01	0.00	0.51	-0.02	0.09	0.44

# Washoe County

Arrow Creek #1

Drift-Pac Plan View

Closure Distance = 0.51 Feet      Closure Bearing = 358.3 Degrees      True Vertical Depth = 503.74 Feet



Date of Survey: Thursday, December 21, 2000

Balanced Tangential Calculation Method

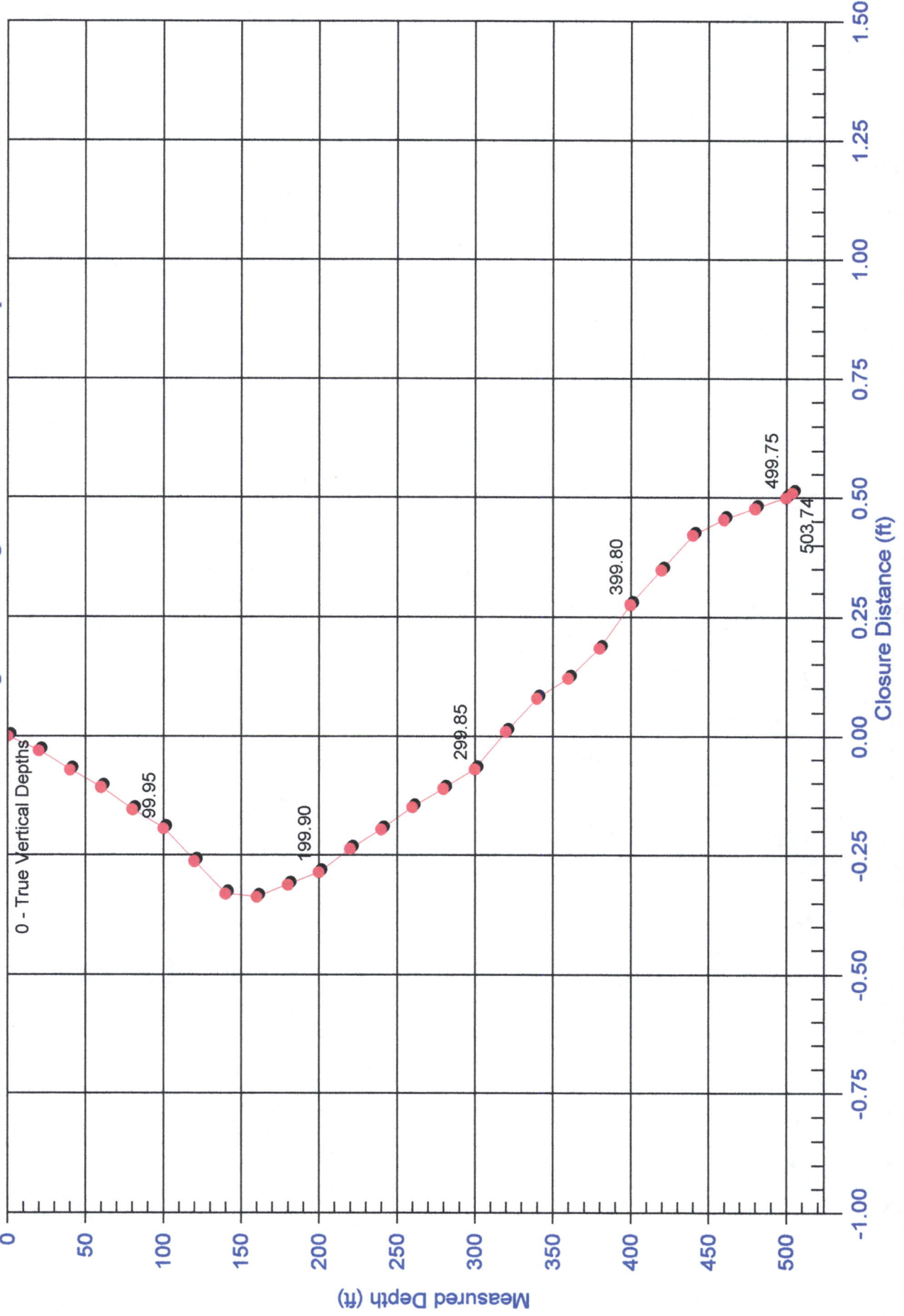
Welenco, Inc. (800) 445-9914

# Washoe County

Arrow Creek #1

Drift-Pac Plane of Closure View

Closure Distance = 0.51 Feet    Closure Bearing = 358.3 Degrees    True Vertical Depth = 503.74 Feet



Date of Survey: Thursday, December 21, 2000

Welenco, Inc. (800) 445-9914

Balanced Tangential Calculation Method

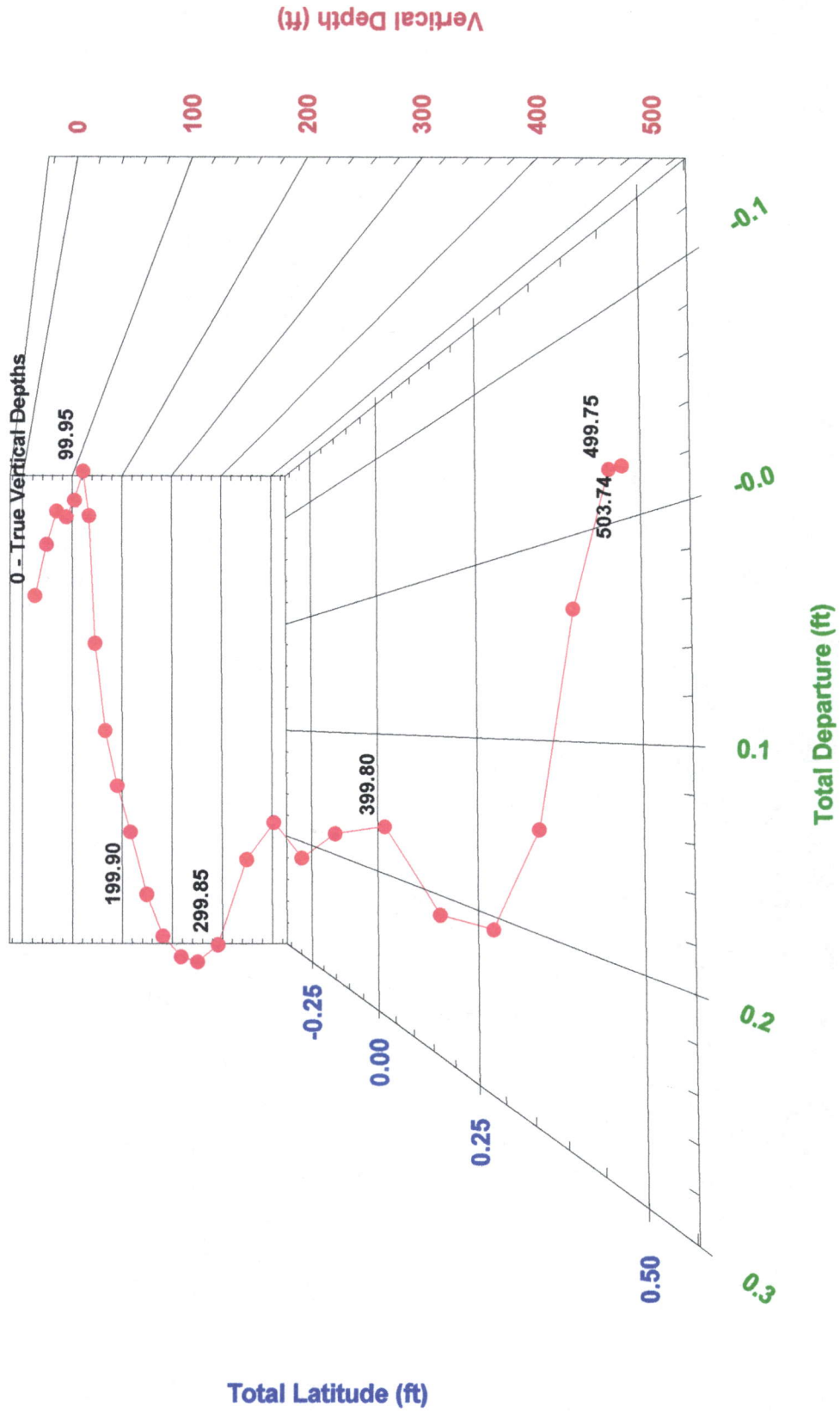
# Washoe County

Arrow Creek #1

Drift-Pac 3D Projection View

Closure Distance = 0.51 Feet    Closure Bearing = 358.3 Degrees    True Vertical Depth = 503.74 Feet

359.0



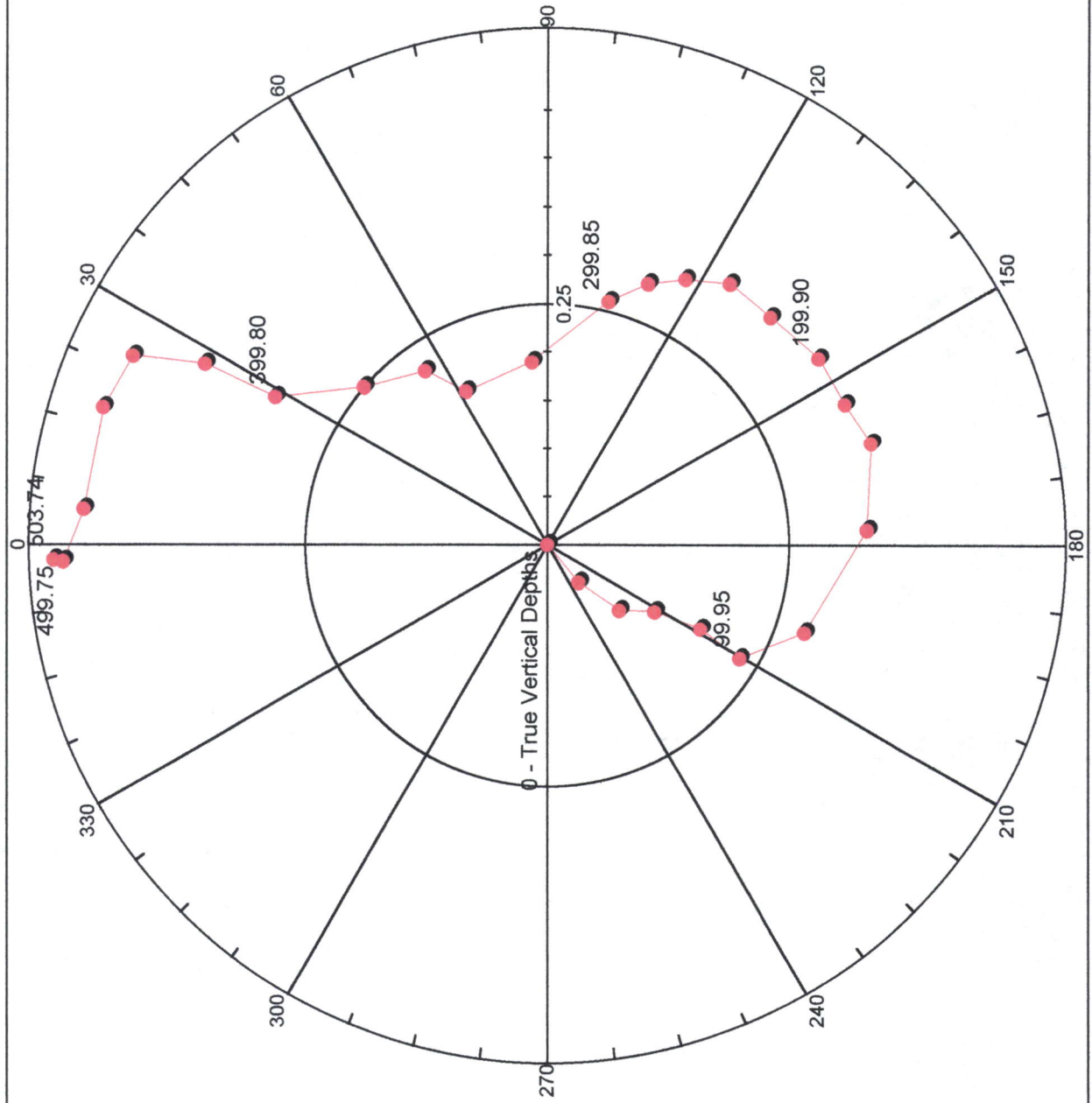


# Washoe County

## Arrow Creek #1

### Drift-Pac Polar View

Closure Distance = 0.51 Feet    Closure Bearing = 358.3 Degrees    True Vertical Depth = 503.74 Feet

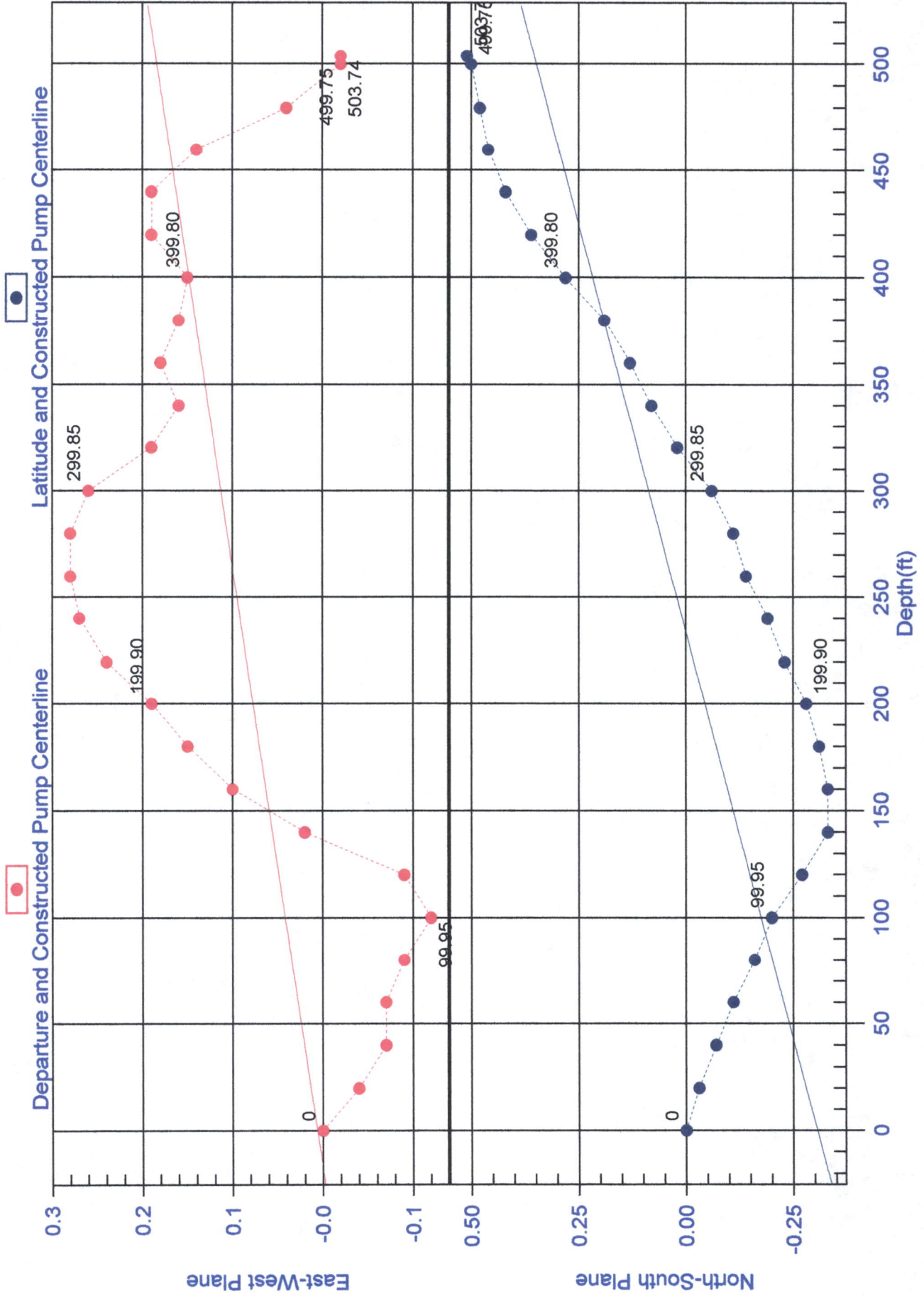


# Washoe County

Arrow Creek #1

Drift-Pac Alignment Calculations

Constructed Pump Centerline View



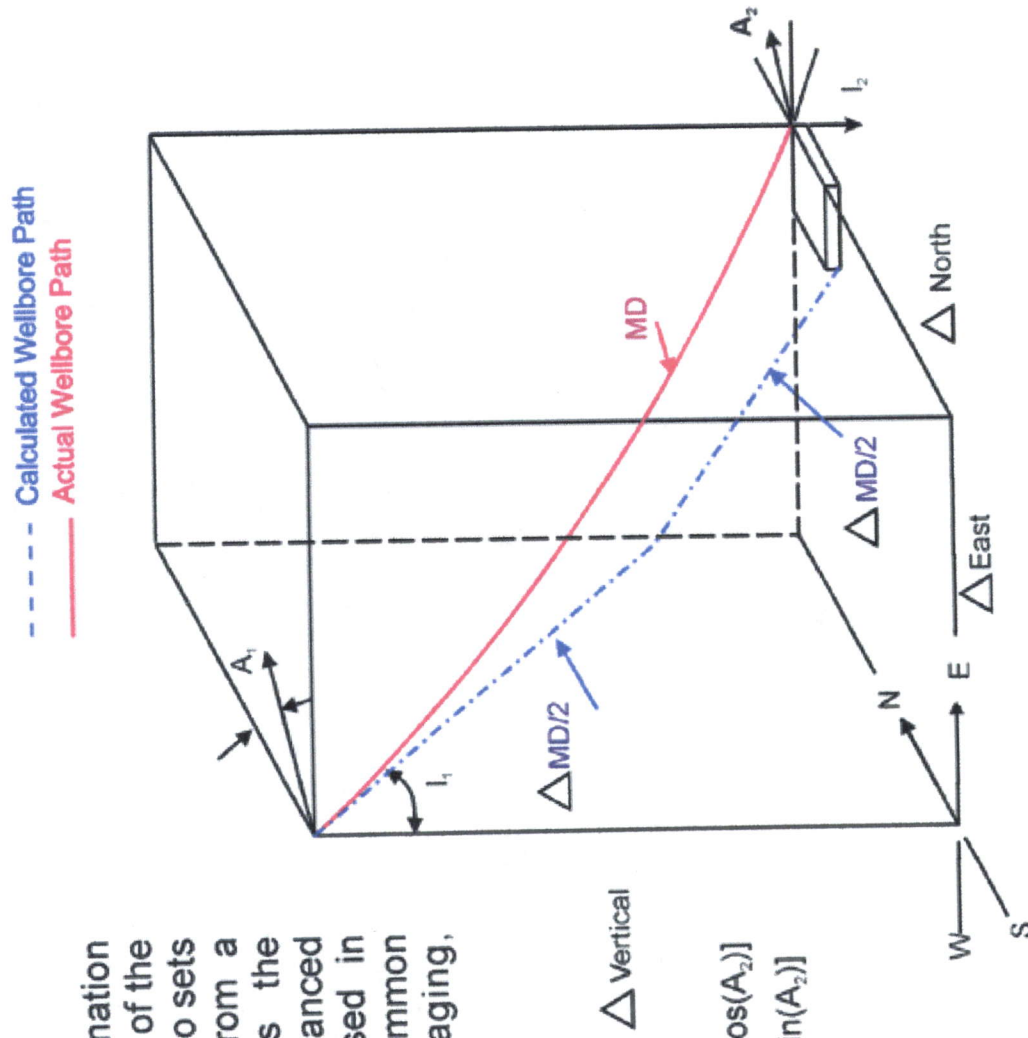
Date of Survey: Thursday, December 21, 2000

Balanced Tangential Calculation Method

Welenco, Inc. (800) 445-9914

## 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.



$$\begin{aligned}\Delta \text{ North} &= [\Delta MD/2] \times [\sin(I_1) \times \cos(A_1) + \sin(I_2) \times \cos(A_2)] \\ \Delta \text{ East} &= [\Delta MD/2] \times [\sin(I_1) \times \sin(A_1) + \sin(I_2) \times \sin(A_2)] \\ \Delta \text{ Vertical} &= [\Delta MD/2] \times [\cos(I_1) + \cos(I_2)]\end{aligned}$$

# OWEN BROTHERS PUMP

P O BOX 60808 • RENO • NEVADA • 89506 • 702-677-2574 • FAX 702-972-5081  
NV LIC #19623 / CA LIC #480750

*Per Roger Owen (10/13/98), this is pump installed. TJK*

## SPECIFICATIONS FOR PUMPING EQUIPMENT WASHOE COUNTY SOUTH POINTE WELL #1

(10 Sheets Total w/ Cover)

JANUARY 30, 1997

Mr. John Bronder, P.E.  
County of Washoe  
Dept of Public Works  
Utility Division  
P O Box 11130  
Reno NV 89520-0027

SUBMITTAL REVIEW	
ACTION	
<input checked="" type="checkbox"/>	NO EXCEPTIONS TAKEN
<input type="checkbox"/>	REVISIONS REQUIRED
<input type="checkbox"/>	REJECTED - RESUBMIT
Office of Washoe County Utility Division	
By <u>JNB</u>	Date <u>2-5-97</u>

# **Specifications Vertical Turbine Pump Water Lubricated**

## **A. Scope**

This specification covers a deep well lineshaft turbine pump with above ground discharge, arranged for water lubrication of the lineshaft bearings by the water being pumped and furnished with suitable driver and accessories as specified herein. The pumping unit shall be designed and furnished in accordance with the latest hydraulic institute and AWWA specifications for lineshaft turbine pumps.

## **B. Service Conditions**

The pump shall be designed and constructed to operate satisfactorily with a reasonable service life, when installed in a typical continuous turbine pump application. The pump shall be the product of, and manufactured by Goulds Pumps, Inc. Other manufacturers will be considered providing the unit offered is an approved equal in all respects to the brand and model preferred by the customer. Factory pump curves for alternate pumps shall be submitted with the bid.

## **C. Operating Conditions**

Design conditions: 350 Gallons per minute  
Design head: 916 Feet total dynamic head (TDH)  
Minimum pump efficiency of: 78 Percent  
Maximum allowable speed: 1800 RPM  
Liquid to be pumped: Water  
Pump bowl setting: Top of bowl 360 Feet • 380 Ft. Suction  
Well diameter I.D.: 10 Inches

## **D. Pump Construction:**

1. **Bowl assembly:** the intermediate bowls, suction bowl, and discharge adapter shall be flanged type constructed from close grained cast iron, and shall conform to ASTM designation A48, class 30. They shall be free from sand holes, blow holes, or other faults and must be accurately machined and fitted to close tolerances. The intermediate bowls shall have vitra glass lined waterways for maximum efficiency and wear protection. All intermediate bowls shall be of identical design for interchangeability. A discharge adapter shall be used to connect bowls to the discharge column. Threaded connecting bowls will be allowed on bowl sizes 8" and smaller. To ensure quality and consistency of product, cast iron components must be produced in a foundry owned by the pump manufacturer.
2. **Impellers:** the impellers shall be constructed from ASTM B584 Silicon Bronze and shall be the X enclosed, (or ~~semi-open~~) type. They shall be free from defects and must be accurately cast, machined, balanced, and filed for optimum performance and minimum vibration. Impellers are to be standard product of the pump manufacturer and not contain special workmanship to temporarily increase efficiency. They shall be securely fastened to the bowl shaft with taper locks of X C1045 steel (or ~~416 SS~~). The impellers shall be adjustable by means of a top shaft adjusting nut.
3. The suction bowl shall be provided with a non-soluble grease packed bronze bearing, and a bronze sand collar shall be incorporated in the pump design to protect this bearing from abrasives. The bearing housing shall have a sufficient opening at the bottom for easy removal of the bearing.
4. **Wear rings:** pumps 6" and larger shall ~~be~~ (or shall not X) be fitted with replaceable wear rings of bronze material in the suction bowl and intermediate bowls. Wear rings shall have the minimum practical clearance to the mating cylindrical surface of the impeller to provide adequate sealing independent of vertical positioning of the impellers.
5. The bowl shaft shall be constructed from ASTM A582 type 416 stainless steel. It shall be precision turned, ground and polished and shall be supported by water lubricated bronze bearings, or ~~optional fluted rubber bearings.~~

### **E. Column Assembly - Water Lubricated**

1. Pump speeds up to 2200 RPM shall have intermediate column lengths and lineshaft bearing spacing not to exceed 10 feet. Pump speeds between 2200 RPM and 3600 RPM shall have intermediate column length and bearing spacing no greater than 5 feet.
2. *Column pipe:* the column pipe shall be grade A steel pipe with the ends machined with 8 threads per inch with  $\frac{3}{16}$ " taper and faced parallel to butt against the centering spiders. Inside diameter of the pipe shall be such that the head losses shall not be over 5 feet per 100 feet of pipe, and shall weigh not less than 19 lbs/ft. Pipe shall be connected with threaded sleeve type steel couplings.
3. Lineshaft shall be of ample size to operate the pump without distortion or vibration. Diameter of the shaft shall be such that it does not exceed the horsepower limitations indicated in the engineering section of the Goulds Catalog. Shaft shall be furnished in interchangeable sections not over ten feet in length, and shall be coupled with extra-strong threaded steel couplings machined from solid bar steel. Lineshaft shall be C1045 steel with a chrome spot surfacing for the bearing area. The chrome spot to be electroplated.
4. Bronze centering spiders of the drop-in type shall be furnished for shaft stabilization at each column pipe coupling. Bearings shall be fluted rubber retained in the spider by a shoulder on each end of the bearing.

### **F. Discharge Head Assembly - Water Lubricated - 250 PSI FLANGE**

1. Discharge head shall be of the high profile type and be a suitable base of high grade cast iron, ASTM A48-30, or fabricated steel. It shall be provided for mounting the motor with a discharge elbow having an above ground flanged discharge outlet for 6 inch standard pipe. The design shall have sufficient capacity to carry the combined weight of the column assembly. The design shall allow the top shaft to couple above the stuffing box. The head shall have a  $\frac{1}{2}$ " NPT connection for a pressure gauge.
2. The stuffing box shall be cast iron and shall contain a minimum of five rings of packing. It shall have a pressure relief connection. The packing gland shall be a bronze split type secured in place with noncorrosive studs and nuts. The bearing shall be SAE660 bronze. A rubber slinger shall be secured to the shaft above the packing gland.

### **G. Suction Pipe and Strainer**

The suction pipe shall be 4 feet in length and shall have a minimum inside diameter and weight equal to that of the discharge column pipe. A suitable cone strainer of galvanized steel shall be provided having a free area of at least five times the flow area of the suction pipe.

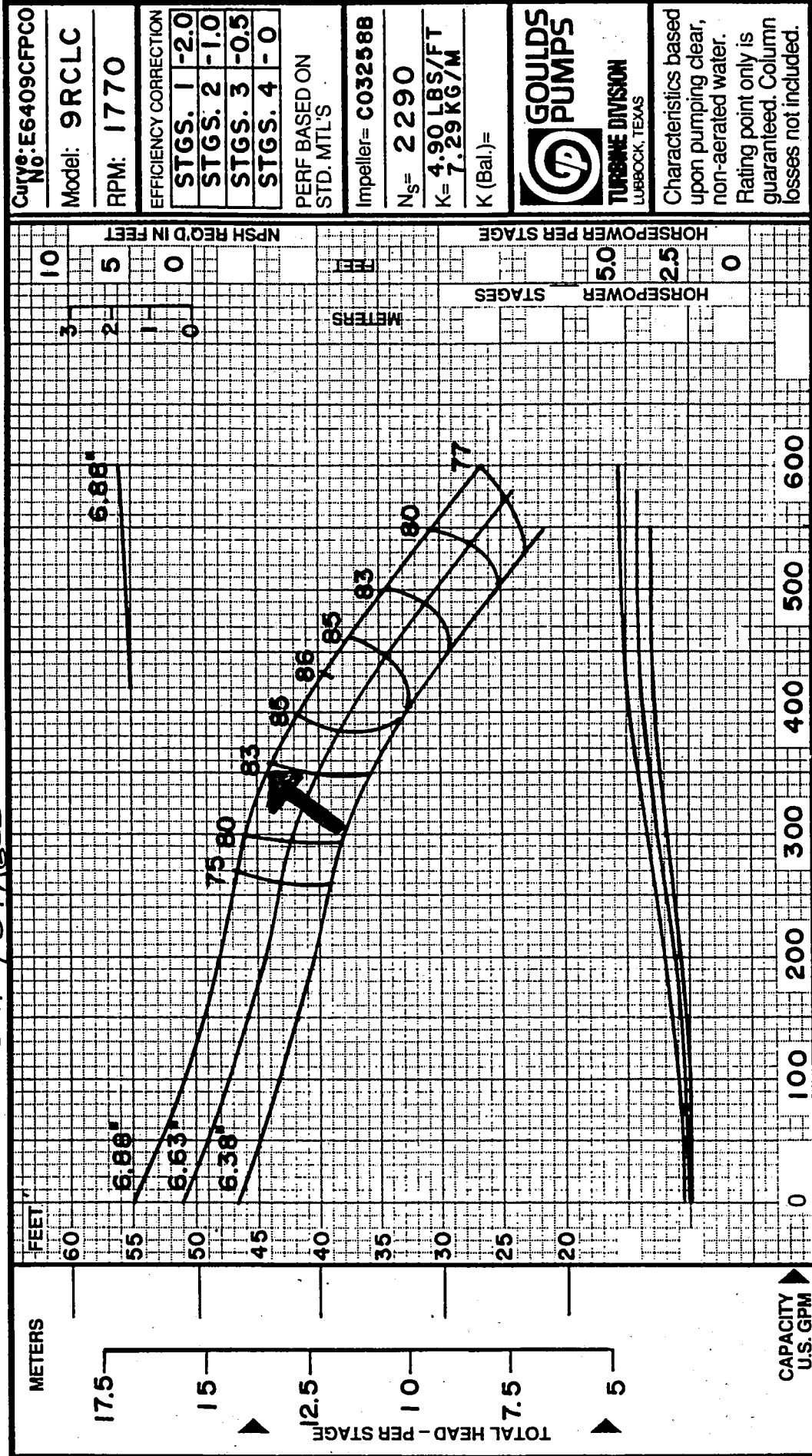
### **H. Electric Motor**

The motor shall be a heavy duty squirrel cage induction type, NEMA design B, 1760 RPM vertical hollow shaft motor, with a non reverse ratchet to prevent reverse rotation of the rotating elements. A suitable thrust bearing shall be incorporated in the upper end of the motor adequate to receive the entire hydraulic thrust load of the pump unit plus the weight of the rotating parts under all conditions of operation. The motor shall be ~~normal~~ (or premium) efficiency with a WP-1 enclosure, 1.15 service factor, and suitable for use on a 460 volt, three phase, 60 cycle electric service.



GOULDS PROPOSAL NO.	GOULDS S.O. NO.	INQUIRY NO.	CUSTOMER P.O. NO.	P.O. DATE	ITEM NO.	CUSTOMER
PROJECT			SERVICE		GPM CAPACITY	
			F.T. TDH		% EFFICIENCY	
			RPM			

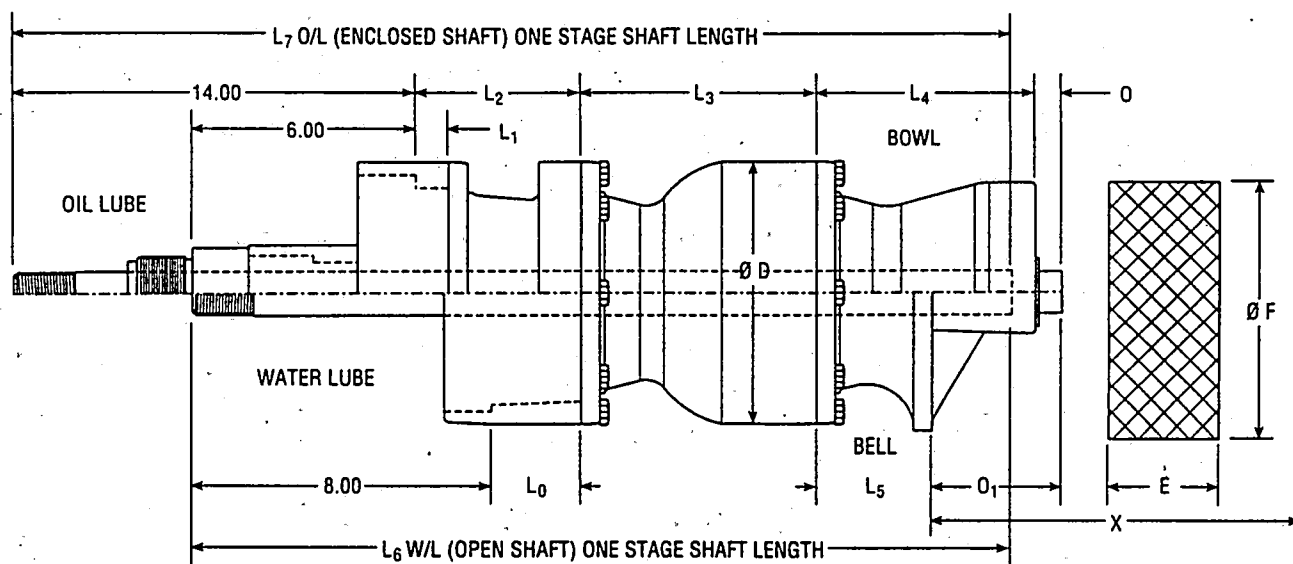
21 / STAGES



MODEL  
**9RCLC**  
 DATE  
 August, 1995

# Vertical Turbine Pumps Engineering Data

Effective January 1, 1997

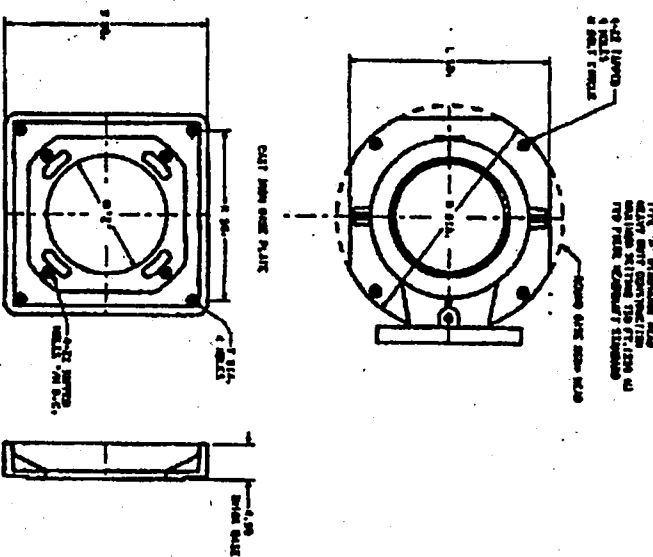


## Turbine Mechanical Bowl Data

Model and Size	Bowl Assembly Length										Basket Strainer (Optional)		Floor Clearance	Bowl O.D.	Bowl Shaft Dia.	Available Lineshaft Sizes	Column Pipe Size	Suction Pipe Size	1st Stage Bowl Assembly Weight		Add'l Stage Weigh
	$L_0$	$L_1$	$L_2$	$L_3$	$L_4$	$L_5$	$L_6$	$L_7$	$O$	$O_1$	E	F	X	D					Open Shaft	Enclosed Shaft	
5C	1.81	NA	4.75	4.63	5.0	NA	18.50	NA	0.63	NA	NA	NA	2.0	5.13	1.0	1.0	3.4	4	42	NA	13
5T	1.81	NA	4.75	4.81	5.0	NA	18.63	NA	0.63	NA	NA	NA	2.0	5.13	1.0	1.0	3.4	4	43	NA	13
6C	2.5	NA	4.75	5.13	5.0	3.94	19.88	28.13	0.63	1.68	4.0	7.31	2.0	5.88	1.0	1.0	3.4	4	47	55	17
6DH	2.06	NA	5.13	5.5	5.38	5.38	21.06	30.13	1.0	1.5	4.0	7.31	4.63	5.5	1.0	1.0	3.4	4.5	48	57	16
6RA	2.06	NA	5.13	3.75	NA	3.0	19.19	28.25	NA	4.0	4.88	7.0	6.0	5.5	1.0	1.0	3.4	NA	42	52	20
7C	2.38	.88	4.38	6.38	5.88	3.25	22.0	30.0	1.0	3.63	6.81	8.0	4.5	7.13	1.19	1.0-1.19	5.6	5	50	72	28
7RA	2.38	1.19	4.38	4.5	NA	3.63	20.38	28.38	NA	3.38	4.88	7.0	5.38	7.5	1.0	1.0	3.4	NA	51	69	28
7T	2.38	.88	4.38	7.09	5.88	3.25	22.81	30.81	1.0	3.63	6.81	8.0	5.50	7.13	1.19	1.0-1.19	5.6	5	53	71	31
7WA	2.38	.88	4.38	5.5	6.13	3.25	21.25	29.25	1.0	3.63	6.81	8.0	8.0	7.13	1.19	1.0-1.19	4.5, 6	4	54	76	30
8DH	2.38	1.19	4.38	7.38	6.0	6.0	24.75	32.75	2.5	2.5	8.5	9.5	9.0	7.5	1.19	1.0-1.19	5.6	6	80	95	34
8I	2.38	1.19	4.38	6.38	6.38	3.75	22.94	30.94	1.0	4.13	6.25	8.63	6.5	7.5	1.19	1.0-1.19	4.5, 6	5	75	90	33
8RA	2.38	1.19	4.38	5.0	NA	3.13	20.63	28.63	NA	3.88	5.88	8.0	5.88	7.5	1.19	1.0-1.19	4.5, 6	NA	67	82	36
8RJ	2.38	1.19	4.38	6.5	6.25	3.5	22.53	30.53	1.0	3.75	5.5	9.25	6.5	7.5	1.19	1.0-1.19	5.6	5	77	92	34
9RA	2.38	1.19	4.38	6.5	NA	4.0	21.88	29.88	NA	5.25	5.88	8.0	7.25	7.5	1.19	1.0-1.19	4.5, 6	NA	66	126	46
9RC	3.0	1.25	5.25	8.5	9.25	5.0	28.0	36.25	0.88	5.13	5.5	11.0	7.13	9.25	1.5	1.0-1.5	5.6, 8	6	144	182	64
9T	3.0	1.25	5.25	9.25	9.25	5.0	28.75	37.0	0.88	5.13	5.5	11.0	7.13	9.25	1.5	1.0-1.5	5.6, 8	6	150	188	70
9WA	3.0	1.25	5.25	6.63	9.25	5.0	26.13	34.38	0.88	5.13	5.5	11.0	7.13	9.25	1.5	1.0-1.5	5.6, 8	6	138	176	58
10RDH	2.94	1.25	5.19	9.25	8.38	5.75	30.63	38.88	4.44	7.06	14.0	14.25	14.0	9.5	1.69	1.0-1.69	6.8	8	140	170	64
10I	2.94	1.25	5.19	7.81	9.75	5.0	27.44	35.69	1.0	5.75	6.63	10.75	7.5	9.5	1.5	1.0-1.5	6.8	6	128	162	58
10L	2.94	1.25	7.63	8.75	9.38	9.38	30.81	41.5	4.0	4.0	5.25	11.0	6.5	9.5	1.69	1.0-1.69	8, 10	8	195	225	64
10RA	2.94	1.25	5.19	6.63	NA	3.63	25.06	33.31	NA	3.0	6.5	9.75	7.88	9.5	1.5	1.0-1.5	4.6, 8	NA	141	176	76
10RJ	2.94	1.25	5.19	8.4	9.75	5.88	28.13	36.44	1.0	5.88	5.5	11.0	7.5	9.5	1.5	1.0-1.5	6.8	6	130	165	60
10WA	2.94	1.25	5.19	7.63	9.25	5.06	27.13	35.38	1.0	5.0	5.5	11.0	9.0	9.5	1.5	1.0-1.5	4.6, 8	6	126	160	56

(All dimensions are in inches and weights in lbs.)  
Continued on next page.





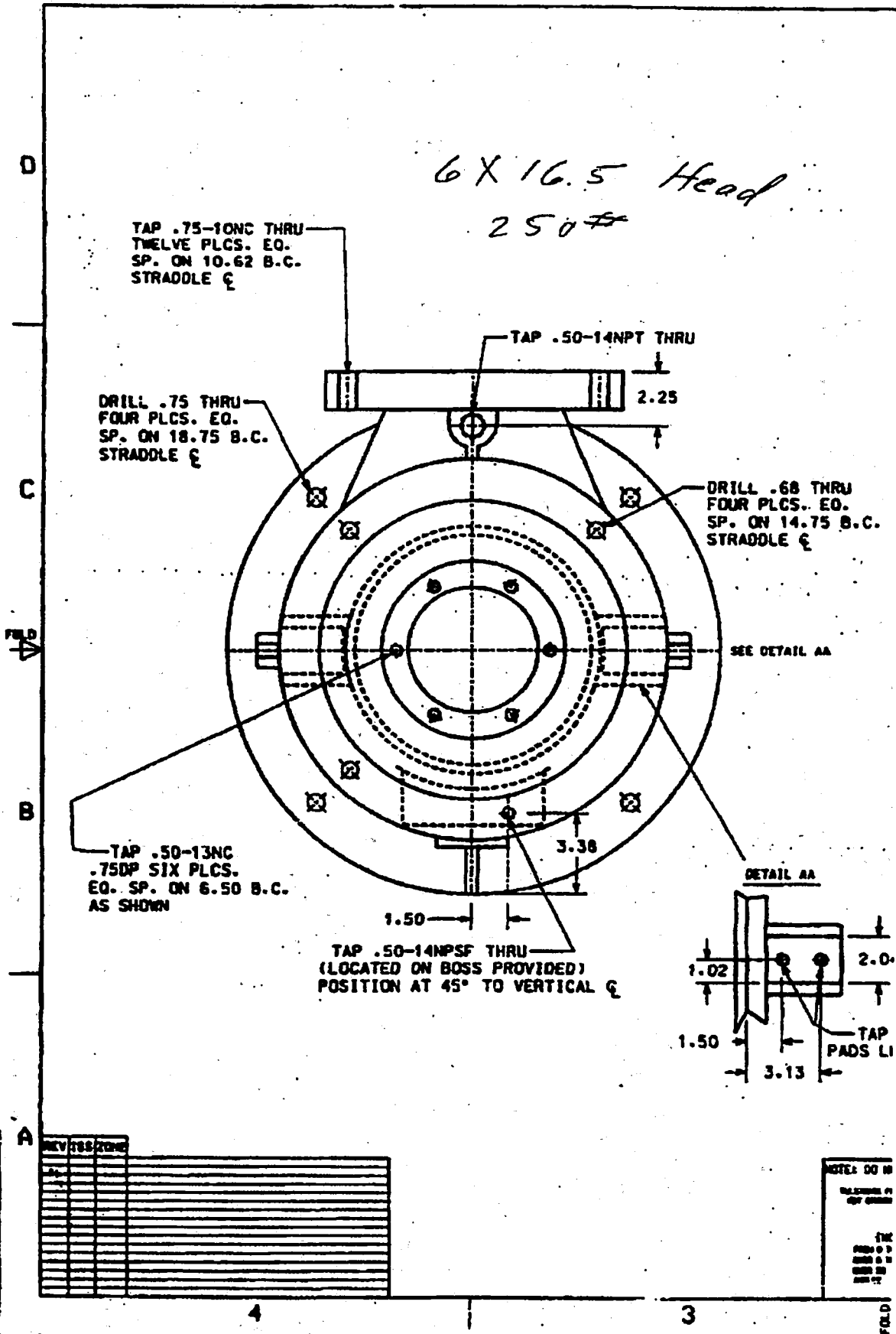
125# DISCH. HD & COL. SIZE MOTOR										DISCHARGE HEAD										OPTIONAL BASE PLATE					
SIZE	BD	C	D	E	F	G	H	J	L	Q	R	W	X	Y	Z	ZZ									
4 x 10	160(254.1)	3	5	13.50 (343.1)	.625 (15.87)	NA	14	.625 (15.87)	125(.41)	.18 (4.57)	7.75 (196.8)	18	16	.625 (15.87)	12	1/2-13									
6 x 12	127(320.6)	12	6.75 (171.5)	15.25 (386.8)	1 (25.4)	23.50 (596.4)	21.25 (539.8)	.75 (19.05)	20 (508)	1 (25.4)	10 (254)	24	22	.875 (22.23)	16	5/8-15									
8 x 16	154(391.2)	13	7.50 (190.5)	17.50 (442.5)	1.50 (38.1)	25.50 (647.8)	30.25 (768.1)	.15 (3.81)	20 (508)	1 (25.4)	12.25 (311.3)	24	22	.875 (22.23)	16	5/8-16									
10 x 20	181(457.0)	14	8.25 (209.5)	19 (482.5)	1.53 (38.8)	25 (635)	31.75 (807.3)	.75 (19.05)	21 (533.4)	1 (25.4)	14.75 (374.8)	26	23	.875 (22.23)	17	5/8-17									
12 x 24	214(544.1)	16	10.75 (273.1)	23 (584.2)	1.70 (43.1)	32 (812.8)	36 (914.2)	.875 (22.23)	23 (584.2)	1.25 (31.8)	16 (406.4)	30	31	.875 (22.23)	24	3/4-10									

230# DISCH. HD & COL. SIZE MOTOR										DISCHARGE HEAD						OPTIONAL BASE PLATE					
SIZE	BD	C	D	E	F	G	H	J	L	Q	R	W	X	Y	Z	ZZ					
6 x 16.5	168.5(428.9)	12	6.75 (171.5)	19.50 (495.3)	1 (25.4)	21.00 (533.4)	18.75 (476.4)	.75 (19.05)	NA	1.46 (37.0)	10.25 (260.3)	24	22	.875 (22.23)	14	5/8-15					
8 x 18.5	186.5(472.6)	13	7.50 (190.5)	21.50 (546.7)	1.50 (38.1)	22.00 (558.8)	21.25 (539.8)	.75 (19.05)	NA	1.82 (46.2)	12.00 (304.8)	26	22	.875 (22.23)	16	5/8-16					

21.75

250 #

6 X 16.5 Head  
250#





# Mechanical Seal/Stuffing Box Data

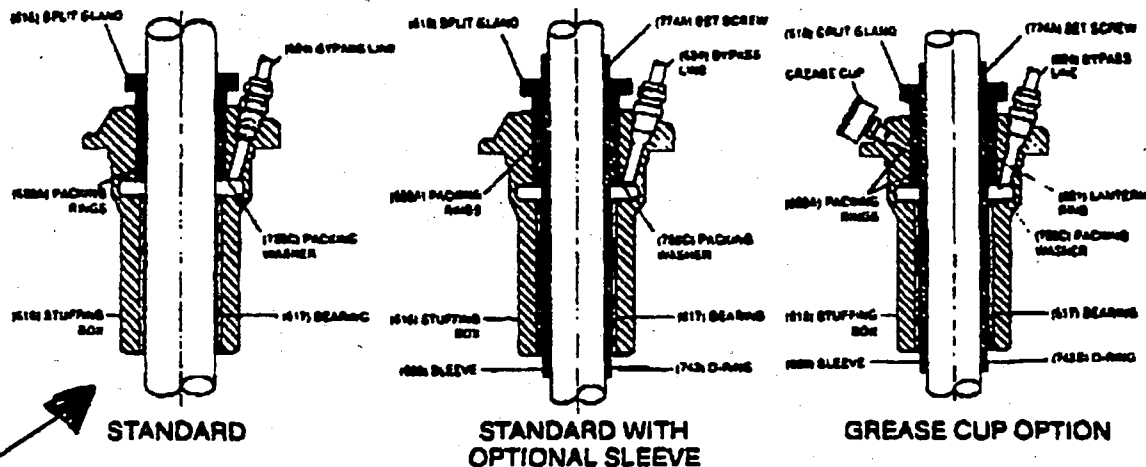
## Sectionals and Selection

**25.1**

October 1, 1988  
(Sup. 8/1/82)

ATTN: JOE

### Stuffing Box Sectionals



Type of Packing	Applications	Pressure Range	Temperature Range	Comments
Graphite & Petrolatum Impregnated Non Abestos Yarn	General Services	300g	Ambient to 300°	
Lead Foil	High Temperature		250°F to 450°F	Shaft hardfacing or a shaft sleeve is recommended

For Abrasive Services, refer to factory.

Shaft or Sleeve Size (2)	Number of Packing Rings		Packing Required	Box Depth
	Standard	With Lantern Ring	Size	Standard With One Lantern Ring
1"	6	4	3/4" square	2 1/4"
1 1/8"	6	4	3/4" square	2 1/4"
1 1/2"	6	4	3/4" square	2 1/4"
1 3/4"	6	4	3/4" square	2 1/4"
1 7/8"	6	4	3/4" square	2 1/4"
2 1/8"	6	4	3/4" square	2 1/4"
2 1/2"	6	4	3/4" square	2 1/4"
2 3/4"	6	4	1/2" square	3 1/4"
2 7/8"	6	4	1/2" square	3 1/4"

#### NOTES:

1. Stuffing box and lineshaft bearing should be sized alike.
2. Sleeve is two (2) sizes larger than shaft.



# VERTICAL PREMIUM EFFICIENT

## WPI HOLLOSHAFT & SOLID SHAFT

### 230, 460, & 575 VOLTS; 3 PHASE, 60 HERTZ

### HIGH THRUST ENGINEERING DATA

SECTION: 504  
PAGE: 22  
EFFECTIVE: 01-15-93  
SUPERSEDES: PG 8.2  
DATED: 11-15-92

I.P.	RPM		% EFFICIENCY			% POWER FACTOR			CURRENT (AMPS) 460VOLTS		TORQUE AT FULL VOLTAGE (FT.-LBS.)			NEMA CODE
	NO LOAD	FULL LOAD	FULL LOAD	3/4 LOAD	1/2 LOAD	FULL LOAD	3/4 LOAD	1/2 LOAD	FULL LOAD	LOCKED STARTING	FULL LOAD TORQUE AT FULL LOAD SPEED	LOCKED (STARTING)	PULLOUT BREAKDOWN	
5	900	880	88.4	88.7	87.3	71.4	64.5	52.5	7.4	46	30	130	205	H
-1/2	1800	1760	91.2	91.6	91.0	85.9	83.1	78.1	9.3	63.5	22	175	215	H
	1200	1170	89.5	90.1	89.3	80.4	75.1	64.5	9.8	68	34	150	205	J
	900	875	88.6	89.3	88.5	73.3	66.7	55.2	10.8	63.5	45	125	200	H
10	1800	1760	91.2	91.9	91.6	86.3	83.8	77.1	12.3	78	30	165	200	G
	1200	1170	88.8	89.7	89.2	81.4	75.8	65.2	13.0	91	45	150	200	J
	900	875	88.6	89.9	89.8	75.9	70.7	60.6	13.9	81	60	125	200	G
15	1800	1765	91.7	92.2	91.4	81.9	78.2	69.4	18.7	116	45	160	200	G
	1200	1170	90.5	91.4	91.2	81.5	76.6	66.7	19.1	136	67	140	200	J
	900	875	87.9	89.1	88.7	74.0	67.4	55.9	21.6	116	90	125	200	G
20	3600	3525	90.5	91.4	91.1	88.0	87.4	83.4	23.5	145	30	130	200	G
	1800	1770	92.4	93.3	93.2	85.0	83.7	78.4	23.8	145	60	150	200	G
	1200	1170	90.5	91.7	91.7	82.2	77.6	68.0	25.2	200	90	135	200	J
25	900	880	90.1	91.1	90.8	75.1	70.5	60.1	27.7	145	119	125	200	G
	3600	3530	91.2	92.1	91.8	87.1	86.2	81.6	29.4	182.5	37	130	200	G
	1800	1770	93.0	93.9	93.9	83.8	81.6	74.8	30.0	182.5	74	150	200	G
30	1200	1175	90.9	92.0	92.0	85.0	83.4	77.9	30.3	200	112	135	200	G
	900	880	90.3	91.6	91.7	76.8	73.0	63.7	33.8	182.5	149	125	200	G
	3600	3520	90.7	92.0	92.1	88.2	87.4	83.1	35.1	217.5	45	130	200	G
40	1800	1765	92.9	94.0	94.2	84.2	82.5	76.4	35.9	217.5	89	150	200	G
	1200	1180	91.5	92.6	92.6	85.5	83.8	78.3	35.9	258	134	135	200	G
	900	880	90.9	92.0	91.7	76.1	70.8	59.7	40.6	217.5	179	125	200	G
50	3600	3520	92.1	93.3	93.4	89.1	88.5	84.7	45.7	290	60	125	200	G
	1800	1780	93.2	93.7	93.3	87.2	86.4	82.2	46.1	290	118	140	200	G
	1200	1175	91.5	92.8	93.0	84.6	82.3	75.4	48.4	336	179	135	200	H
60	900	880	91.2	92.5	92.6	77.4	72.8	62.4	53.1	290	239	125	200	G
	3600	3545	90.7	90.8	89.4	85.3	83.9	78.4	60.5	362.5	74	120	200	G
	1800	1780	93.9	94.4	94.0	87.6	86.1	80.6	56.7	36.5	148	140	200	G
75	1200	1175	92.5	93.7	93.9	86.2	84.1	77.8	58.7	429	223	135	200	H
	900	880	91.1	92.1	92.0	79.5	75.2	65.5	64.6	362.5	299	125	200	G
	3600	3550	91.4	91.8	90.8	87.7	87.0	83.1	70.1	435	89	120	200	G
90	1800	1780	94.1	94.7	94.5	87.9	86.7	81.7	67.9	435	178	140	200	G
	1200	1175	92.4	93.4	93.4	86.8	84.9	78.9	70.1	478	268	135	200	H
	900	880	91.7	92.7	92.6	80.3	76.3	67.1	76.4	435	358	125	200	G
125	3600	3540	91.8	92.4	92.0	88.1	88.5	86.1	87.0	542.5	111	105	200	G
	1800	1775	94.1	94.9	94.9	88.0	86.9	82.0	84.8	542.5	222	140	200	G
	1200	1175	93.4	94.3	94.4	87.8	86.4	81.7	85.6	636	335	135	200	H
150	900	890	93.7	94.4	94.2	80.1	77.2	69.1	93.6	542.5	443	125	200	G
	3600	3535	92.1	93.1	93.0	89.1	89.4	87.2	114.1	725	149	105	200	G
	1800	1780	94.6	95.2	95.0	87.0	86.1	81.5	108.9	725	295	125	200	G
200	1200	1185	93.4	94.2	94.0	84.5	82.1	75.1	118.6	792	443	125	200	H
	900	890	93.8	94.5	94.4	80.2	76.9	68.2	124.5	725	591	125	200	G
	3600	3545	92.9	93.5	93.1	88.9	88.1	83.9	141.7	907.5	185	100	200	G
250	1800	1780	94.9	95.5	95.4	87.0	86.0	81.4	141.7	907.5	369	110	200	G
	1200	1190	94.0	94.6	94.3	84.0	80.8	72.6	148.2	1113	553	125	200	H
	3600	3545	93.1	93.9	93.8	89.9	89.2	85.4	167.8	1085	222	100	200	G
300	1800	1785	95.5	95.7	95.2	85.8	82.8	75.1	171.2	1085	443	110	200	G
	1200	1185	93.7	94.8	95.1	86.8	85.6	80.8	172.7	1180	665	120	200	H
	3600	3560	93.4	93.7	92.8	89.1	88.3	84.4	224.9	1450	295	100	200	G
400	1800	1780	95.5	95.9	95.7	87.4	85.5	79.3	224.3	1450	591	100	200	G
	3600	3550	93.4	93.9	93.4	89.2	88.4	84.3	280.8	1825	370	70	175	G
	1800	1780	95.1	95.8	95.8	86.7	84.8	78.4	283.8	1825	738	80	175	G

Efficiency & power factor values listed above are representative values. For guaranteed and certified values, refer to company.

The code letter is an indication of the locked rotor K.V.A. in accordance with the National Electrical Code.

When performance values have been quoted, they should be shown on the order.

For data not listed, refer to company. Data subject to change without notice.

Extra high thrust may decrease typical efficiency below values listed above.

ADDED OR CHANGED  
THIS ISSUE



U. S. ELECTRICAL MOTORS  
DIVISION OF EMERSON ELECTRIC CO. EMERSON

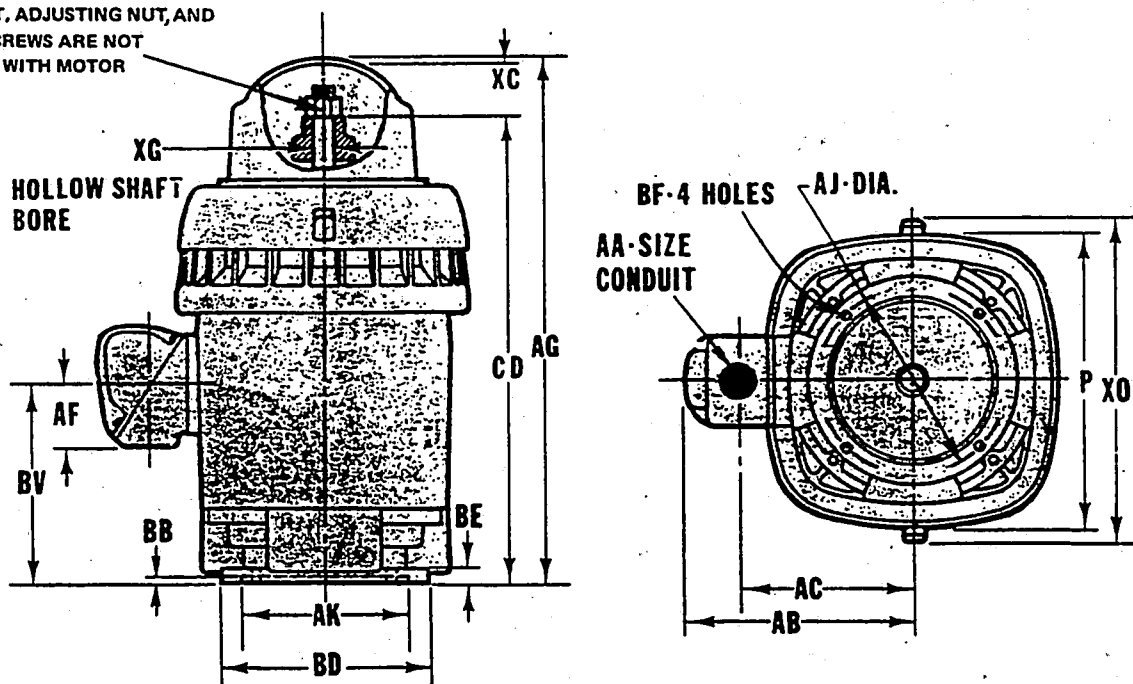
# VERTICAL MOTORS



## DIMENSIONS

FRAMES 324TP THRU 405TPA -- TYPES RU, RUE (DRIPPROOF) -- WEATHER PROTECTED TYPE 1

PUMP SHAFT, ADJUSTING NUT, AND  
LOCKING SCREWS ARE NOT  
FURNISHED WITH MOTOR



ALL DIMENSIONS ARE IN INCHES

BASIC FRAME	P*	AA	AB	AC	AF	AG	BE	BV	CD	XC	XO
320	18-3/8	3	15-3/16	11-5/8	4	32-5/8	11/16	11-1/16	28-7/32	4-7/32	21
360	18-3/8	3	15-3/16	11-5/8	4	35-9/16	11/16	14	31-5/32	4-7/32	21
400	20-1/2	3	16-3/8	12-3/4	4	41-5/8	3/4	18-1/8	36-15/16	4-9/16	23-3/8

FRAME	AJ	AK	BB	BD MAX.	BF	XG	BRACKET PART NO.
324, 326TP	14-3/4	13-1/2	1/4	16-1/2	11/16	1-9/16	192169
324, 326TPH	9-1/8	8-1/4	3/16	12	7/16	1-9/16	192163
364, 365TP	14-3/4	13-1/2	1/4	16-1/2	11/16	1-9/16	192169
364, 365TPA	9-1/8	8-1/4	3/16	12	7/16	1-9/16	192163
404, 405TP	14-3/4	13-1/2	1/4	16-1/2	11/16	1-7/8	188662
404, 405TPA	14-3/4	13-1/2	1/4	20	11/16	1-7/8	188664

\* Largest motor width.

Conduit box opening may be located in steps of 90 degrees. Standard as shown with conduit opening down.

All rough casting dimensions may vary by 1/4" due to casting variations.

TOLERANCES	AK DIMENSION	
	8-1/4	13-1/2
Face runout	.004 F.I.R.	.007 F.I.R.
Permissible eccentricity of mounting rabbet	.004 F.I.R.	.007 F.I.R.
AK dimension	+.003	+.005



U.S. ELECTRICAL MOTORS DIVISION EMERSON ELECTRIC CO.

Printed in U.S.A.

EFFECTIVE: OCTOBER 28, 1984  
UPPERSEDES: APRIL 24, 1983

SECTION : 505  
PAGE : 3

DO NOT USE FOR CONSTRUCTION  
PURPOSES UNLESS CERTIFIED

# OWEN BROTHERS PUMP

P O BOX 60808 • RENO • NEVADA • 89506 • 702-677-2574 • FAX 702-972-5081  
NV LIC #19623 / CA LIC #480750

*Per Roger Owen (10/13/98), this is pump installed.*  
*TLK.*

## SPECIFICATIONS FOR PUMPING EQUIPMENT WASHOE COUNTY SOUTH POINTE WELL #2

(8 Sheets Total w/ Cover)

JANUARY 30, 1997

Mr. John Bronder, P.E.

County of Washoe  
Dept of Public Works  
Utility Division  
P O Box 11130  
Reno NV 89520-0027

- Reading ~ 70 ft while running 730 gpm
- off, recovered to 131 on electronic meter  
Reads 203.75 ft w/sounder

*Transducer is @ 332 ft below top  
of pedestal*

SUBMITTAL REVIEW
ACTION
✓ NO REPORT ONE TAKEN
NO REPORT NOTED
NO REPORT SUBMIT
NO REPORT SUBMIT
Office of Washoe County Utility Division
By <u>JNB</u> Date <u>2-5-97</u>

# **Specifications Vertical Turbine Pump Water Lubricated**

## **A. Scope**

This specification covers a deep well lineshaft turbine pump with above ground discharge, arranged for water lubrication of the lineshaft bearings by the water being pumped and furnished with suitable driver and accessories as specified herein. The pumping unit shall be designed and furnished in accordance with the latest hydraulic institute and AWWA specifications for lineshaft turbine pumps.

## **B. Service Conditions**

The pump shall be designed and constructed to operate satisfactorily with a reasonable service life, when installed in a typical continuous turbine pump application. The pump shall be the product of, and manufactured by Goulds Pumps, Inc. Other manufacturers will be considered providing the unit offered is an approved equal in all respects to the brand and model preferred by the customer. Factory pump curves for alternate pumps shall be submitted with the bid.

## **C. Operating Conditions**

Design conditions: 750 Gallons per minute  
Design head: 500 Feet total dynamic head (TDH)  
Minimum pump efficiency of: 78 Percent  
Maximum allowable speed: 1800 RPM  
Liquid to be pumped: Water  
Pump bowl setting: 400 Feet to Top (410 Ft to Suction)  
Well diameter I.D.: 12 Inches

## **D. Pump Construction:**

1. **Bowl assembly:** the intermediate bowls, suction bowl, and discharge adapter shall be flanged type constructed from close grained cast iron, and shall conform to ASTM designation A48, class 30. They shall be free from sand holes, blow holes, or other faults and must be accurately machined and fitted to close tolerances. The intermediate bowls shall have vitra glass lined waterways for maximum efficiency and wear protection. All intermediate bowls shall be of identical design for interchangeability. A discharge adapter shall be used to connect bowls to the discharge column. Threaded connecting bowls will be allowed on bowl sizes 8" and smaller. To ensure quality and consistency of product, cast iron components must be produced in a foundry owned by the pump manufacturer.
2. **Impellers:** the impellers shall be constructed from ASTM B584 Silicon Bronze and shall be the X enclosed, (or ~~semi-open~~) type. They shall be free from defects and must be accurately cast, machined, balanced, and filed for optimum performance and minimum vibration. Impellers are to be standard product of the pump manufacturer and not contain special workmanship to temporarily increase efficiency. They shall be securely fastened to the bowl shaft with taper locks of X C1045 steel (or ~~416 SS~~). The impellers shall be adjustable by means of a top shaft adjusting nut.
3. The suction bowl shall be provided with a non-soluble grease packed bronze bearing, and a bronze sand collar shall be incorporated in the pump design to protect this bearing from abrasives. The bearing housing shall have a sufficient opening at the bottom for easy removal of the bearing.
4. **Wear rings:** pumps 6" and larger shall ~~be~~ (or shall not X) be fitted with replaceable wear rings of bronze material in the suction bowl and intermediate bowls. Wear rings shall have the minimum practical clearance to the mating cylindrical surface of the impeller to provide adequate sealing independent of vertical positioning of the impellers.
5. The bowl shaft shall be constructed from ASTM A582 type 416 stainless steel. It shall be precision turned, ground and polished and shall be supported by water lubricated bronze bearings, or ~~optional fluted rubber bearings.~~

### **E. Column Assembly – Water Lubricated**

1. Pump speeds up to 2200 RPM shall have intermediate column lengths and lineshaft bearing spacing not to exceed 10 feet. Pump speeds between 2200 RPM and 3600 RPM shall have intermediate column length and bearing spacing no greater than 5 feet.
2. *Column pipe:* the column pipe shall be grade A steel pipe with the ends machined with 8 threads per inch with  $\frac{3}{16}$ " taper and faced parallel to butt against the centering spiders. Inside diameter of the pipe shall be such that the head losses shall not be over 5 feet per 100 feet of pipe, and shall weigh not less than 29 lbs/ft. Pipe shall be connected with threaded sleeve type steel couplings.
3. Lineshaft shall be of ample size to operate the pump without distortion or vibration. Diameter of the shaft shall be such that it does not exceed the horsepower limitations indicated in the engineering section of the Goulds Catalog. Shaft shall be furnished in interchangeable sections not over ten feet in length, and shall be coupled with extra-strong threaded steel couplings machined from solid bar steel. Lineshaft shall be C1045 steel with a chrome spot surfacing for the bearing area. The chrome spot to be electroplated.
4. Bronze centering spiders of the drop-in type shall be furnished for shaft stabilization at each column pipe coupling. Bearings shall be fluted rubber retained in the spider by a shoulder on each end of the bearing.

### **F. Discharge Head Assembly – Water Lubricated**

1. Discharge head shall be of the high profile type and be a suitable base of high grade cast iron, ASTM A48-30, or fabricated steel. It shall be provided for mounting the motor with a discharge elbow having an above ground flanged discharge outlet for 8 inch standard pipe. The design shall have sufficient capacity to carry the combined weight of the column assembly. The design shall allow the top shaft to couple above the stuffing box. The head shall have a  $\frac{1}{2}$ " NPT connection for a pressure gauge.
2. The stuffing box shall be cast iron and shall contain a minimum of five rings of packing. It shall have a pressure relief connection. The packing gland shall be a bronze split type secured in place with noncorrosive studs and nuts. The bearing shall be SAE660 bronze. A rubber slinger shall be secured to the shaft above the packing gland.

### **G. Suction Pipe and Strainer**

The suction pipe shall be 0 feet in length and shall have a minimum inside diameter and weight equal to that of the discharge column pipe. A suitable cone strainer of galvanized steel shall be provided having a free area of at least five times the flow area of the suction pipe.

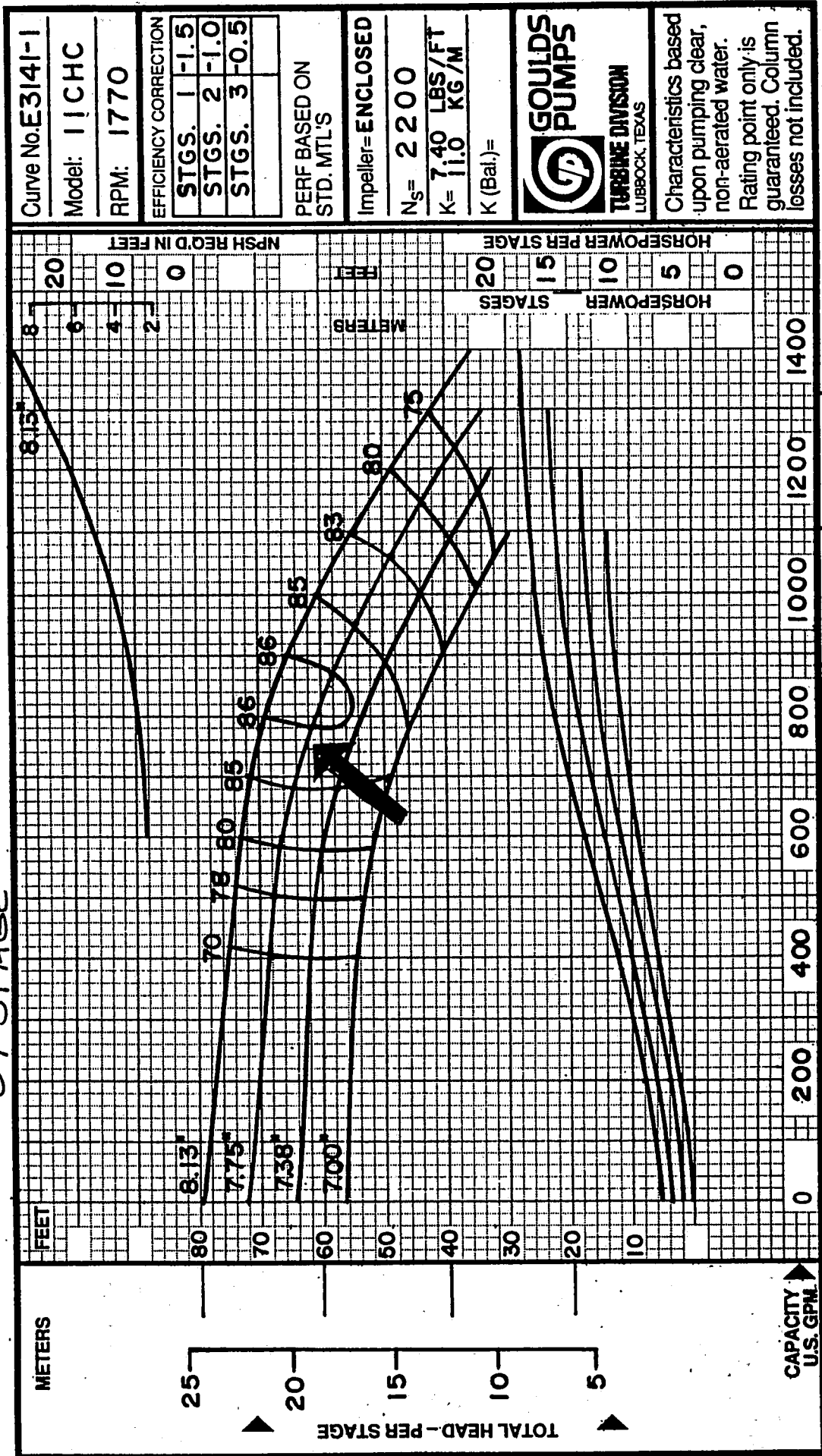
### **H. Electric Motor**

The motor shall be a heavy duty squirrel cage induction type, NEMA design B, 1750 RPM vertical hollow shaft motor, with a non reverse ratchet to prevent reverse rotation of the rotating elements. A suitable thrust bearing shall be incorporated in the upper end of the motor adequate to receive the entire hydraulic thrust load of the pump unit plus the weight of the rotating parts under all conditions of operation. The motor shall be ~~normal~~ (or premium) efficiency with a WP-1 enclosure, 1.15 service factor, and suitable for use on a 460 volt, three phase, 60 cycle electric service.



GOULDS PROPOSAL NO.		GOULDS S.O. NO.		INQUIRY NO.		CUSTOMER P.O. NO.		P.O. DATE		ITEM NO.		CUSTOMER	
PROJECT				SERVICE				GPM CAPACITY		F.T. TDH		% EFFICIENCY	
												RPM	

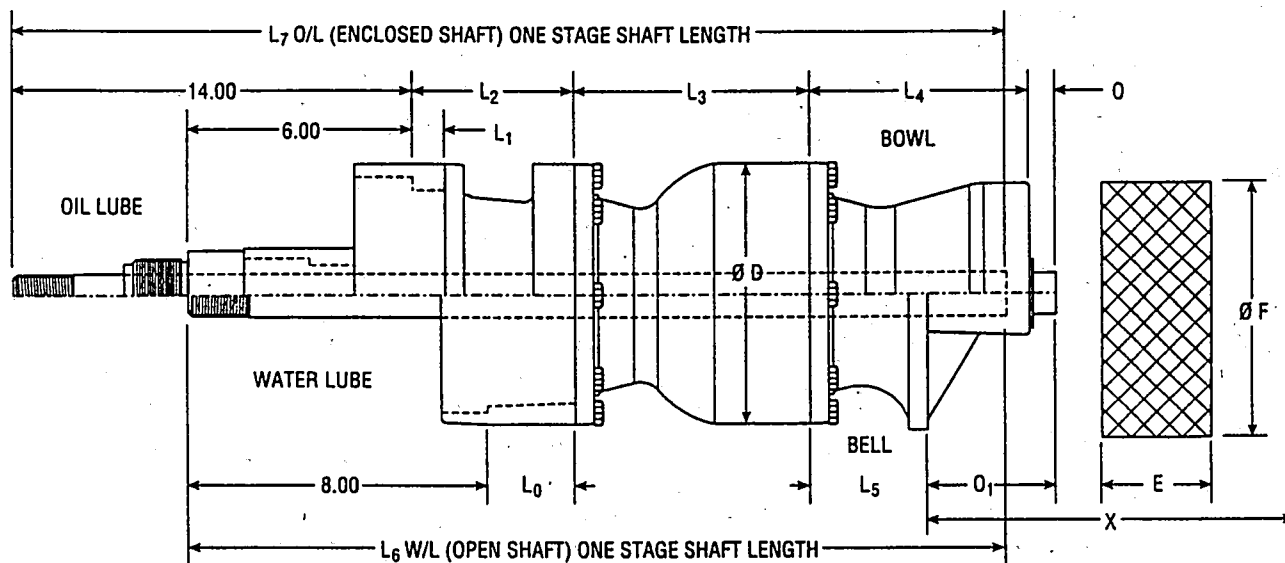
8/ STAGE



MODEL  
**11CHC**  
 DATE  
 July 1996  
 SUPERCEDES  
 April 1994

# Vertical Turbine Pumps Engineering Data

Effective January 1, 1997



## Turbine Mechanical Bowl Data

Model and Size	Bowl Assembly Length										Basket Strainer (Optional)		Floor Clearance	Bowl O.D.	Bowl Shaft Dia.	Available Lineshaft Sizes	Column Pipe Size	Suction Pipe Size	1st Stage Bowl Assembly Weight		Add'l Stage Weight
	L <sub>0</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	L <sub>5</sub>	L <sub>6</sub>	L <sub>7</sub>	0	01									Open Shaft	Enclosed Shaft	
	E	F	X	D																	
11C	3.5	1.0	5.75	9.88	10.13	5.63	30.25	38.5	1.0	5.38	8.0	11.5	8.0	11.0	1.69	1.0–1.69	6,8,10	8,10	240	265	97
11RA	4.13	2.13	5.75	8.0	NA	4.63	28.63	36.25	NA	6.0	6.88	11.25	8.13	11.6	1.69	1.0–1.69	6,8,10	NA	216	231	103
11WA	3.5	1.0	5.75	8.75	10.13	5.63	29.38	37.63	1.0	5.50	8.0	11.5	9.5	11.0	1.69	1.0–1.69	5,6,8	8,10	229	254	90
12C	4.13	2.13	5.75	11.0	10.38	6.88	32.63	40.25	.88	4.38	5.5	12.75	8.0	11.75	1.69	1.0–1.69	6,8,10	8,10	263	295	124
12RDH	4.13	2.13	5.75	11.25	9.5	8.0	33.25	40.88	2.5	4.0	5.5	12.75	13.0	11.6	1.94	1.0–1.94	6,8,10	10	275	300	129
12FR	4.13	NA	8.25	12.5	9.13	8.0	33.75	43.88	2.75	NA	NA	NA	NA	11.75	1.94	1.0–1.94	10	10	255	320	129
12I	4.13	2.13	5.75	9.0	10.38	6.88	30.25	37.88	1.0	4.5	5.5	12.75	8.0	11.6	1.69	1.0–1.69	6,8,10	8	245	270	92
12RA	4.13	2.13	5.75	9.0	9.75	6.88	29.88	37.5	1.0	3.88	5.5	12.75	8.0	11.6	1.69	1.0–1.69	6,8,10	6	240	265	95
12RJ	4.13	2.13	5.75	9.6	10.38	6.88	30.81	38.5	1.0	4.5	5.5	12.75	8.0	11.6	1.69	1.0–1.69	6,8,10	8	250	275	95
13C	4.13	NA	5.75	11.13	10.13	5.56	32.0	39.63	1.0	5.56	7.5	14.25	8.0	12.38	1.94	1.0–1.94	8,10	10	315	380	150
13RA	3.13	3.0	9.0	9.5	NA	7.0	31.38	43.25	NA	5.5	7.5	14.25	7.63	13.38	1.94	1.0–1.94	8,10,12	NA	374	459	164
14RDH	3.13	3.0	9.0	13.25	10.75	10.75	37.00	49.88	5.75	5.75	13.5	15.5	18.0	13.25	2.19	1.19–2.19	10,12	12	405	490	169
14H	3.88	NA	13.5	13.63	11.0	11.0	37.63	53.25	3.75	3.75	11.5	14.75	12.0	14.0	2.19	1.19–2.19	10,12	10	493	568	195
14RJ	3.13	3.0	9.0	11.5	10.5	6.25	31.75	43.63	1.0	5.25	9.5	15.0	10.0	13.63	1.94	1.0–1.94	8,10,12	10	390	475	155

(All dimensions are in inches and weights in lbs.)

Continued on next page.



# Mechanical Seal/Stuffing Box Data

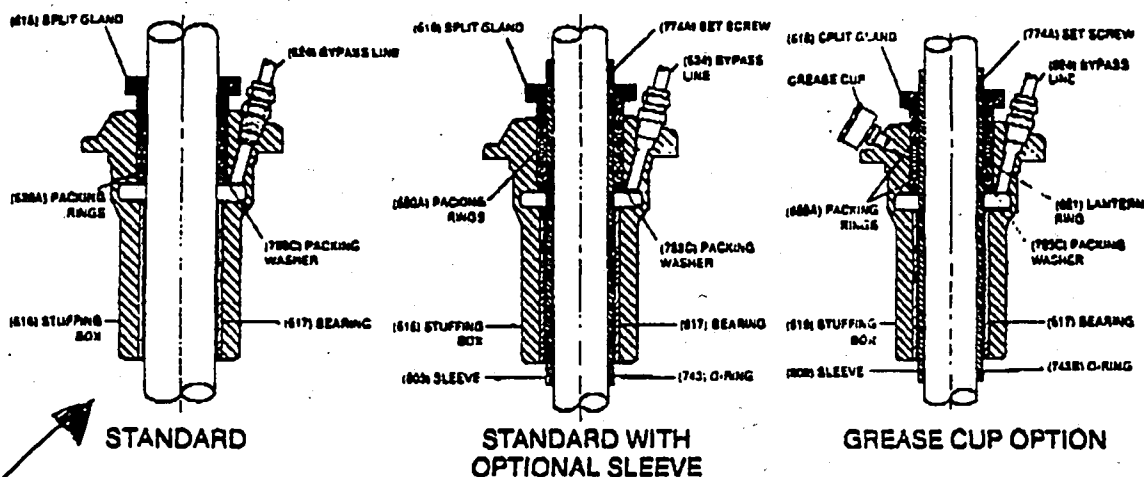
## Sectionals and Selection

**25.1**

October 1, 1986  
(Sup. 6/1/82)

ATTN: JOE

### Stuffing Box Sectionals



Type of Packing	Applications	Pressure Range	Temperature Range	Comments
Graphite & Petrolatum Impregnated Non Abestos Yarn	General Services	300#	Ambient to 300°	
Lead Foil	High Temperature		250°F to 450°F	Shaft hardfacing or a shaft sleeve is recommended

For Abrasive Services, refer to factory.

Shaft or Sleeve Size (2)	Number of Packing Rings		Packing Required	Box Depth
	Standard	With Lantern Ring	Size	Standard With One Lantern Ring
1"	6	4	3/8" square	2 1/2"
1 1/16"	8	4	3/8" square	2 1/2"
1 1/8"	8	4	3/8" square	2 1/2"
1 1/4"	8	4	3/8" square	2 1/2"
1 3/8"	8	4	3/8" square	2 1/2"
2 1/16"	6	4	3/8" square	2 1/2"
2 1/8"	6	4	3/8" square	2 1/2"
2 1/4"	8	4	1/2" square	3 1/2"
2 3/8"	8	4	1/2" square	3 1/2"

**NOTES:**

1. Stuffing box and lineshaft bearing should be sized alike.
2. Sleeve is two (2) sizes larger than shaft.



# VERTICAL PREMIUM EFFICIENT

## WPI HOLLOSHAFT & SOLID SHAFT

### 230, 460, & 575 VOLTS; 3 PHASE, 60 HERTZ

### HIGH THRUST ENGINEERING DATA

SECTION: 504  
PAGE: 22  
EFFECTIVE: 01-15-93  
SUPERSEDES: PG 8.2  
DATED: 11-15-92

I.P.	RPM		% EFFICIENCY			% POWER FACTOR			CURRENT (AMPS) 460VOLTS		TORQUE AT FULL VOLTAGE (FT.-LBS.)			NEMA CODE
	NO LOAD	FULL LOAD	FULL LOAD	3/4 LOAD	1/2 LOAD	FULL LOAD	3/4 LOAD	1/2 LOAD	FULL LOAD	LOCKED STARTING	FULL LOAD TORQUE AT FULL LOAD SPEED	LOCKED (STARTING)	PULLOUT BREAKDOWN	
5	900	880	88.4	88.7	87.3	71.4	84.5	52.5	7.4	48	30	130	205	H
	1800	1760	91.2	91.8	91.0	85.9	83.1	78.1	9.3	63.5	22	175	215	H
	1200	1170	89.5	90.1	89.3	80.4	75.1	64.5	9.8	68	34	150	205	J
	900	875	88.6	89.3	88.5	73.3	86.7	55.2	10.8	63.5	45	125	200	H
10	1800	1760	91.2	91.9	91.6	86.3	83.8	77.1	12.3	78	30	165	200	G
	1200	1170	88.8	89.7	89.2	81.4	75.8	65.2	13.0	91	45	150	200	J
	900	875	88.6	89.9	89.8	75.9	70.7	60.6	13.9	81	60	125	200	G
	1800	1785	91.7	92.2	91.4	81.9	78.2	69.4	18.7	116	45	160	200	G
15	1200	1170	90.5	91.4	91.2	81.5	76.6	66.7	19.1	136	67	140	200	J
	900	875	87.9	89.1	88.7	74.0	67.4	55.9	21.6	116	90	125	200	G
	3600	3525	90.5	91.4	91.1	88.0	87.4	83.4	23.5	145	30	130	200	G
	1800	1770	92.4	93.3	93.2	85.0	83.7	78.4	23.8	145	60	150	200	G
20	1200	1170	90.5	91.7	91.7	82.2	77.6	68.0	25.2	200	90	135	200	J
	900	880	90.1	91.1	90.8	75.1	70.5	60.1	27.7	145	119	125	200	G
	3600	3530	91.2	92.1	91.8	87.1	86.2	81.6	29.4	182.5	37	130	200	G
	1800	1770	93.0	93.9	93.9	83.8	81.8	74.8	30.0	182.5	74	150	200	G
25	1200	1175	90.9	92.0	92.0	85.0	83.4	77.9	30.3	200	112	135	200	G
	900	880	90.3	91.6	91.7	76.8	73.0	63.7	33.8	182.5	149	125	200	G
	3600	3520	90.7	92.0	92.1	88.2	87.4	83.1	35.1	217.5	45	130	200	G
	1800	1765	92.9	94.0	94.2	84.2	82.5	76.4	35.9	217.5	89	150	200	G
30	1200	1180	91.5	92.6	92.6	85.5	83.8	78.3	35.9	258	134	135	200	G
	900	880	90.9	92.0	91.7	76.1	70.8	59.7	40.6	217.5	179	125	200	G
	3600	3520	92.1	93.3	93.4	89.1	88.5	84.7	45.7	290	60	125	200	G
	1800	1780	93.2	93.7	93.3	87.2	86.4	82.2	46.1	290	118	140	200	G
40	1200	1175	91.5	92.8	93.0	84.6	82.3	75.4	48.4	336	179	135	200	H
	900	880	91.2	92.5	92.6	77.4	72.8	62.4	53.1	290	239	125	200	G
	3600	3545	90.7	90.8	89.4	85.3	83.9	78.4	60.5	362.5	74	120	200	G
	1800	1780	93.9	94.4	94.0	87.6	86.1	80.6	58.7	36.5	148	140	200	G
50	1200	1175	92.5	93.7	93.9	86.2	84.1	77.8	58.7	429	223	135	200	H
	900	880	91.1	92.1	92.0	79.5	75.2	65.5	64.6	362.5	299	125	200	G
	3600	3550	91.4	91.8	90.8	87.7	87.0	83.1	70.1	435	89	120	200	G
	1800	1780	94.1	94.7	94.5	87.9	86.7	81.7	67.9	435	178	140	200	G
60	1200	1175	92.4	93.4	93.4	86.8	84.9	78.9	70.1	478	268	135	200	H
	900	880	91.7	92.7	92.6	80.3	76.3	67.1	78.4	435	358	125	200	G
	3600	3540	91.6	92.4	92.0	88.1	88.5	86.1	87.0	542.5	111	105	200	G
	1800	1775	94.1	94.9	94.9	88.0	86.9	82.0	84.8	542.5	222	140	200	G
75	1200	1175	93.4	94.3	94.4	87.8	86.4	81.7	85.6	636	335	135	200	H
	900	890	93.7	94.4	94.2	80.1	77.2	69.1	93.6	542.5	443	125	200	G
	3600	3535	92.1	93.1	93.0	89.1	89.4	87.2	114.1	725	149	105	200	G
	1800	1780	94.6	95.2	95.0	87.0	86.1	81.5	108.9	725	295	125	200	G
100	1200	1185	93.4	94.2	94.0	84.5	82.1	75.1	118.6	792	443	125	200	H
	900	890	93.8	94.5	94.4	80.2	76.9	68.2	124.5	725	591	125	200	G
	3600	3545	92.9	93.5	93.1	88.9	88.1	83.9	141.7	907.5	185	100	200	G
	1800	1780	94.9	95.5	95.4	87.0	86.0	81.4	141.7	907.5	369	110	200	G
125	1200	1190	94.0	94.6	94.3	84.0	80.8	72.6	148.2	1113	553	125	200	H
	3600	3545	93.1	93.9	93.8	89.9	89.2	85.4	167.8	1085	222	100	200	G
	1800	1785	95.5	95.7	95.2	85.8	82.8	75.1	171.2	1085	443	110	200	G
	1200	1185	93.7	94.8	95.1	86.8	85.6	80.8	172.7	1180	665	120	200	H
200	3600	3560	93.4	93.7	92.8	89.1	88.3	84.4	224.9	1450	295	100	200	G
	1800	1780	95.5	95.9	95.7	87.4	85.5	79.3	224.3	1450	591	100	200	G
250	3600	3550	93.4	93.9	93.4	89.2	88.4	84.3	280.8	1825	370	70	175	G
	1800	1780	95.1	95.8	95.8	86.7	84.8	78.4	283.8	1825	738	80	175	G

Efficiency & power factor values listed above are representative values. For guaranteed and certified values, refer to company.

The code letter is an indication of the locked rotor K.V.A. in accordance with the National Electrical Code.

When performance values have been quoted, they should be shown on the order.

For data not listed, refer to company. Data subject to change without notice.

Extra high thrust may decrease typical efficiency below values listed above.

ADDED OR CHANGED  
THIS ISSUE



U. S. ELECTRICAL MOTORS  
DIVISION OF EMERSON ELECTRIC CO. EMERSON

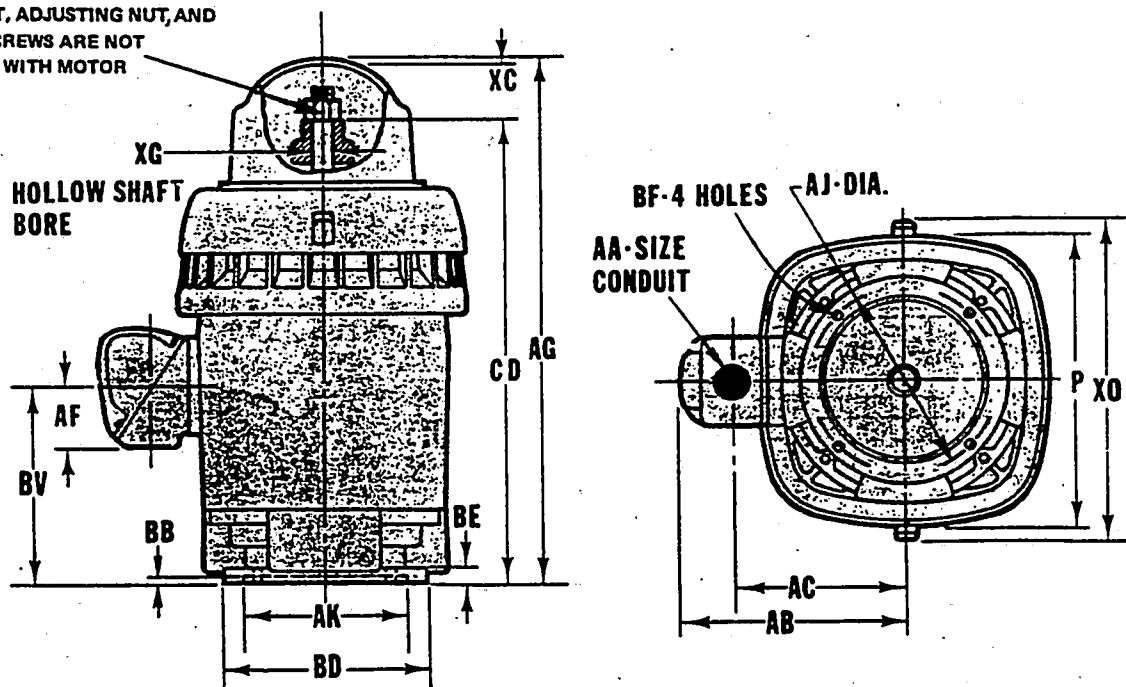
# VERTICAL MOTORS



## DIMENSIONS

FRAMES 324TP THRU 405TPA -- TYPES RU, RUE (DRIPPROOF) -- WEATHER PROTECTED TYPE 1

PUMP SHAFT, ADJUSTING NUT, AND  
LOCKING SCREWS ARE NOT  
FURNISHED WITH MOTOR



ALL DIMENSIONS ARE IN INCHES

BASIC FRAME	P*	AA	AB	AC	AF	AG	BE	BV	CD	XC	XO
320	18-3/8	3	15-3/16	11-5/8	4	32-5/8	11/16	11-1/16	28-7/32	4-7/32	21
360	18-3/8	3	15-3/16	11-5/8	4	35-9/16	11/16	14	31-5/32	4-7/32	21
400	20-1/2	3	16-3/8	12-3/4	4	41-5/8	3/4	18-1/8	36-15/16	4-9/16	23-3/8

FRAME	AJ	AK	BB	BD MAX.	BF	XG	BRACKET PART NO.
324, 326TP	14-3/4	13-1/2	1/4	16-1/2	11/16	1-9/16	192169
324, 326TPH	9-1/8	8-1/4	3/16	12	7/16	1-9/16	192163
364, 365TP	14-3/4	13-1/2	1/4	16-1/2	11/16	1-9/16	192169
364, 365TPA	9-1/8	8-1/4	3/16	12	7/16	1-9/16	192163
404, 405TP	14-3/4	13-1/2	1/4	16-1/2	11/16	1-7/8	188662
404, 405TPA	14-3/4	13-1/2	1/4	20	11/16	1-7/8	188664

\* Largest motor width.

Conduit box opening may be located in steps of 90 degrees. Standard as shown with conduit opening down.

All rough casting dimensions may vary by 1/4" due to casting variations.

TOLERANCES	AK DIMENSION	
	8-1/4	13-1/2
Face runout	.004 F.I.R.	.007 F.I.R.
Permissible eccentricity of mounting rabbet	.004 F.I.R.	.007 F.I.R.
AK dimension	+.003	+.005



U.S. ELECTRICAL MOTORS DIVISION EMERSON ELECTRIC CO.

Printed in U.S.A.

EFFECTIVE: OCTOBER 28, 1984  
SUPERSEDES: APRIL 24, 1983

SECTION : 505  
PAGE : 3

DO NOT USE FOR CONSTRUCTION  
PURPOSES UNLESS CERTIFIED



5201 Woodmere Dr. • Bakersfield, CA • 93313-2770 **JOB TICKET**  
Toll Free (800) 445-9914 • Fax (661) 834-2550 **33719**  
email: welenco@welenco.com www.welenco.com

OPERATOR(S): THUS CHARGE TO: WALTON WELL NOS:      
JOB DATE: 12-21-01 INVOICE ADDRESS:      
CUSTOMER P.O.: 194359 PHONE:      
BASE: RAE CITY:     STATE:     ZIP:      
LOCATION: ARIZONA  
TRUCK No.: 1-10 REQUESTED BY: DAN

### CONDITIONS OF THIS CONTRACT

To welenco, inc.:

You are hereby requested to furnish the service and materials herein set forth upon the following terms and conditions:

The undersigned, as customer, agrees to pay you for the services and/or materials ordered hereunder at the office of welenco, inc., Bakersfield, California. Should any account not be paid within the term fixed by the invoice, a finance charge will be charged at the rate of 1.5% per month, 18% per annum from the date of such invoice. In case of default, Customer agrees that venue is in the court of the seller, and to pay all attorney's fees and court costs.

Customer certifies that it is the owner of the well on which the work herein ordered is to be done or that it has the full right and authority to order such work done on such wells. Customer further agrees that the General Terms and Conditions set forth on the reverse side of this document constitute the entire agreement and that no employee of your company is authorized to alter the terms hereof. I have read and understand the terms of this contract and represent that I am authorized to sign the same as agent of the customer.

DESCRIPTION	PRICE	AMT	DESCRIPTION	PRICE	AMT
<b>MISCELLANEOUS SERVICES</b>			<b>WELL REPAIR SERVICES</b>		
Service Charge 1 <sup>ST</sup> Run/Day:	\$	\$ 520	Swage Labor Charge	\$ 50/hr	\$
Service Charge ____ Run/Day:	\$	\$	Swage Mast Charge	\$ 70/hr	\$
Excess Standby Time	\$	\$	SlimHole Patch Charge	\$ ea	\$
____ Hrs. (3 Free Hours)			Patch Charge #		
Excess Mileage Charge	\$	\$	5' Annealed Liner	\$ ea	\$
____ Miles (100 Free Mi.)			Patch Charge #	\$ ea	\$
ASCII Diskettes #	\$	\$	5' Stainless Steel Liner	\$ ea	\$
DXF Diskettes #	\$	\$	Patch Welding #	\$ ea	\$
<b>LOGGING SERVICES</b>			<b>ADDITIONAL SERVICES</b>		
Electric	\$ /ft	\$	EnerJet #	ft 1st Well	\$
Lateral	\$ /ft	\$	EnerJet #	ft 2nd Well	\$
Induced Polarization	\$ /ft	\$			\$
Single Induction	\$ /ft	\$			\$
Dual Induction	\$ /ft	\$			\$
Micro-Resistivity	\$ /ft	\$			\$
GR-Neutron	\$ /ft	\$			\$
Gamma Ray	\$ /ft	\$			\$
Caliper	\$ /ft	\$			\$
Borehole Geometry	\$ /ft	\$			\$
Temp/FR	\$ /ft	\$			\$
Sonic	\$ /ft	\$			\$
CBL	\$ /ft	\$			\$
Drift-Pac	\$ /ft	\$ 1500			\$
BHTV	\$ /ft	\$			\$
Water Quality Log	\$ /ft	\$			\$
Nitrate	\$ /ft	\$			\$
Guard	\$ /ft	\$			\$
Spinner(#1)	\$ /ft	\$			\$
Spinner(#2)	\$ /ft	\$			\$
Spinner(#3)	\$ /ft	\$			\$
Spinner(#4)	\$ /ft	\$			\$
Spinner(#5)	\$ /ft	\$			\$

REMARKS:    

I certify the above work has been performed:

AGENT:     DATE:

Project Price

(✓ Check Appropriate Services)

SUB TOTAL:

SALES TAX:

JOB TICKET TOTAL:

## GENERAL TERMS AND CONDITIONS

IN CONSIDERATION OF THE PRICES HEREINAFTER SET OUT, IT IS UNDERSTOOD THAT THE SERVICES OFFERED BY US ARE TO BE PERFORMED ONLY UNDER THE FOLLOWING TERMS AND CONDITIONS:

1. Terms of Payment. Terms of payment are net cash 30 days following invoice date. Finance charge at 1.5% per month, 18% per annum will be charged on invoices unpaid 60 days after invoice date. All prices are exclusive of any Federal, State or other taxes on the sale or use of the merchandise and services listed, which taxes will be added to quoted prices where applicable. In case of default, Customer agrees that venue is in the county of the seller, and to pay all attorney's fees and court costs.

2. A reasonable attempt will be made by us to get from the highway to the location and back again under our own power. If tractors or other types of equipment or services are required to give us access to or return from the well location, same will be provided by the customer at his expense. On jobs where our equipment is transported by a conveyance belonging to or arranged for by the Customer, the Customer shall be responsible for the undamaged and safe return to the point of embarkation of all our equipment.

3. We endeavor to design and maintain our equipment to safely service properly drilled and conditioned wells. We carry public liability and property damage insurance. As there are so many conditions in and around wells which are uncertain and unknown and not subject to our control, we can neither guarantee the results nor be liable for injuries to property or persons nor for loss or damage arising from the performance of our services or resulting therefrom.

4. In the event any of our instruments or equipment is lost in the well, customer shall either recover same without cost to us, or (unless Instrument Protection Charge has been purchased) pay for such instruments or equipment. In case it is necessary for Customer to "fish" for any of our instruments or equipment, Customer assumes the entire responsibility for such operations, but we will, if so desired by Customer, without any responsibility or liability on our part, render assistance in an advisory capacity for the recovery of such equipment and instruments. None of our employees is authorized to do anything other than advise and consult with Customer in connection with such "fishing" operations and any "fishing" tools furnished by us are furnished solely as an accommodation to the Customer, and we shall not be liable or responsible for any damage that Customer may incur or sustain through their use by reason of any advice or assistance rendered to Customer by our agents or employees, irrespective of cause.

5. Notwithstanding the provisions of Paragraph 4 hereof, if Customer chooses to purchase the Instrument Protection Charge (which is only offered when well conditions are normal), which choice must be exercised before operations begin, Customer is relieved of liability to pay for repair costs to subsurface equipment (which shall mean the cablehead and all equipment below the cablehead) damaged by recovery operations and replacement costs of subsurface equipment lost in the well. The protection to Customer given by the Instrument Protection Charge is only effective once Customer has made every reasonable effort to recover the equipment lost. A reasonable fishing effort is at least three complete attempts to reach and recover the equipment lost not counting any attempt to recover lost cable. Welenco in its discretion may choose not to provide the protection given by the Instrument Protection Charge when it considers the well conditions to be other than normal. The Instrument Protection Charge does not cover damage to equipment in other than normal well conditions.

6. In accepting an order to perform or attempt to perform any service involving the use of radioactive material, Welenco does so with the understanding that we do not guarantee results, and Customer agrees that we shall not be liable or

responsible for injury to or death of persons or damage to property (including but not limited to injury to the well), or any damages whatsoever, irrespective of the cause, growing out of or in any way connected with our use of radioactive material. Customer acknowledges that he is aware of the fact that radioactive sources used in logging are potentially dangerous to humans and animals; should the source be lost in the well bore, special precautions must be taken in fishing in order that the container of the source is not broken or damaged; and the source, if not recovered, must be isolated by cementing it in place or by some other appropriate means that is in compliance with the policies of the applicable regulatory agencies. Customer shall absolve and hold Welenco, its agents, servants, officers and employees harmless against all loss, costs, damages and expenses incurred or sustained by Customer or any third party, irrespective of the cause including negligent acts or omissions by Welenco, its agents, servants, officers or employees, resulting from any such use of radioactive material. Pursuant to regulations established by the Arizona Radiation Regulatory Agency, when services are undertaken in that state which require the use of radioactive materials, a written agreement must be entered into between Welenco and Customer which specifies procedures to be carried out in the event a radioactive source is lodged or lost in a well bore.

7. In making any interpretation of logs, our employees will give Customer the benefit of their judgment as to the correct interpretation. Nevertheless, since all interpretations are opinions based on inferences from electrical or other measurements, we cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not be liable or responsible for any loss, costs, damages or expenses incurred or sustained by Customer resulting from any interpretation made by any of our officers, agents or employees. Welenco does not warrant or guarantee the accuracy of log data, specifically including (but without limitation) the accuracy of log data transmitted by electronic process, and, Welenco will not be responsible for accidental or intentional interception of such data by third parties.

8. If Customer is not the sole owner of well in respect of which Welenco is requested to provide services, but shares ownership with one or more third parties, or is acting as agent for these parties. Customer represents, warrants and covenants that Customer is the duly constituted and authorized agent of each of such third parties with full powers to represent the interests thereof to the same effect and extent as if the Customer were sole owner.

9. All the preceding terms and conditions shall also apply in favor of any manufacturer or supplier of equipment that we may use in the well.

10. Information derived by us in rendering our services will be held in strict confidence and will be released only upon approval of the Customer.

11. The Customer shall have a responsible representative present to issue orders relative to the service or services to be performed

12. Our cables, bridles and downhole instruments are designed to operate under conditions normally encountered in the well bore. Under extreme conditions, they may be seriously damaged by corrosive gases, chemicals or other substances in the well bore. Customer shall pay for equipment damaged beyond repair by such causes.

13. No employee is empowered to alter the above terms and conditions

FAILURE TO ENFORCE ANY OR ALL OF THE ABOVE TERMS AND CONDITIONS IN A PARTICULAR INSTANCE OR INSTANCES SHALL NOT CONSTITUTE A WAIVER OF, OR PRECLUDE SUBSEQUENT ENFORCEMENT OF, ANY OR ALL OF THE ABOVE TERMS AND CONDITIONS.