

Dragan

1506-00018

CONSTRUCTION AND TESTING SUMMARY

DOUBLE DIAMOND NORTH

JANUARY 1993

WASHOE COUNTY

DEPARTMENT OF PUBLIC WORKS

UTILITY DIVISION

P.O. BOX 11130 RENO, NEVADA 89520



CONSTRUCTION AND TESTING SUMMARY

DOUBLE DIAMOND NORTH

JANUARY 1993

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SUMMARY AND RECOMMENDATIONS

During the time frame of November 20, 1992 through January 11, 1993, a replacement well for the Double Diamond North well was undertaken. The well was completed as a 12 inch diameter well to a depth of 180 feet. A 24 inch diameter conductor casing was installed and cemented to a depth of 100 feet. Wire wrap Johnson "HiCap" screen, 60 slot, was placed from 175 feet to 100 feet. The filter pack consisted of 4 x 12, rounded to well rounded sand.

Well development consisted of 18 hours of air jetting and 2 hours of pumping and surging resulting in a fully developed and sand free well. A four step drawdown test was conducted at rates varying from 218 to 437 gpm. At 350 gpm, the well is 83 % efficient. A constant discharge test at 400 gpm was conducted for 23 hours before generator failure occurred. A 72 hour test was later conducted at 350 gpm. No boundary conditions were observed. No effects from pumping were measured in the Dotta and Flindt wells located approximately 1,000 feet to the west. No long term effects on these wells from pumping the County well were calculated given the lack of sufficient hydrogeological data. The Flindt agricultural well should be monitored on a quarterly basis.

It is recommended that this replacement well be equipped to pump 350 gpm. The pump intake level should be 95 below land surface. The pumping level would be at 82 feet below land surface after 48 hours of pumping. The static water level is approximately four feet below land surface.

Water quality meets all Federal and State drinking water standards. The arsenic content is 0.012 ppm. Water quality should be monitored annually in order to determine if any deterioration in quality is occurring.

INTRODUCTION

The Double Diamond North well was constructed in 1980 to serve as a quasi-municipal water well (Hydro Search, 1981). Figure 1 shows the location of this well in the South Truckee Meadows. The well was acquired by Washoe County, tested in 1983 and again in 1992 (Widmer, 1992). While this 8" diameter, mill slot cased well was fairly efficient, it produced sand on the order of 150 ppm and was eventually abandoned. The site, however, was favorable for a replacement well. In the autumn of 1992, Washoe County contracted with Sargent Irrigation, Inc. to redrill and construct a replacement well with more efficient materials. Additionally, the replacement well was required by State regulations to be constructed with a 100 foot sanitary seal due to its nearby location to Thomas Creek (the old well has a 50 foot seal).

Design, construction supervision, data collection and analyses were conducted by Washoe County Utility Division personnel. Drilling began on November 20, 1992 with the well construction completed on Dec 9, 1992. Development and testing took place from December 11 through January 11, 1993.

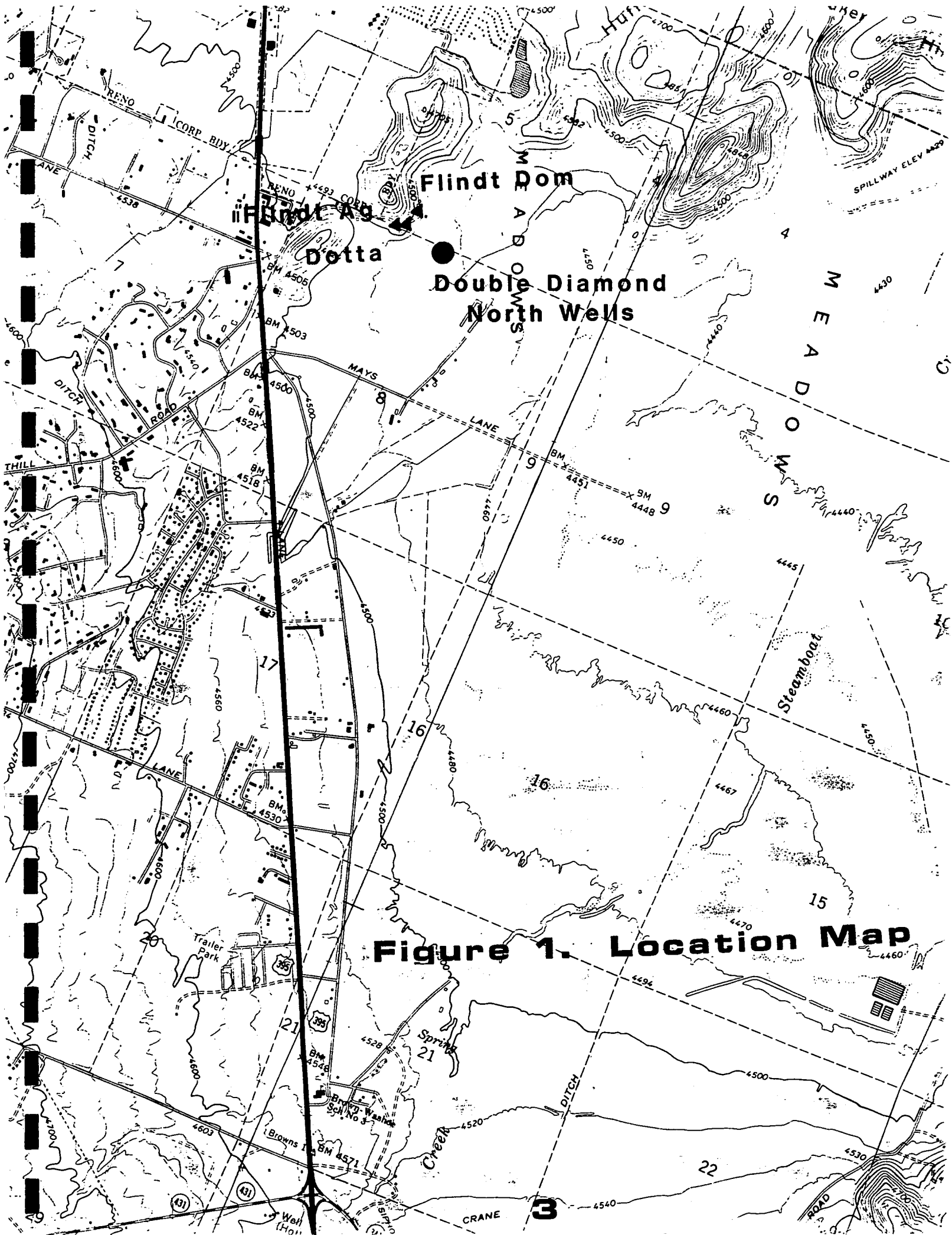
BOREHOLE DRILLING AND LITHOLOGY

A 7-7/8 inch diameter borehole was drilled to a depth of 180 feet. The standard mud rotary method was employed using a Speedstar rotary drill rig. The drilling fluid consisted of high yield bentonite clay. The borehole was drilled in one day without any problems.

Table 1 is the lithology log of this borehole. Clays, silts, sands and gravels were encountered to a depth of 149 feet. A fine sand or coarse silt was present throughout most of the aquifer material below 95 feet. From 149 to 180 feet a purplish andesite was found. The andesite drilled as if fractured to a depth of 170 feet, then competent to 180 feet. The most promising aquifer materials occurred from 70 to 90 feet and from 110 to 140 feet.

Figure 2 shows the geophysical logs run downhole. These were the standard electric logs, natural gamma, temperature and caliper logs. These logs verified the aquifer materials noted above. Because of borehole sluff, the logging tools could not penetrate below 173 feet.

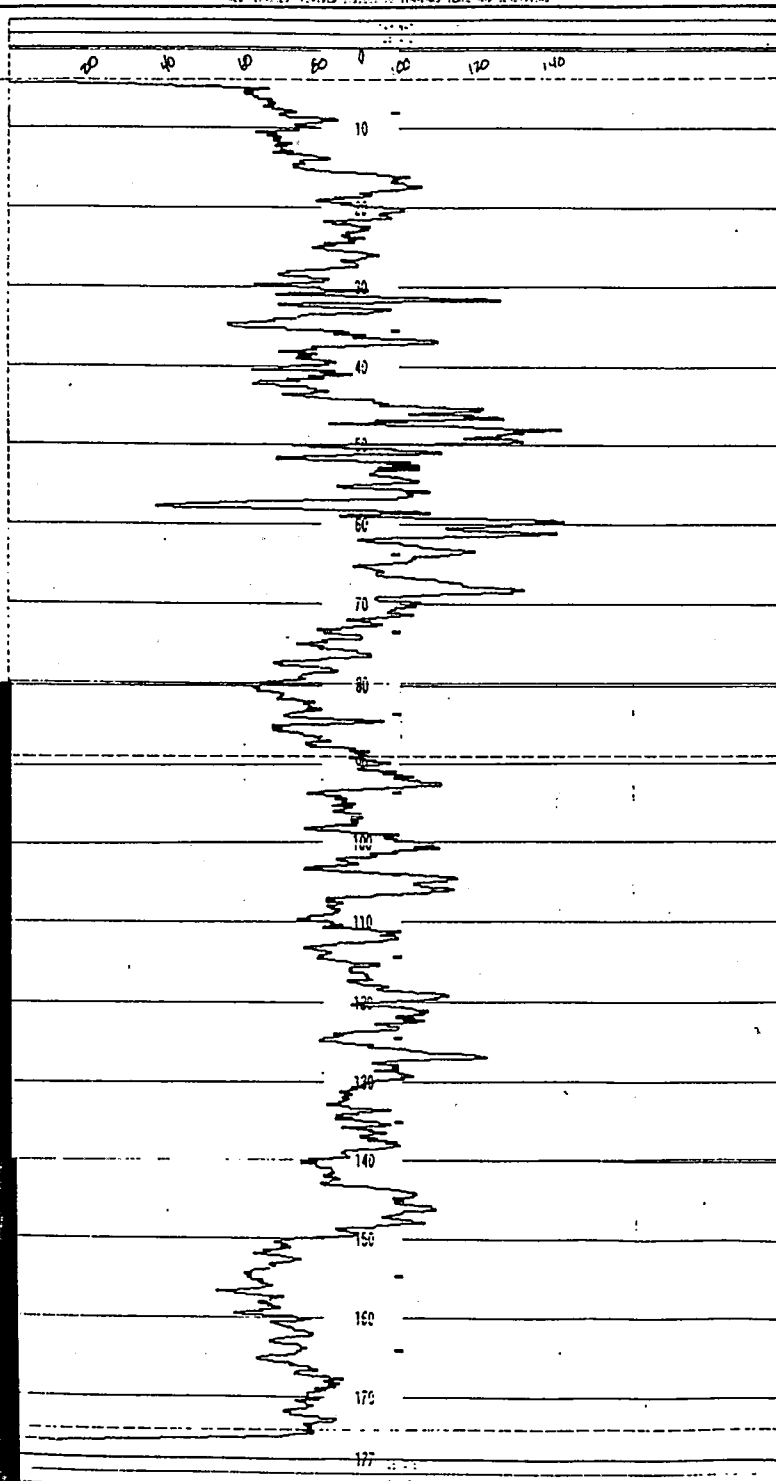
Figure 3 is the results from the sieve analysis. Analysis were taken of aquifer material from 95 to 100 feet, 110 to 120 feet and from 130 to 140 feet. Based on this analysis and the availability of material, a 4 x 12 gravel pack was specified.



NATURAL GAMMA LOG

[illegible]

ALL SUBJECTS PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS



INCORPORATED

ELECTRIC WELL LOG

```

COMPANY : WINDO CONTI
MILL : DOUBLE SHIMMER NORTH
CASH PRICE PER TON : 10.00
CASH PRICE PER TON : 10.00
CHARGE : WINDO
STATE : NEWARK
SECTION : 0

TONGHIP : 10 H
SPACE : 20 F

DATE : 11/21/92
PERMANENT MATH : C.L.
ELEVATIONS
NORTH MILLER : 100
CLY FROM MATH :
CL : 1
LOC NORTH : 177.90
LOC NEEDED FROM C.L.
M :
LOC TOP : 0.40
BEL REACHED FROM C.L.
CL : 1

CASING MILLER : -
LOGGING DRILL : FINE
CASING TYPE : -
FIELD OFFICE : BRACKENFIELD
CASING THICKNESS :
RECOVER BY : FOR TOP

BUTT SIZE : 0.75
BONDABLE FLUID : CLAY-CEL
FILE : PROCESSED
PROTECTIVE INCL. :
IN TYPE : 9041A
MATH POSITIVITY :
LOC : 1
FLUID POSITIVITY :
MATH INCL 1 :
PLUT : 00.0
NEUTRON MATH :
FLUID INCL 1 :
THRESH : 1000
EXPANSES :
MILLER BY : SARGENT LOGISTICS

```

ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS

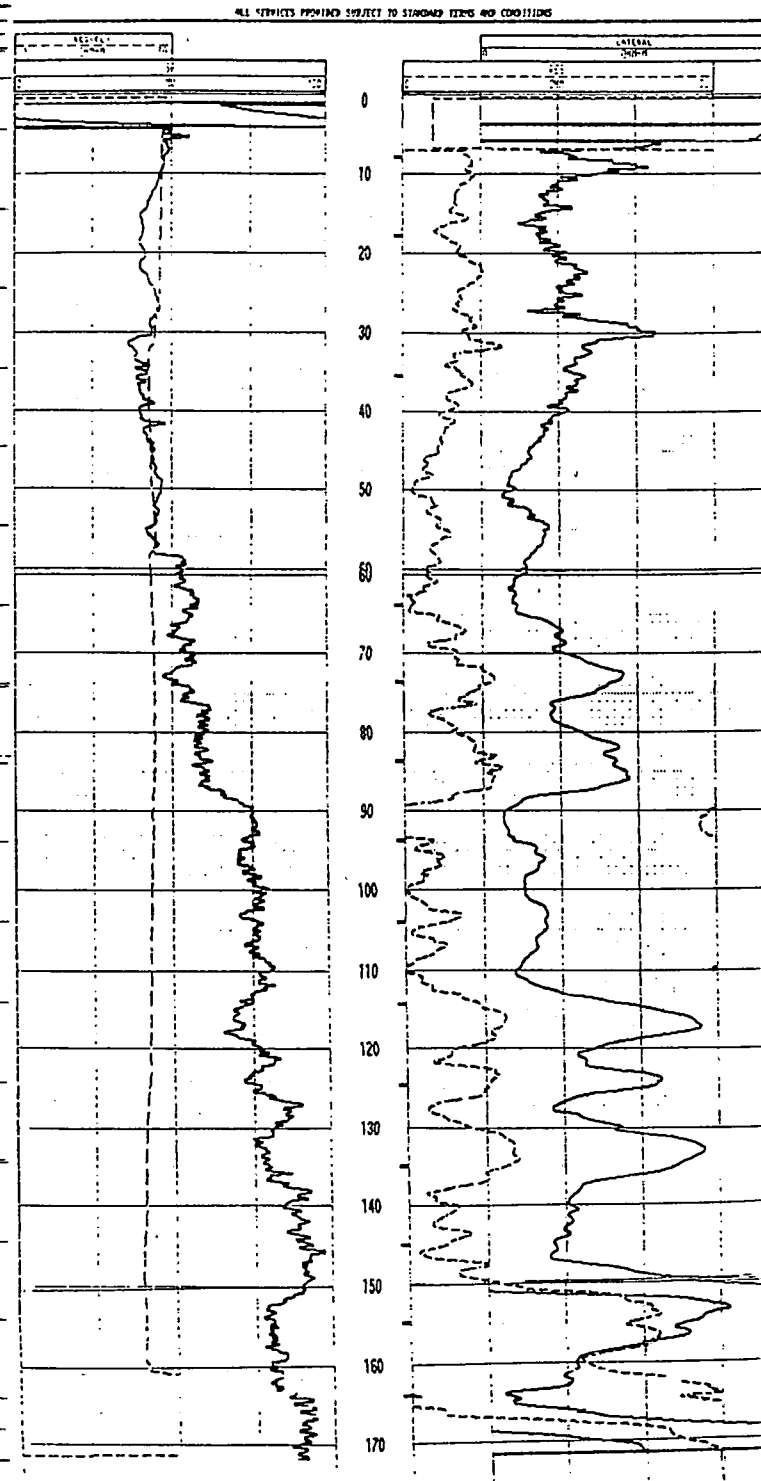


Figure 2. Borehole Geophysical Results

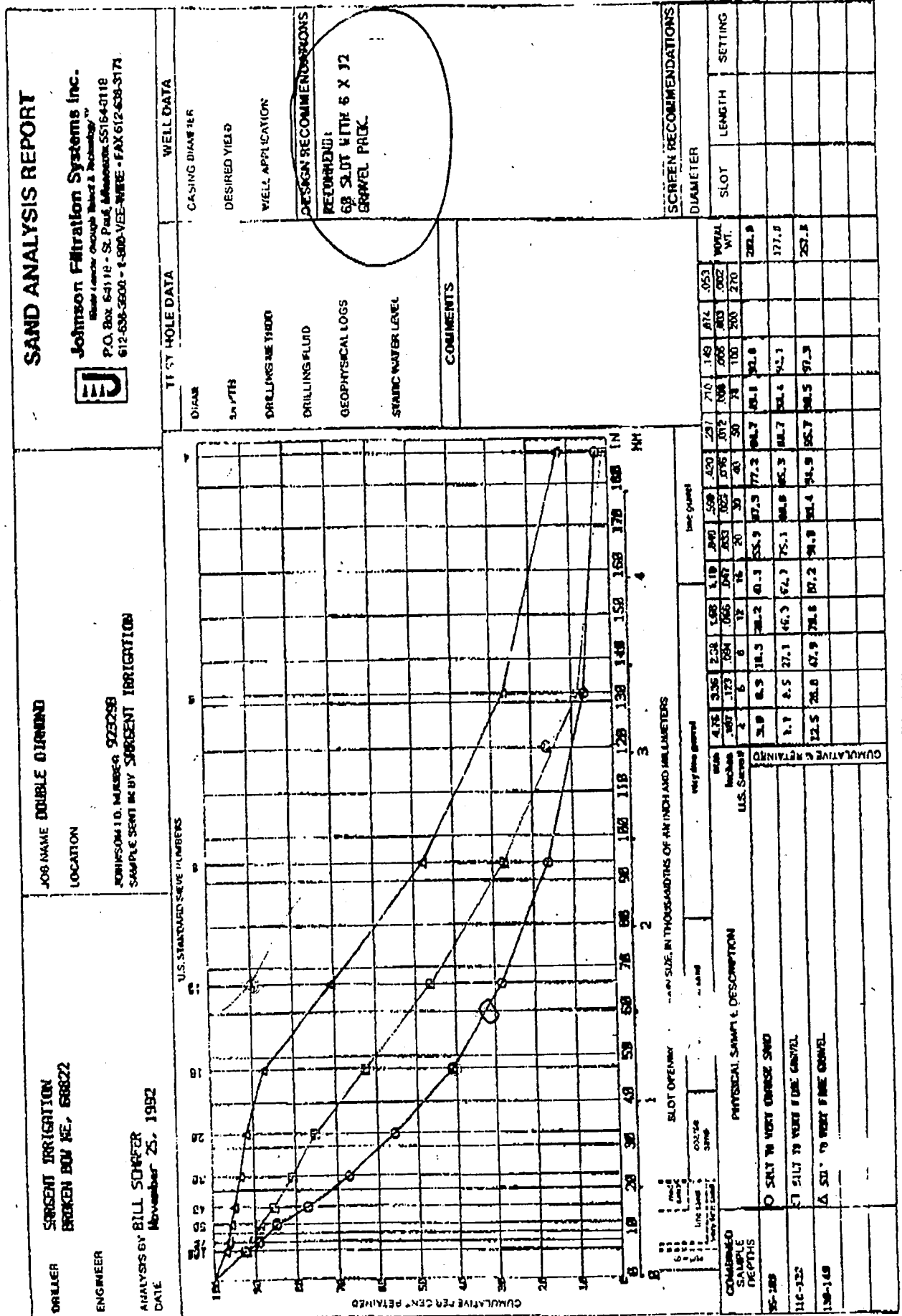


Figure 3. Sieve Analysis

TABLE 1
Lithologic Log
Double Diamond North Well

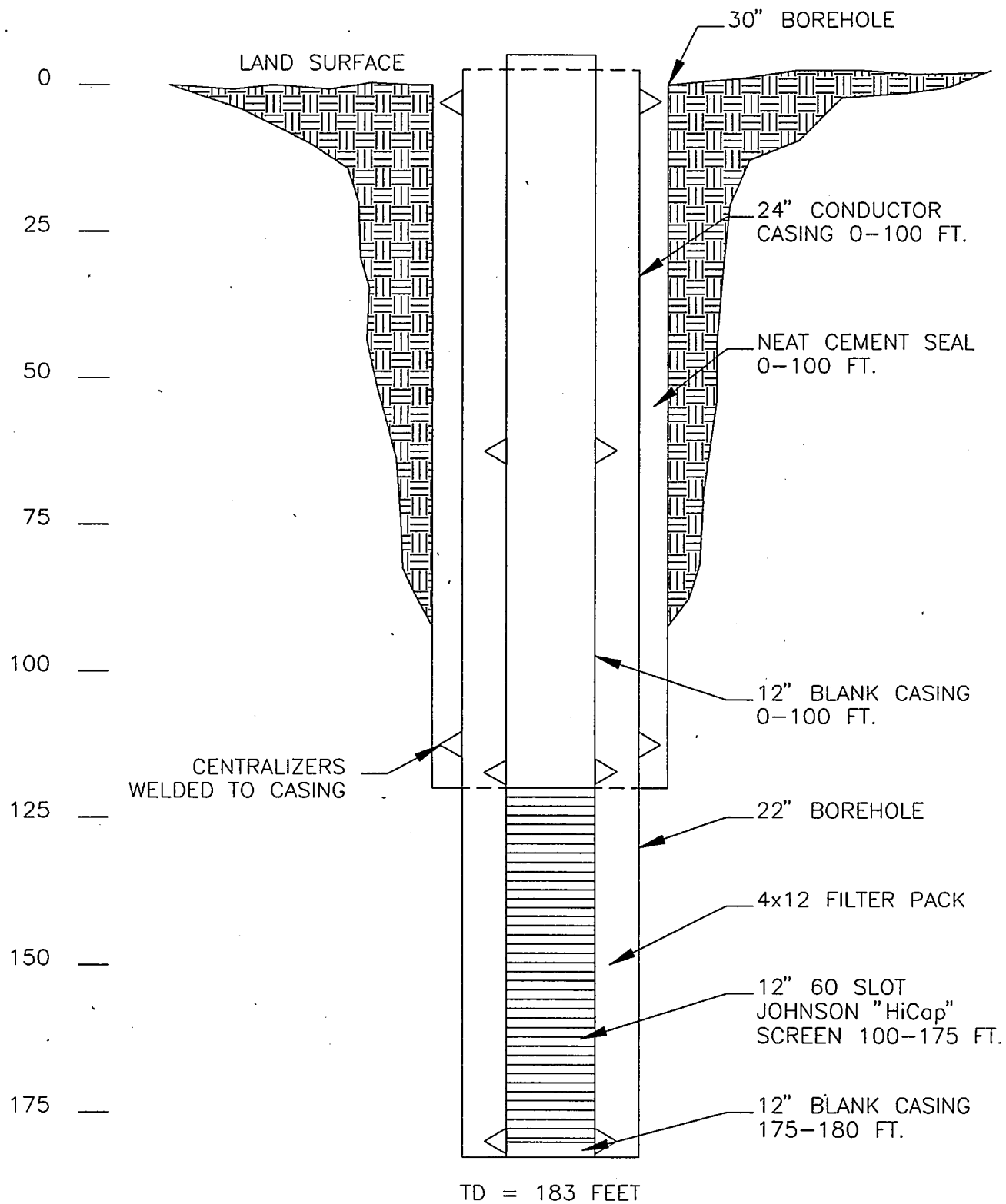
<u>Depth</u>	<u>Lithology</u>
000-020	silt, sand and gravel
020-040	silty, gravelly, coarse sand
040-070	sandy clay with minor gravel
070-080	clay and silty sand, very fast drilling
080-093	sandy, med. grained gravel
093-096	silty, sandy clay
096-108	fine sand
108-115	silty, sandy clay
115-149	silty, coarse sand with some clay
149-180	purplish andesite, broken to 170 feet, competent to 180 feet

WELL CONSTRUCTION

Figure 4 illustrates the well construction. A 100 foot seal was required by NRS 534.390. Since the alluvial aquifer has a depth of 150 feet, a conductor casing construction was used in order to maximize all 50 feet of this alluvial aquifer. The pilot hole was redrilled with the reverse rotary drilling method using a Sargent 55 drill rig and water. A 100 foot, 30 inch borehole was drilled with a three-way drag bit. From land surface to 100 feet a 24 inch diameter conductor casing was installed. This casing wall thickness is 0.388 inch. Centralizers were attached at the bottom of the casing and at 50 feet. Grouting was accomplished with a tremmie pipe and pump. The slurry was neat cement. A total of 16 yards of slurry was used. The slurry was allow to set 12 days before drilling resumed.

From 100 feet to 180 feet the pilot bore was opened to 22 3/4 inches using a two-tiered reamer bit. Blank 12 1/4 inch O.D. casing was installed from 180 to 175 feet and 100 feet to surface. Johnson "Hi-Cap" 60 slot screen was installed from 175 to 100 feet. Centralizers were installed at 176 and 99 feet.

The filter pack was installed via tremmie pipe, beginning at the 175 foot level and subsequent 32 foot upward levels. The filter pack is a 4 x 12, rounded to well rounded sand from the Silica Resources pit located near Marysville, California. Nineteen yards was installed up to a depth of 38 feet. The rest of the annular space was "topped off" with Cheavruex 6 x 12 gravel.



DOUBLE DIAMOND NORTH WELL CONSTRUCTION DIAGRAM

FIGURE 4

DEVELOPMENT

Development consisted of both air jetting and rawhiding (pumping and surging). Eighteen hours of airjetting was performed until the discharge was clear throughout the screened interval. Rawhiding was performed for only two hours as the discharge was always sand free (less than 1 ppm) and could never be made unclear. Sand content was measured with a Rossum Sand Tester and standard methods.

TEST PUMPING

Test pumping consisted of a four step-drawdown test and a 23 hour constant discharge test. The constant discharge test was scheduled for 96 hours, but after 23 hours the generator failed. The data collected after 23 hours was considered adequate for the well capacity analysis and previous testing of the old well yielded adequate data for aquifer analysis. Finally, a 72 hour pumping test was conducted in order to estimate potential water level declines on periphrial domestic and agricultural wells.

The step test consisted of four pumping rates held at 100 minutes each and were 218 gpm, 268 gpm, 345 gpm and 437 gpm. Figures 5, 6 and 7 show the results of testing. As shown in figure 5, the specific capacity of the well at 350 gpm is 5.5 gpm/ft of drawdown. In figure 6 the well (C) and aquifer (B) loss coefficients are determined with the illustrated graph. Figure 7 illustrates the well and formation losses. As shown, most of the total losses are associated with the aquifer formation (and probably the gravel pack). At a pumping rate of 350 gpm, the well efficiency is 83%.

The 400 gpm constant discharge test was conducted for 23 hours before generator failure occurred. As can be seen from figure 8, no boundary effects were discernable. Previous testing of the old well also showed no boundary effects (Widmer, 1992). Using the WHIP program (Gupta and Walter, 1988), transmissivities and storativity values were derived. Table 2 shows these results. A transmissivity of 6,400 gpd/ft and a storativity of 0.04 was derived for the well. A transmissivity of 21,000 gpd/ft was then

TABLE 2
WHIP Derived Aquifer Parameters

<u>Well</u>	<u>Transmissivity</u>	<u>Storativity</u>	<u>Hydr. Cond</u>
New	6,400 gpd/ft	0.04	12.2 ft/day
Old	8,100 gpd/ft	0.0003	10.1 ft/day
Obs	14,700 gpd/ft	0.0002	18.8 ft/day
Aqu	21,000 gpd/ft		18.7 ft/day

Double Diamond North
Step Test Dec 16, 1992

Step	A (Ac)	Q (gpm)	SC (gpm/A)	SD (Ac/gpm)
1	36.04	218	6.05	0.1653
2	46.72	268	5.74	0.1743
3	62.50	345	5.52	0.1812
4	80.58	437	5.42	0.1844

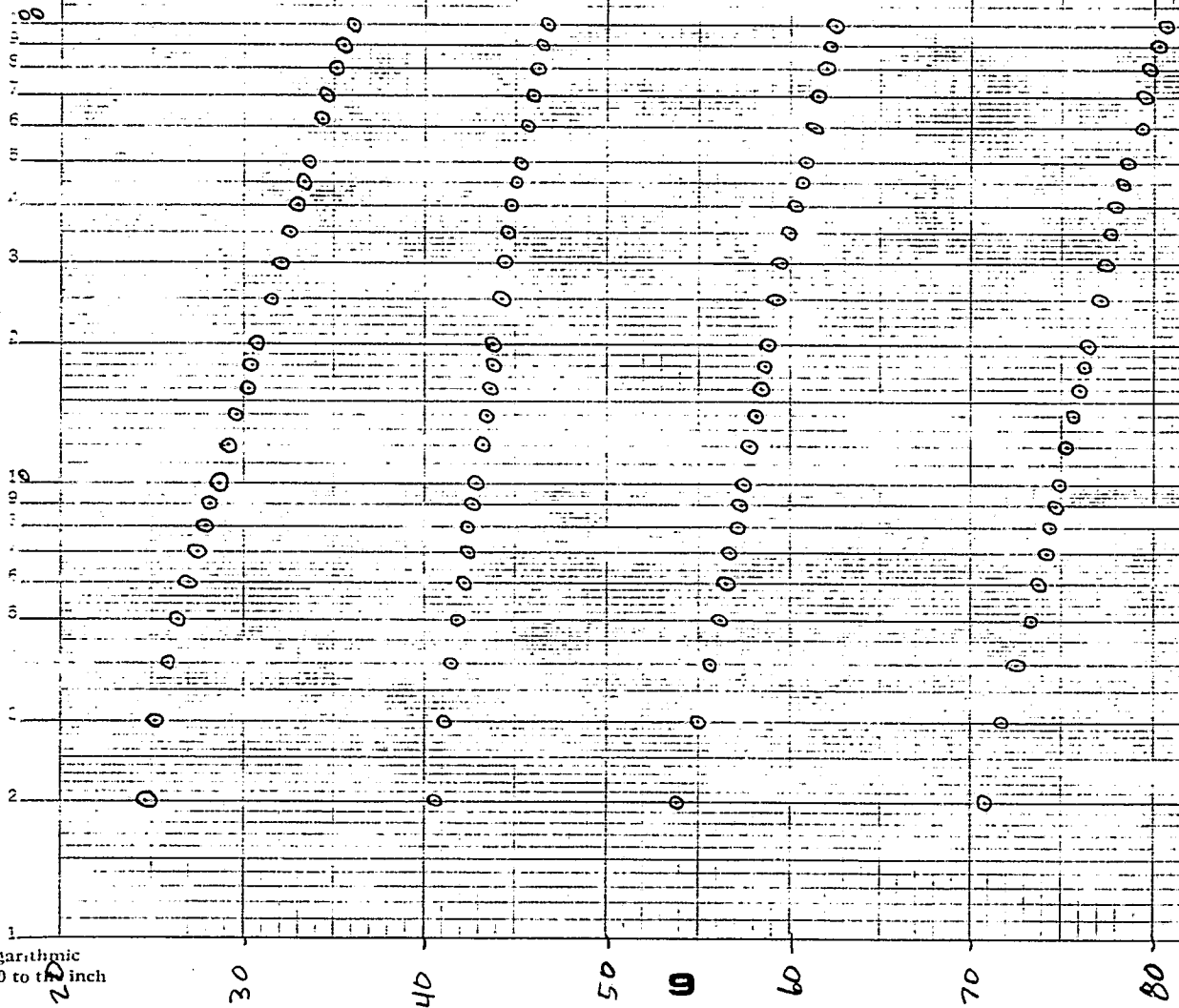


Figure 5
Step Drawdown Results

0.190 -

0.180 -

0.170 -

0.160 -

0.150 -

0.140 -

0.130

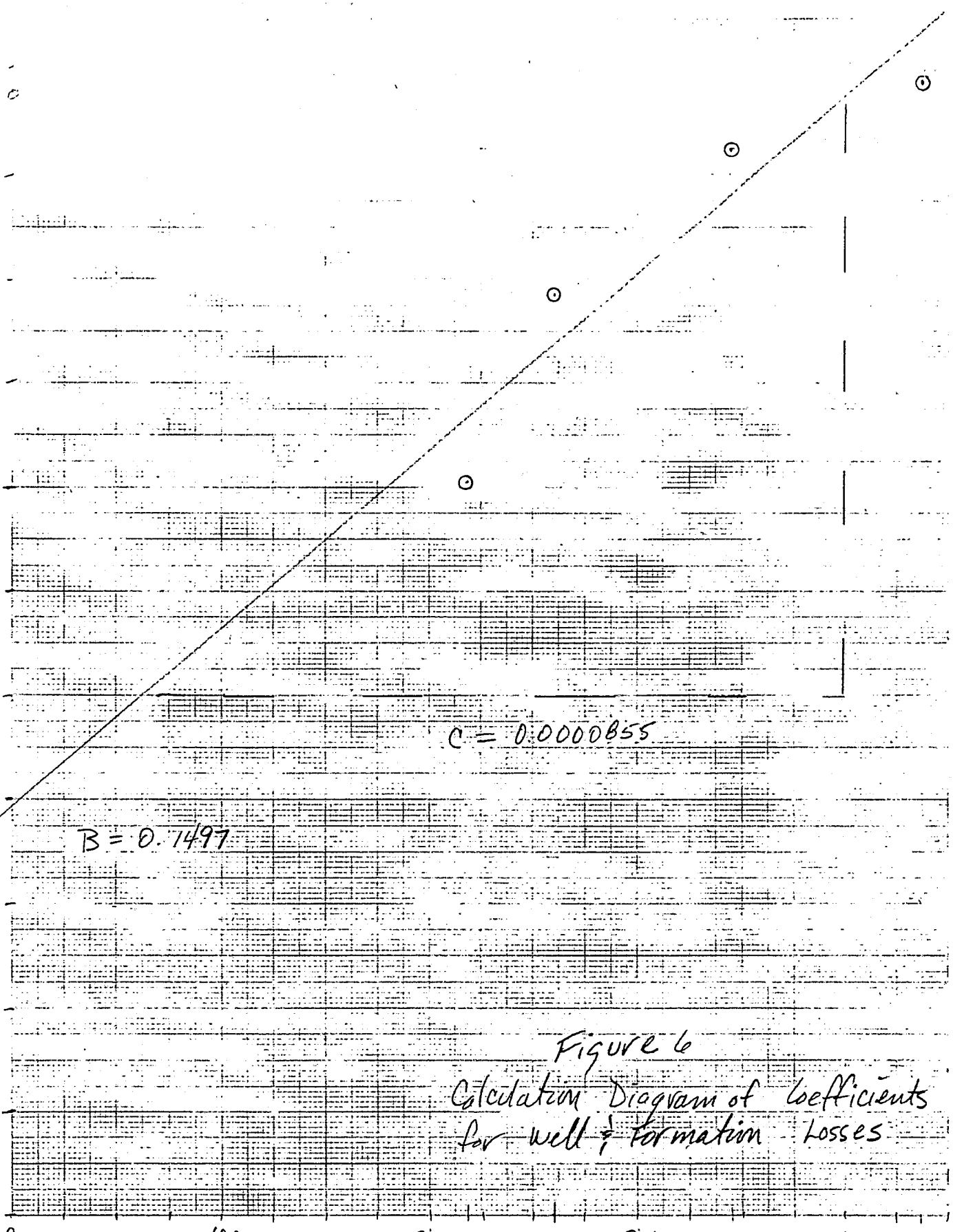


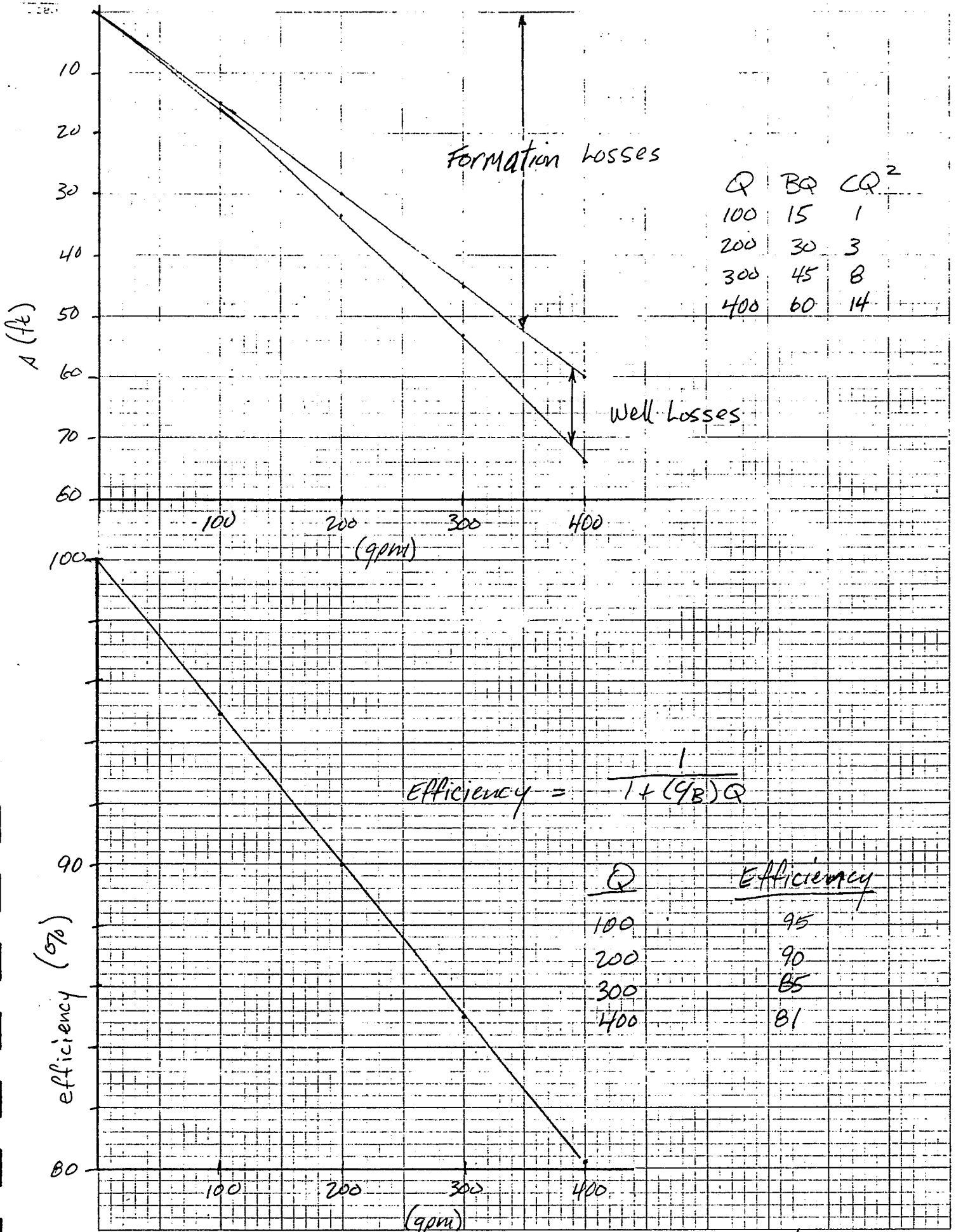
Figure 6
Calculation Diagram of Coefficients
for well & formation losses

0 Millimeters to the Centimeter

10

qpm

400



0000

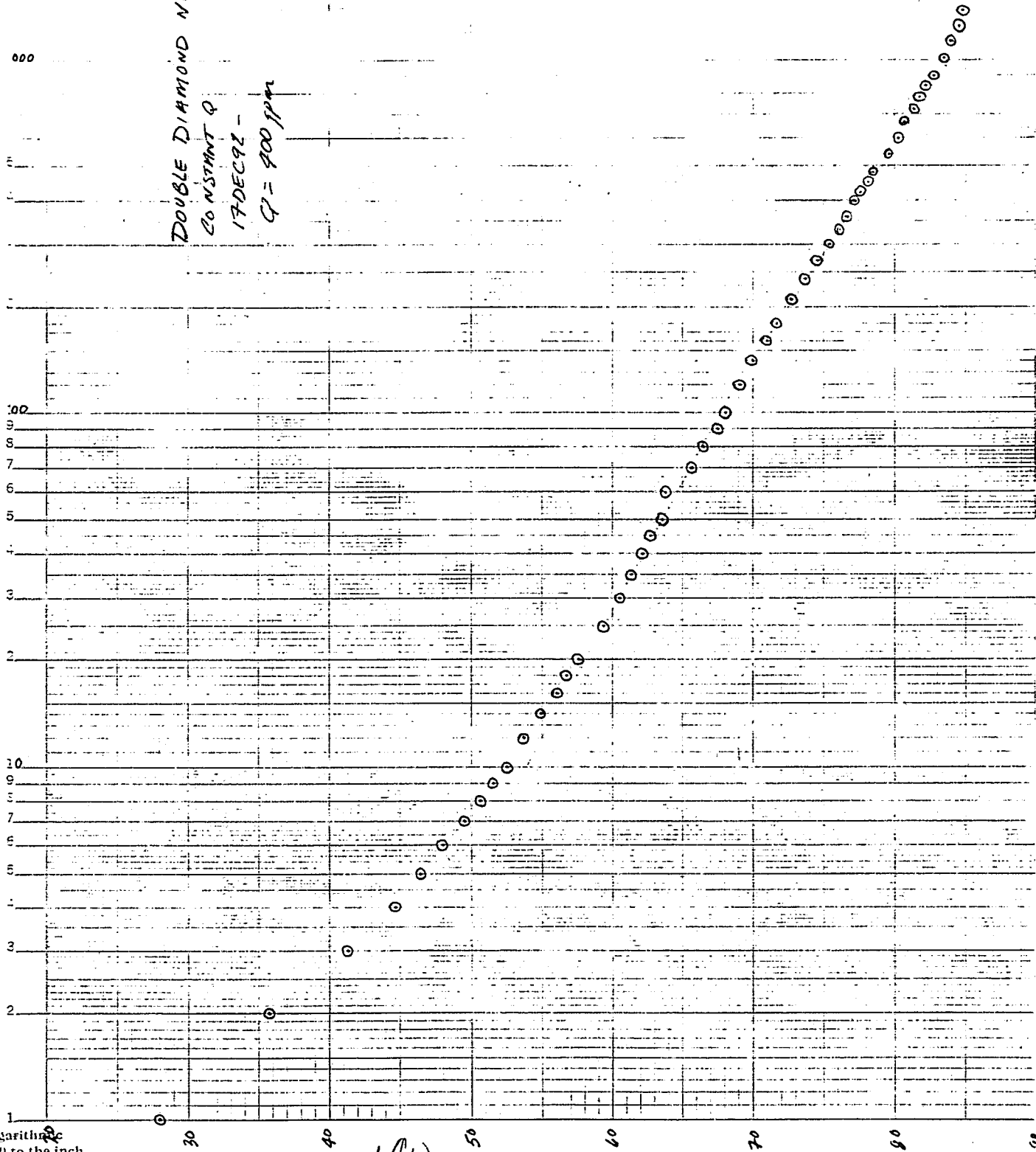
DOUBLE DIAMOND NORTH WELL

20 INSTANT Q

17 DEC 92 -

Q = 400 gpm

t (min)



calculated for the entire alluvial aquifer using a hydraulic conductivity value of 18.8 ft/day and 145 feet of alluvial aquifer. Considering a clay layer from 40 to 70 feet and a storativity value of 0.0002 (Observation well), the aquifer section penetrated by the new production well can be considered confined.

Figures 9 and 10 show the results from the 72 hours of constant pumping at a rate of 350 gpm. A flattening of the curves at the latter stages of the test indicate downward leakage of ground water. This is probably from the aquifer section above 40 feet (see Lithologic log).

During testing, nearby domestic and agricultural wells were monitored (see appendix for measurements). These are the Dotta and Flindt domestic wells and the Flindt agricultural well located approximately 1,000 feet to the west. The Dotta and Flindt agricultural wells are completed in volcanics. No discernable impacts were measured in any of these wells during testing. Long term effects on these wells from the pumping of the County production well cannot be realistically determined as the hydraulics of the volcanics are not understood. That is to say the storativity and transmissivity of these volcanics could not be determined from the testing. Simplifying the hydrogeology in order to use the Theis Equation did not result in reliable results. Quarterly monitoring of the Flindt agricultural well should be undertaken indefinitely to determine if any long term effects are occurring.

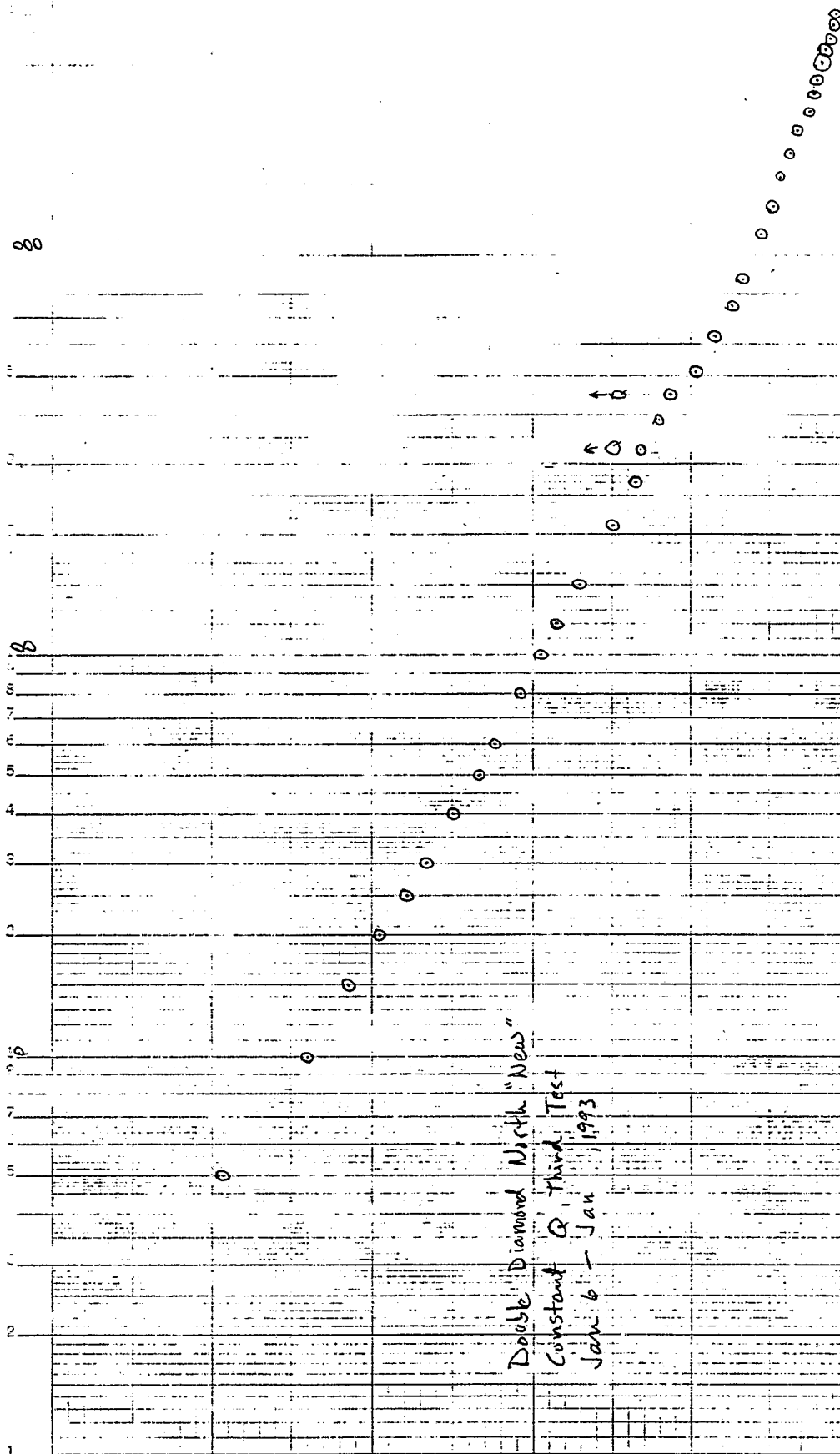
WELL CAPACITY RECOMMENDATION

It is recommended that this replacement well be equipped to pump 350 gpm. The pump intake level should be set at 95 below land surface. This is five feet above the well screen. The pumping level would be at 82 feet below land surface after 48 hours of pumping at 350 gpm. The static water level is approximately four feet below land surface.

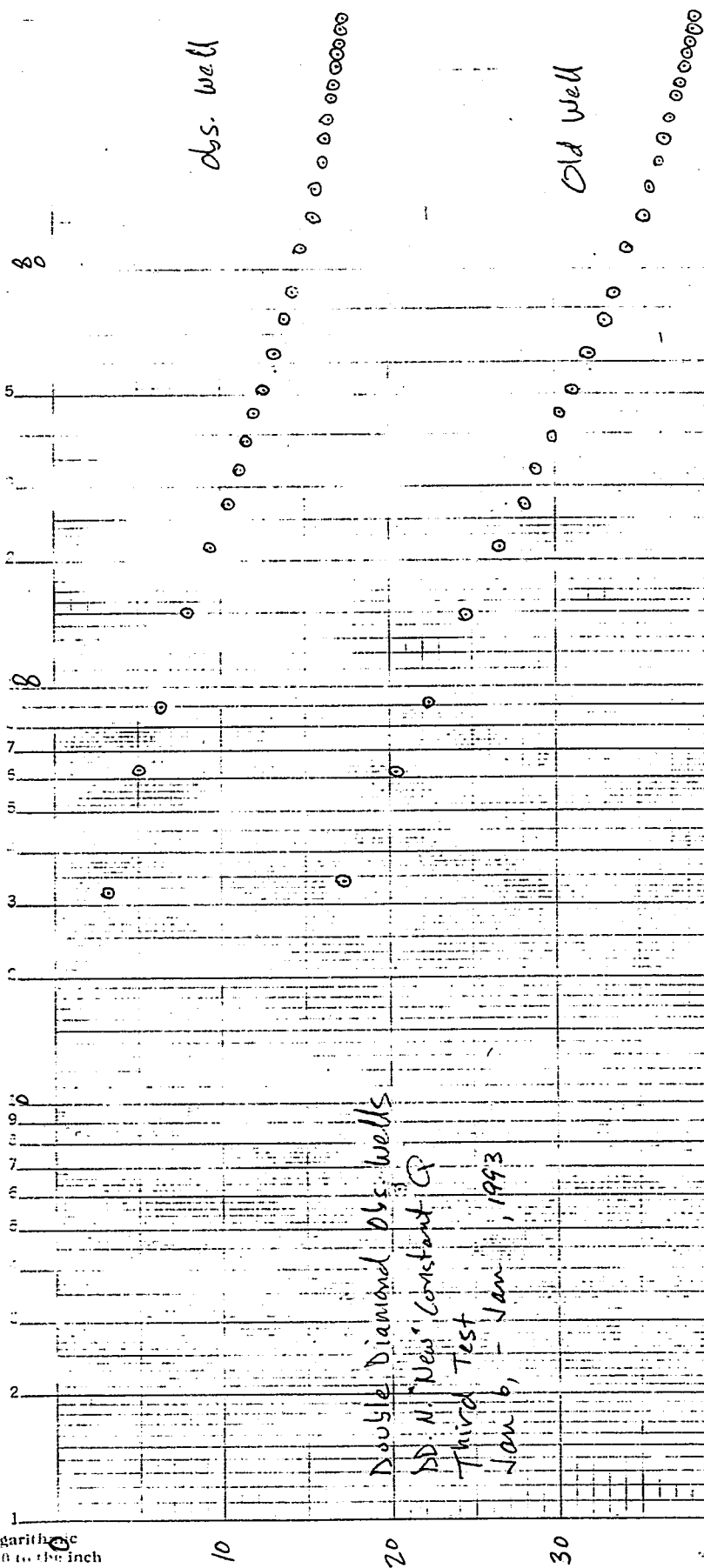
WATER QUALITY

Water quality analysis was conducted at the Nevada State Health Lab. The results are included in the appendices. The analysis shows that this water meets all of the Safe Drinking Water Act Standards. The total dissolved solids was measured at 245 ppm. This water primarily consists of calcium, magnesium, sodium and bicarbonate. The arsenic content was detected at 0.012 ppm. From earlier testing on the "Old" production well, no heavy metals were detected. Gross Alpha, Beta and Radon were measured at 8, 10 and less than 3 picocuries/liter, respectively, also in the Old Well.

t (min)



Doyle Diamond North "New"
Constant Q, Third Test
Jan 6 - Jan 1, 1993



Double Diamond Obs. Wells
 DD. N. "New" Constant Q
 Third Test
 Jan 6, Jan, 1993

REFERENCES

Hydro-Search, Inc. 1981. TEST WELL CONSTRUCTION AND TESTING, DOUBLE DIAMOND RANCH, RENO, NEVADA. Consultant Report prepared for Collins and Ryder; Reno, Nevada. 36 p.

Widmer, Michael, 1992. Double Diamond Well Testing. April 7, 1992 Office Memorandum to Paul Orphan, Washoe County Utility Division, Reno, Nevada. 2 p.

Gupta and Walter, 1988. Well Hydraulics Interpretation Program. Hydro Geo Chem, Inc. Tucson, Arizona.

APPENDICES

Pumping Test Field Notes

1. Step Drawdown Test
2. First 23 Hour Test
3. Second 23 Hour Test
4. 72 Hour Constant Discharge Test
5. Miscellaneous Peripheral Well Soundings

Water Quality Analysis

Miscellaneous Calculations

Double Diamond North Wells Cross Section Illustration

Bid Proposal, Change Order and Actual Costs

Well Drillers Report

WASHOE COUNTY

**DEPARTMENT OF PUBLIC WORKS
UTILITY DIVISION**

PUMPING TEST DATA

WELL Double Diamond North

PUMPING/OBSERVATION WELL

PUMPING/RECOVERY DATA

PAGE 1 OF 3

TYPE of PUMPING TEST STEP DRAWDOWN

HOW Q MEASURED drift 4 3/8 X 6 1/4

HOW WL's MEASURED Solnist

M.P. for WL's top of pvc elev. top casing

DEPTH of PUMP/AIRLINE 94 wrt 1

% SUBMERGENCE: initial _____; pumping _____

PUMP ON : date 12-16-92 time 0811

PUMP OFF: date 12-16-92 time 1441

• RADIUS of PUMPED WELL 12"

DISTANCE from PUMPED WELL _____

TIME t = at t' = 0					WATER LEVEL DATA STATIC WATER LEVEL 5.90				WATER PRODUCT.		COMMENTS	
CLOCK TIME	ELAPSED TIME			t / t'	READING	CONVERSIONS OR CORRECTIONS	WATER LEVEL	S or S'		in	Q	(NOTE ANY CHANGES IN OBSERVERS)
	mins	hrs	t									
DB11	/		0									— 500 cld
	/		1		—							adj Q ↓
	/		2		30.60			24.70		8	218	
	/		3		31.00			25.10				
	/		4		31.78			25.88				
	/		5		32.38			26.48				
	/		6		32.69			26.99		8		
	/		7		33.43			27.53		8		
	/		8		33.85			27.95				
	/		9		34.04			28.14				
	/		10		34.55			28.65		7 7/8		↑
	/		12		35.03			29.13		8		
	/		14		35.70			29.80		8	218	
	/		16		36.15			30.25				
	/		18		36.37			30.47				
	/		20		36.83			30.93				
	/		25		37.47			31.57				
	/		30		37.95			32.05				
	/		35		38.47			32.57				
	/		40		38.92			33.02		8		
	/		45		39.25			33.35				
	/		50		39.60			33.70				
	/		60		40.20			34.30				
	/		70		40.50			34.60				
	/		80		40.98			35.08				
	/		90		41.34			35.44		27 3/4		Q ↑
0941	/		100		41.94			36.04		8		
	/		2		46.50			40.60		≥ 12	268	
	/		3		47.07			41.17				
	/		4		47.36			41.46				
	/		5		47.74			41.84				
	/		6		47.99			42.09				
	/		7		48.19			42.29				
	/		8		48.30			42.40		212		Q ↑
	/		9		48.62			42.72		12		
	/		10		48.82			42.92		12		
	/		12		49.05			43.15		12	268	



WASHOE COUNTY

DEPARTMENT OF PUBLIC WORKS
UTILITY DIVISION

PUMPING TEST DATA

WELL Doble Diamond North

PUMPING/OBSERVATION WELL

PUMPING/RECOVERY DATA

PAGE 2 OF 3

TYPE of PUMPING TEST STEP DRAWDOWN

HOW Q MEASURED orifice 6" x 4 3/8

HOW WL's MEASURED solnist

PUMPED WELL NO. D1 North

RADIUS of PUMPED WELL 12"

DISTANCE from PUMPED WELL —

M.P. for WL's top of PVC elev. —

DEPTH of PUMP/AIRLINE 94 wrt top of casing

% SUBMERGENCE: initial —; pumping —

PUMP ON: date 12-16-92 time 0811

PUMP OFF: date 12-16-92 time 1441

TIME					WATER LEVEL DATA					WATER PRODUCT.		COMMENTS
at t' = 0					5.90							
CLOCK TIME	ELAPSED TIME			t / t'	READING	CONVERSIONS OF CORRECTIONS	WATER LEVEL	S or S'		in	Q	(NOTE ANY CHANGES IN OBSERVERS)
	mins	hrs	t									
0955	/		14		49.22			43.32		12	268	
	/		16		49.48			43.58				
	/		18		49.64			43.74		12		
1001	/		20		49.76			43.86				
	/		25		50.11			44.21		12		
	/		30		50.34			44.44		12		
	/		35		50.57			44.67		12		
	/		40		50.77			44.87		12		
	/		45		50.95			45.05		12		
	/		50		51.10			45.20		12		1 Q
	/		60		51.58			45.68		12		
	/		70		51.91			46.01		12		22.80 Old well
	/		80		52.15			46.25		12		
	/		90		52.36			46.46		12		
1121	/		100		52.62			46.72		12	268	
	/		2		59.80			53.90		20	345	1 Q
	/		3		60.86			54.96		20		
	/		4		61.48			55.58		20		Q 1
	/		5		62.02			56.12		20		
	/		6		62.34			56.44				
	/		7		62.66			56.76		20		
	/		8		62.98			57.08				
	/		9		63.20			57.30				
	/		10		63.35			57.45		20		Q 1
	/		12		63.72			57.82		20		
	/		14		64.00			58.10		20		
	/		16		64.34			58.44		20		
	/		18		64.59			58.69		20	345	
	/		20		64.80			58.90		20		
	/		25		65.20			59.30				
	/		30		65.48			59.58		20		Q 1
	/		35		65.93			60.03		20		
	/		40		66.19			60.29		20		Q 1
	/		45		66.60			60.70		20		
	/		50		66.81			60.91		20		
1221	/		60		67.22			61.32		20		
	/		70		67.57			61.67		20		
	/		80		67.87			61.97		20		



**DEPARTMENT OF PUBLIC WORKS
UTILITY DIVISION**

PUMPING TEST DATA

WELL Double Diamond North
~~PUMPING~~/OBSERVATION WELL
~~PUMPING~~/RECOVERY DATA
 PAGE 3 OF 3

TYPE of PUMPING TEST Step Drawdown

HOW Q MEASURED orifice 6 1/4 x 4 5/8

HOW WL's MEASURED Solnist

PUMPED WELL NO. DA North

RADIUS of PUMPED WELL 12"

DISTANCE from PUMPED WELL

M.P. for WL's top of PVC elev. _____

DEPTH of PUMP/AIRLINE 94 wrt top casing

% SUBMERGENCE: initial _____; pumping _____

PUMP ON : date 12-16-92 time 0811

PUMP OFF: date 12-16-92 time 1441

[illegible]



WASHOE COUNTY

DEPARTMENT OF PUBLIC WORKS
UTILITY DIVISION

PUMPING TEST DATA

WELL Double Diamond North

PUMPING OBSERVATION WELL

PUMPING/RECOVERY DATA

PAGE 1 OF 2

TYPE of PUMPING TEST Constant Q

HOW Q MEASURED orifice 6 1/4 x 4 3/8

M.P. for WL's top of PVC elev. _____

HOW WL's MEASURED solnist

DEPTH of PUMP/AIRLINE 94 wrt top of casing

PUMPED WELL NO. DD North

% SUBMERGENCE: initial _____; pumping _____

RADIUS of PUMPED WELL 12"

PUMP ON: date 12-17-92 time 0900

DISTANCE from PUMPED WELL —

PUMP OFF: date 12-18-92 time 0825

TIME					WATER LEVEL DATA					WATER PRODUCT.		COMMENTS	
t = _____ at t' = 0					STATIC WATER LEVEL 6.23								
CLOCK TIME	ELAPSED TIME		t	t'	t/t'	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	S or S'	Q/S	" H		Q
	mins	hrs											
0900	/		0								27	400	
	/		1			34.28			28.05				
	/		2			42.04			35.81				
	/		3			47.56			41.33				Q↑
	/		4			50.96			44.73		27 3/4		Q↓
	/		5			52.58			46.35				
	/		6			54.24			48.01				
	/		7			55.74			49.51				
	/		8			56.90			50.67	7.9			
	/		9			57.83			51.60				
0910	/		10			58.70			52.47				Q↑
	/		12			60.05			53.82				
	/		14			61.22			54.99				
	/		16			62.27			56.04				
	/		18			63.02			56.79				
0920	/		20			63.88			57.65				
	/		25			65.50			59.27				
	30	-	30			66.64			60.41	6.6			
	/		35			67.55			61.32				
	/		40			68.41			62.18				
	/		45			69.08			62.85				
	/		50			69.66			63.43				Q↑
1000	-	1	60			69.96			63.73		26 7/8 - 27 1/4		Q↑
	10	1	70			72.00			65.77				
	20	1	80			72.72			66.49				Q↑
1030	30	1	90			73.66			67.43				
	/		100			74.26			68.03	5.9			
1100	-	2	120			75.34			69.11				
1120	20	2	140			76.28			70.05				
1140	40	2	160			77.23			71.00	5.6			
1200	-	3	180			77.91			71.68		26 3/4		Q↑
1230	30	3	210			78.98			72.75	5.5			
1300	-	4	240			79.97			73.74				Q↑
1330	30	4	270			80.82			74.59				
1400	-	5	300			81.69			75.46				
1430	30	5	330			82.24			76.01				
1500	/		360			82.82			76.59				

WASHOE COUNTY

**DEPARTMENT OF PUBLIC WORKS
UTILITY DIVISION**

PUMPING TEST DATA

WELL D D North

PUMPING/OBSERVATION WELL

PUMPING/RECOVERY DATA

PAGE 2 OF 2

TYPE of PUMPING TEST Constant Q

HOW Q MEASURED orifice plate 6 1/4 x 4 3/8

HOW WL's MEASURED Solinst

PUMPED WELL NO. DD North

RADIUS of PUMPED WELL 12"

DISTANCE from PUMPED WELL _____

M.P. for WL's TOP OF PVC elev. _____

DEPTH of PUMP/AIRLINE 94 wrt _____

% SUBMERGENCE: initial _____; pumping _____

PUMP ON: date 12-17-92 time 0900

PUMP OFF: date 12-18-92 time 0825

[illegible]



WASHOE COUNTY

DEPARTMENT OF PUBLIC WORKS
UTILITY DIVISION

PUMPING TEST DATA

WELL DD old
PUMPING/OBSERVATION WELL
~~PUMPING/RECOVERY DATA~~
PAGE 1 OF 2

TYPE of PUMPING TEST Constant Q
HOW Q MEASURED orifice plate
HOW WL's MEASURED solnist
PUMPED WELL NO. DD North
RADIUS of PUMPED WELL 12"
DISTANCE from PUMPED WELL 72'
M.P. for WL's top of casing elev. _____
DEPTH of PUMP/AIRLINE _____ wrt _____
% SUBMERGENCE: initial _____; pumping _____
PUMP ON: date 12-17-92 time 0900
PUMP OFF: date 12-18-92 time 0825

TIME t = at t' = 0					WATER LEVEL DATA STATIC WATER LEVEL <u>5-25 5.21</u>				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'								
8:58	/				5 21						DRAWN
	/	0									
	/	1			6.81			1.60			
	/	2			9 22			4.01			
	/	3			11.24			6.03			
	/	4			12.69			7.48			
	/	5			13.94			8.73			
	/	6			14.87			9.66			
	/	7			15.78			10.57			
	/	8			16.52			11.31			
	/	9			17.18			11.97			
	/	10			17.77			12.56			
	/	12			18.85			13.64			
	/	14			19.77			14.56			
	/	16			20.42			15.21			
	/	18			21.10			15.89			
	/	20			21.69			16.48			
	/	25			23.01			17.80			
	/	30			24.16			18.95			
	/	35			25.11			19.90			
	/	40			25.83			20.62			
	/	45			26.45			21.24			
	/	50			27.06			21.85			
	/	60			28.21			23.00			
	/	70			29.25			24.04			
	/	80			29.84			24.63			
	/	90			30.50			25.21			
	/	100			31.11			25.91			
	/	120			32.13			26.92			
	/	140			32.91			27.70			
	/	160			33.74			28.53			
	/	180			34.38			29.17			
	/	210			35.30			30.09			
	/	241			36.16			30.95			
	/	272			36.91			31.70			
	/	302			37.52			32.31			
	/	331			38.03			32.82			
1502	/	362			38.48			33.27			
	/										
	/										

WASHOE COUNTY

**DEPARTMENT OF PUBLIC WORKS
UTILITY DIVISION**

PUMPING TEST DATA

WELL DD old

PUMPING/OBSERVATION WELL

PUMPING/RECOVERY DATA

PAGE 2 OF 2

TYPE of PUMPING TEST Constant Q

HOW Q MEASURED orifice plate

HOW WL's MEASURED Solinst

PUMPED WELL NO. DD North

RADIUS of PUMPED WELL 12"

DISTANCE from PUMPED WELL 72'

M.P. for WL's top of casing elev. _____

DEPTH of PUMP/AIRLINE _____ wrt _____

% SUBMERGENCE: initial _____; pumping _____

PUMP ON: date 12-17-92 time 0900

PUMP OFF: date 12-18-92 time 0825

[illegible]

דף 12



WASHOE COUNTY

DEPARTMENT OF PUBLIC WORKS
UTILITY DIVISION

PUMPING TEST DATA

WELL DD observation
PUMPING / ~~OBSERVATION~~ WELL
~~PUMPING~~ / RECOVERY DATA
PAGE 1 OF 2

TYPE of PUMPING TEST Constant Q

HOW Q MEASURED orifice plate

HOW WL's MEASURED actat

PUMPED WELL NO. DD North

RADIUS of PUMPED WELL 12"

DISTANCE from PUMPED WELL 271'

M.P. for WL's top of 2" elev. _____

DEPTH of PUMP/AIRLINE _____ wrt _____

% SUBMERGENCE: initial _____; pumping _____

PUMP ON: date 12-17-92 time 0900

PUMP OFF: date 12-18-92 time 0825

TIME					WATER LEVEL DATA					WATER PRODUCT.		COMMENTS
t = at t' = 0					STATIC WATER LEVEL 4.34'							
CLOCK TIME	ELAPSED TIME			t / t'	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	S or S'			Q	(NOTE ANY CHANGES IN OBSERVERS)
	mins	hrs	t'									
0900	/		0									
	/		1		4.34			.0				
	/		2		4.37			.03				
	/		3		4.52			.18				
	/		4		4.72			.38				
	/		5		4.91			.57				
	/		6		5.10			.76				
	/		7		5.27			.93				
	/		8		5.44			1.10				
	/		9		5.60			1.26				
	/		10		5.76			1.42				
	/		12		6.11			1.77				
	/		14		6.38			2.04				
	/		16		6.65			2.31				
	/		18		6.90			2.56				
	/		20		7.15			2.81				
	/		25		7.74			3.40				
	/		30		8.26			3.92				
	/		35		8.73			4.39				
	/		40		9.19			4.84				
	/		45		9.58			5.24				
	/		50		9.97			5.63				
	/		60		10.68			6.34				
	/		70		11.27			6.93				
	/		80		11.76			7.42				
	/		90		12.30			7.96				
	/		100		12.72			8.38				
1100	/		120		13.60			9.26				
	/		140		14.20			9.86				
	/		160		14.80			10.46				
1200	- 3		180		15.28			10.94				
	/		210		15.98			11.64				
1300	/		240		16.54			12.20				
1330	/		274		17.10			12.76				
1403	/		303		17.53			13.19				
1430	/		330		17.90			13.56				
1503	/		363		18.28			13.94				
	/											
	/											

WASHOE COUNTY

**DEPARTMENT OF PUBLIC WORKS
UTILITY DIVISION**

PUMPING TEST DATA

WELL DD observation

PUMPING / OBSERVATION WELL

PUMPING RECOVERY DATA

PAGE 2 OF 2

TYPE of PUMPING TEST Constant Q

HOW Q MEASURED orifice plate

HOW WL's MEASURED Actual

PUMPED WELL NO. DD North

RADIUS of PUMPED WELL 12''

DISTANCE from PUMPED WELL 271'

M.P. for WL's top of 2" elev. _____

DEPTH of PUMP/AIRLINE _____ wrt _____

% SUBMERGENCE: initial _____; pumping _____

PUMP ON: date 12-17-92 time 0900

PUMP OFF: date 12-18-92 time 0825

[illegible]

WASHOE COUNTY

**DEPARTMENT OF PUBLIC WORKS
UTILITY DIVISION**

PUMPING TEST DATA

WELL DOTTA DOMESTIC

PUMPING/OBSERVATION WELL

(PUMPING) RECOVERY DATA

PAGE 1 OF 1

TYPE of PUMPING TEST CONSTANT Q

HOW Q MEASURED _____

HOW WL's MEASURED ACTAT 300

PUMPED WELL NO. DOUBLE DIAMOND NORTH

RADIUS of PUMPED WELL _____

DISTANCE from PUMPED WELL ~1000'

M.P. for WL's TDP B'' CAS NL elev. _____

DEPTH of PUMP/AIRLINE _____ wrt _____

% SUBMERGENCE: initial _____; pumping _____

PUMP ON: date 12/17/92 time 0900

PUMP OFF: date 12-18-92 time 0825

[illegible]

WASHOE COUNTY

**DEPARTMENT OF PUBLIC WORKS
UTILITY DIVISION**

PUMPING TEST DATA

WELL FLINT AGRICULTURE WELL

PUMPING/OBSERVATION WELL

~~PUMPING~~ RECOVERY DATA

PAGE 1 OF 1

TYPE of PUMPING TEST CONSTANT Q

HOW Q MEASURED _____

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

HOW WL's MEASURED ACTAT 300

DEPTH of PUMP/AIRLINE _____ wrt _____

PUMPED WELL NO. 12"

% SUBMERGENCE: initial _____; pumping _____

RADIUS of PUMPED WELL DARFIE DIAMOND NORTH

PUMP ON: date 12/17/92 time 0900

DISTANCE from PUMPED WELL 21000'

PUMP OFF: date 12-18-92 time 0825

[illegible]

PUMPING TEST DATA

WELL WELK
~~PUMPING / OBSERVATION WELL~~
~~PUMPING / RECOVERY DATA~~
 PAGE 1 OF 1

M.P. for WL's NEIR day

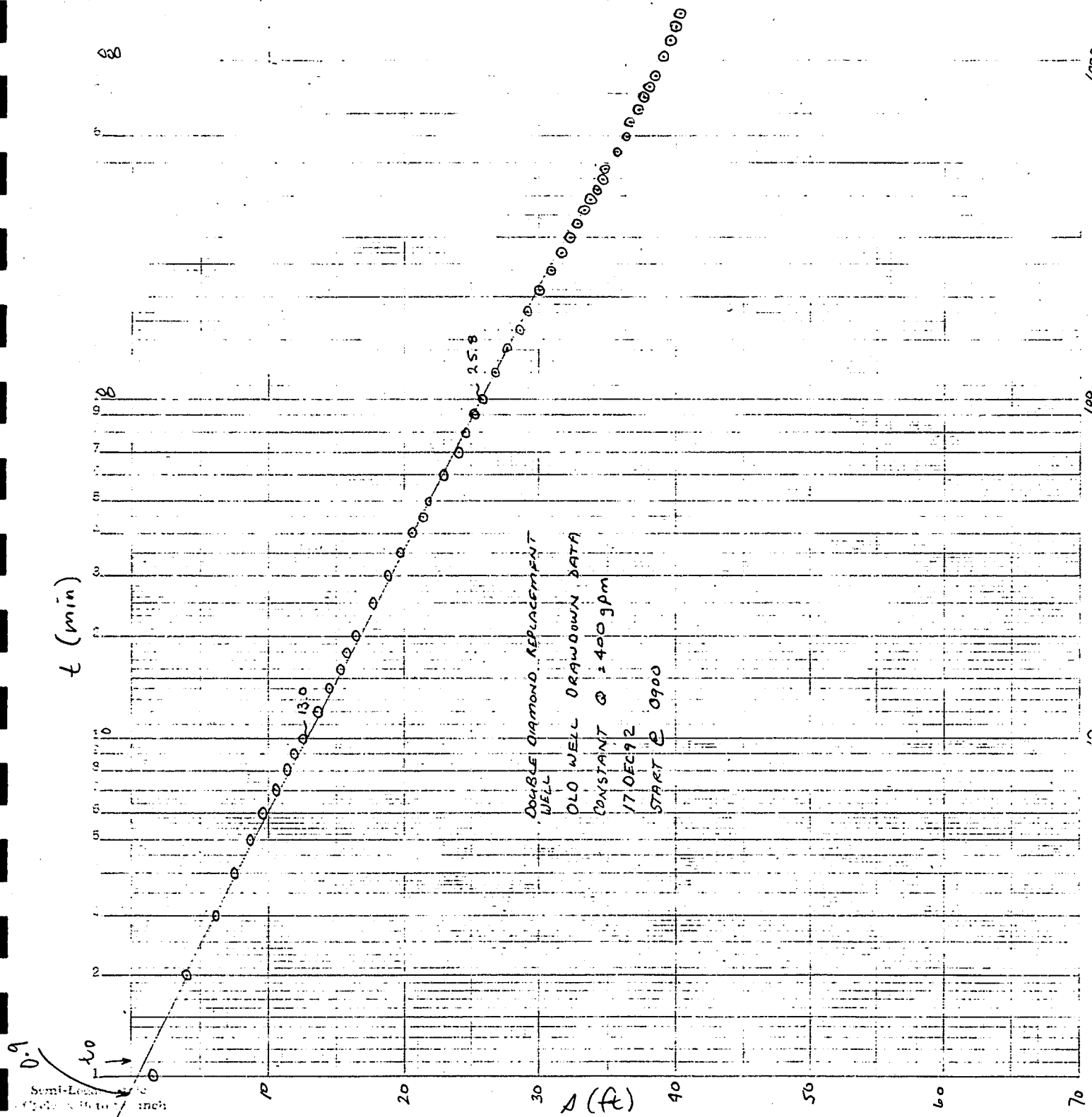
DEPTH of PUMP/AIRLINE _____ wrt _____

% SUBMERGENCE: initial _____; pumping _____

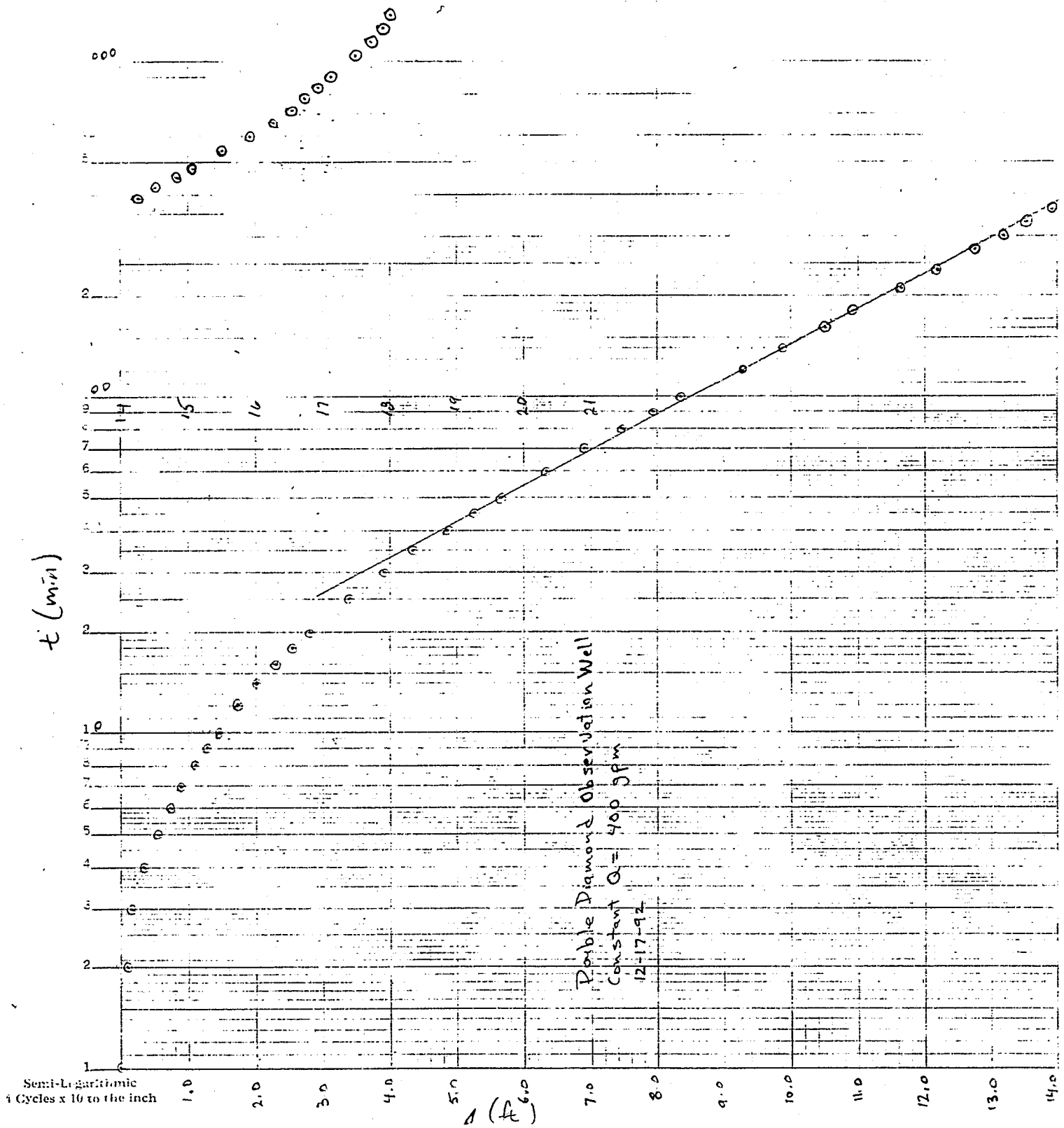
PUMP ON: date 12-17-92 time 0900

PUMP OFF: date 12-18-92 time 0825

[illegible]



observation





WASHOE COUNTY

DEPARTMENT OF PUBLIC WORKS
UTILITY DIVISION

PUMPING TEST DATA

WELL DOUBLE DIAMOND NORTH

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 PVC STILL WELL elev. _____

HOW WL's MEASURED SOLINIST SOUNDER

DEPTH of PUMP/AIRLINE _____ wrt _____

PUMPED WELL NO. DDN

% SUBMERGENCE: initial _____; pumping _____

RADIUS of PUMPED WELL 12"

PUMP ON: date 4 JAN 93 time 1035

DISTANCE from PUMPED WELL -

PUMP OFF: date 5 Jan 93 time 0830

TIME					WATER LEVEL DATA					WATER PRODUCT.		COMMENTS
t = _____ at t' = 0					STATIC WATER LEVEL 4.36							
CLOCK TIME	ELAPSED TIME		t / t'		READING	CONVERSIONS OF CORRECTIONS	WATER LEVEL	Sors'	Q/s			
	mins	hrs	t	t'						H "	Q	(NOTE ANY CHANGES IN OBSERVERS)
1036	/		1		30.00			25.64		21	350	VALVE FROZEN Q ↓
	/		2		36.50			32.14				
	/		3		40.78			36.42				SET @ 21-21.5"
	/		4		43.20			38.84				
	/		5		44.91			40.55				
	/		6		46.23			41.87				
1042	/		7		47.90			43.04				
	/		8		48.44			44.08				QT
	/		9		49.45			45.09				
1045	/		10		50.19			45.83				
1047	/		12		51.50			47.14				Q ↓
1049	/		14		52.31			47.95				
1051	/		16		53.09			48.73				
1053	/		18		53.76			49.40				
1055	20 -		20		54.35			49.99				QT SLIGHTLY
1100	25 -		25		55.63			51.27				
1105	30 -		30		56.62			52.26				
1110	35 -		35		57.45			53.09				Q ↑
1115	40 -		40		58.18			53.82				
1120	45 -		45		58.80			54.44				
1125	50 -		50		59.36			55.00				QT
1135	1 -		60		60.33			55.97				
1145	10 1		70		61.41			57.05				
1155	20 1		80		62.15			57.79				
1205	30 1		90		62.82			58.46				
1215	40 1		100		63.44			59.08				
1235	2 -		120		64.48			60.12				
1255	20 2		140		65.33			60.97				
1340	5 3		185		66.97			62.58				QT
1405	30 3		210		67.91			63.55				
1435	4 -		240		68.67			64.31				
1505	30 4		270		69.34			64.98				
1535	5 -		300		69.99			65.63				QT
1605	30 5		330		70.86			66.50				DD
1635	/		360		71.32			66.96				
1705	/		390		72.02			67.66				
1805	/		450		72.92			68.56				
1930	/		535		74.24			69.88				Q ↑
2035	/		600		74.50			70.14				Q ↑ Quite a bit
2100	/		645		75.02			71.47				DDN: -

WASHOE COUNTY

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UTILITY DIVISION**

PUMPING TEST DATA

WELL DOUBLE DIAMOND NORTH

PUMPING/OBSERVATION WELL
PUMPING/RECOVERY DATA

PAGE 2 OF 2

TYPE of PUMPING TEST CONSTANT Q

HOW Q MEASURED ORICE WEIR

HOW WL's MEASURED SOLINST SONDER

PUMPED WELL NO. DDN

RADIUS of PUMPED WELL 12"

DISTANCE from PUMPED WELL

M.P. for WL's TDP PVC STILL WELL elev. _____

DEPTH of PUMP/AIRLINE _____ wrt _____

% SUBMERGENCE: initial _____; pumping _____

PUMP ON: date 4 JAN 93 time 1035

PUMP OFF: date 5 Jan 93 time 0830

[illegible]



WASHOE COUNTY

DEPARTMENT OF PUBLIC WORKS
UTILITY DIVISION

PUMPING TEST DATA

WELL DOUBLE DIAMOND - OLD
PUMPING ☒ OBSERVATION WELL ☐
PUMPING/RECOVERY DATA
PAGE 1 OF 2

TYPE of PUMPING TEST CONSTANT Q

HOW Q MEASURED _____

M.P. for WL's TOP OF CASING elev. _____

HOW WL's MEASURED _____

DEPTH of PUMP/AIRLINE _____ wrt _____

PUMPED WELL NO. DOUBLE DIAMOND NORTH

% SUBMERGENCE: initial _____; pumping _____

RADIUS of PUMPED WELL 12"

PUMP ON: date JAN 92 time 10:35

DISTANCE from PUMPED WELL 72'

PUMP OFF: date Jan 93 time 0830

TIME					WATER LEVEL DATA					WATER PRODUCT.		COMMENTS
t = _____ at t' = 0					STATIC WATER LEVEL 3.78					Q		
CLOCK TIME	ELAPSED TIME		t / t'	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	ft or s'					
	mins	hrs										
	/		1		5.88		2.40				DD	
	/		2		7.68		4.20					
	/		3		9.22		5.74					
	/		4		10.42		6.94					
	/		5		11.42		7.94					
	/		6		12.23		8.75					
	/		7		12.94		9.46					
	/		8		13.56		10.08					
	/		9		14.12		10.64					
	/		10		14.64		11.16					
	/		12		15.51		12.03					
	/		14		16.26		12.78					
	/		16		16.90		13.42					
	/		18		17.43		13.95					
	/		20		17.93		14.45					
	/		25		18.80		15.32					
	/		30		19.85		16.37					
	/		35		20.60		17.12					
	/		40		21.24		17.76					
	/		45		21.82		18.34					
	/		50		22.32		18.84				E.E.	
	/		60		23.28		19.80					
	/		70		24.06		20.58					
	/		80		24.74		21.26					
	/		90		25.31		21.83					
	/		100		25.84		22.36					
	/		120		26.76		23.28					
	/		140		27.52		24.04					
	/		185		28.95		25.47					
	/		210		29.64		26.16					
	/		240		30.33		26.85					
	/		270		30.94		27.46					
	/		300		31.48		28.00					
	/		330		32.06		28.58					
	/		365		32.48		29.00				DD	
	/		395		33.03		29.55					
1804	/		449		33.72		30.24					
1935	/		540		34.78		31.30					
2035	/		600		35.22		31.74					
2105	/		660		35.80		32.40				DD	



PUMPING TEST DATA

PAGE 2 OF 2

DISTANCE from PUMPED WELL 72'

PUMP OFF: date 5 Jan 93 time 0830

[illegible]



WASHOE COUNTY

DEPARTMENT OF PUBLIC WORKS
UTILITY DIVISION

PUMPING TEST DATA

WELL DOUGIE DRAINAGE ONE

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 Acstat Sounder / tape

PUMPED WELL NO. DD North

RADIUS of PUMPED WELL 12"

DISTANCE from PUMPED WELL 271'

M.P. for WL's 2854 elev. _____

DEPTH of PUMP/AIRLINE _____ wrt _____

% SUBMERGENCE: initial _____; pumping _____

PUMP ON: date 4 JAN 93 time 1035

PUMP OFF: date 5 JAN 93 time 0830

TIME					WATER LEVEL DATA					WATER PRODUCT.		COMMENTS
t = _____ at t' = 0 _____					STATIC WATER LEVEL 3.10					Q		
CLOCK TIME	ELAPSED TIME		t / t'		READING	CONVERSIONS OF CORRECTIONS	WATER LEVEL	S or S'				
	mins	hrs	t	t'							(NOTE ANY CHANGES IN OBSERVERS)	
1035			0		3.10							
1036			1		3.10			0.0				
1037			2		3.20			.10				
1038			3		3.32			.22				
1039			4		3.47			.37				
1040			5		3.61			.51				
1041			6		3.77			.67				
1042			7		3.91			.81				
1043			8		4.05			.95				
1044			9		4.18			1.08				
1045			10		4.32			1.22				
1047			12		4.57			1.47				
1049			14		4.80			1.70				
1051			16		5.02			1.92				
1053			18		5.23			2.13				
1055			20		5.42			2.32				
1100			25		5.90			2.80				
1105			30		6.32			3.22				
1110			35		6.73			3.63				
1115			40		7.10			4.00				
1120			45		7.45			4.35				
1125			50		7.76			4.66				
1135	0	1	60		8.34			5.24				
1145			70		8.89			5.79				
1155			80		9.36			6.26				
1205			90		9.80			6.70				
1215			100		10.16			7.06				
1235	0	2	120		10.82			7.72				
1255			140		11.39			8.29				
1340			185		12.46			9.36				
1405			210		12.89			9.79				
1435	0	4	240		13.42			10.32				
1505			270		13.87			10.77				
1535	0	5	300		14.29			11.19				
1605			330		14.63			11.53				
1640			365		14.95			11.85			New sounder	
1705			390		15.24			12.14				
1800			451		15.81			12.71				
1935			540		16.46			13.36				
2000			600		16.90			13.80			DA OBS	



**DEPARTMENT OF PUBLIC WORKS
UTILITY DIVISION**

PUMPING TEST DATA

WELL Double Diamond OF
PUMPING/OBSERVATION WELL
PUMPING/RECOVERY DATA
PAGE 2 OF 2

TYPE of PUMPING TEST CONSTANT Q

HOW Q MEASURED _____

HOW WL's MEASURED metal solnist

PUMPED WELL NO. SS North

RADIUS of PUMPED WELL 12"

DISTANCE from PUMPED WELL 271'

M.P. for WL's top of 2" elev. _____

DEPTH of PUMP/AIRLINE _____ wrt _____

% SUBMERGENCE: initial _____; pumping _____

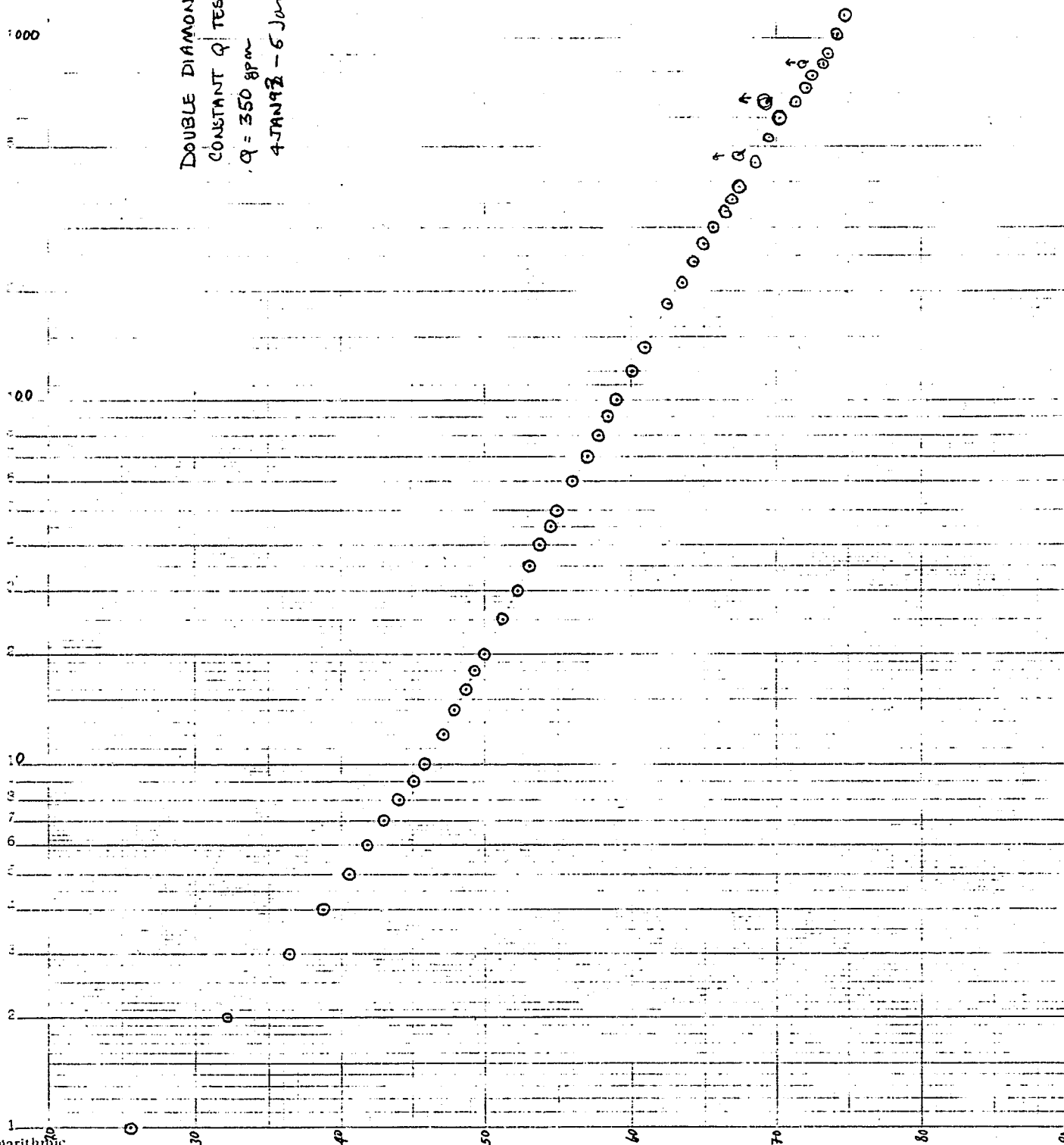
PUMP ON: date 4 JAN. 1993 time 10:35

PUMP OFF : date 5 Jan 93 time 0830

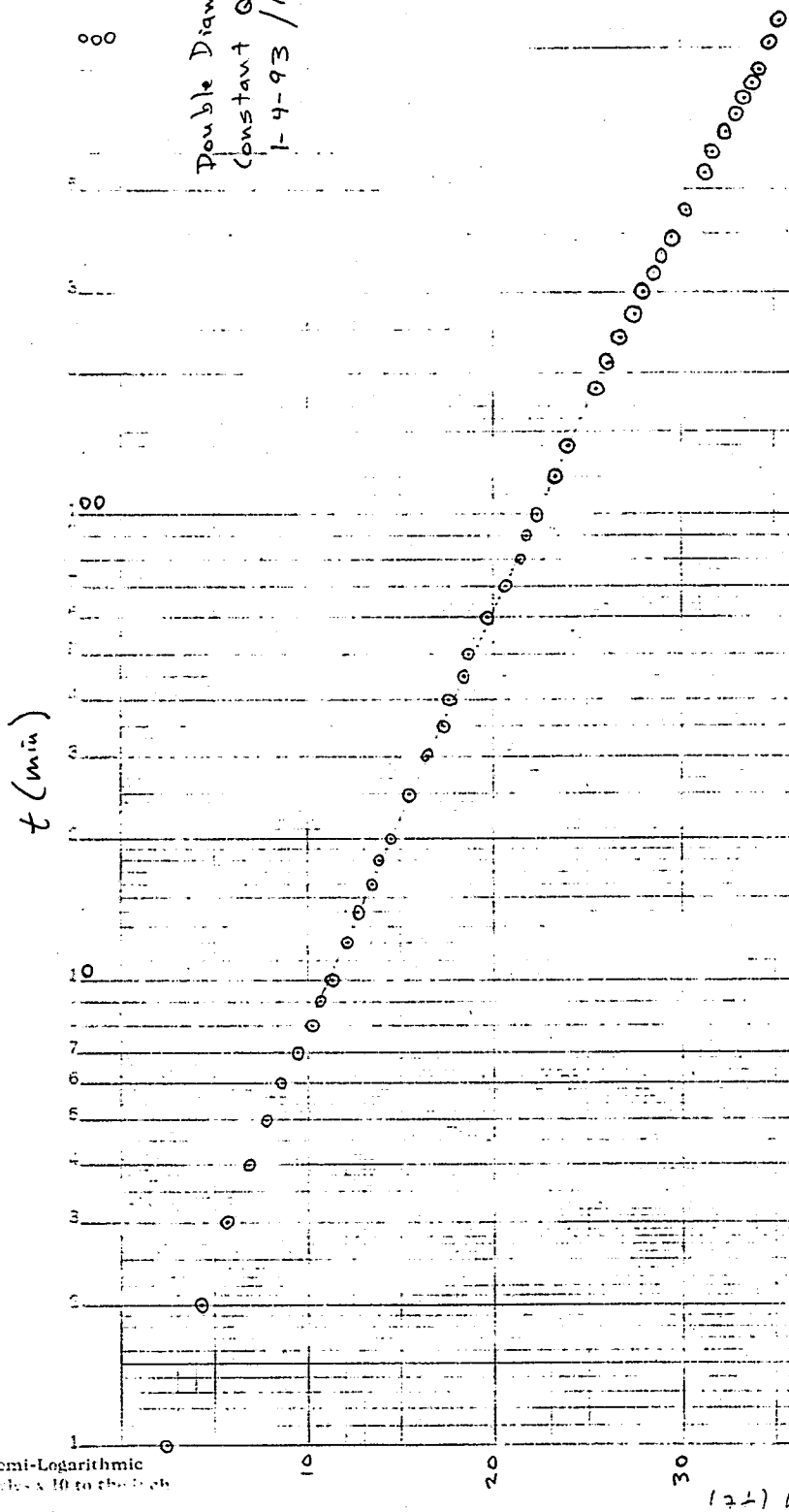
[illegible]

DOUBLE DIAMOND NORTH WELL
 CONSTANT Q TEST
 Q = 350 gpm
 4 JAN 93 - 5 Jan 93

$t(\text{min})$

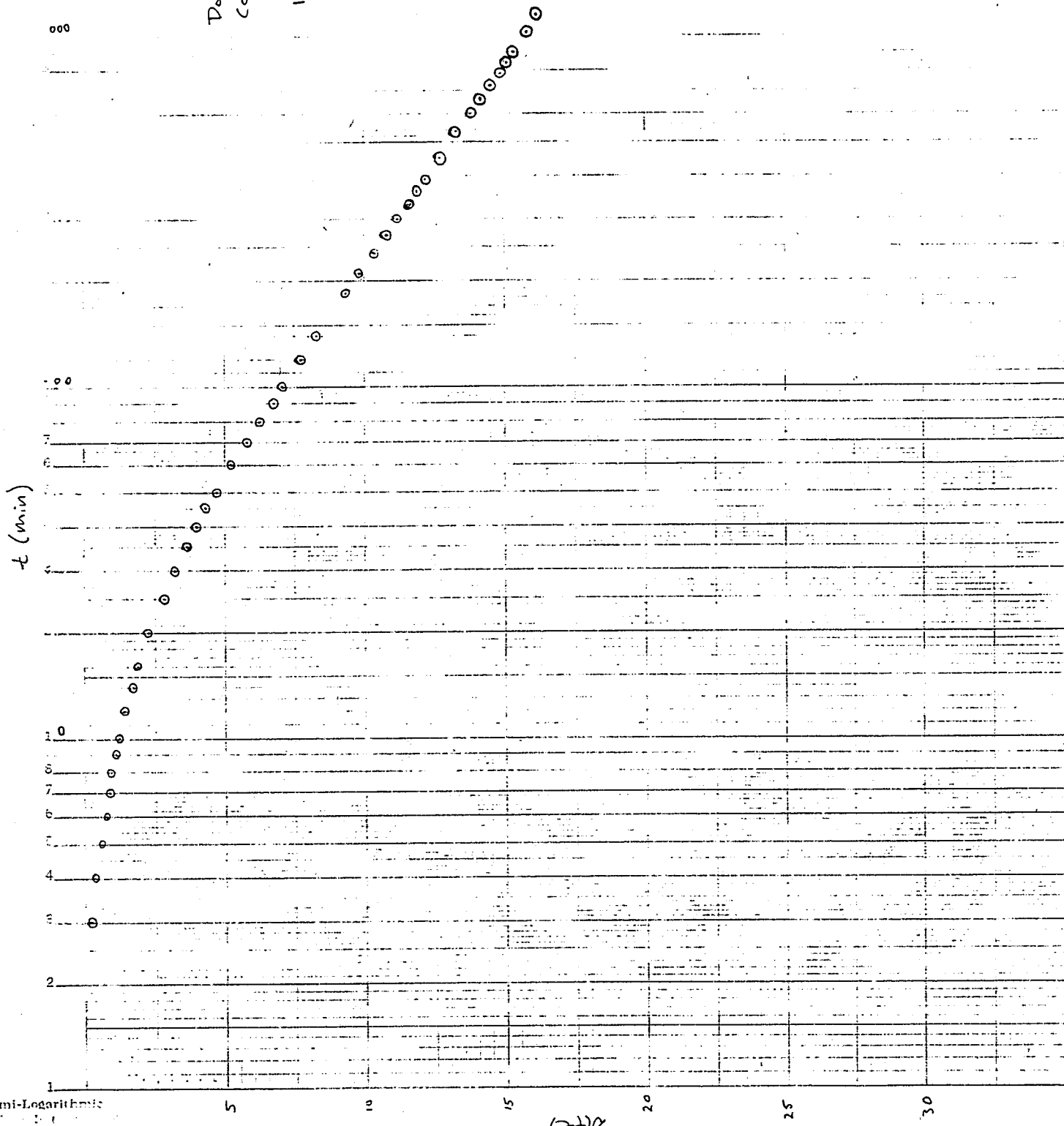


Double Diamond old well
 constant Q @ 350 gpm
 1-4-93 / 1-5-93



Double Diamond Observation Well
constant @ 350 gpm

1-4-93 / 1-5-93



**DEPARTMENT OF PUBLIC WORKS
UTILITY DIVISION**

PUMPING TEST DATA

WELL DD N. New

~~PUMPING~~/OBSERVATION WELL

PUMPING/RECOVERY DATA

PAGE 1 OF 1

TYPE of PUMPING TEST Constant q

HOW Q MEASURED orifice

HOW WL'S MEASURED solnist

PUMPED WELL NO. North New

RADIUS of PUMPED WELL 12"

DISTANCE from PUMPED WELL

M.P. for WL's top of PVC elev. _____

DEPTH of PUMP/AIRLINE _____ wrt _____

% SUBMERGENCE: initial _____; pumping _____

PUMP ON: date 1-6-93 time 0930

PUMP OFF: date 1-9-93 time 0930

[illegible]



**DEPARTMENT OF PUBLIC WORKS
UTILITY DIVISION**

PUMPING TEST DATA

WELL DD N. Old

PUMPING / OBSERVATION - WELL

~~PUMPING~~/RECOVERY DATA

PAGE 1 OF 1

TYPE of PUMPING TEST Constant cv

HOW Q MEASURED orifice

HOW WL's MEASURED solnist

PUMPED WELL NO. North new

RADIUS of PUMPED WELL 12"

DISTANCE from PUMPED WELL 72'

M.P. for WL's top of casing elev. _____

DEPTH of PUMP/AIRLINE _____ wrt _____

% SUBMERGENCE: initial _____; pumping _____

PUMP ON: date 1-6-93 time 0930

PUMP OFF: date 1-9-93 time 0930

[illegible]

PUMPING TEST DATA

WELL DDN obs.

PUMPING / OBSERVATION WELL

PUMPING/RECOVERY DATA

PAGE 1 OF 1

TYPE of PUMPING TEST Constant-Q

HOW Q MEASURED orifice

HOW WL's MEASURED solnist

PUMPED WELL NO. New

RADIUS of PUMPED WELL 12"

DISTANCE from PUMPED WELL 271'

M.P. for WL's top of 2" elev. _____

DEPTH of PUMP/AIRLINE _____ wrt _____

% SUBMERGENCE: initial _____; pumping _____

PUMP ON: date 1-6-93 time 0.930

PUMP OFF: date 1-9-93 time 0930

JTIL-16

**DEPARTMENT OF PUBLIC WORKS
UTILITY DIVISION**

PUMPING TEST DATA

WELL DOTTA DOMESTIC

~~PUMPING/OBSERVATION WELL~~

RUMPIING RECOVERY DATA

PAGE 1 OF 1

TYPE of PUMPING TEST Constant Q

HOW Q MEASURED

M.P. for WL's top of casing elev. _____

HOW WL's MEASURED actual

DEPTH of PUMP/AIRLINE _____ wrt _____

PUMPED WELL NO. DD North

% SUBMERGENCE: initial _____; pumping _____

RADIUS of PUMPED WELL 12"

PUMP ON: date 1-4-93 time 1035

DISTANCE from PUMPED WELL ~1000'

PUMP OFF: date 1-9-93 time 0930

[illegible]

**DEPARTMENT OF PUBLIC WORKS
UTILITY DIVISION**

PUMPING TEST DATA

TYPE of PUMPING TEST Constant Q

HOW Q MEASURED _____

HOW WL's MEASURED actat

PUMPED WELL NO. D.D. North

RADIUS of PUMPED WELL 12"

DISTANCE from PUMPED WELL ~1000'

WELL FLINT AGR

PUMPING / OBSERVATION WELL

~~RUM~~ PING/RECOVERY DATA

PAGE 1 OF 1

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

DEPTH of PUMP/AIRLINE _____ wrt _____

% SUBMERGENCE: initial _____; pumping _____

PUMP ON: date 1-4-93 time 1035

PUMP OFF: date 1-9-93 time 0930

[illegible]

PUMPING TEST DATA

PAGE / OF /

PUMP OFF: date 1-9-43 time 0930

11. 16



WASHOE COUNTY

DEPARTMENT OF PUBLIC WORKS
UTILITY DIVISION

PUMPING TEST DATA

WELL DC North New
PUMPING/OBSERVATION WELL
PUMPING/RECOVERY DATA
PAGE 1 OF 2

TYPE of PUMPING TEST Constant Discharge Recovery

HOW Q MEASURED orifice

M.P. for WL's top of pvc elev. _____

HOW WL's MEASURED solinst

DEPTH of PUMP/AIRLINE _____ wrt _____

PUMPED WELL NO. New

% SUBMERGENCE: initial _____; pumping _____

RADIUS of PUMPED WELL 12"

PUMP ON: date 1-6-93 time 0930

DISTANCE from PUMPED WELL -

PUMP OFF: date 1-9-93 time 0930

TIME					WATER LEVEL DATA					WATER PRODUCT.		COMMENTS
t = at t' = 0					STATIC WATER LEVEL							
CLOCK TIME	ELAPSED TIME		t / t'		READING	CONVERSIONS OF CORRECTIONS	WATER LEVEL	S or S'		Q		
	mins	hrs	t	t'							(NOTE ANY CHANGES IN OBSERVERS)	
0930			4320	0	86.05			79.27				
			4321	1	56.30			49.52				
			4322	2	52.70			45.92				
			4323	3	49.56			42.78				
			4324	4	46.70			39.92				
			4325	5	44.84			37.70				
			4326	6	43.15			36.37				
			4327	7	41.43			34.65				
			4328	8	40.40			33.62				
			4329	9	39.92			33.14				
			4330	10	38.38			31.60				
			4332	12	36.1			30.18				
			4334	14	310			28.81				
			4336	16	271			27.82				
			4338	18	241			27.05				
			4340	20	217			26.36				
			4345	25	174			24.97				
1000			4350	30	145			23.87				
			4355	35	124			22.94				
			4360	40	109			22.15				
			4365	45	97			21.47				
			4370	50	87			20.82				
1030			4380	60	78			19.85				
			4390	70	68			18.96				
			4400	80	55			18.18				
1100			4410	90	49			17.59				
			4420	100	44			17.00				
			4440	120	37			15.85				
1150	2	2	4460	140	32			15.03				
1210			4480	160	28			14.84				
1230			4500	180	25			13.67				
1300			4530	210	22			12.82				
1330			4560	240	19			11.90				
1400			4590	270	17			11.12				
1500			4650	330	14			9.83				
1600			4710	390	12			8.92				
1700			4770	450	10.6			8.10				
1850			4850	560	8.7			6.76				
5000			5000	750	1.3			1.00				

**DEPARTMENT OF PUBLIC WORKS
UTILITY DIVISION**

PUMPING TEST DATA

WELL DD NORTH

~~PUMPING / OBSERVATION WELL~~

PUMPING/RECOVERY DATA

PAGE 2 OF 2

TYPE of PUMPING TEST Constant Q Recovery

HOW Q MEASURED _____

HOW WL's MEASURED solnist

PUMPED WELL NO. DD North

RADIUS of PUMPED WELL 12"

DISTANCE from PUMPED WELL

M.P. for WL's top of pvc elev. _____

DEPTH of PUMP/AIRLINE _____ wrt _____

% SUBMERGENCE: initial _____; pumping _____

PUMP ON : date 1-4-93 time 0930

PUMP OFF: date 1-9-93 time 0930

[illegible]



WASHOE COUNTY

DEPARTMENT OF PUBLIC WORKS
UTILITY DIVISION

PUMPING TEST DATA

WELL DDU OLD

PUMPING/OBSERVATION WELL

PUMPING/RECOVERY DATA

PAGE 1 OF 1

TYPE of PUMPING TEST Constant & Recovery

HOW Q MEASURED orifice

HOW WL's MEASURED solinst

PUMPED WELL NO. "New"

RADIUS of PUMPED WELL 12"

DISTANCE from PUMPED WELL _____

M.P. for WL's top of casing elev. _____

DEPTH of PUMP/AIRLINE _____ wrt _____

% SUBMERGENCE: initial _____; pumping _____

PUMP ON: date 1-6-93 time 0930

PUMP OFF: date 1-9-93 time 0930

TIME					WATER LEVEL DATA					WATER PRODUCT.		COMMENTS
t =	at t' = 0				STATIC WATER LEVEL							
CLOCK TIME	ELAPSED TIME				READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	S or S'		Q	(NOTE ANY CHANGES IN OBSERVERS)	
	mins	hrs	t	t'								
0930					44.12			38.64				
			4321	1	4321	42.56		37.08				
			4323	3	1441	37.98		32.00				
			4325	5	865	34.96		29.48				
				6.25		31.91	?	27.40				
			4327	7.50	618	32.88		27.40				
			4330	10.5	433	30.98		25.50				
			4334	14.0	310	29.40		23.92				
			4338	17.5	241	28.18		22.70				
			4340	20.5	217	27.32		21.84				
			4344	24	181	26.52		21.04				
			4348	28	155	25.74		20.26				
			4353	33	132	24.90		19.42				
			4357	37	118	24.34		18.86				
			4362	42	104	23.68		18.20				
			4367	47	93	23.12		17.64				
			4372	52	84	22.62		17.14				
1030			4380	60	73	21.92		16.44				
			4390	70	63	21.15		15.67				
			4400	80	55	20.50		15.02				
1100			4410	90	49	19.92		14.44				
			4420	100	41	19.39		13.91				
			4443	123	36	18.34		12.86				
			4461	141	32	17.72		12.24				
12:24			4494	174	26	16.73		11.25				
12:54			4524	204	22	15.92		10.44				
1332			4562	242	19	15.04		9.56				
1358			4588	268	17	14.56		9.08				
1500			4650	330	14	13.47		7.99				
1556			4706	386	12	12.72		7.24				
1656			4766	446	10.6	12.01		6.53				
1745			4875	555	8.8	10.97		5.49				
1801			5071	751	6.8	9.64		4.16				
0310			5380	1060	5.1	8.24		2.76			10 JAN 93	
10:45			5835	1515	3.9	6.96		1.48				
1715			6225	1905	3.3	6.28		0.80				
1000			7230	2910	2.5	5.23		-0.25			11 Jan 93	

WASHOE COUNTY

DEPARTMENT OF PUBLIC WORKS
UTILITY DIVISION

PUMPING TEST DATA

WELL OC. WELL

PUMPING OBSERVATION WELL

PUMPING RECOVERY DATA

PAGE 1 OF 1

TYPE of PUMPING TEST CONSTANT Q Recovery

HOW Q MEASURED CRIFICE

M.P. for WL's top of 2" elev. _____

HOW WL's MEASURED _____

DEPTH of PUMP/AIRLINE _____ wrt _____

PUMPED WELL NO. DD North

% SUBMERGENCE: initial _____; pumping _____

RADIUS of PUMPED WELL 12"

PUMP ON: date 1-6-93 time 0930

DISTANCE from PUMPED WELL 271'

PUMP OFF: date 1-9-93 time 093

TIME					WATER LEVEL DATA				WATER PRODUCT.		COMMENTS	
t =	at t' = 0				STATIC WATER LEVEL							
CLOCK TIME	ELAPSED TIME		t	t'	t/t'	READING	CONVERSIONS OF CORRECTIONS	WATER LEVEL	S or S'		Q	(NOTE ANY CHANGES IN OBSERVERS)
0929			4320			22.32						
			4322	2	2161	22.26			17.46			
			4324	4	1081	22.11			17.31			
			4326.25	6.25	1692	21.91			17.11			
			4329	9	481	21.65			16.85			
			4332	12	361	21.34			16.54			
			4336	16	271	20.97			16.17			
			4338.75	18.75	231	20.71			15.91			
			4342	22	197	20.40			15.60			
			4346	26	167	20.08			15.28			
			4350	30	145	19.69			14.89			
			4355	35	124	19.31			14.51			
			4360	40	109	18.95			14.15			
			4365	45	97	18.59			13.79			
			4370	50	87	18.27			13.47			
			4382	62	71	17.59			12.79			
			4394.5	74.5	59	16.96			12.16			New Recorder
			4403	83	53	16.58			11.78			
			4412	92	48	16.22			11.42			
			4422	102	43	15.86			11.06			
			4442	122	36	15.22			10.42			
			4463	143	31	14.66			9.86			
12:22			4492	172	26	13.97			9.17			
12:55			4525	205	22	13.32			8.52			
13:31			4561	241	19	12.70			7.90			
13:59			4599	269	17	12.28			7.40			
14:59			4649	329	14	11.52			6.72			
16:00			4710	39	12	10.90			6.10			
17:00			4770	450	10.6	10.42			5.62			
18:50			4880	560	8.7	9.54			4.74			
22:07			5072	752	6.7	8.45			3.70			
03:10			5380	1060	5.1	7.31			2.51			10 JAN 93
10:45			5835	1515	3.9	6.21			1.41			
11:15			6225	1905	3.3	5.64			0.84			
10:00			7230	2910	2.5	4.75			-0.05			11 Jan 93
									</			



**DEPARTMENT OF PUBLIC WORKS
UTILITY DIVISION**

PUMPING TEST DATA

WELL Misc.

PUMPING / ~~OBSERVATION~~ WELL

PUMPING/RECOVERY DATA

PAGE 1 OF 1

TYPE of PUMPING TEST constant Q

HOW Q MEASURED _____

HOW WL's MEASURED actat

PUMPED WELL NO. DD North

RADIUS of PUMPED WELL 12"

DISTANCE from PUMPED WELL ~1000'

M.P. for WL's 2 elev. _____

DEPTH of PUMP/AIRLINE _____ wrt _____

% SUBMERGENCE: initial _____; pumping _____

PUMP ON: date _____ time _____

PUMP OFF : date _____ time _____

TIME					WATER LEVEL DATA 852-3108				WATER		COMMENTS
at t'=0					STATIC WATER LEVEL 328 325 -3044 (W)				PRODUCT.		
CLOCK TIME	ELAPSED TIME			t/t'	READING	CONVERSIONS OF CORRECTIONS	WATER LEVEL	S or S'	H.O.C.	Q	(NOTE ANY CHANGES IN OBSERVERS)
	mins	hrs	t								
N1300					87.05	8" DOTTA DOMESTIC WELL			1.60		220 EST 125 P 5GT
					50.47	FLINT AL WELL	1953		0.50		79' Shp 80 gpm
										7/7/12	T.D. 178' Pump 105
											STATIC 49' P.L. 87'
					35.28	FLINT DOMESTIC			3' below MA IS AT GA		OLD SITHLOW WELL
									LEVEL		
					86.92	DOMESTIC WELL					
					50.35	FLINT AL WELL					
					35.36	FLINT DOMESTIC					
					86.50	DOTTA DOMESTIC					
					50.10	FLINT AL					
					35.23	FLINT DOWN					

WASHOE COUNTY

**DEPARTMENT OF PUBLIC WORKS
UTILITY DIVISION**

PUMPING TEST DATA

WELL _____
PUMPING/OBSERVATION WELL
PUMPING/RECOVERY DATA
PAGE _____ OF _____

TYPE of PUMPING TEST _____

HOW Q MEASURED _____

HOW WL's MEASURED _____

PUMPED WELL NO. _____

RADIUS of PUMPED WELL _____

DISTANCE from PUMPED WELL _____

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

DEPTH of PUMP/AIRLINE _____ wrt _____

% SUBMERGENCE: initial _____; pumping _____

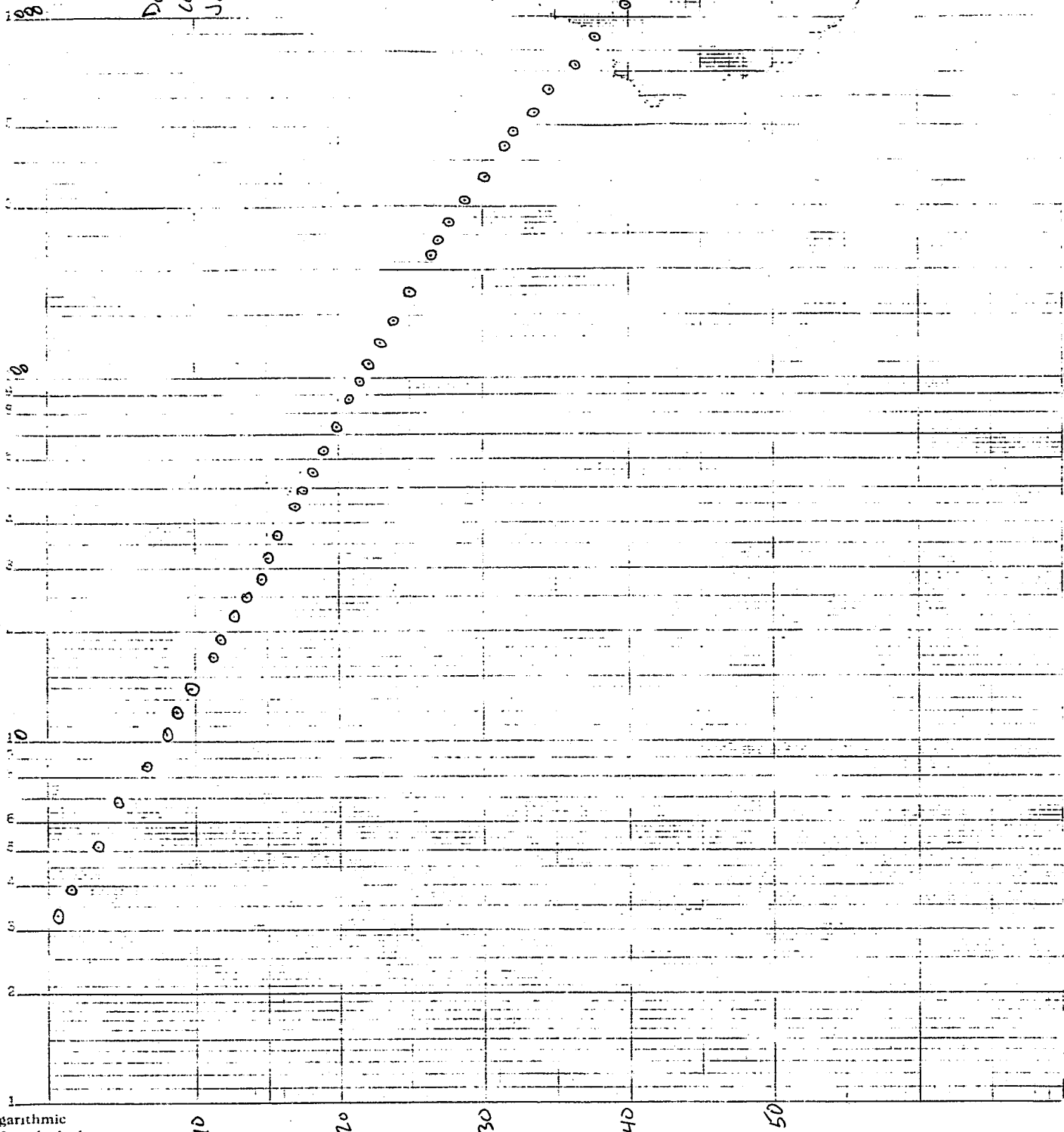
PUMP ON : date _____ time _____

PUMP OFF : date _____ time _____

[illegible]

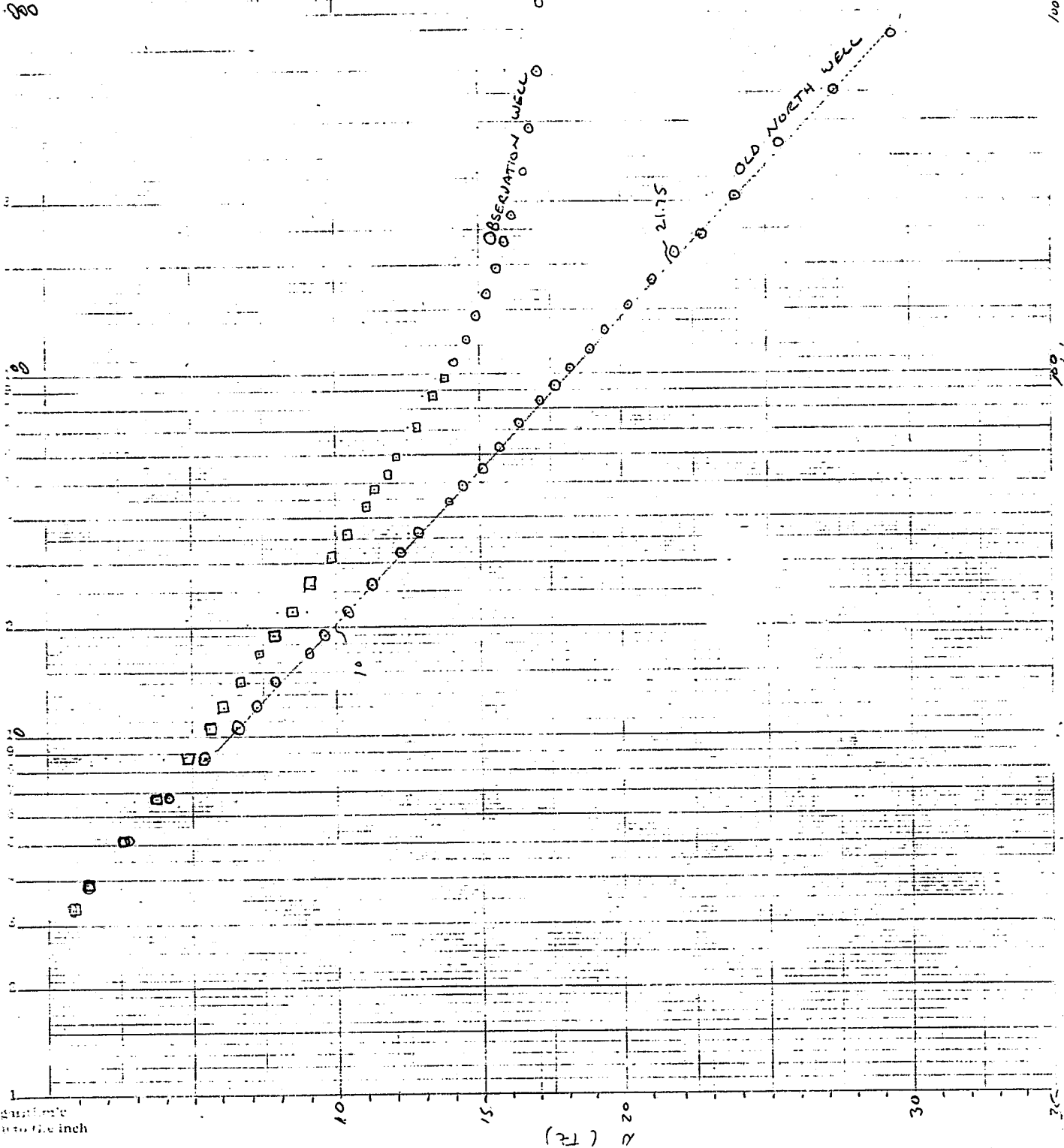
Double Diamond North, New
 Constant Q Recovery
 Jan 9-11, 1993

t/t'



DOUBLE DIAMOND
NORTH WELL (NEW 1113)
CONSTANT Q -
RECOVERY DATA

000



Semi-Logarithmic
1/4 inch x 10 to the inch

x (FE)

Remarks.....

1018
111

Eng A/C
115113
OK

FEB 05 1993

Well Information for 1108 East Holcomb Lane, Reno, NV.

197' deep

8" well casing, percolation starts at 160 to 197'

77' water level

145 recommended setting for pump

200 gallons per minute when tested 11-20-80

10" outside casing, then reduced to 8" last 50" on top.

5 H.P. 60 G.P.M. 2" main line to house.

2 CA 220 Pressure Tanks in basement of home.

Paul WILLIAMS, drilled well.

OWENS BROTHERS PUMP, set pump.

Dotta Domestic



WASHOE COUNTY

"To Protect and To Serve"



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

January 3, 1993

1195-B CORPORATE BOULEVARD
POST OFFICE BOX 11130
RENO, NEVADA 89520
PHONE: (702) 785-4743
FAX #: (702) 785-5978

To: Caesar Dotta
1108 E. Holcomb Lane
Reno, Nv 89511

Re: Water level measurements.


Dear Caesar,

Attached is the information you requested from our meeting of February 1, 1993. This includes copies of the original data sheets that contain our measurements of water levels in the Dotta domestic well, the Flindt agricultural well and the Flindt domestic well. I have also summarized these measurements with respect to testing that occurred on the new Double Diamond North well. As you can see there was no response measured in any of these wells that can be related to the limited pumping at the production well. While it was difficult to measure the springs, we were not able to detect any change in the flow during this time.

At this time I do not know when this well will be equipped and put into production. As we have discussed, our office would like to continue to measure your and the Flindt wells quarterly, for purposes of determining any impacts the Double Diamond well might influence on them. This information will be given to you at the time of our measurements and at your request.

If I can answer any questions or provide you any information, please do not hesitate to contact me at 785-4743.

Yours very truly,


Michael C. Widmer
Hydrogeologist

c: John Collins
Jack Ferris

Date	Time	Dotta	Ag Well	Flindt
Dec 04	Initial measurement with Caesar Dotta			
12-04	1315	87.05*	50.47*	35.28*
Dec 11-15	Development pumping			
12-14		86.92	50.35	35.28
Dec 16	Step Test			
12-16		86.50	50.10	35.23
Dec 17	23 Hour Constant Test (0900)			
12-17	1005	86.85	50.28	35.29
	1053	86.84	50.27	35.28
	1213	86.84	50.25	35.33
	1505	86.82	50.26	35.30
	1816	86.82	50.24	35.27
	2217	86.87	50.31	35.30
12-18	0236	86.87	50.32	35.29
Jan 4- 5	23 Hour Constant Test			
1-04	1623	86.80	50.27	35.40
1-04	2250	86.86	50.30	35.41
1-05	0920	86.84	50.30	35.43
Jan 6- 9	72 Hour Constant Test			
1-07	0950	86.82	50.28	35.52
	1500	86.81	50.28	35.48
	2315	86.82	none	none
1-08	0930	86.83	50.38	35.41
	1515	86.84	50.30	35.69
1-09	0510	86.82	50.28	35.44

* water level measurements in feet below measuring point.

WASHOE COUNTY

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

POST OFFICE BOX 11130
RENO, NEVADA 89520
PHONE: (702) 785-4743



DATE Jan 93

PAGE 1 OF 3 PAGES

PROJECT DDN "New" Test: Loc test Whip

Pumping Rate 1

Loc pump

Pumping well

Loc well

0'

old well

Loc old

72'

Obs well

Loc obs

271'

$T = 1969 \text{ ft}^2/\text{day} = 14,700 \text{ gpd/ft}$ } obs well

$S = 0.0002$ $K = 18.75 \text{ ft/day}$

$T = 1084 \text{ ft}^2/\text{day} = 8,100 \text{ gpd/ft}$ } old well

$S = 0.0003$ $K = 10$

$T = 853 \text{ ft}^2/\text{day} = 6,400 \text{ gpd/ft}$ } New well

$S = 0.04$ $K = 12.2$

T for alluvial aquifer $\sim 2800 \text{ ft}^2/\text{day} = 21,000 \text{ gpd/ft}$

good fit in obs w/ $T = 1450$; $S = 0.0005$

WASHOE COUNTY

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

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RENO, NEVADA 89520
PHONE: (702) 785-4743



DATE Jan 93

PAGE 2 OF 3 PAGES

PROJECT WHIP Calculations - Double Diamond North

~~STEP DATA~~ - Pump data ST Pump
~~STEP DATA~~ - drawdown data STD ATA

File LOC STP

$$H_w = C Q^n = 14 \text{ ft when } Q = 400 \text{ gpm} = 53 \text{ ft}^3/\text{min}$$

$$C = 0 - \text{big}$$

$$n = 2.5 - 2.7$$

$$14 = C (53)^{2.6} \Rightarrow C = 0.0005$$

$$C = 0.00009 \sim 0.0001$$

$$C_w = \frac{1}{0.0005} \left(\frac{.5}{1} \right)^2 = 500 \quad \text{Well bore Storage } C$$

$$\frac{1}{0.04} (.5)^2 = 6.25$$

$$\text{Loss Coef} = 0.000015 \quad \text{Loss } n_p = 1.984$$



WASHOE COUNTY

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

POST OFFICE BOX 11130
RENO, NEVADA 89520
PHONE: (702) 785-4743



DATE Jan 93
PAGE 3 OF 3 PAGES

PROJECT Calcs. Double Diamond North

Old well $t_0 = 1.1 \text{ min} = 0.0008 \text{ day}$

Obs well $t_0 = 12 \text{ min} = 0.0083 \text{ day}$

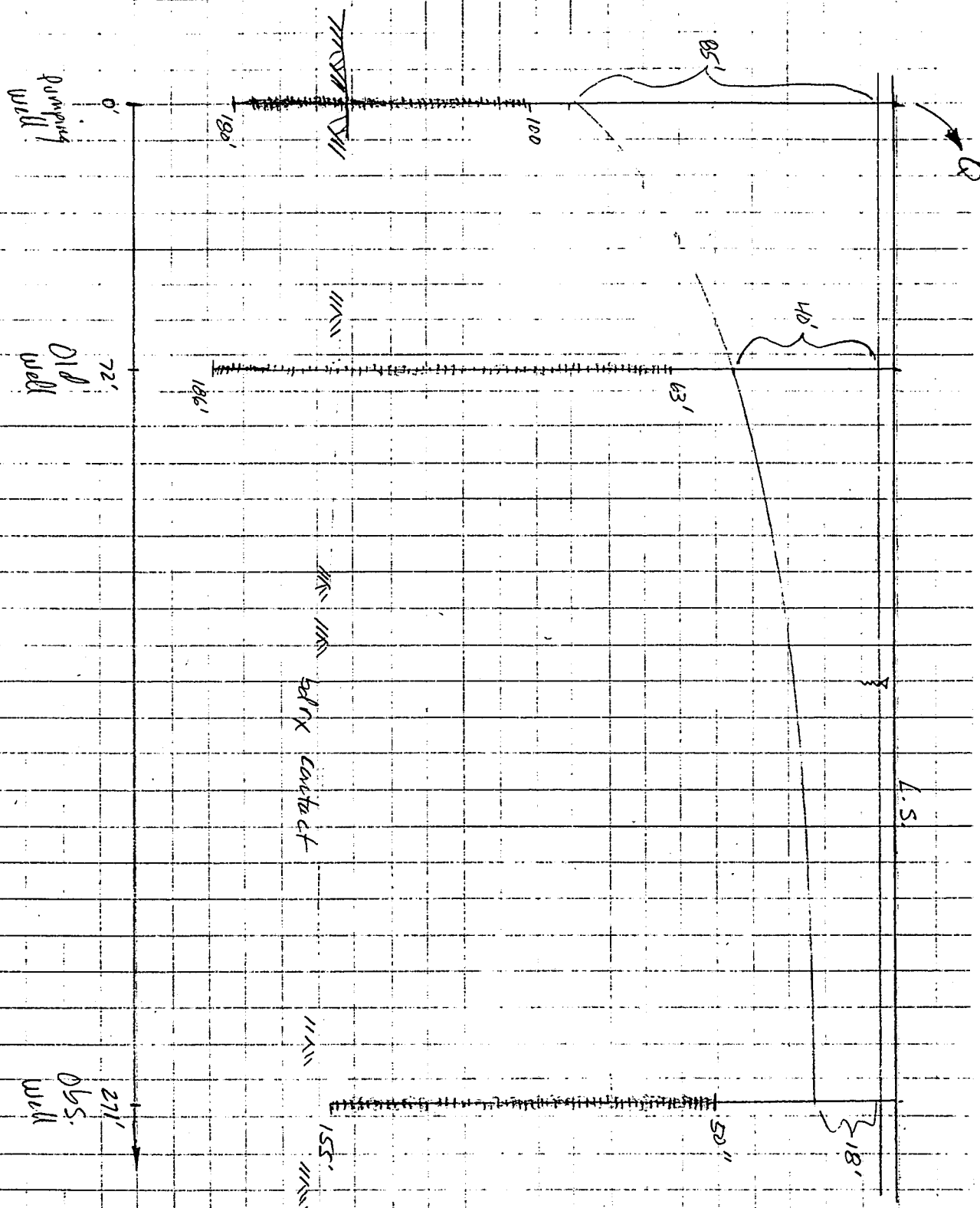
Pump $r_1 = 0.5 \text{ ft}$

Old $r_2 = 72 \text{ ft}$ $s = 0.0008$

Obs $r_3 = 271 \text{ ft}$ $s = 0.0006$

$$s = \frac{0.3 T t_0}{r^2} = \frac{0.3 (18,000) 0.0008}{72^2}$$

↗ entire aquifer



**Contract Documents and Specifications
for Double Diamond Well**

4. Production Well Construction

- A. Pilot Bore - The diameter of the pilot bore for the production well shall be not less than 6-3/4 inches. Formation samples shall be taken at ten (10) foot intervals and at each change in formation. Samples shall be stored in Ziploc freezer bags or equivalent and properly labeled as to depth and date.

Upon completion of the pilot hole, the Contractor shall employ a commercial logging service such as Welenco, Geo-Hydro-Data or approved equal. The commercial logging service shall run spontaneous potential, long and short resistivity, point resistivity and temperature logs on the well pilot borehole.

The Contractor, at the request of the Owner, shall have a grain size analysis performed by an approved laboratory, on each of three formation samples selected by the geologist. The results of the analysis, including distribution curves and recommendations for slot size screen openings, shall be delivered to the geologist for review prior to ordering well screen.

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

**Contract Documents and Specifications
for Double Diamond Well**

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. Installation of Conductor Casing - The conductor casing borehole shall be a minimum 26-inch diameter and drilled to a depth of 101 feet. The conductor casing shall be of new, first quality material and free of defects in workmanship and handling. No reject, subgrade or limited-use pipe is acceptable. The conductor casing shall meet the same requirements as the production casing with an outside diameter of 20 inches and a minimum wall thickness of 0.375 inches. The lower end of the conductor casing shall be fitted with a standard guide shoe.

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.

- D. Installation of Grout Surface Seal - Grouting the annular space between the conductor casing and the 26 inch borehole wall shall be by the Standard Halliburton Method. This involves pumping from the bottom of the casing through the guide shoe up the outside of the casing. 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 the plug at the bottom of the casing may be drilled. 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.

- E. Production Well Construction - The production casing borehole shall be 16-inch minimum diameter to a minimum depth of 185 feet. The production well will consist of

Contract Documents and Specifications
for Double Diamond Well

100 feet of blank, then continuously screened from a depth of 98 to 178 feet and five feet of blank on the bottom of the well at a depth of 178 to 183 feet.

All production casing shall be of new, first quality material and free of defects in workmanship and handling. No reject, subgrade or limited-use pipe is acceptable. Production 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. The outside diameter shall be 10 3/4-inches with a wall thickness of 0.250 inch. The Contractor shall furnish the Owner with mill certification from the casing manufacturer prior to installation of the casing.

- F. Well Screen - Well screen shall be of the continuous slot design, wire wound Hi Cap (TM) 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 for extra strong construction. Well screen shall have an outside diameter of 10 3/4-inches. A blank casing sump, five (5) feet in length shall be added to the well screen. The bottom of the sump shall be covered with a steel, rounded bull-nosed plug fabricated of the same material as the 10 3/4-inch diameter production casing.
- G. Casing & 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 borehole shall be drilled to a minimum diameter of sixteen (16) inches.

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 the gravel installation is complete. The casing shall have centering guides approved by the Owner. Centering guides shall be installed at

**Contract Documents and Specifications
for Double Diamond Well**

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

- H. 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 determined by the Owner, within two working days of receipt of grain size distribution curves described in Section 12 B, Pilot Bore. 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.

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 2-inch minimum diameter tremmie pipe installed to a depth as defined 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.

Contract Documents and Specifications
for Double Diamond Well

5. Development

- A. Air Jetting - Initial development shall be by air jetting. The Contractor shall provide an air-jetting tool approved by the Owner. The tool shall have horizontal nozzles so air is directed directly into screen. The compressor for air jetting shall have a minimum capacity of 125 psi, and produce a minimum air volume of 400 cubic feet per minute. Contractor shall provide compressor specifications if requested by Owner.

Air development 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 surging shall continue at five (5) foot intervals, until it is the opinion of the Owner that the air development is complete.

- B. Development Pumping - The Contractor shall furnish, install, operate and remove a submersible pump for developing the well. The pump shall have a capacity in excess of 600 gallons per minute (gpm) against a total head of 80 feet, with an anticipated bowl setting of 90 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 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.

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 5-inches in diameter and one 4-inches in diameter. The discharge piping shall also include an easily operable gate valve to control flow rates (see figure for orifice design). All flow and flow rate monitoring equipment shall be approved by the Owner prior to installation.

Contract Documents and Specifications for Double Diamond Well

The Contractor shall include with the pump installation, a 3/4-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.

6. Testing for Yield and Drawdown

Following development operations, the Contractor shall perform a complete pumping test of the well. The test pumping equipment shall have a capacity range between 200 and 600 gpm against a total head of 80 feet, with an anticipated pump intake setting of 90 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.

Test pumping shall be directed by the Owner with 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 600 gpm. Each rate will be pumped for a minimum 100 minutes. After completion of the step test the well

**Contract Documents and Specifications
for Double Diamond 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 600 gpm, whichever is less, for a minimum uninterrupted period of 48 hours. Pumping beyond 48 hours shall be at the discretion of the Owner but shall not exceed 72 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 Owner. The Contractor shall maintain and operate all equipment and ensure its continuous uninterrupted operation as required. Test must be continuous without interruption for a minimum 48 hours. If the Constant Q test is interrupted before 48 hours of pumping have elapsed, the 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 48 hours or the time specified by the Owner.

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

Payment for development and testing by pumping shall be at the hourly rate specified in the bid sheet and shall include all fuels and other emergency sources necessary for completion of work as specified. The hourly rate does not include the time spent for equipment installation and removal.

7. Plumbness and Alignment

The Contractor shall guarantee that the well when completed, shall

Contract Documents and Specifications
for Double Diamond Well

BID PROPOSAL

Item No.	Approx. Quantity	Description of Item With Unit Price Written In Words	Unit Price	Total
1.	1 Each	Mobilization & Demobilization including all materials, labor, and equipment for completion of one production well as described in Specifications for the lump sum price of <u>Two Thousand Five Hundred and no/100</u>	<u>\$2,500.00</u>	<u>\$2,500.00</u> ✓
2.	24 Hrs	Standby hours specifically at the request of the Owner at the rate of <u>Two Hundred and no/100</u> per hour.	<u>\$ 200.00</u>	<u>\$4,800.00</u> ✓
3.	185 FT	Drill minimum diameter 6 3/4-inch diameter pilot hole to a depth of 185 feet at <u>Sixteen and no/100</u> per foot.	<u>\$ 16.00</u>	<u>\$2,960.00</u> ✓
4.	1 EA.	Provide a geophysical log to 185 feet at <u>Nine Hundred Twenty-five and no/100</u> lump sum.	<u>\$ 925.00</u>	<u>\$ 925.00</u>
5.	101 FT	Drill minimum 26-inch diameter conductor borehole to a depth of 101 ft. at <u>Fifty and no/100</u> per lineal ft.	<u>\$ 50.00</u>	<u>\$5,050.00</u> ✓

**Contract Documents and Specifications
for Double Diamond Well**

Item No.	Approx. Quantity	Description of Item With Unit Price Written In Words	Unit Price	Total
6.	100 FT	Provide and install 20-inch diameter blank conductor casing to a depth of 100 ft. at <u>Forty-six and no/100</u> per lineal ft.	\$ 46.00	\$4,600.00 ✓
7.	101 Feet	Provide and install surface seal to 101 feet at <u>Two Thousand Five Hundred and no/100</u> lump sum.	\$2,500.00	\$2,500.00 /
8.	85 Feet	Drill minimum 16-inch diameter production casing borehole, approximately 85 feet at <u>Thirty-five and no/100</u> per lineal ft.	\$ 35.00	\$2,975.00
9.	105 Feet	Furnish & install 10-inch diameter blank production casing, approximately 105 feet at <u>Fourteen and 68/100</u> per lineal ft.	\$ 14.68	\$1,541.40 ✓
10.	80 Feet	Furnish & install 10-inch diameter wire wrap well screen, approximately 80 feet at <u>Forty-four and 65/100</u> per lineal foot.	\$ 44.65	\$3,572.00 ✓
11.	9 Yards ³	Furnish & install design gravel pack, estimated 9 yds ³ at <u>Two Hundred and no/100</u> per yd ³ .	\$ 200.00	\$1,800.00 ✓

Contract Documents and Specifications
for Double Diamond Well

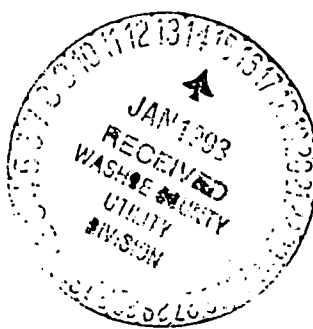
Item No.	Approx. Quantity	Description of Item With Unit Price Written In Words	Unit Price	Total
12.	30 Hours	Development by jetting, estimated at 30 hours at <u>Two Hundred Twenty and no/100</u> per hour.	\$ 220.00	\$6,600.00 ✓
13.	18 Hours	Furnish, install, operate and remove necessary equipment, including discharge piping for development pumping, estimated 18 hours at <u>One Hundred Forty and no/100</u> per hour.	\$ 140.00	\$2,520.00 ✓
14.	56 Hours	Furnish, install, operate and remove necessary equipment for test pumping, estimated at <u>One Hundred Ten and no/100</u> per hour.	\$ 110.00	\$6,160.00 ✓
15.	1 Each	Well disinfection and capping, at the lump sum price of <u>Nine Hundred and no/100</u>	\$ 900.00	\$ 900.00 ✓

TOTAL BID (Written in Words) TOTAL

Forty-nine Thousand Four Hundred Three

and 40/100 Dollars

\$ 49,403.40 ✓

SARGENT IRRIGATION CO.9955 North Virginia
RENO, NEVADA 89506

R 1558

(702) 677-0150

TO

Washoe County Utility Division

Post Office Box 11130

Reno, Nevada 89520

DATE January 13, 1993 JOB NO. R1558

JOB NAME Double Diamond Well

JOB LOCATION Reno, Washoe County, Nevada

TERMS Net 30 days

	DESCRIPTION	PRICE	AMOUNT	
1 each	Mobilization & Demobilization including all materials, labor, and equipment for completion of one production well	\$.lump sum	\$ 2,500	00
180 feet	Drill minimum diameter 7 7/8 inch diameter pilot hole	16.00/ft	2,880	00
177 feet	Provide a geophysical log	lump sum	907	50
100 feet	Drill minimum 30 inch diameter conductor borehole	60.00/ft	6,000	00
100 feet	Provide and install 24 inch diameter blank conductor casing	55.00/ft	5,500	00
97 feet	Provide and install surface seal	lump sum	3,500	00
80 feet	Drill minimum 22 inch diameter production casing borehole	40.00/ft	3,200	00
105 feet	Furnish and install 12 inch diameter blank production casing	22.00/ft	2,310	00
75 feet	Furnish and install 12 inch diameter wire wrap well screen	46.60/ft	3,495	00
18.75 yards	Furnish and install Silica Resource design gravel pack	230.00/yd	4,312	50
2 yards	Furnish and install Chevreux design gravel pack	200.00/yd	400	00
17 hours	Development by air jetting method	220.00/hr	3,740	00

ORIGINAL

Thank You

9955 North Virginia Street
RENO, NEVADA 89506

INVOICE

TO

DATE **January 13, 1993** JOB NO. **R1558**

JOB NAME Double Diamond Well

JOB LOCATION **Reno, Washoe County, Nevada**

[illegible]

PRODUCT 209 Inc. To Order PHONE TOLL FREE 1-800-225-6380



40% Pre-Consumer Content
10% Post-Consumer Content

Thank You

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.

NOTICE OF INTENT NO. 21177

1. OWNER Washoe County Utility Division ADDRESS AT WELL LOCATION East Moana Lane
MAILING ADDRESS 1195 B Cordorate BLVD (UNPAVED) RENO, NV
RENO, NV 89520

2. LOCATION NW 1/4 NE 1/4 Sec. 8 T. 18 N. R. 20 E. Washoe County
PERMIT NO. 57410 Parcel No. Washoe County Permit # 4600
Issued by Water Resources 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

LITHOLOGIC LOG				
Material	Water Strata	From	To	Thick-ness
Clay, Silt, Sand		0	5	5
Black Fine Sand		5	7	2
Tan Clay, Sm/LG Sand				
Small Gravels		7	31	24
Small/LG Sands, Gravel		31	39	8
Tan Clay, Sm Gravels		39	72	33
Sm/LG Sand, Gravel		72	90	18
Tan Clay's		90	95	5
Sm/LG Sand, Gravel		95	108	13
Tan Clay's, Fine Sand		108	113	5
SM/LG Sand, Gravel				
Thin layer's tan Clay		113	138	25
Broken up lite Red lava				
Rock		138	148	10
Solid lite red lava Rock		148	170	22
Charcoal Gray LAVA				
Rock		170	180	10

Date started November 19, 1992
Date completed December 15, 1992

WELL TEST DATA			
TEST METHOD: <input type="checkbox"/> Bailer <input checked="" type="checkbox"/> Pump <input type="checkbox"/> Air Lift			
G.P.M.	Draw Down (Feet Below Static)	Time (Hours)	
350	77	96	

8. WELL CONSTRUCTION
Depth Drilled 180 Feet Depth Cased 180 Feet

HOLE DIAMETER (BIT SIZE)			
From	To	From	To
30 Inches	0 Feet	100 Feet	
22 Inches	100 Feet	180 Feet	

CASING SCHEDULE				
Size O.D. (Inches)	Weight/Ft. (Pounds)	Wall Thickness (Inches)	From (Feet)	To (Feet)
24	63.41	.250	0	100
12	33.38	.250	0	180

Perforations:
Type perforation Johnson Hi-CAP
Size perforation

From 0 feet to 100 feet Blank
From 100 feet to 177 feet Screen
From .. feet to .. 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 100 feet to 180 feet

9. WATER LEVEL
Static water level 7.7 feet below land surface
Artesian flow .. G.P.M. .. P.S.I.
Water temperature Cold °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 Co Contractor
Address 9955 NORTH VIRGINIA ST Contractor
RENO, NV 89506
Nevada contractor's license number 21246
issued by the State Contractor's Board
Nevada driller's license number issued by the 1391
Division of Water Resources, the on-site driller.
Signed Don Thompson
By driller performing actual drilling on site or contractor
Date January 13, 1993