SUMMARY OF RESULTS
ZOLEZZI LANE AND LOWER MT. ROSE FAN
GROUNDWATER SUPPLY DEVELOPMENT

January 1985

CH2M HILL

R17326.A0

STMGID #2 PW

WELL DRILLERS REPORT

Basin:

PRINT OR TYPE ONLY — Please complete this form in its entirety

TEST NOTICE OF INTENT NO. 2567 2570

SOUTH TRUCKEE

OWNER MEADOWS GENERAL IMPROVEMENT DISTRICT

ADDRESS AT WELL LOCATION 3/4 mile west on Zolezzi Lane

MAILING ADDRESS DEPT OF PUBLIC WORKS 1205 MILL STREET RENO, NV 89520

2. LOCATION SE ¼ NE ¼ Sec. 19 T. 18 N/S R. 20 E WASHOE County

PERMIT NO. 46778 (Issued by Water Resources) Parcel No. Subdivision Name

3. TYPE OF WORK: New Well ☒ Recondition ☐ Deepen ☐ Other ☐

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

5. TYPE WELL: Cable ☐ Rotary ☒ Other ☐ Reverse

6. LITHOLOGIC LOG

Material	Water Strata	From	To	Thickness
silty sand, gravel, cobbles & boulders		0	40	40
cobbles & boulders		40	60	20
silty sand & gravel		60	70	10
silty sand to boulders		70	80	10
mixed clay to boulders		80	100	20
silty sand & gravel, some cobbles		100	125	25
gravel & cobbles		125	135	10
silty sand w/fine pebbles xx		135	360	225
silty sand & fine pebbles mixed w/clay	xx	360	390	30
silty to coarse sand	xx	390	400	10
silty to coarse sand mixed w/clay	xx	400	490	90
silty to coarse sand	xx	490	520	30
silty sand w/light blue clay		520	540	20
silty to med sand w/some xx clay; volcanic & mica rich		540	580	40
fine to med sand	xx	580	590	10
med grained sand clean	xx	590	640	50
fine to med sand	xx	640	660	20
silty to fine sand	xx	660	680	20
weathered andesite		680	710	30
andesite flow		710	715	5

increasing clays lost to top 100 feet

Date started APRIL 2 19 84

Date completed APRIL 25 19 84

7. WELL TEST DATA

Pump RPM	G.P.M.	Draw Down	After Hours Pump
1200	109	42	~~1~~ 1½
1300	152	65	3½
1400	179	92½	23½ 48½

BAILER TEST

G.P.M. ____ Draw down ____ feet ____ hours

G.P.M. ____ Draw down ____ feet ____ hours

G.P.M. ____ Draw down ____ feet ____ hours

8. WELL CONSTRUCTION

Diameter hole 22 inches Total depth 515 feet

Casing record 14" x .312

Weight per foot 45.61 Thickness ____

Diameter	From	To
22 inches	+2 feet	515 feet
____ inches	____ feet	____ feet
____ inches	____ feet	____ feet
____ inches	____ feet	____ feet
____ inches	____ feet	____ feet
____ inches	____ feet	____ feet

Surface seal: Yes ☒ No ☐ Type sand-cement grout

Depth of seal 88 feet

Gravel packed: Yes ☒ No ☐

Gravel packed from 88 feet to 515 feet

Monteray 8 x 16

Perforations:

Type perforation Johnson Screen 14" Hycap

Size perforation 50 slot

From 255 feet to 505 feet

From ____ feet to ____ feet

From ____ feet to ____ feet

From ____ feet to ____ feet

From ____ feet to ____ feet

9. WATER LEVEL

Static water level 132 feet below land surface

Flow bottom G.P.M. ____ P.S.I.

Water temperature 68 ° F. Quality good

10. DRILLERS CERTIFICATION

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

Name CHARLES SARGENT IRRIGATION, INC. (Contractor)

Address P. O. BOX 2480 RENO, NV 89505 (Contractor)

Nevada contractor's license number 21246

Nevada contractor's drillers number 1391 LARRY WHITESEL

Nevada driller's license number 1388 GENE MAPEL (Actual Driller)

Signed ____ (Contractor)

Date APRIL 30, 1984

USE ADDITIONAL SHEETS IF NECESSARY

CANARY—CLIENT'S COPY
PINK—WELL DRILLER'S COPY

PW #2

DIVISION OF WATER RESOURCES
WELL DRILLERS REPORT

Please complete this form in its entirety

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

PRINT OR TYPE ONLY
SOUTH TRUCKEE

TEST 2567
NOTICE OF INTENT NO. 2570

1. OWNER MEADOWS GENERAL IMPROVEMENT DISTRICT
MAILING ADDRESS DEPT OF PUBLIC WORKS
1205 MILL STREET RENO, NV 89520

ADDRESS AT WELL LOCATION
3/4 mile west on Zolezzi Lane

2. LOCATION SE ¼ NE ¼ Sec. 19 T. 18 N/S R. 20 E WASHOE County

PERMIT NO. 46778 (Issued by Water Resources) | Parcel No. | Subdivision Name

3. TYPE OF WORK
New Well ☒ Recondition ☐
Deepen ☐ Other ☐

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

5. TYPE WELL
Cable ☐ Rotary ☒
Other ☐ Reverse

6. LITHOLOGIC LOG

Material	Water Strata	From	To	Thickness
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mixed clay to boulders		80	100	20
silty sand & gravel, some cobbles		100	125	25
gravel & cobbles		125	135	10
silty sand w/fine pebbles	xx	135	360	225
silty sand & fine pebbles mixed w/clay	xx	360	390	30
silty to coarse sand	xx	390	400	10
silty to coarse sand mixed w/clay	xx	400	490	90
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med grained sand clean	xx	590	640	50
fine to med sand	xx	640	660	20
silty to fine sand	xx	660	680	20
weathered andesite		680	710	30
andesite flow		710	715	5

INCREASING CLAYS TO 1057 TO 1100 TOP

8. WELL CONSTRUCTION
Diameter hole 22 inches Total depth 515 feet
Casing record 14" x .312
Weight per foot 45.61 Thickness

Diameter	From	To
22 inches	+2 feet	515 feet
inches	feet	feet
inches	feet	feet
inches	feet	feet
inches	feet	feet
inches	feet	feet

Surface seal: Yes ☒ No ☐ Type sand-cement grout
Depth of seal 88 feet
Gravel packed: Yes ☒ No ☐
Gravel packed from 88 feet to 515 feet
Monteray 8 x 16
Perforations:
Type perforation Johnson Screen 14" Hycap
Size perforation 50 slot
From 255 feet to 505 feet
From ... feet to ... feet
From ... feet to ... feet
From ... feet to ... feet
From ... feet to ... feet

9. WATER LEVEL
Static water level 132 feet below land surface
Flow ... G.P.M. ... P.S.I.
Water temperature bottom 68 ° F. Quality good

Date started APRIL 2 19 84
Date completed APRIL 25 19 84

WELL TEST DATA

Pump RPM	G.P.M.	Draw Down	After Hours Pump
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BAILER TEST
G.P.M. Draw down feet hours
G.P.M. Draw down feet hours
G.P.M. Draw down feet hours

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

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Address P. O. BOX 2480 RENO, NV 89505 (Contractor)
Nevada contractor's license number 21246
Nevada contractor's drillers number 1391 LARRY WHITESEL
Nevada driller's license number 1388 GENE MAPEL (Actual Driller)
Signed ... (Contractor)
Date APRIL 30, 19...

USE ADDITIONAL SHEETS IF NECESSARY

STMGID #1,2,3 WELLS REPORT 10/98 THRU 12/98

8/19/99 For Randy VanHoozer

Well #1	21,449,000	gal		
Well #2	60,000	gal		
Well #3	11,353,000	gal	**1+2+3 ttl:**	32,862,000
Upper 400gm	51,840,000	gal	**2+3+400gpm ttl:**	63,253,000
			difference:	(30,391,000) good, a surplus

51,840,000

From Saddlehorn

SUMMARY OF RESULTS
ZOLEZZI LANE AND LOWER MT. ROSE FAN GROUNDWATER SUPPLY DEVELOPMENT

Two drilling projects were performed. The first project included drilling three test holes along Zolezzi Lane. (See Figure 1 for hole locations.) This drilling program was described in a February 1983 report entitled "Zolezzi Lane Test Drilling," attached hereto as Appendix A. One of the test holes, Zolezzi-3, was completed as a 6-inch well. The yield of this well was estimated to be 265 gallons per minute, and a water quality sample from this well indicated that groundwater is of potable quality in this location. Based on these results, it was recommended that additional wells be drilled in the vicinity to more completely develop the groundwater resources of the area.

The second project included production well drilling. It began in March 1984 and continued through September 1984. Five test holes were drilled (see geologic and geophysical logs in Appendix B). Based on the results of the test hole drilling, three production wells were drilled. Since andesite bedrock was found at depths shallower than 500 feet in Test Holes TH-3, TH-4, and TH-5, it was decided not to complete production wells in this location. A detailed discussion of the drilling and testing of the production wells is presented below. Specifications for the production wells are included as Appendix C. All of the production wells were completed as 14-inch wells. Johnson Hi-Cap continuous wire-wrap well screen (0.050-inch slot aperature) was used in the perforated intervals. The annular space was backfilled using Monterey 8x16 sand.

PRODUCTION WELL 1

Production Well 1 was drilled in March 1984. The well was completed to a depth of 530 feet, with perforations extending from 260 feet to 520 feet. Based on the pumping test results (see Appendix D), it was determined that the reliable long-term yield of this well is about 750 gpm. The recommended pump setting is 300 to 320 feet below the land surface.

12" casing

PRODUCTION WELL 2

Production Well 2 was drilled in April 1984. The well was completed to a depth of 515 feet, with perforations extending from 255 to 505 feet. When first completed, Production Well 2 produced an excessive amount of sand and turbidity. The problem was alleviated by additional well development. Following a pumping test (Appendix D), it was determined that the yield of Production Well 2 is about 250 gpm. The

14" casing

recommended pump setting is 320 to 340 feet below the land surface.

PRODUCTION WELL 3

Production Well 3 was drilled in August and September 1984. The well was completed to a depth of 590 feet, with perforations extending from 240 feet to 580 feet. Following a pumping test (Appendix D), it was determined that the yield of Production Well 3 is 500 gpm. The pump setting should be at 380 feet below the land surface.

14" casing

RELATED ACTIVITIES

In addition to the test hole and production well drilling, two related projects were performed. The first project was a test of the "Otten-Wycoff" well located in the southwestern portion of Section 30, T. 18 N., R. 20 E. Results of a 10-day test indicated that the long-term yield of this well was 200 gpm. The report describing this test is included as Appendix E.

The second project included testing of two existing wells on the Double Diamond Ranch. The results of these tests indicated that the long-term yield of DD-T-1 is 330 gpm, and the long-term yield of DD-T-2 is 800 gpm. However, DD-T-2 will have to be enlarged to produce this quantity of water. Results of this testing are presented in Appendix F.

DISCUSSION OF RESULTS

The estimated total yield of the three production wells is about 1,500 gpm, although short-term yields could be higher. It is important to adequately monitor the response of the wells to pumping, since the estimated yield of the wells is based on relatively short-term pumping tests. The long-term response of the wells and the aquifer can be precisely determined only by a long-term aquifer monitoring program. Such a program would include monthly measurements of water levels in the production wells and in monitoring wells. In addition, each well should be tested annually to determine if well efficiency is being maintained.

When the three production wells are pumped, groundwater levels will decline within the radius of influence in each well. When the radius of influence from a well expands to include another production well, that well will show a drawdown. This phenomenon, called "interference," causes wells to be drawn down more than if a well is pumping alone.

The source of water for the three wells is the alluvial aquifer of the Mt. Rose Fan. Groundwater is moving in this aquifer from recharge areas near the Carson Range to

discharge areas on the valley floor. Initially, groundwater pumped from the production wells will be withdrawn from storage in the aquifer.

However, as time passes and the radius of influence of each well expands, an increasing amount of water will be derived by interception of water moving down the fan. When the total pumpage from the well field is balanced by interception of groundwater moving down the fan, water levels in the wells should stabilize. Using the transmissivity measured in the pumping tests and an estimated long-term storage coefficient of 0.10, the water levels should stabilize after about one year. Additional drawdown due to interference should be about 10 feet in Wells 1 and 3 and about 20 feet in Well 2. This additional drawdown is only a small fraction of the total expected for these wells. Therefore, it is probable that well interference will not significantly affect the yield of any of the wells. However, because of the inherent uncertainties of predicting the future performance of the well field based on short-term testing, it is recommended that monthly monitoring of water levels be performed during the initial year of operation.

RDR28/001

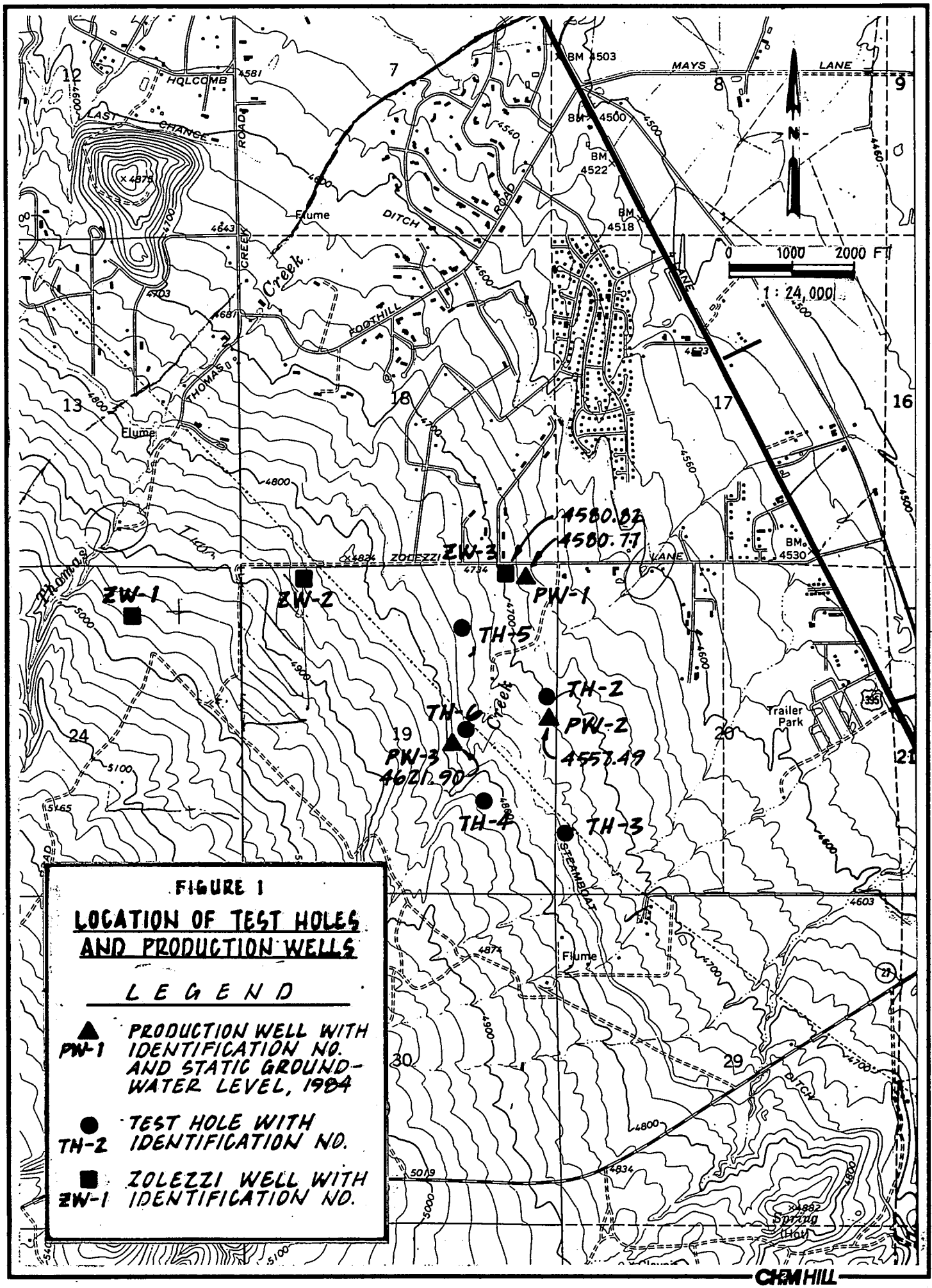


FIGURE 1

LOCATION OF TEST HOLES AND PRODUCTION WELLS

LEGEND

- ▲ PW-1 — PRODUCTION WELL WITH IDENTIFICATION NO. AND STATIC GROUNDWATER LEVEL, 1984
- ● TH-2 — TEST HOLE WITH IDENTIFICATION NO.
- ■ ZW-1 — ZOLEZZI WELL WITH IDENTIFICATION NO.

CHEM HILL

Appendix A

ZOLEZZI LANE TEST DRILLING REPORT

ZOLEZZI LANE TEST DRILLING

for

WASHOE COUNTY
DEPARTMENT OF PUBLIC WORKS

Zolezzi Test Wells

CH2M HILL
Engineers
Planners
Economists
Scientists

February 17, 1983

R15545.92

Mr. John Collins
Chief Sanitary Engineer
Washoe County, Nevada
1205 Mill Street
Reno, Nevada 89502

Dear Mr. Collins:

Here is our report outlining the work, recommendations, and conclusions relative to the Zolezzi Lane test drilling. We believe the results of the test drilling have shown that a reliable, good quality water supply may be developed on the Mt. Rose alluvial fan. Additionally, the effort has provided a 6-inch-diameter well that could be utilized as a 265-gallon per minute water supply.

Dan and I both enjoy working for Washoe County and in Reno. We look forward to a continued working relationship with your office. Please call if you have any questions.

Sincerely,

Fritz Carlson
Department Manager
Groundwater

mpj
R11/003
Enclosures

CONCLUSIONS AND RECOMMENDATIONS

1. The long-term (20-year) yield of Zolezzi No. 3 is 265 gpm. This well is constructed with a 50-foot grout surface seal and, following disinfection, is ready for production.

2. The results of the Zolezzi No. 3 test indicate that future wells should be drilled deeper to intersect a greater thickness of saturated material. I recommend that the depth of the first production well be 700 feet.

3. Analysis of the results of the Zolezzi No. 3 test indicate that the first production well should be located about 2,000 feet south of Zolezzi No. 3. A potential site area is shown on the attached map.

4. Final well site selection and land acquisition should be based on the following guidelines:

   a. Wells should be spaced about 2,000 feet apart.

   b. The wells field would extend along the eastern boundary of Section 19.

   c. To minimize the potential for intercepting geothermal water, no well should be drilled east of the eastern boundary of Section 19.

5. Well drilling should proceed on a step-by-step basis. Each well will be tested as it is completed. The results of these tests will be analyzed to help optimize continued well field development.

6. The first production well should be constructed with 10- or 12-inch casing for a maximum anticipated yield of 500 to 700 gpm.

RDR11/004

GROUNDWATER EXPLORATION
ZOLEZZI LANE

PREFACE

The work described in this report was authorized by agreement (Form No. OMB No. 15B-R0144) dated October 8, 1982, from Washoe County Department of Public Works, Reno, Nevada, to CH2M HILL, Redding, California.

INTRODUCTION

This report details the construction and testing of three test holes near Zolezzi Lane in Reno, Nevada. The test holes were designed to provide information about the potential for developing a municipal water supply in the area.

Zolezzi Wells No. 1 and 2 were drilled, electric logged, completed as 2-inch monitoring wells, and developed for water sample collection. Zolezzi Well No. 3 was drilled, electric logged, completed as a 6-inch-diameter test well, and test pumped.

Figure 1 shows the locations of the exploratory holes.

DRILLING

The test holes were constructed by Paul Williams and Sons, Inc., of Sparks, Nevada, under the field observation of CH2M HILL hydrogeologists. A mud-rotary drilling rig was used for drilling and development. Electric logging of each borehole was completed by GEO/HYDRO/DATA Inc., from Bakersfield, California. Drilling and testing of the three test holes was completed between December 13, 1982, and February 4, 1983.

SUBSURFACE GEOLOGY

A CH2M HILL hydrogeologist inspected the geologic materials penetrated during drilling. The logs, coupled with information supplied by the driller (drilling rates, down-pressure, bit clogging, drill-chatter, etc.), indicate the subsurface geology to be composed primarily of alluvial silts, sands, gravels, and boulders. Zolezzi Well No. 1 encountered what appeared to be volcanic bedrock at a depth of 598 feet. Drill cuttings in Zolezzi Well No. 2 did not circulate to the surface because of loss-circulation zones below ground surface. The driller's log of Zolezzi Well No. 2 is based on the driller's knowledge of drilling characteristics in the area. Detailed geologic logs are included in Appendix 1.

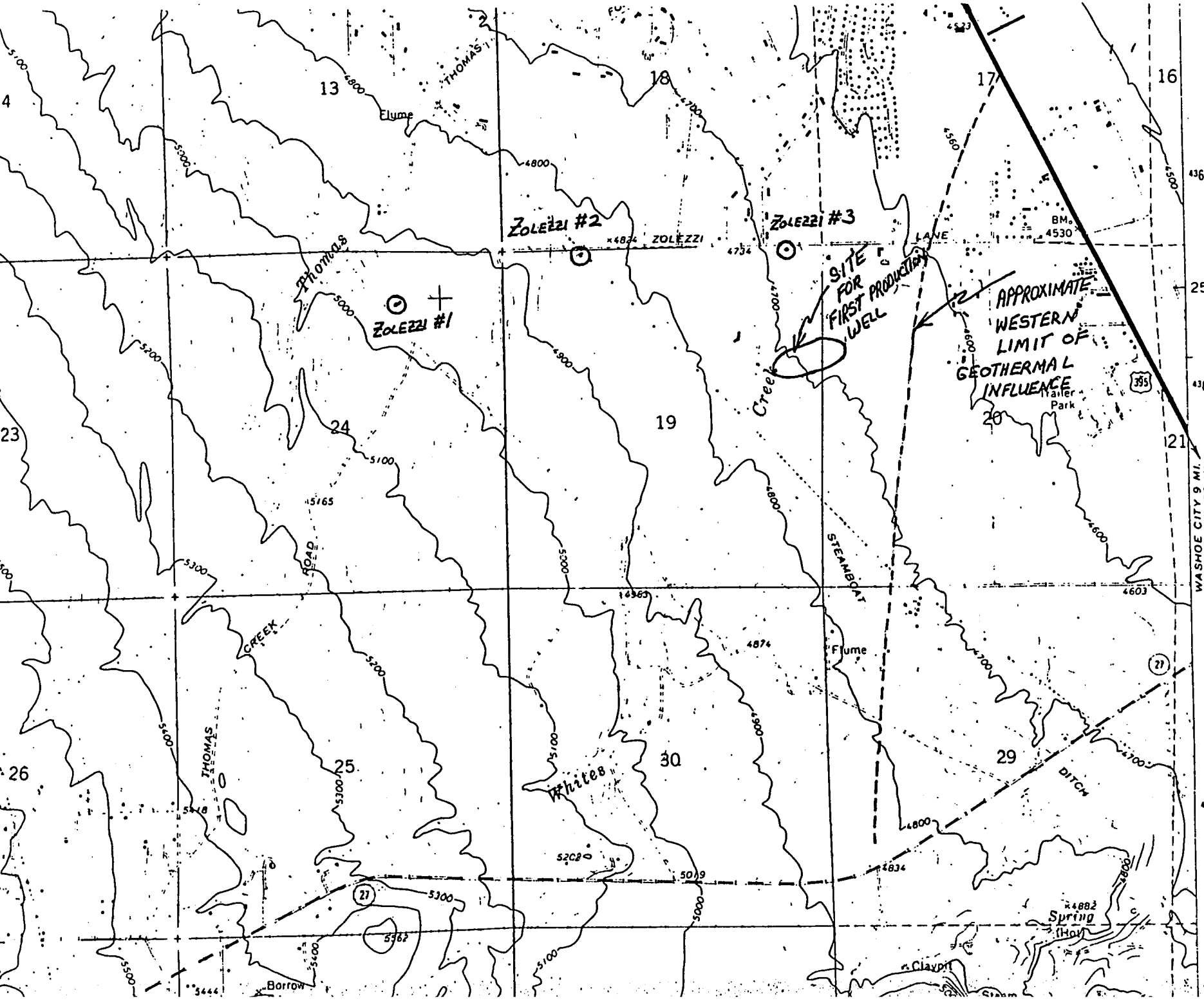


FIGURE 1.- LOCATION MA

CONSTRUCTION METHODS

Figures 2, 3, and 4 show the as-constructed diagram for each well. Slotted intervals were selected based on the data collected from the electric logs. Copies of each electric log are included in the packet at the end of this report.

WATER QUALITY ANALYSIS

Water samples from Zolezzi Wells No. 1 and 2 were collected by air lift pumping. The water sample from Zolezzi Well No. 3 was collected at the end of a 22-hour test pumping of the well which was pumped at a rate of approximately 340 gpm. Results of the analysis of water collected from Zolezzi No. 1 are included in Appendix 2. Analysis of samples collected from Zolezzi Wells No. 2 and 3 have not yet been completed.

PUMPING TEST OF ZOLEZZI WELL NO. 3

There are several reasons why Zolezzi Well No. 3 was completed as a 6-inch-diameter well and test pumped:

- Examination of drill cuttings, observation of drilling characteristics, and evaluation of electric logs indicated the Zolezzi Well No. 3 site had the best potential for municipal well development.
- The potential for water quality problems associated with arsenic and boron required a longer and greater volume pumping period prior to water sample collection.
- The test pumping provided data relative to production well design and aquifer yield.
- The 6-inch-diameter well was completed, conforming to water well standards and regulations, and could be utilized as a backup water supply if necessary.

Appendix 3 includes test pump data and calculations.

PUMPING TEST EQUIPMENT

The test pump was a 30-hp submersible turbine powered by a diesel generator. The discharge rate was measured by the "down and out" free discharge method. Water levels were measured with electronic well sounders.

Appendix 1

GEOLOGIC LOGS

Appendix 1
GEOLOGIC LOGS

Zolezzi Test Hole No. 1

Depth (ft)	Description	Remarks
0-73	Coarse sand, gravel, volcanic boulders	
73-83	Silty clayey sand, gravel, and boulders	
83-84	Silty sandy clay and boulders	
84-96	Fine sand, gravel, and boulders	
96-107	Brown sand, gravel, and boulders	Intermittent, smooth drilling
107-128	Brown silty clay, boulders	
128-162	Brown silty sand, gravel, and boulders	
162-172	Silty brown clay	
172-175	Sand, gravel, and cobbles	
175-186	Silty sand and gravel	Alternating zones
186-236	Silty sand and gravel	Drill chatter--increasing gravel
236-255	Dark granitic rock chips (boulders)	Very hard
255-357	Soft, brown silty sandy clay--occasional sand and gravel layer	Clay plugs bit
357-361	Silty sand and gravel	Drill chatter
361-364	Brown silty sandy clay	
364-390	Sandy gravel and cobbles	
390-431	Brown silty sandy clay	Occasional drill chatter
431-434	Coarse sand and gravel	Rapid drilling
434-452	Brown silty sandy clay--occasional boulders	Occasional drill chatter

452-496	Brown sandy silty clay	
496-529	Cemented sand and gravel	Very hard
529-536	Brown silty sandy clay	
536-555	Hard rock or cemented gravels	Rock chips returned
555-598	Hard rock or cemented fine sand	Variable drilling rate
598-621	Red volcanic rock fragments	Driller indicates fractured bedrock
		TD @ 621

Zolezzi Test Hole No. 2*

Depth (ft)	Description	Remarks
0-65	Brown silty sand, gravel, boulders	Loss circulation @ 37 feet

Driller's Log

65-123	Small rocks
123-153	Gravel and rocks
153-155	Large gravel
155-170	Clay and gravel
170-178	Large cobbles
178-213	Large gravel and sand
213-237	Gravel, sand, clay binder
237-313	Gravel, sand, clay streaks
313-318	Clay
318-323	Gravel and sand
323-325	Clay
325-376	Hard-packed sand and gravel
376-380	Sand
380-429	Sandy clay with gravel streaks
429-453	Hard-packed sands and gravel
453-463	Sandy clay
463-479	Gray clay
479-481	Fine gravel
481-513	Sandy clay

*Test Hole No. 2 repeatedly lost drill fluid circulation. At 65 feet and below, essentially no drill cuttings returned to surface. This log is based on drilling characteristics and driller's assessment.

Zolezzi Test Hole No. 3

Depth (ft)	Description	Remarks
0-32	Brown silty sand with large volcanic boulders	
32-37	Brown silty gravelly clay	
37-51	Sand and gravel	Rapid drilling--clean sand
51-69	Alternating sand, gravel, silt, clay layers	
69-85	Coarse sand, fine gravel	
85-89	Brown silty clay	
89-92	Gravel, cobbles	Drill chatter
92-131	Clean coarse sand and gravel--occasional brown silty clay layer	Mud temperature 10 degrees C
131-151	Brown silty sandy clay, gravel lenses	
151-176	Clean coarse sand, occasional clay lense	
176-225	Very clean, unconsolidated coarse sand	Mud temperature 10 degrees C
225-310	Coarse sand and gravel--increasing clay layers with depth	Rapidly alternating drilling rate
310-365	Unconsolidated, clean coarse sand	Mud temperature 13 degrees C
365-370	Coarse sand and gravel--dense	Hard drilling
370-376	Unconsolidated coarse sand and gravel	Mud temperature 14 degrees C
376-392	Alternating sand, gravel, clay lenses	
392-402	Gravelly brown clay	
402-420	Coarse sand and gravel	
420-450	Sandy silty brown clay--sand lenses	Mud temperature 14 degrees C

RDR11/102

Appendix 2

WATER QUALITY ANALYSIS

APPENDIX B 2

CH2M HILL
ENVIRONMENTAL LABORATORY
2218 RAILROAD AVENUE, P.O. BOX 2088
REDDING, CA 96001—TELEPHONE (916) 243-5831

REF. NO. 8553
DATE 1/18/83
PAGE 1 OF 1

ysical
emical &
Bacteriological
Analysis

ANALYSIS

REPORT TO RENO/ZOLEZZI LANE WELL #1
CH2M HILL/RDD

ATTN: Dan Dragan PHONE:

SAMPLE DESCRIPTION Well Sample SAMPLED BY: D. Dragan

DATE OF SAMPLE 12/22/82 DATE RECEIVED 12/23/82

MAJOR CATIONS	milligrams per liter	milli-equivalents per liter
Calcium (Ca)	18.5	
Magnesium (Mg)	12.8	
Potassium (K)		
Sodium (Na)	13.3	
total milli-equivalents per liter		
MAJOR ANIONS		
Bicarbonate (HCO_3)	151	
Carbonate (CO_3)	0	
Chloride (Cl)	1.8	
Nitrate (NO_3)	<0.22	
Phosphate (PO_4)		
Sulfate (SO_4)	8	
total milli-equivalents per liter		

TRACE ELEMENTS	milligrams per liter
Arsenic (As)	<0.005
Barium (Ba)	<0.1
Cadmium (Cd)	<0.01
Chromium (Cr) total	<0.02
Copper (Cu)	<0.02
Fluoride (F)	0.07
Iron (Fe)	0.21
Lead (Pb)	<0.05
Manganese (Mn)	0.08
Mercury (Hg)	<0.001
Selenium (Se)	<0.01
Silver (Ag)	<0.02
Zinc (Zn)	0.02
Boron	<0.05
BACTERIA	MPN/100 ml
Total Coliform	
Fecal Coliform	

OTHER	milligrams per liter
Phenolphthalein Alkalinity ($CaCO_3$)	
Methyl Orange (total) Alkalinity ($CaCO_3$)	124
Total Hardness ($CaCO_3$)	98.9
pH (units)	8.07
Electrical Conductivity (micromhos/cm @ 25°C)	234
Turbidity (NTU)	12
Color (units)	10
Odor (units)	none
Total Dissolved Solids	175
MBAS	<0.05
PESTICIDES	
Endrin	
Lindane	
Methoxychlor	
Toxaphene	
2-4-D	
2-4-5-TP Silvex	

COMMENTS: Filtered for General Mineral, except Ca, Fe, Mn, Zn. Did Trace ments on supernate after settling 24 hrs.

All analyses by EPA or State of California recommended methods, unless otherwise noted

tate Approved Water Laboratory for Chemical, acteriological, and Bioassay Examinations

REPORTED BY: James E. Hawley

The information shown on this sheet is test data only and no analysis or interpretation is intended or implied.

Form 121

Appendix 3

TEST PUMP DATA AND CALCULATIONS

CH2M HILL PUMPING TEST DATA

WELL ZOLEZZI LANE #3
(PUMPING) OBSERVATION WELL
(PUMPING) RECOVERY DATA
PAGE 1 OF ____

TYPE of PUMPING TEST CONSTANT DISCHARGE
HOW Q MEASURED ORIFICE PLATE
HOW WL's MEASURED ELECTRONIC WELL SOUNDER
PUMPED WELL NO. ZOLEZZI NO. 3
RADIUS of PUMPED WELL 6" Dia. 3" RADIUS
DISTANCE from PUMPED WELL —

M.P. for WL's TOC. elev. ____
DEPTH of PUMP/AIRLINE — wrt —
% SUBMERGENCE : initial — ; pumping —
PUMP ON : date 2 FEB 83 time ____
PUMP OFF : date ____ time ____

LOCATION ZOLEZZI LANE - RENO, NEVADA
PERSONNEL E. CARLSON
CLIENT WASHOE COUNTY
JOB NO. R15545.92

TIME t = ____ at t' = 0					WATER LEVEL DATA STATIC WATER LEVEL 94.08					WATER PRODUCT.		COMMENTS
CLOCK TIME	ELAPSED TIME mins/hrs t	t'	t/t'	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	(S) or S'				Q	(NOTE ANY CHANGES IN OBSERVERS)
	1:20			126.30			32.22					
	2:05			128.60			34.52					
	3:00			131.60			37.52					
	4:15			133.47			39.39					
	5:00			134.83			40.75				340	
	6:15			136.60			42.52					
	8:00			138.69			44.61					
	10:00			139.17			45.09					
	14:35			144.17			50.09					
	16:45			145.49			51.41					T = 16°C
	19:46			147.01			52.93					
	22:30			148.09			54.01					
	27:00			149.73			55.65					
	32:00			151.37			57.29					
	40			152.13			58.05					ELECTRICAL CONDUCTIVITY 145 µmhos
	48			156.10			62.02					
	55			158.06			63.98				340	Q = 340 gpm
	71			162.40			68.32					
	84			165.17			71.09					
	100			168.50			74.42					
	120			171.03			76.95					
	139			172.78			78.70					
	164			174.84			80.76					
	190			176.01			81.93					Q = 340 gpm
	225			177.60			83.52					
	287			180.38			86.30					ELECTRICAL CONDUCTIVITY 140 µmhos
	373			184.03			89.95					
	440			185.03			90.95				345	Q = 345 gpm
	507			186.78			92.70					
	592			187.48			93.40					
	697			187.86			93.78					
	822			189.01			94.93					
	894			189.75			95.67					
	937			—			—					
	957			189.95			95.87					
	1079			190.84			96.76					
	1185			191.05			96.97					SAMPLE COLLECTED
	1297			191.51			97.43					ELECTRICAL CONDUCTIVITY 140 µmhos
												T = 15°C

Form 126

CH2M HILL PUMPING TEST DATA

WELL Zolezzi #3
(PUMPING) OBSERVATION WELL
PUMPING/(RECOVERY DATA)
PAGE ____ OF ____

TYPE of PUMPING TEST Constant Discharge
HOW Q MEASURED Orifice Plate
HOW WL's MEASURED Electronic well sounder
PUMPED WELL NO. Zolezzi #3
RADIUS of PUMPED WELL 3"
DISTANCE from PUMPED WELL ____

M.P. for WL's TOC. elev. -
DEPTH of PUMP/AIRLINE ~260' wrt -
% SUBMERGENCE : initial ____ ; pumping ____
PUMP ON : date 2 FEB 83 time ____
PUMP OFF : date ____ time ____

PERSONNEL F. Carlson
LOCATION Zolezzi Ranch Reno, Nevada
JOB NO. R15545.92

TIME t = 1301 at t' = 0					WATER LEVEL DATA STATIC WATER LEVEL 94.08				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)
		1302	.62	2100			149.60	55.52			
		1302.3	1.32	987			148.75	54.67			
		1303.2	2.20	592			145.30	51.22			
		1303.8	2.83	461			143.37	49.29			
		1304.5	3.50	373			141.65	47.57			
		1305.4	4.37	299			139.72	45.64			
		1306.2	5.23	250			138.10	44.02			
		1307.3	6.32	207			136.27	42.19			
		1308.3	7.25	180			134.94	40.86			
		1309	8.00	164			134.08	40.00			
		1310	9.00	146			132.91	38.83			
		1311	10.00	131			131.77	37.69			
		1312.5	11.50	114			130.33	36.25			
		1314	13.00	101			129.09	35.01			
		1315	14.00	94			128.33	34.25			
		1316	15.12	87			127.53	33.45			
		1317	16.00	82			126.94	32.86			
		1318	17.00	78			126.26	32.18			
		1319	18.00	73			125.61	31.53			
		1321	20.00	66			124.54	30.46			
		1324	22.67	58			123.14	29.06			
		1326	25.00	53			122.15	28.07			
		1331	30.00	44			120.29	26.21			
		1336	35.00	38			118.67	24.59			
		1341	40.00	34			117.32	23.24			
		1351	50.00	27			115.15	21.07			
3 FEB											
1407		1362	62.0	22			113.07	18.99			
14:21		1376	76.0	18.1			113.63	19.55			
14:29		1384	84.0	16.5			111.87	17.79			
14:45		1400	100.0	14.0			109.59	15.51			
14:51		1406	106.0	13.3			109.00	14.92			
15:02		1417	117.0	12.1			108.65	14.57			
4 FEB											
13:20		2255	1455.0	1.9			96.90	2.82			

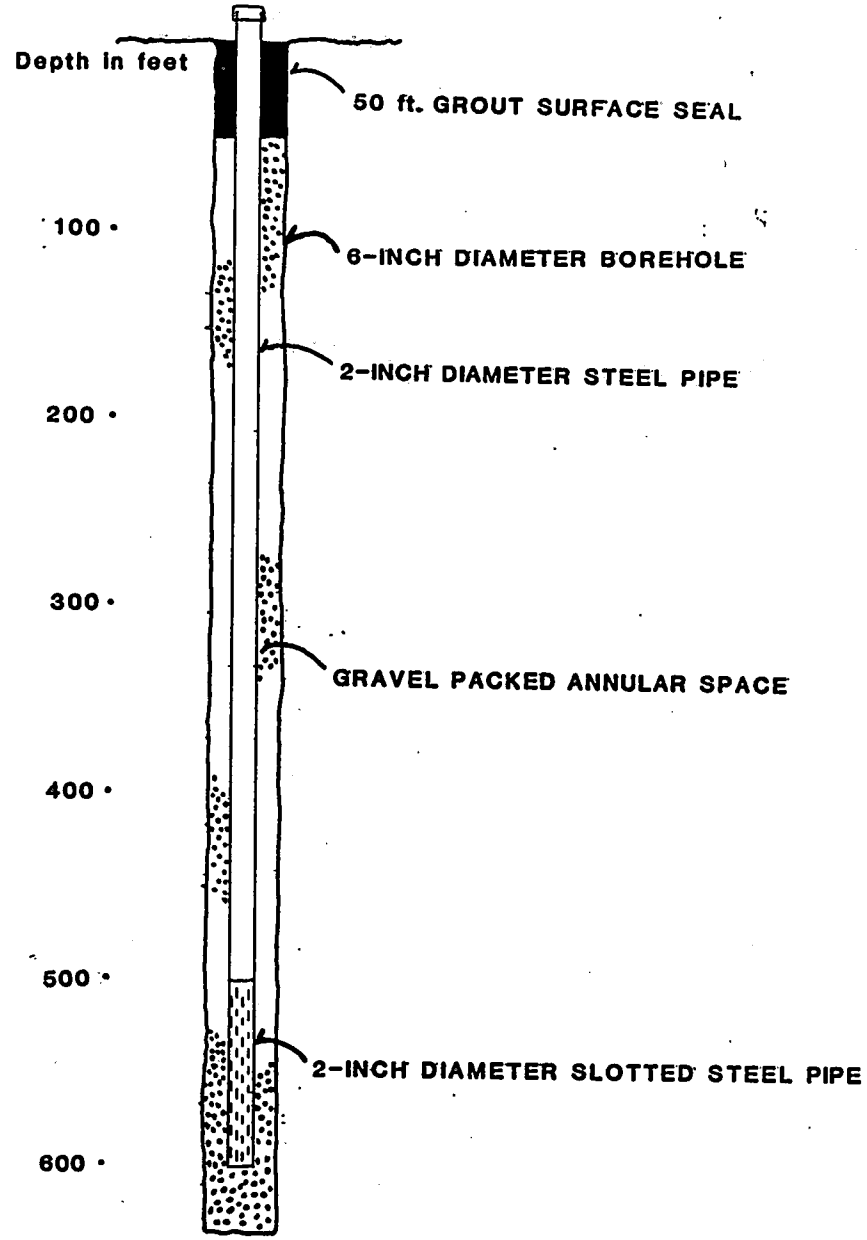


FIGURE-2

AS CONSTRUCTED DIAGRAM FOR ZOLEZZI TEST WELL No. 1

CH2M HILL

FEB 83

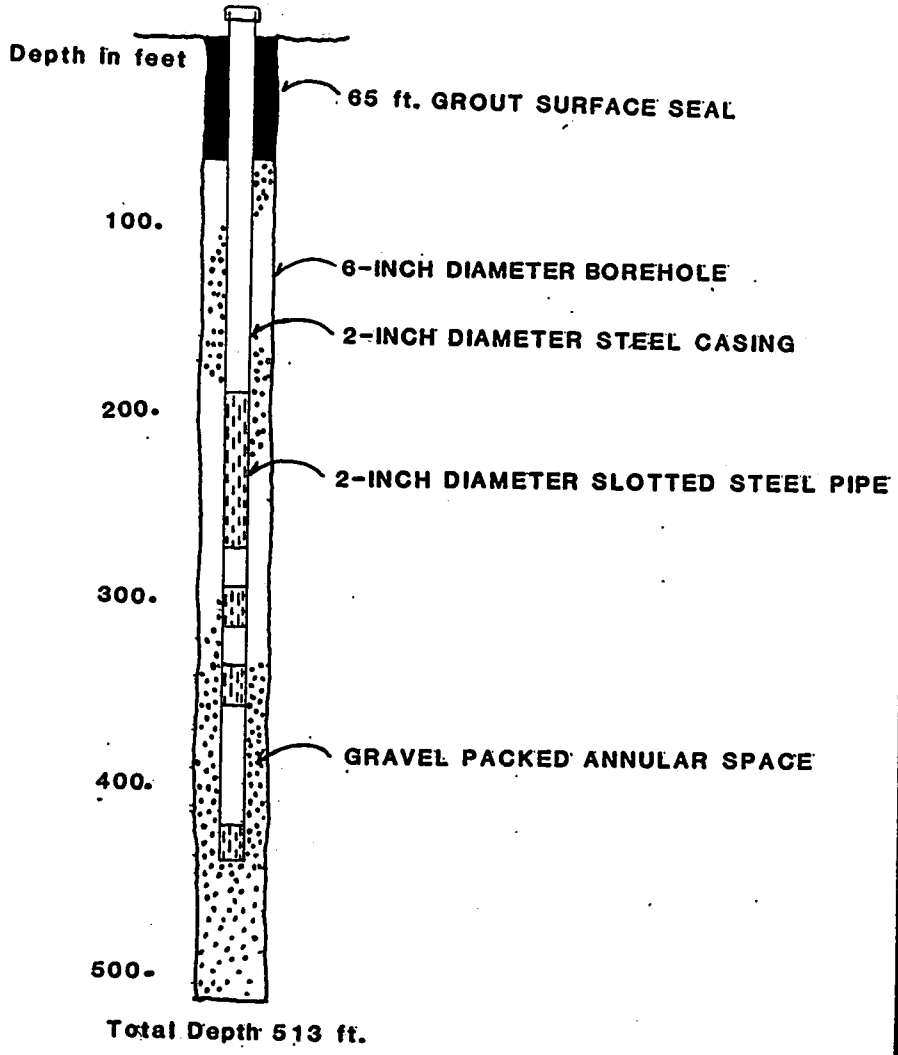


FIGURE- 3

AS CONSTRUCTED DIAGRAM FOR ZOLEZZI TEST WELL No. 2

CH2M HILL

FEB 83

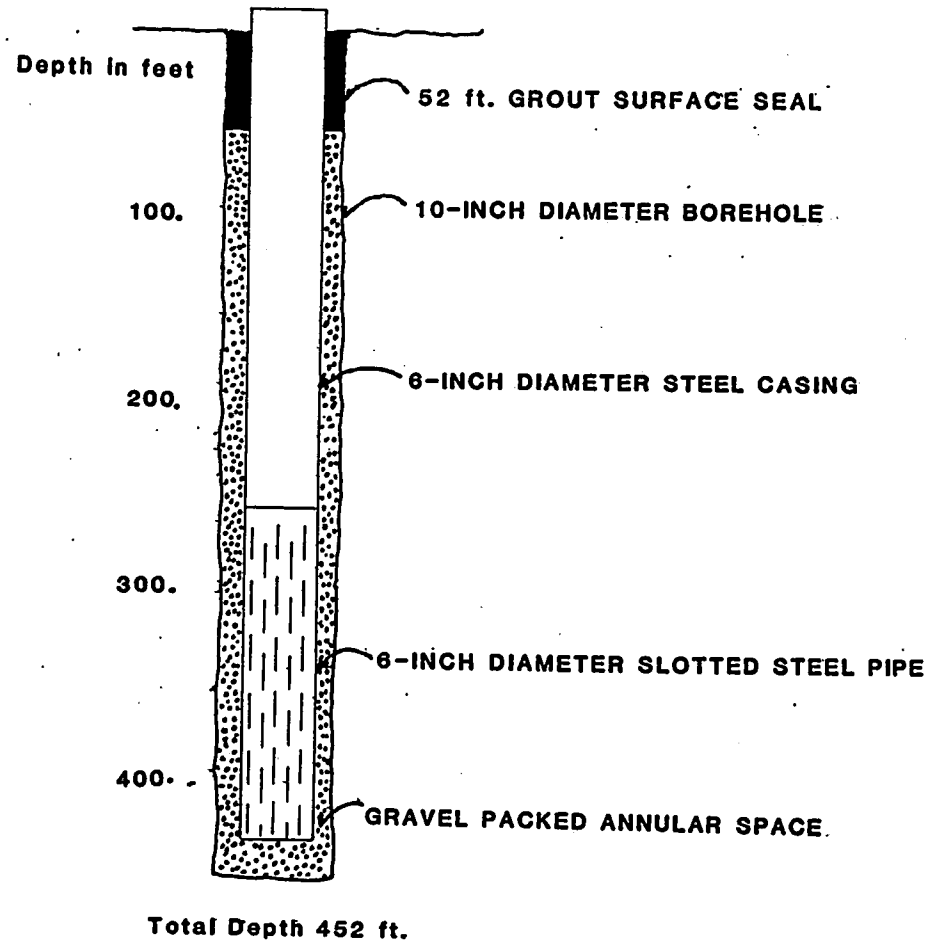
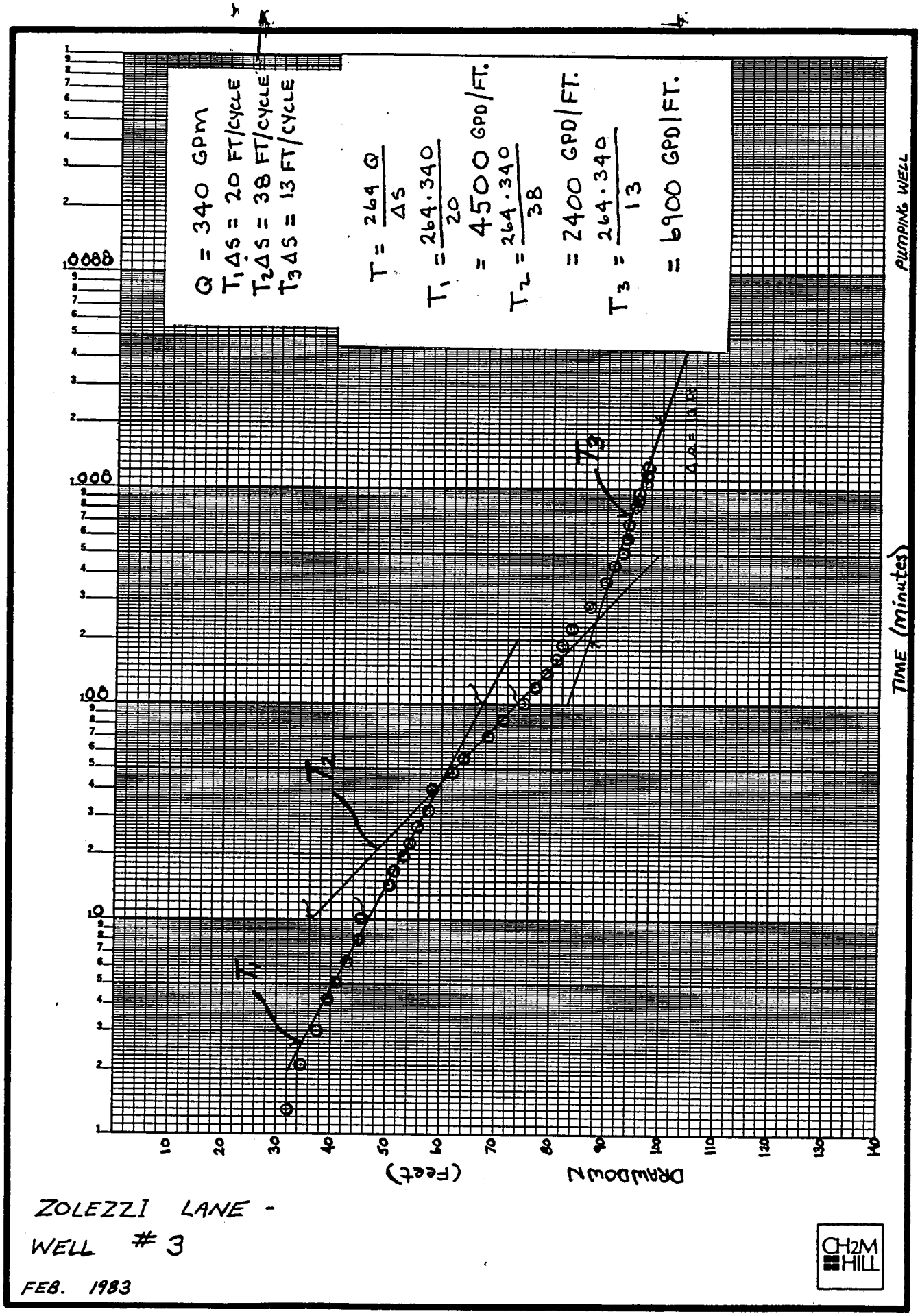


FIGURE-4

AS CONSTRUCTED DIAGRAM FOR ZOLEZZI TEST WELL No. 3

CH2M HILL

FEB 83

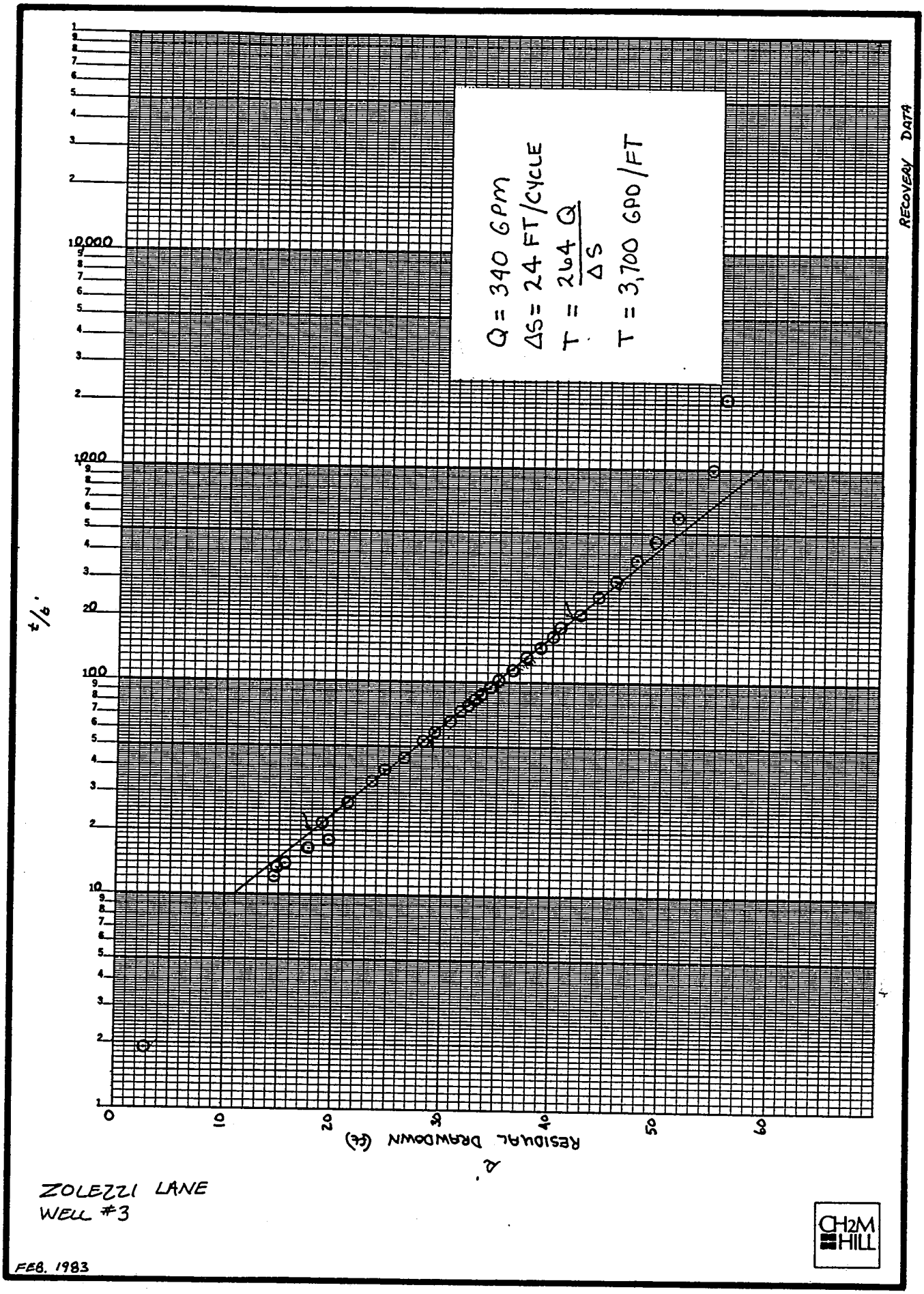


ZOLEZZI LANE -

WELL # 3

FEB. 1983

CH2M HILL



ZOLEZZI LANE
WELL #3

FEB. 1983

CH2M HILL

ATTACHMENT A
AQUIFER TEST ANALYSIS

GENERAL

We propose to have a new well drilled which will penetrate the entire water bearing formation. The well will be designed to serve not only for testing purposes but also as a production well when the project is constructed. The existing 60-foot deep test hole will be used in making observations of aquifer reaction to test pumping. We will use the test data to locate required production wells and determine casing diameter and well design to develop the yield potential from this aquifer. Recommended size of the pump and pump placement will also be based on aquifer test data.

SCOPE OF WORK

The tasks we would perform under this activity include:

1. Detailed review of specific data in previous reports for selection of well location and size of drilled hole. Determine if an additional observation well is needed.

2. Develop drilling and testing program and select local well driller.

3. Supervise well drilling operation including E-logging and resistivity logging.

4. Determine test well casing size, screen size, and screen locations.

5. Supervise development of the well to obtain maximum efficiency and sand free discharge.

6. Conduct 2-3 day aquifer performance test including drawdown and recovery.

7. Analyze collected data and size necessary equipment. Determine long-term yield capabilities of aquifer in the Sycamore Flat Area.

8. Prepare report summarizing work performed and detailing conclusions and recommendations.

Appendix B

GEOLOGIC AND GEOPHYSICAL LOGS

GEOPHYSICAL LOGS
PRODUCTION WELL 1

GEOLOGIC AND GEOPHYSICAL LOGS
PRODUCTION WELL 2

PRODUCTION WELL 2
GEOLOGIC LOGS

0-40	silty sand, gravel, cobbles, boulders	
40-60	cobbles and boulders	
60-70	silty sand and gravel	
70-80	silty sand to boulders, some clay at 75'-80'	
80-100	mixed clay to boulders	
100-125	silty sand and gravel, some cobbles	
125-135	gravel and cobbles	
135-300	silty sand to fine gravel (pebbles)	
300-360	silty sand w/fine pebbles	
360-390	silty sand and fine pebbles mixed with clay	
390-400	silty to coarse sand	
400-490	silty to coarse sand mixed with clay	
490-520	silty to coarse sand	
520-540	silty sand with light blue clay	
540-580	silty to medium sand with some clay; volcanic and mica rich sand	Determined from e log that only coarse material came up, clays disappeared into formation. Lithology probably clay, much like Hole No. 1
580-590	fine to medium sand	
590-640	medium grained sand "clean"	
640-660	fine to medium sand	
660-680	silty to fine sand	
680-710	weathered andesite	
710-715	andesite flow	

RD/R1/002-1

GEOLOGIC AND GEOPHYSICAL LOGS
OF TEST HOLE 6

(Production Well 3 was completed nearby.)

GEOLOGIC LOGS OF TEST HOLES 3, 4, AND 5

GEOLOGIC LOG OF TEST HOLE 3

0-40	mixed clay to boulders
40-50	coarse gravels
50-60	medium gravels
60-100	mixed gravels and boulders, sands
100-110	cemented(?) gravels
110-153	sand, gravel, and cobbles
153-158	boulder
158-193	sands, gravels, and cobbles
193-200	boulders
200-220	sands, gravels, and boulders, minor silty clay
220-260	sandy gravel, increasing silty clay
260-280	silty sandy fine gravel, clay
280-300	clayey, silty sand
300-320	silty clay to coarse sand
320-330	silty sandy clay, tinted blue (anaerobic?)
330-340	same, 60 to 70 percent clay
340-360	pinkish-purplish clay, minor sand
360-370	bluish clay, minor sand
370-380	bluish clay, increasing andesitic sand
380-400	clay mixed with andesitic sand, coarse
400-440	weathered andesite, greenish blue sandy clay

GEOLOGIC LOG OF TEST HOLE 4

0-100	sand, gravel, and boulders	
100-120	medium to coarse gravel, boulders	(Lost circulation 120')
120-160	sand to coarse gravel, minor cobbles	
160-170	boulders	
170-240	fine sand to fine gravel	
240-290	fine to coarse sand	
290-330	silty sand to coarse sand	
330-360	gritty silty sand to coarse sand	
360-365	silty sand	
365-370	silty to medium sand, purple (anaerobic)	
370-390	purple andisitic flow bedrock	
390-400	blue andesitic flow rock	

GEOLOGIC LOG OF TEST HOLE 5

0-75	sandy gravel and boulders, volcanic
75-85	sandy gravel
85-120	sandy gravel and boulders
120-180	sandy gravel
180-220	fine to coarse sand, minor clay and cobbles
220-280	fine to coarse sand, increasing silty clay
280-320	silty clay to medium sand
320-340	fine to medium sand, some clay
340-405	silt to medium sand, minor clay
405-482	silt to medium sand, absence of clay
482-500	very hard andesite flow bedrock

Appendix C

CONTRACT DOCUMENTS AND DRILLING SPECIFICATIONS

STM Well Contract.

SPECIFICATIONS AND CONTRACT DOCUMENTS
FOR
SOUTH TRUCKEE MEADOWS GENERAL IMPROVEMENT DISTRICT WATER WELL CONSTRUCTION

WASHOE COUNTY, NEVADA

September, 1983

ADDENDUM NO. 1
TO
SPECIFICATIONS AND CONTRACT DOCUMENTS
FOR
SOUTH TRUCKEE MEADOWS GENERAL IMPROVEMENT DISTRICT WATER WELL CONSTRUCTION

WASHOE COUNTY, NEVADA

January 3, 1984

The following changes, modifications, additions, or deletions are made to the Specifications and Contract Documents for the STMGID Water Well Construction Project scheduled for bid opening on January 12, 1984:

1. On page 20, Item 5 of 4.01-B SCHEDULE OF WORK, changed to read "Within 60 days after completion of Well 2, a Notice to Proceed will be issued for Well No. 3."

2. For each well a gravel feed tube shall be provided. The feed tube shall have a nominal diameter of 4-inches, being constructed of PVC or galvanized iron, and extend from 2-ft below the sanitary grout seal to 2-ft above the ground surface. The upper end of the tube shall terminate with a screw-on cap.

3. Geophysical logging shall be provided by the Contractor. This is a change to the second paragraph of Section C WORKMANSHIP on page 22. The Geophysical logging Contractor and his methods shall be subject to approval by the Geologist. The Contractor shall provide spontaneous potential curves, point resistivity curves, and temperature logging. Payment for geophysical logging shall be included in the payment for drilling the test well.

4. On page 25, in the first line of the first paragraph, delete the words, "Variable speed type."

5. On page 20, Item A-3, PUMPING EQUIPMENT CAPACITY, the pumping level for all three wells shall be changed to 400 feet.

6. On page 23, Item A-5, BOUNDARIES OF WORK, the term "Suitable provisions for ingress and egress" is concerned only with the right to enter the property and not with improvements to the access route. All improvements required to move the Contractors men and equipment in and out of the well sites shall be at the Contractors expense.

7. The method for performing the plumbness test, as discussed on page 26, shall be as approved by the Geologist.

8. On page 27, Item C-8, WELL DISINFECTION, change "500 ppm free available chlorine" to 50 ppm free available chlorine."

9. Attached is a copy of the well log for a test well constructed in the area of the proposed Well No. 1. This well log is provided for the bidder's interest only and is not intended to guarantee or dictate what the site conditions will be at any of the well sites associated with these specifications.

Zolezzi Test Hole No. 3

Depth (ft)	Description	Remarks
0-32	Brown silty sand with large volcanic boulders	
32-37	Brown silty gravelly clay	
37-51	Sand and gravel	Rapid drilling--clean sand
51-69	Alternating sand, gravel, silt, clay layers	
69-85	Coarse sand, fine gravel	
85-89	Brown silty clay	
89-92	Gravel, cobbles	Drill chatter
92-131	Clean coarse sand and gravel--occasional brown silty clay layer	Mud temperature 10 degrees C
131-151	Brown silty sandy clay, gravel lenses	
151-176	Clean coarse sand, occasional clay lense	
176-225	Very clean, unconsolidated coarse sand	Mud temperature 10 degrees C
225-310	Coarse sand and gravel--increasing clay layers with depth	Rapidly alternating drilling rate
310-365	Unconsolidated, clean coarse sand	Mud temperature 13 degrees C
365-370	Coarse sand and gravel--dense	Hard drilling
370-376	Unconsolidated coarse sand and gravel	Mud temperature 14 degrees C
376-392	Alternating sand, gravel, clay lenses	
392-402	Gravelly brown clay	
402-420	Coarse sand and gravel	
420-450	Sandy silty brown clay--sand lenses	Mud temperature 14 degrees C

RDR11/102

TABLE OF CONTENTS

SECTION I:

BID AND CONTRACT DOCUMENTS

NOTICE TO CONTRACTORS

1. Sealed proposals will be received in the Office of the Department of Public works, Room #3 - Administration Building at 1205 Mill Street, (P.O. Box 11130) Reno, Nevada 89520, until 10:00 AM on January 12, 1984, for "South Truckee Meadows General Improvement District Water Well Construction." Such sealed proposals will be opened publicly at the Office of the Director of Public Works at 1205 Mill Street, Reno, Nevada. The Board of Washoe County Commissioners will consider awarding the contract during their regularly scheduled meeting on January 17, 1984.

2. The improvements consist of drilling and developing three (3) gravel-packed municipal water supply wells. One well will have a 12-inch cased diameter and the other two wells will have 16-inch cased diameters. All three wells will be approximately 700-feet deep.

3. To assure consideration, all proposals shall be made on the blank form of proposal attached to the Specifications and shall be enclosed and sealed in an envelope which is addressed to the Department of Public Works, Room #3, Administration Building at 1205 Mill Street (P.O. Box 11130) Reno, Nevada 89520, and marked "STMGID Water Well Construction."

4. No proposal will be considered unless accompanied by cash, cashier's check, certified check, or bid bond, in an amount equal to five per cent (5%) of the bid, made payable to the Washoe County Treasurer as provided for in the General Conditions.

5. Specifications and Bid Forms may be secured at the Department of Public Works, Room #3 - Administration Building at 1205 Mill Street, Reno, Nevada, by prospective bidders, holding a valid State Contractors License for the type of work specified herein. In addition, the well driller shall also hold a valid State of Nevada Driller's License and a Washoe County Business License.

6. There shall be no deposit required for each set of Specifications. A maximum of two (2) sets will be issued to each General Contractor.

7. Attention of the Bidder is particularly called to the requirements as to the conditions of employment and to the prevailing minimum State of Nevada wage rates in accordance with the "Prevailing Wage Rates for Northern Nevada." Pursuant to NRS Chapter 338, copies of which may be obtained at the Office of the Nevada State Labor Commission, or the Washoe County Department of Public Works.

8. No bidder may withdraw their Bid within thirty (30) days after the actual date of the opening thereof.

INSTRUCTIONS TO BIDDERS

Proposals, to be entitled to consideration, must be made in accordance with the following instructions:

1. Proposals shall be made on the form provided therefore in these Specifications, and all applicable blank spaces in the form shall be filled; numbers for item bid shall be stated both in writing and in figures; the signatures of all persons shall be in longhand; and the completed form shall be without interlineation, alteration or erasure. The form shall be enclosed and sealed in an envelope which is to be marked "STMGID Water Well Construction", and it shall be addressed to the Department of Public Works, Room #3 - Administration Building - 1205 Mill Street (P.O. Box 11130) Reno, Nevada 89520.

2. Proposals shall not contain any recapitulation of the work to be done. No oral, telegraphic or telephone proposals or modifications will be considered.

3. Bids will be accepted only on the complete project as outlined in the scope of work. No partial bids will be accepted.

4. Should a bidder find discrepancies in, or omissions from, the drawings or documents, or should he be in doubt as to their meaning, he should at once notify the Engineer, who will send a written instruction to all bidders. Neither Owner nor Engineer will be responsible for any oral instructions.

5. Any written instructions, bulletins or drawings issued to bidders by the Engineer during the course of bidding shall be covered in the proposal and in closing a contract they will become a part thereof.

6. The Agreement Form attached hereto will be used in executing a contract for this work.

7. No proposal will be considered unless accompanied by cash, cashier's check, certified check, or bid bond, in an amount equal to five percent (5%) of the bid, made payable to the Washoe County Treasurer as provided in the General Conditions.

8. The Agreement shall be signed within ten (10) calendar days after the Contractor has received written notification of the award of the Contract.

9. A Payment Bond and a Performance Bond, each in an amount equal to one hundred percent (100%) of the total contract sum, shall be provided by the successful Contractor in accordance with the General Conditions. Said bonds shall be in favor of the "County of Washoe, a political subdivision of the State of Nevada."

10. The County reserves the right to reject any or all bids. If there are minor irregularities of informalities in any bid or in the bidding process, the County reserves the right to waive provisions of the Specifications relating to said minor irregularities or informalities.

11. Contracts for work under this proposal will obligate the contractors and subcontractors not to discriminate in employment practices pursuant to Section 338.125 NRS, and that contractors must pay the prevailing wage rates pursuant to NRS Chapter 338, copies of which may be obtained at the office of the Nevada State Labor Commission, or the Washoe County Department of Public Works.

12. Before submitting a Bid, each Bidder must (a) examine the Contract Documents thoroughly, (b) visit the site to familiarize himself with local conditions that may in any manner affect cost, progress or performance of the work. (c) familiarize himself with federal, state and local laws, ordinances, rules and regulations that may in any manner affect cost, progress or performance of the work; and (d) study and carefully correlate Bidder's observations with the Contract Documents.

13. Time of completion for Wells 1 and 2 shall be sixty (60) days. Time of completion for Well 3, shall be thirty (30) days. After execution of the Contract Documents, a "Notice to Proceed" shall be issued for Wells 1 and 2. Upon completion of Well 2, and after a time not to exceed sixty (60) days, the "Notice to Proceed" shall be issued for Well 3.

PROPOSAL - SCHEDULE OF ITEMS AND PRICES

Washoe County Commissioners
c/o Department of Public Works
Room #3 - Administration Building
1205 Mill Street
Reno, Nevada 89502

Gentlemen:

I (we) hereby submit my (our) proposal for "STMGID Water Well Construction."

Having carefully examined the contract documents as described in the Agreement Form, together with addenda Numbered 1 and having examined all the conditions affecting the work, the undersigned proposed to furnish all labor, materials, tools, and equipment called for by said documents and to contract the work complete for the following items:

ITEM NO.	DESCRIPTION	TOTAL FOR ITEM
1.0	Well No. 1	
1.1	Test Well Mobilization at the lump sum price of: ONE THOUSAND SEVEN HUNDRED DOLLARS and _____ CENTS	$ 1,700.00
1.2	Access Improvements at the lump sum price of: FIVE HUNDRED DOLLARS and _____ CENTS	$ 500.00
1.3	Drill 8-inch minimum diameter test hole at the unit price of: FOUR THOUSAND TWO HUNDRED DOLLARS and _____ CENTS 700 V.F. at $6.00 per foot 12.00 1988 Includes geophysical log	$ 4,200.00
1.4	Production well mobilization at the lump sum price of: FOUR THOUSAND DOLLARS and _____ CENTS	$ 4,000.00
1.5	Drill 20-inch minimum diameter production hole at the unit price of: TWENTY-ONE THOUSAND DOLLARS and _____ CENTS 700 V.F. at $30.00 per foot 18 inch 40.00 ft	$ 21,000.00
1.6	Install 12-inch diameter casing at the unit price of: NINE THOUSAND DOLLARS and _____ CENTS 500 V.F. at $18.00 per foot 20.00 ft Roscoe Moss with collars, guides, & bottoms Includes water measuring & gravel pipes	$ 9,000.00
1.7	Install 12-inch diameter wire-wrapped screen at the unit price of: SEVEN THOUSAND TWO HUNDRED DOLLARS and _____ CENTS 200 V.F. at $36.00 per foot Johnson screen Hycap 100 slot 20 foot lengths with weld rings	$ 7,200.00

1.8 Install 12-inch diameter louvered casing at the unit price of:
FIVE THOUSAND SIX HUNDRED DOLLARS
and CENTS
200 V.F. at 28.00 per foot $ 5,600.00
Roscoe Moss flu-flow

1.9 Furnish and install gravel filter at the unit price of:
TWO THOUSAND SIX HUNDRED TWENTY FIVE DOLLARS
and CENTS
35 C.Y. at $75.00 per yard $ 2,625.00
Auburn, Ca Bear Valley Pit - 1/8 to 1/4" quartz pebbles
Wadsworth, Nv 7/16" gravel @ $50.00 per yard

1.10 Install surface seal at the price of:
ONE THOUSAND SIX HUNDRED DOLLARS
and CENTS
80 V.F. at $20.00 per foot $ 1,600.00

1.11 Perform plumbness and alignment test at the lump sum price of:
ONE THOUSAND DOLLARS
and CENTS $ 1,000.00

1.12 Perform well development at the unit price of:
TWO THOUSAND FOUR HUNDRED DOLLARS
and CENTS
12 hrs. at $200.00 per hour $ 2,400.00
Includes installation & removal of 400 foot of pump column

1.13 Perform well yield and drawdown test at the unit price of:
THREE THOUSAND EIGHT HUNDRED FORTY DOLLARS
and CENTS
48 hrs. at $80.00 per hour $ 3,840.00

1.14 WELL NO. 1 TOTAL:
(Add items 1.1 through 1.13) $ 64,665.00

Total includes items 1.7 & 1.8 which specifies the same 200 feet of well design. One item will, therefore, be optional.

2.0 WELL NO. 2

2.1 Test Well mobilization at the lump sum price of:
FIVE HUNDRED DOLLARS
and CENTS $ 500.00

2.2 Access Improvements at the lump sum price of:
FIVE HUNDRED DOLLARS
and CENTS $ 500.00

2.3 Drill 8-inch minimum diameter test hole at the unit price of:
FOUR THOUSAND TWO HUNDRED DOLLARS
and CENTS
700 V.F. at $6.00 per foot $ 4,200.00
Includes geophysical log

2.4 Production Well Mobilization at the lump sum price of:
ONE THOUSAND DOLLARS
and CENTS $ 1,000.00

3.0 WELL NO. 3

3.1 Test Well Mobiliznation at the lump sum price of:
FIVE HUNDRED DOLLARS
and _____ CENTS $ 500.00

3.2 Access Improvements at the lump sum price of:
FIVE HUNDRED DOLLARS
and _____ CENTS $ 500.00

3.3 Drill 8-inch minimum diameter test hole at the unit price of:
FOUR THOUSAND TWO HUNDRED DOLLARS
and _____ CENTS
700 V.F. at $6.00 per foot $ 4,200.00
Includes geophysical log

3.4 Production well mobilization at the lump sum price of:
ONE THOUSAND FIVE HUNDRED DOLLARS
and _____ CENTS $ 1,500.00

3.5 Drill 22-inch minimum diameter production hole at the unit price of:
TWENTY-ONE THOUSAND DOLLARS
and _____ CENTS $ 21,000.00
700 V.F. at $30.00 per foot.

3.6 Install 14-inch diameter casing at the unit price of:
TWELVE THOUSAND FIVE HUNDRED DOLLARS
and _____ CENTS
500 V.F. at $25.00 per foot $ 12,500.00
Roscoe Moss with collars, guides, & bottoms
Includes water measuring & gravel pipes. 14"od x .250 wall @ $22.00

3.7 Install 14-inch diameter wire-wrapped well screen at the unit price of:
SEVEN THOUSAND EIGHT HUNDRED DOLLARS
and _____ CENTS
200 V.F. at $39.00 per foot $ 7,800.00
Johnson screen Hycap 100 slot
20 foot lengths with weld rings

3.8 Install 14-inch diameter louvered well casing at the unit price of:
SIX THOUSAND DOLLARS
and _____ CENTS
200 V.F. at $30.00 per foot $ 6,000.00
Roscoe Moss flu-flow ¼" wall

3.9 Furnish and install gravel filter at the unit price of:
TWO THOUSAND EIGHT HUNDRED DOLLARS
and _____ CENTS
40 C.Y. at $75.00 per cubic yard $ 2,800.00
Auburn, Ca. Bear Valley Pit - 1/8 to 1/4" quartz pebbles
Wadsworth, Nv 7/16" gravel @ $50.00 per yard

3.10 Install surface seal at the unit price of:
ONE THOUSAND DOLLARS
and _____ CENTS
50 V.F. at $20.00 per foot $ 1,000.00

3.11	Perform plumbness and alignment test at the lump sum price of: FIVE HUNDRED DOLLARS and CENTS	$ 500.00
3.12	Perform well development at the unit price of: TWO THOUSAND FOUR HUNDRED DOLLARS and CENTS 12 hrs. at $200.00 per hour Includes installation & removal of 400 foot of pump column	$ 2,400.00
3.13	Perform well yield and drawdown test at the unit price of: THREE THOUSAND EIGHT HUNDRED FORTY DOLLARS and CENTS 48 hrs. at $80.00 per hour	$ 3,840.00
3.14	WELL NO. 3 TOTAL (Add items 3.1 through 3.13) Total includes items 3.7 & 3.8 which specifies the same 200 feet of well design. Therefore, one item will be optional.	$ 64,540.00
4.0	TOTAL BID (Add items 1.14, 2.14, 3.14)	$ 193,245.00

TOTAL BID WITH JOHNSON SCREEN	$ 175,645.00
TOTAL BID WITH ROSCOE MOSS LOUVERED	$ 170,445.00

The unit prices above shall be the basis for determining the amount paid for the completed project including any increased or decreased quantities authorized by the Engineer.

If the undersigned is notified of the accpetance of his proposal, he agrees to execute the agreement for the work covered in his proposal for the above stated prices as full compensation for furnishing all materials and labor, and doing all of the work, instrict accordance with the contract documents, to the satisfaction of the Engineer.

The undersigned agrees, upon being notified of the acceptance of his proposal, that he shall execute the above agreement within ten (10) calendar days and commence work within seven (7) calendar days following the date of the Notice to Proceed.

The undersigned further agrees to complete the work specified within the time stated in the Notice to Contractors.

The undersigned states that he has a thorough understanding of the conditions embodied in the Contract Documents and Specifications.

Enclosed find cashiers check, certified check, bidders bond or cash in an amount equal to at least five (5) percent of the amount bid.

NAME OF FIRM: CHARLES SARGENT IRRIGATION, INC.

BY: Gene Mapel

TITLE: MANAGER NEVADA OPERATIONS

ADDRESS: P. O. BOX 2480

RENO, NV 89505

NEVADA CONTRACTOR'S LICENSE NO: 21246

WELL DRILLER (if other than above)

NEVADA WELL DRILLER'S LICENSE: 1388 GENE MAPEL

WASHOE COUNTY BUSINESS LICENSE: 11585

Nevada Contractor's License Limit: Unlimited

WITNESS:

AGREEMENT FORM

THIS AGREEMENT, made and entered into this _____ day of _____, 19___, by and between the COUNTY OF WASHOE, a political subdivision of the State of Nevada, acting through its Board of Commissioners, hereinafter called "Owner" and _____, General Contractor, Nevada State License No. _____, hereinafter called the "Contractor".

WITNESSETH:

That the Owner and the Contractor, for the consideration hereinafter named, agree as follows:

Article 1. Scope of Work: The Contractor shall furnish all of the materials and perform all of the work described in the Specifications entitled "South Truckee Meadows General Improvement District Water Well Construction", prepared by the Department of Public Works, and shall do everything required by this agreement and the Specifications.

Article 2. Time of Completion The work to be perfomed under this agreement, for Wells 1 and 2 shall be completed within sixty (60) working days of the Wells 1 and 2 "Notice to Proceed" and for Well 3 shall be completed within thirty (30) working days of the Well 3 "Notice to Proceed".

Should the Contractor fail or refuse to complete the work within the stipulated time, including any authorized extensions of time, there shall be deducted from monies due him, not as a penalty, but as liquidated damages, the sum of fifty dollars ($50.00) for each working day required to complete the work in addition to the period of time hereinbefore set forth.

Article 3. Progress Payments: The Owner, once each month, may if the County elects to do so, make an estimate of the total amount of work completed to date and the monetary value thereof and make a partial payment on the Contract.

The Owner shall retain ten percent (10%) of such estimated value of the work done as part security for the fulfillment of the Contract and shall pay monthly to the Contractor, while carrying on the work the balance not retained, after deducting therefrom all previous payments. No partial payment shall be made when, in the judgment of the Owner, the work is not being diligently prosecuted by the Contractor.

The amount of payments withheld as provided herein shall be retained for a period of forty (40) days from the date of filing of the Notice of Completion.

Article 4. Acceptance and Final Payment. As soon as practical following the completion of the work, the Contractor shall make request by letter to the County for a final inspection and acceptance of the work, and if, in his opinion, all provisions of the Specifications and Agreement have been satisfied, he will cause a Notice of Completion to be filed with the County Recorder.

At the expiration of forty (40) calendar days following the filing of the Notice of Completion, final payment shall be made as follows: After deducting all previous payments from the total value of the work, the remaining balance shall be paid, providing that no claims, liens or outstanding debts have been filed against the work. Notwithstanding the expiration of forty (40) days, the Contractor, upon demand by the Owner, shall submit evidence satisfactory to the Owner that all payrolls, materials, bills, and other indebtedness relating to the

Article 4. Acceptance and Final Payment - Continued

work performed, have been paid before final payment is made.

Article 5. The Contract Sum: The Owner shall pay the Contractor, as full compensation for furnishing all materials and labor and doing all the work in strict accordance with the Specifications and to the satisfaction of the Engineer, the amounts as set forth in the Bid Prosposal. This sum is to be paid in the manner and under the conditions hereinbefore specified.

Article 6. Performance and Payment Bonds. The Contractor agrees that he will before this Contract becomes effective, furnish the Owner a Performance Bond and a Payment Bond, furnished by a company or companies acceptable to the Owner, each in an amount equal to one hundred percent (100%) of the total Contract sum.

The Performance Bond shall be conditioned that the work under the Contract shall be performed in accordance with the Specification and the terms of this Agreement.

The Payment Bond shall be conditioned to provide and secure payment for all material, provisions, provender and supplies, teams, trucks and other means of transportation used in, or upon or about the work and for any labor done thereon.

Article 7. The Contract Documents. The following is an enumeration of the Contract Documents, and they are as fully a part of the Contract as if hereto attached or herein repeated:

NOTICE TO CONTRACTORS	
INSTRUCTIONS TO BIDDERS	SPECIAL CONDITIONS
BID PROPOSAL	GENERAL CONDITIONS
BID BOND	DETAIL SPECIFICATIONS DATED
PAYMENT BOND	_____
PERFORMANCE BOND	ADDENDA_____

IN WITNESS WHEREOF, the parties hereto have executed this Agreement the day and year first above written.

COUNTY OF WASHOE, by:

_____
CHAIRMAN
Board of Washoe County Commissioners

ATTEST:

_____
CLERK OF THE BOARD OF
WASHOE COUNTY COMMISSIONERS

_____
CONTRACTOR

LABOR AND MATERIAL PAYMENT BOND
FOR PUBLIC WORKS REQUIRED PURSUANT TO NRS CHAPTER 339

KNOW ALL MEN BY THESE PRESENTS: That _____

_____

(Name and Address (or legal designation) of Contractor)

As Principal, hereinafter called "Principal", and,_____

_____

(Legal designation and Address of Surety)

authorized to do business of surety in the State of Nevada, as Surety, hereinafter called "Surety", are held and firmly bound unto the COUNTY OF WASHOE, a political subdivision of the State of Nevada, as Obligee, hereinafter called "Owner", for the use and benefit of claimants as hereinafter defined in the amount of _____ _____Dollars ($_____) for the payment whereof Principal and Surety bind themselves, their heirs, executors, administrators successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, Principal has by written agreement dated _____

19____, entered into contract with Owner for _____

_____

which contract is attached hereto and by reference made a part hereof, and is hereinafter referred to as the "Contract".

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if Principa shall promptly make payment to all claimants as hereinafter defined, for all labor and material used or reasonably required for use in the performance of the Contract, then this obligation shall be void; otherwise it shall remain in full force and effect.

THIS BOND, is executed for the purpose of complying with the laws of the State of Nevada as contained in Chapter 339 of Nevada Revised Statutes, and all acts amendatory thereof, and this Bond shall inure to the benefit of any and all persons who perform labor upon or furnish materials to be used in or furnish appliances, teams or power contributing to, the work described in said contract, in accordance with provisions of Chapter 339 of Nevada Revised Statutes.

Any suit or action brought on this bond shall be maintained in accordance with provisions as set forth in Chapter 339 of Nevada Revised Statutes, and all acts amendatory thereof.

IN WITNESS WHEREOF, the above bounden Principal and the above bounden Surety have hereunto set their hands and seals, this _____ day of _____, 19____

IN THE PRESENCE OF:

_____

_____

_____
Principal (Seal)

_____
Title

_____
Surety (Seal)

_____
Title Attorney-In-Fact

FAITHFUL PERFORMANCE BOND FOR
PUBLIC WORKS REQUIRED PURSUANT TO NRS CHAPTER 339

KNOW ALL MEN BY THESE PRESENTS: That _____

_____

(Name and Address (or legal designation) of Contractor)
as Principal, hereinafter called "Principal", and, _____

_____

(Legal designation and Address of Surety)
authorized to do business of surety in State of Nevada, as Surety, hereinafter called "Surety", are held and firmly bound unto the COUNTY OF WASHOE, a political subdivision of State of Nevada, as Obligee, hereinafter called "Owner", for the use and benefit of claimants as hereinafter defined in the amount of _____ _____Dollars ($_____) for the payment whereof Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, Principal has by written agreement dated _____,

19 , entered into contract with Owner for _____

_____,

which contract is attached hereto and by reference made a part hereof, and is hereinafter referred to as the "Contract".

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is the condition that if the Principal as contractor in the Contract shall faithfully perform each and all of the conditions of the Contract to be performed by him, at the times and places therein agreed upon and in conformity with the terms, specifications and conditions stated and referred to in the Contract, then this obligation shall be void; otherwise, it shall remain and be in full force and effect.

THE SURETY, for value received, hereby stipulates and agrees that no prepayment or delay in payment and no change, extension, addition or alteration of any provision of the Contract or in the plans, profiles, detailed drawings, specifications, and no forbearance on the part of Owner shall operate to relieve Surety from liability on this bond and consent thereto without notice to or consent by Surety is hereby given, and the Surety hereby waives provisions of any law relating thereto:

THIS BOND, is executed for the purpose of complying with the laws of the State of Nevada as contained in Chapter 339 of Nevada Revised Statutes, and all acts amendatory thereof and no right of action shall accrue on this bond to or for the use of any person or corporation other than the Owner named herein or the heirs, executors, administrators or successors of Owner.

IN WITNESS WHEREOF, the above bounden Principal and the above bounden Surety have hereunto set their hands and seals, this _____ day of _____, 19___.

IN THE PRESENCE OF :

_____

_____

_____ (Seal)
Principal

_____
Title

_____ (Seal)
Surety

_____ Attorney-In-Fact
Title

SECTION II:

GENERAL CONDITIONS

GENERAL PROVISIONS

The General Provisions listed in "Standard Specifications for Public Works Construction, Washoe County, Nevada, 1978" are an integral part of the contract and are incorporated herein by reference. The contractor is advised to become familiar with the contents of the Standard Specifications as they shall govern the construction of this project. The following is a list of items found in the Standard Specifications for the contractor's convenience:

TABLE OF CONTENTS

Part 1 General Provisions

Section

The following correction to Sections 152.00 and 153.00 should be made per NRS 108.225(2):

The time frame for the withholding of the ten (10) percent retention shall be changed from thirty-five (35) days to forty (40) days.

The following correction to "Standard Specifications for Public Works Construction Washoe County, Nevada 1978", Section 114.00 shall be made:

114.01 INDUSTRIAL INSURANCE: It is understood and agreed that there shall be no Industrial Insurance coverage provided for Contractor by the Agency, and in view of NRS 616.280 and 617.210 requiring that Contractor comply with the provisions of Chapters 616 and 617 of NRS, Contractor shall, before commencing work under the provisions of this Agreement, furnish to the Agency a certificate from the State Industrial Insurance System certifying that the Contractor has complied with the provisions of the Nevada Industrial Insurance Act, by providing coverage for each and every owner, including a sole proprietor, associate, partner, officer, employee, sub-contractor and independent contractor. It is further understood and agreed by and between the Agency and Contractor that Contractor shall procure, pay for and maintain the above-mentioned industrial insurance coverage at the Contractor's sole cost and expense. In the event the Agency must pay any premiums to the State Industrial Insurance System on behalf of Contractor, after the execution of this Contract, Contractor shall reimburse the Agency for all such payments. The payments shall be subtracted from any compensation owed to Contractor by the Agency as provided herein.

114.02 HOLD HARMLESS AGREEMENT BY CONTRACTOR FOR LIABILITY FOR LOSS OR DAMAGE AND LIABILITY INSURANCE:

The Contractor agrees that he shall hold and save harmless the Agency from any loss, damage or liability whatsoever, including the risk of loss or damage to property of the Contractor, resulting from any act, failure to act, or omission of Contractor or any employee, agent, or representative of Contractor in carrying out or attempting to carry out the provisions of this contract or any subcontract.

The Contractor further agrees, to save the Agency harmless from and defend the Agency against all losses, liabilities, expenses, and other detriments of every nature and description to which the Agency may be subjected as a result of any claim, demand, action, or cause of action which may be made or had against the Agency as a result of any negligent act or omission by Contractor, or any of the Contractor's sub-contractors, employees, agents, invitees, or licensees where such loss, liability, expense or other detriment arises out of or in connection with the performance of work under this Contract or any subcontract, including but not limited to liens, personal injury and loss of or damage to property of the Agency.

Contractor also agrees to submit to the Agency at the time of execution of this contract a Certificate of Insurance evidencing that Contractor has obtained a contract of liability insurance satisfactory to the County's Risk Management Analyst in the amount of not less than those set forth in Sections 114.02.01 - .03 protecting all insureds against liability arising out of any act or omission done pursuant to this Contract and naming the Agency as an additional insured. The Certificate of Insurance shall provide a thirty (30) day notice of cancellation or material alteration to all insureds.

Such insurance shall name the Agency as additional insured using the following wording:

> "The Agency, its officers, agents, and employees, is added as additional insured; however, the 'other insurance' condition or other policy terms which conflict with the agreement under which such parties are added to the named insured's policy do not apply to the additional insured."

If the Contractor fails to maintain such insurance the Agency may take out such public liability insurance to cover any damages which the Agency may be liable to pay through any of the operations under this contract and duduct the amount of the premiums for such insurance from any sums due under the contract.

Nothing herein contained shall be construed as limiting in any way the extent to which the Contractor may be held responsible for payment of damages to persons or property resulting from his operations or the operations of any subcontractor under him.

114.02.01 LIMIT OF LIABILITY FOR BODILY INJURY, INCLUDING DLATH RESULTING THEREFROM:

Per Occurrence:	$500,000
Annual Aggregate:	$500,000

114.02.02 LIMIT OF LIABILITY FOR PROPERTY DAMAGE:

Per Occurrence:	$250,000
Annual Aggregate:	$250,000

114.02.03 ALTERNATIVE LIMITS OF PUBLIC LIABILITY AND PROPERTY DAMAGE IN LIEU OF 114.02.01 AND 114.02.02:

Combined Single Limit for Bodily Injury and Property Damage:	$1,000,000

114.03 CONTRACTOR'S EMPLOYEES: In regard to all persons in the Contractor's employ for the services covered by this agreement, there shall be no:

a. Withholding of income taxes by the Agency;

b. Industrial insurance coverage provided by the Agency;

c. Participation or contribution by either the Contractor or the Agency to the Nevada Public Employee's Retirement System;

d. Participation in group insurance plans which shall be available to the employees of the Agency.

114.04 FIRE INSURANCE: The Contractor shall provide builders risk insurance on an "all risk" basis to cover the bid value of all structures in the Contract.

SECTION III:

SPECIAL CONDITIONS

SECTION III

SPECIAL CONDITIONS

3.01 SPECIAL CONDITIONS

General: This section of the specifications covers the Special Conditions applicable to this project, which are not covered by the General Conditions, Supplemental General Conditions, Federal Provisions, or the Technical Specifications.

3.02 PRECONSTRUCTION CONFERENCE

Before starting the work, a conference will be held to review scheduling of the 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, the Contractor, and his Superintendent and representatives of the Owner.

3.03 COMPLIANCE WITH LAWS AND LOCAL LABOR AND MATERIAL REQUIREMENTS

The Contractor shall conduct the work in compliance with all existing state and national laws and county and municipal ordinances and regulations limiting or controlling the work in any manner. Particular attention is called to the following State of Nevada Laws:

Prevailing Wage - Minimum wages shall not be less than the prevailing wage rates, as determined by the Labor Commission of the State of Nevada pursuant to provisions of Nevada Revised Statutes, Sections 338.010 and 338.100.

Registration of Contractors - Before submitting proposals, Contractors shall be licensed in accordance with the provisions of the Nevada Revised Statutes, Chapter 186, and ordinances of other political subdivisions having jurisdiction over the work.

Preferential Employment - Only citizens or wards of the United States or persons who have been honorably discharged from the Military service of the United States shall be employed by the Contractor pursuant to the provisions of Section 38.130 NRS. Preference shall be given to bona fide residents of the county where they are qualified to perform such work.

3.04 WELL LOCATIONS

The locations of the proposed wells are shown in the location Map contained in Section 5 of these specifications. The actual well location and available work area shall be staked in the field by the Owner.

3.05 WATER AND POWER

Neither water or electrical power is available from the Owner at the well sites. The Contractor shall make his own arrangements for any required water and electrical power.

3.06 SITE ACCESS

Access to the well sites shall be as shown on the Location Map contained in Section 5 of these specifications. The Contractor shall improve access conditions as required (grade, gravel, fill or cut) to provide access for his equipment.

SECTION IV:

TECHNICAL SPECIFICATIONS

SECTION IV

TECHNICAL SPECIFICATIONS

4.01 GENERAL

A. SCOPE OF WORK: The work proposed to be completed under this Contract includes construction of test holes and three (3) gravel packed municipal water supply wells. All work shall be in accordance with these specifications and all applicable state laws and regulations.

1. TEST HOLE AND GEOPHYSICAL LOG: An 8-inch minimum diameter test hole will be drilled by the Contractor and geophysically logged by others at each Well location. The final decision to proceed with constructing a water supply well will be made by the geologist after examining the results of the geophysical and electric logs.

2. ANTICIPATED WELL DIMENSIONS: For the purpose of this Contract, the three wells are identified as Well 1, Well 2, and Well 3 as shown in the Location Map contained in Section 5 of these Specifications. The anticipated well dimensions, and casing diameters are as follows:

	Minimum Diameter of Drilled Hole	Well Depth	Casing & Screen Diameter
Well 1	20-in.	700 ft.	12-in.
Well 2	22-in.	700 ft.	14-in.
Well 3	22-in.	700 ft.	14-in.

3. PUMPING EQUIPMENT CAPACITY: The pumping equipment used for well development and testing shall have the following range of capacity at the specified pumping level:

	Min. Q (gpm)	Max. Q (gpm)	Pumping Level (ft.)
Well 1	150	400	200
Well 2	400	800	300
Well 3	400	800	300

B. SCHEDULE OF WORK: The Schedule of work shall be in the following order:

1. Notice to Proceed issued for Wells 1 & 2.
2. Contractor completes drilling of test hole and construction of Well 1.
3. Contractor completes developing and testing of Well 1, while drilling test hole for Well 2. The Contractor may, at his option, complete the developing and testing of Well 1, before starting to drill Well 2 test hole.
4. Contractor completes drilling of Well 2 test hole and drilling, developing and testing of Well 2.
5. Within 90 days after completion of Well 2, a Notice to Proceed will be issued for Well 3.
6. Contractor completes drilling of Well 3 test hole and drilling, developing and testing of Well 3.

4.02 MOBILIZATION AND ACCESS

A. SCOPE

This section covers the work necessary to mobilize, demobilize, and provide access for the drillers equipment and materials.

B. EQUIPMENT

No equipment is herein specified to be used by the Contractor for mobilization, demobilization, or development of access.

C. WORKMANSHIP

The Contractor is required to mobilize to and demobilize from the well sites shown in Section 5. The Contractor shall make improvements to the access route as required to allow him to get his materials, equipment, and personnel to and from the sites. The sites and access routes and limits shall be staked in the field and the Contractor shall keep his activities within the limits staked.

D. MEASUREMENT AND PAYMENT

1. Mobilization: Payment for mobilization and demobilization will be made at the lump sum price stated in the Proposal under "Test Well Mobilization" and "Production Well Mobilization." Payment for "Test Well Mobilization" will include movement of equipment for the test well only. Payment for "Production Well Mobilization" will be compensation for the additional mobilization required for construction of the production well. Half of the "Test Well Mobilization" amount will be paid on the first pay estimate after the test well drilling has started and half will be paid on the pay estimate following completion of the test well. Half of the "Production Well Mobilization" amount will be paid on the pay-estimate following after starting construction of the production Well and half will be paid on the pay estimate following completion of the well including development and testing.

2. Access: Payment for providing access improvements to each of the well sites will be made at the lump sum price stated in the Proposal under "Access Improvements." Payment for "Access Improvements" shall be included in the pay estimate following start of construction at each site. Payment shall be total compensation for providing access improvements, within the provided right-of-way, as required by the Contractor to move equipment, materials, and personnel in and out of the site.

4.03 TEST HOLE DRILLING

A. SCOPE:

This section covers the work necessary to drill an 8-inch minimum diameter test hole, and collection and analysis of formation samples.

B. EQUIPMENT:

The Contractor shall provide mud-rotary drilling equipment capable of drilling an 8-inch minimum diameter hole to 700 feet. Formation samples shall be taken at five foot intervals or at each change of formation and stored in plastic bags or other approved containers.

C. WORKMANSHIP

The Contractor shall drill an 8-inch minimum diameter test hole to a depth of 700 feet utilizing the mud-rotary drilling method. The Contractor shall collect representative formation samples by a method to be approved by the Engineer prior to commencing drilling and which does not separate out the fine-grained cuttings.

The Contractor shall have a grain-size analysis, (mechanical analysis of that portion retained on 200 mesh), performed by an approved laboratory on each of 20 formation samples to be selected by the Engineer for review. The results of the analysis including distribution curves for each sample shall be delivered to the Engineer for review.

Geophysical logging of the test hole shall be performed by a commercial logging service selected by the Geologist and approved by the owner. The well contractor shall notify the Geologist, at least one week in advance, of the time the well will be ready for geophysical logging. Stand-by time will not be paid during a 12-hour period set aside for geophysical logging. The Contractor shall provide normal assistance to the geophysical logging service.

Within thirty-six (36) hours after receipt of the grain-size analysis, the geophysical logs and the driller's logs, the Engineer shall notify the Contractor of the screen slot size, intervals to be screened, and the gravel-pack gradation curve,

D. MEASUREMENT AND PAYMENT

1. General: The items listed in the Proposal are the items for which payment will be made for work, materials, and equipment involved in drilling the test holes. Any item not specifically mentioned as a pay item shall be considered incidental to other items. No direct payment shall be made for incidental items.

The quantities listed in the Proposal for Unit price bid items may be increased by up to 35% of the listed quantity or decreased any amount, at the direction of the Owner or the geologist, without affecting the unit price to be paid for the bid item.

Standby time required during geophysical logging and determination of material criteria by the geologist shall not be a pay item.

2. Testhole: Payment for drilling the test hole will be made at the unit price per vertical foot of drilled hole as stated in the Proposal under "Drill 8-inch minimum diameter test hole."

4.04 WELL DRILLING, DEVELOPMENT, AND TESTING

A. SCOPE: This section covers the work necessary to drill, develop, and test pump a gravel-packed well.

1. General: The Contractor shall furnish all material, equipment, labor, and tools as required to drill and test a water well at the location shown on the drawing in Section 5 of these technical specifications. The following work shall be performed with the work progressing in the order shown:

a. Drill production casing borehole.

b. Install production casing and well screen.

c. Install gravel pack and cement-grout sanitary seal.

d. Develop well

e. Test pump well

f. Furnish construction logs and reports

2. Contractor's Qualifications: The Contractor shall have engaged in the business of constructing rotary-drilled, gravel-packed wells of diameter, depth, and capacity equivalent to the proposed well(s) for a period of at least five (5) years.

3. Local Conditions: It is the Contractor's responsibility to be come familiar with site and drilling conditions prior to acceptance of contract.

4. Protection of the Site: The Contractor shall protect all existing fences, buildings, trees, and landscape during the progress of the work. After completion of the work, the Contractor shall remove from the site all materials, debris, and drill cuttings from the well-drilling operation and shall restore the well site(s) to original condition as nearly as possible.

5. Boundaries of Work: The Owner shall provide land or rights-of-way for the work specified in this Contract and make suitable provisions for ingress and egress, and the Contractor shall not enter on or occupy with men, tools, equipment or material, any ground outside the property of the Owner without the written consent of the Owner of such ground. Other Contractors and employees or agents of the Owner may for all necessary purposes enter upon the work and premises used by the Contractor, and the Contractor shall conduct his work so as not to impede unnecessarily any work being done by others on or adjacent to the site.

6. Records: The Contractor shall keep accurate records on all phases of the work including but not limited to a log of the formations drilled through, development, and alignment tests for each well. Final payment shall not be made to the Contractor until copies of all records have been reviewed and accepted by the geologist.

7. Permits, Certificates, Laws and Ordinances: The Contractor shall at his own expense, procure all permits, certificates and licenses required of him by law for the execution of his work. He shall comply with all federal, state or local laws, ordinances or rules and regulations relating the performance of the work. The Owner shall supply the water right permit.

8. Well Dimensions and Pumping Capacities: Well dimensions and pumping capacities shall be as listed in the Special Provisions.

B. MATERIALS:

1. Drilling Equipment: Provide an approved drilling rig with manufacturer's rated capacity equal to or exceeding the dimensions and depth of the well(s) to be drilled.

2. Drilling Fluid: Fluid shall be approved by geologist. Drilling fluid additives used to stop lost circulation shall be as recommended by the manufacturer for that particular use and as approved by the geologist.

3. Well Casing and Screens:

a. General--All production casing and well screen shall be new, first quality material and free of defects in workmanship and handling. No reject, subgrade, or limited-use is acceptable.

b. Production Casing--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 A283, Grade B, or better. Where applicable, fabricated and mill pipe shall conform to either ASTM Standard A53, Grade B; A139, Grade B; or A211, Grade 30. The wall thickness for casings up to and including 12-inches outside diameter shall be 1/4 inch. For casings with outside diameters greater than 12-inches, the wall thickness shall be 3/8 inch. The Contractor shall furnish the geologist with mill certification from the pipe manufacturer. Out of round casing will not be allowed.

c. Well Screen or Louvered Casing--The decision on whether to use well screen or louvered casing will be made by the geologist after reviewing E-log data from the test hole. Opening size will be determined by the geologist following review of the grain size distribution analysis. The well screen shall be of the continuous slot design, wire wound as manufactured by UPO Johnson, Inc., or approved equal. The screen shall be constructed of mild steel and shall have an outside diameter equal to the casing diameter. The Contractor shall furnish the Engineer with mill certification from the screen manufacturer.

The louvered casing shall meet the same physical requirements as the production casing. The perforations shall be machine-made horizontal to the axis of the screen and of a louver form with the aperture facing downward. The aperture size shall be determined by the geologist based on grain-size analysis completed during test hold drilling. The louvered casing shall be of the "ful-flo" or "super-flo" type as manufactured by Roscoe Moss Company or approved equal. The Louvered casing shall be constructed of mild steel.

d. Bottom-Plate--The bottom of the screen assembly shall be covered with a steel plate fabricated of the same material as the production casing.

e. Centralizers--Centralizers shall be installed at minimum 40-foot intervals in the perforated portion of the well. Centralizer design shall be appproved by the geologist prior to installation.

4. Gravel:

a. Gravel--Gravel shall be clean, sound, durable, well rounded, natural rock containing no silt, clay, organic material, anhydrite, gypsum, mica, or calcareous material. Gravel shall be thoroughly washed basalt or siliceous material, as approved, and shall have a specified gravity not less than 2.5. The geologist will notify the Contractor of the gradation required for a "design" gravel-pack. The Contractor shall submit to the geologist a 10-pound sample of the required gravel-pack material along with a gradation curve for approval prior to delivery of the gravel to the site. Samples not meeting to proper gradation shall be rejected and the Contractor shall submit a new sample.

b. Gravel-Sounding Device--Provide an approved gravel-sounding device to measure the level of the gravel in the hole during placement. The device shall have a depth capability of at least 700 feet and shall have direct-reading indicators spaced no farther apart than 10 feet.

5. Portland Cement and Cement Grout:

a. Portland Cement--Conform to ASTM C150, Type II or III.

b. Cement Grout--Sand-cement grout shall be a commercially prepared mixture of Portland cement, sand, and water in the proportion of one bag of cement and an equal volume of dry sand mixed with not more than 6 gallons of clean water, or as approved. The use of admixtures to reduce shrinkage, reduce permeability, increase fludity, and/or control time of set must be approved by the geologist.

6. Well Development and Testing Equipment:

a. Pumping Equipment--Furnish and install a pump and variable-speed type prime mover with all necessary appurtenances capable of pumping water within the ranges listed in the Section 4.01. The discharge piping shall include an approved flow rate measuring device, a valve for regulating flow, and a sand content measuring device. To provide a means for continuous monitoring of the water level in the well a three-quarter (3/4) inch diameter schedule 40 PVC pipe shall be installed between the production casing and the pump column pipe to a depth approximately 10 ft. above the pump intake. The bottom 20 ft of the pipe shall be perforated by hacksaw cut slots. The Contractor shall demonstrate that the PVC pipe is free of obstructions and will provide access for accurate water-level measurements. Rolled plastic tubing will be unacceptable.

b. Sand Content Measuring Device--The Contractor shall provide, install, and maintain a Rossum Sand testing device on the discharge piping, or approved equal. The device shall be installed and operated as recommended by the manufacturer.

c. Flow Measuring Device--The flow rate measuring device shall be an approved machined orifice plate and manometer or flowmeter capable of measuring the pump discharge within plus or minus 10 percent of true flow for flowrates within the range of the pumping equipment.

d. Water Level Measuring Device--The Contractor shall provide, install, and maintain a water level measuring device similar to a Fischer M Scope, or approved equal. The device shall have direct reading marks at least every 5 feet.

C. WORKMANSHIP:

1. Well Drilling: Well drilling shall conform to all requirements for depth and diameters, as specified herein or approved. All work shall be accomplished to permit the installation of the well casing, grout sanitary seal, and gravel pack, all as specified herein and under the respective subsections for plumbness and alignment. The Contractor shall maintain a thoroughly experienced and competent driller at all times to supervise all aspects of the drilling operations.

a. Production casing drill hole--Drill hole to dimensions specified in the Section 4.01 to accommodate the production casing, the screen assembly, the sanitary grout seal, and the gravel pack.

The Contractor shall take necessary precautions and provide adequate equipment for drilling a straight and plumb hole. The use of stabilizers and/or drill collars of sufficient weight is recommended for use in the drilling of cobbles and possible boulders that may be encountered. The geologist may call for a plumbness and alignment test on the hole or reamed hole at the Contractor's expense if in the geologist's opinion precautions are not being taken to drill a straight hole. Lack of precautions may be manifest either through lack of proper drilling tools or improper drilling techniques. The borehole shall not vary from the vertical in excess of one-third of the smallest inside diameter of that part of the hole being tested per 100 feet of depth. In the event the required tolerance cannot be achieved, the Contractor shall ~~fill in~~ abandon the existing hole and drill a new well at a location to be determined by the geologist. The abandonment operation and drilling of a new well shall be at the Contractor's expense.

b. Daily construction log--The Contractor shall maintain a driller's log in which each change in formation is recorded.

The Contractor shall submit to the geologist a daily log of work in progress including but not limited to footage drilled, materials installed, hours of work, names of drilling crew, and equipment in operation. Each daily log shall be submitted to the geologist for review the following work day prior to resuming the drilling operation for the day.

c. Protection of water quality--Take all necessary precautions, as approved, to prevent contaminated water, gasoline, or other deleterious substances from entering the well, either through the opening or by seepage through the ground surface.

2. Casing Installation:

a. Casing which fails, collapses, separates, or does not pass the tests for plumbness and alignment shall be repaired or replaced, or a new well drilled, as approved, at the Contractor's expense.

b. Plumbness test--The production casing shall be plumb to within a maximum variation of 6-inches per 100 feet of depth. The Contractor shall perform ~~the~~ plumbness test in the presence of the geologist.

c. Alignment test--The Contractor shall provide a 40-foot long section of pipe or a dummy of the same length to test alignment. The outside diameter of the test piece shall be 1-inch less than the inside diameter of the production casing. An approved dummy would consist of a rigid spindle with three rings attached to the spindle, one ring at each end and one ring in the center, each ring to be 12-inches long in a direction parallel to the spindle.

Departure from a straight line in the production casing shall not exceed that which will allow the passage through the casing of the 40-foot pipe section or dummy witout binding the side of the casing.

d. Water level measuring tube--A water level measuring tube shall be installed from one (1) foot above the uppermost section of screen or louvered casing to the top of the casing. The tube shall be one (1) inch diameter black steel pipe with a 90° bend at the bottom end of the tube welded to a 1-inch diameter hole in the casing. The top of the tube shall be tightly capped. The tube shall be tack welded to the casing at 20-ft. intervals.

3. Screen or Louvered Casing Installation

a. The Contractor shall install either screen or louvered casing as directed by the geologist. The geologist shall make the decision on whether to use the screen or louvered casing, and the required size of the aperature openings within 36-hours after receiveing the results of the formation grain size distribution analysis and the E-log test results.

4. Gravel Packing: 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 of the gravel occurring during placement.

The procedure for placing gravel shall prevent segregation and bridging of graded material, and the entire gravel-packing operation shall continue without interruption from the bottom of the hole to the bottom of the surface seal.

5. Sanitary Grout Seal: The sand-cement grout shall be placed above the gravel pack from a minimum of 50-feet to a maximum of 100 feet below ground surface to within 2-feet of ground surface. Grout shall be placed in one continuous operation from the bottom upwards by the use of a pressure grout pump. If a conductor or outer casing is used to hold the hole open in the grout zone during development and testing, then the sanitary seal shall be added after development and testing. Otherwise, the sanitary seal shall be installed before development and testing.

Conductor casings which are not removed, shall have a miminum 2-inch thick sanitary seal on the outside of the casing for the entire length of the conductor casing.

6. Well Development:

a. Well development shall not proceed before 72-hours have elapsed since the sanitary grout seal was installed. After the pumping unit has been installed with all necessary piping and monitoring equipment, the well shall be alternately pumped and surged until the pumped water is free from sand, silt, and turbidity, and/or until no further increase in specific capacity can be observed, or when terminated by the geologist. The development pumping shall proceed gradually in ever-increasing rates of discharge. Each discharge rate during development shall be approved by the geologist. The geologist shall determine when development is complete.

b. Sand content shall not exceed 5 ppm as measured 15 minutes after commencement of pumping at a rate which will cause the drawdown to be equal to 80 percent of the available drawdown (available drawdown equals distance between static water level and top of perforated interval). Static level shall be measured water level after a minimum of 4-hours without pumping. If the sand content of the discharge does not meet these criteria, but in the opinion of the geologist the Contractor has properly constructed and developed the well in accordance with the specifications set forth herein, the sand content requirement may be waived.

7. Well Testing: The Contractor shall operate the test pumping equipment either continuously or at various rates of discharge as directed by the geologist and for such periods of time as directed by the geologist. The Contractor shall be prepared to operate and monitor the test pump equipment over a continuous 48-hour period. A gate valve or locking butterfly valve may be installed on the pump discharge line to vary the flowrate from the pump.

A continuous log of the test pump operation shall be kept by the Contractor and shall be submitted to the geologist after the test pump operation is completed.

After completion of the test, the Contractor shall remove any sand or silt accumulated in the well.

8. Well Disinfection: A hypochlorite solution shall be added to the well in a sufficient quanity to give a concentration of ~~500~~ 550 ppm free available chlorine. For calculation purposes, the volume of water shall be considered that water within the well casing. The solution shall be added in such a way to insure even distribution.

9. Capping: A steel plate shall be welded to the top of the casing before the Contractor leaves the site. The plate shall be a minimum 1/4 inch thick and equal in diameter to the outside diameter of the casing.

10. Miscellaneous:

a. Temporary capping: At all times during the progress of the work, the Contractor shall protect the well in such a manner as to effectively prevent either tampering with the well or the entrance of foreign material in to it.

b. Abondonment of well: In the event that the Contractor shall fail to sink the well to the depth specified or to such lesser depth as ordered by the geologist, or should abandon the well because of loss of tools or for any other cause, he shall, if requested and directed by the geologist, fill the abandoned hole with clay or clay and concrete. Salvaged material furnished by the Contractor shall remain his property. The abandonment cost and drilling of new well shall be at the Contractor's expense.

D. MEASUREMENT AND PAYMENT

1. General: The listed items are the pay items for which payment will be made for work, materials, and equipment involved in drilling and developing wells. Any item not specifically mentioned as a pay item shall be considered incidental to other items. No direct payment shall be made for incidental items.

The quantities listed in the Proposal for unit price bid items may be increased by up to the 35% of the listed quanity or decreased by any amount, at the direction of the Owner or the geologist, without affecting the unit price to be paid for the bid item.

2. Production Hole: Payment for drilling the production hole will be made at the unit price per vertical foot of drilled hole as stated in the proposal under "Drill production hole." Installation of any conductor casing shall be considered incidental to this item.

3. Casing: Payment for providing and installing the casing will be based on the unit price per vertical foot of installed casing as stated in the Proposal under "Install casing."

4. Well Screen or Louvered Casing: Payment for providing and installing the well screen or louvered casing as selected by the geologist will be based on the unit price per vertical foot of installed well screen or louvered casing as set forth in the Proposal under "Well screen" or "Louvered casing." While both well screen and louvered casing are listed as bid items, only one of these items shall be used and the other item shall be removed from the Contract by way of change order at the cost listed in the proposal for the eliminated item.

5. Gravel Filter: Payment for providing and installing the gravel filter material will be based on the unit price per cubic yard of installed gravel as set forth in the Proposal under "Gravel Filter." The size and gradation of the gravel will be determined after analysis of the material removed from the well. The Contractor is cautioned that the gravel will require special gradation and may not be locally available. The amount of gravel listed in the Proposal is an estimate only and any increase/decrease in the gravel quantity will not justify a change in the unit price.

6. Well Development: Payment for performing well development will be based on the unit price per hour as set forth in the Proposal under "Well Development." Payment shall be full compensation for furnishing all necessary work, equipment, and materials to perform the well development as specified herein. Payment shall be made only for time spent during actual development.

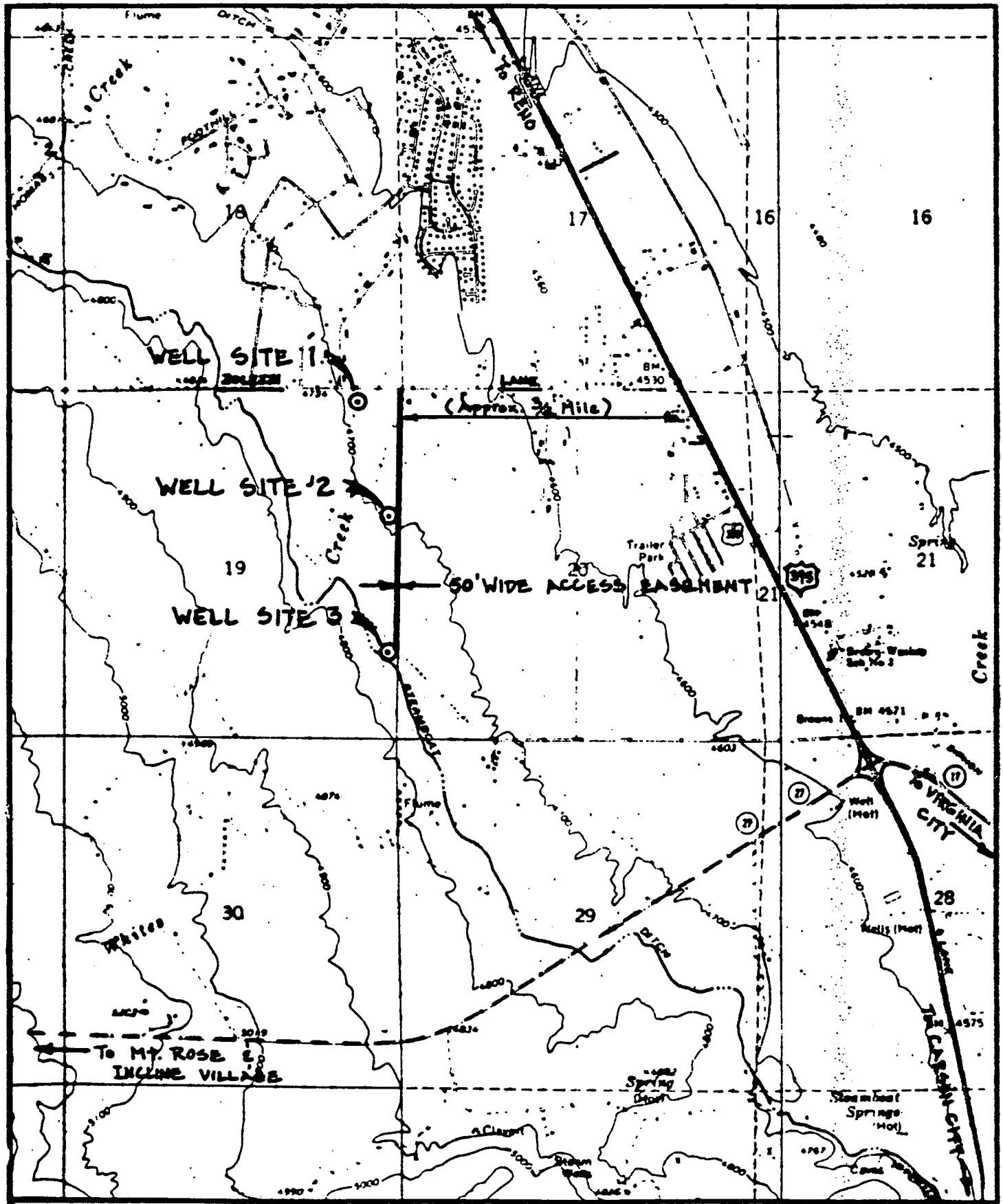
8. Well Yield and Drawdown Test: Payment for performing the well yield and drawdown test will be based on the unit price per hour as set forth in the Proposal under "Well yield and drawdown test." Payment shall be full compensation for furnishing all necessary work, equipment, and materials to perform the well yield and drawdown test as required by the geologist and specified herein. Payment shall be made only for time actually spent pumping water.

9. Plumbness and Alignment Test: Payment for perform the plumbness and alignment test will be at the lump sum price as set forth in the Proposal under "Plumbness and alignment test."

10. Sanitary Grout Seal: Payment for installing the sanitary grout seal will be at the unit price per foot as set forth in the Proposal under "Sanitary grout seal."

SECTION V:

WELL LOCATION AND CONSTRUCTION DIAGRAMS



CONSULTING ENGINEERING SERVICES, INC.
1475 TERMINAL WAY, SUITE C-2
RENO, NEVADA 89502
702-786-5873

S.T.M.G.I.D. Well Construction : WELL LOCATION MAP

SCALE	
DRAWN BY	CHECKED BY
DATE	DESIGNED BY
SHEET	OF
DRAWING NO.	

Appendix D

PUMPING TEST DATA

Production Well #1 Test Data

PUMPING TEST DATA

PRODUCTION WELL 1

PAGE 1

PUMP TEST DATA (P)/O WELL PRODUCTION WELL

LOCATION FIRST PRODUCTION WELL STMGID

TYPE OF TEST STEP TEST 3 3/8" X 4" ORFICE

START OF TEST 3/24/84 END

Clock Time	t	Water Level BTOC	s	Q	Comments
0748	–	94.23			
8:01:50					PUMP ON - RED/BROWN DISCHARGE - PROPELLY FROM CI
8:05	3	107.50			CLEAR DISCHARGE @ 3 MIN
8:06	4	106.50		H = 13"	
8:07	5	109.22			
8:08	6	109.95			
8:09	7	110.53			
8:10	8	110.84			
8:12	10	111.70		H = 12 1/2"	TEMP = 60°F
8:15	13	112.38			EC = 135 MMHO/CM
8:18	16	113.50		H = 13"	
8:22	20	114.22			
8:27	25	115.35		H = 13"	TEMP = 60°F EC = 140 MMHO/CM
8:32	30	116.35			
8:37	35	117.11		H = 13"	
8:42	40	117.80			
8:47	45	118.30			
8:52	50	118.69		H = 13"	EC = 140 MMHO/CM TEMP = 60.5°F
8:57	55	119.15		H = 13"	
09:04	62	119.80	~25.3	H = 13 1/2	
0906					Δ Q/CLEAR DISCHARGE
0909	2	130.00		H = 48"	
09:09	3	131.93		H = 49"	
09:12	6	134.00		H = 49"	
09:14	8	135.23		H = 50"	EC = 145 TEMP = 60.5°C
09:17	11	136.60			
09:22	16	138.25		H = 50"	
09 26	20	139.45			
09 32	26	140.85		H = 50"	EC = 145 TEMP = 60.5°C

PUMP TEST DATA P/O WELL _____

LOCATION FIRST PRODUCTION WELL STN 610

TYPE OF TEST CONSTANT Q 6 X 8"

START OF TEST 3/24/84 END _____

(1)

Clock Time	t	Water Level initial = 94.23 btoc	s	Q	Comments
1049				600 gpm	ON WITH CLEAR DISCHARGE
1052	3	137.1	42.87	H = 16"	
1054	5	140.80	46.57	H = 15"	
1058	9	149.40	55.17	H = 16"	
11:00	11	151.60	57.37	H = 16"	
1104	15	154.50	60.27		
1108	19	156.70	62.47	H = 16	
1113	24	158.73	64.50	H = 15	TEMP = 60.0°F EC = 145 m MHO
1116	29	160.65	66.42		
1124	35	162.40	68.17	H = 16"	
1129	40	163.30	69.07		
1134	45	164.30	70.07		
1141	52	165.52	71.29		
1149	60	166.51	72.28	H = 16"	
1200					2 SAMPLES PW #1 T = 1200 1 - W/ NO3 1 WP PRES.
1202	73	167.90	73.67	H = 16"	
1214	85	168.87	74.64	H = 16"	
1231	102	170.11	75.88	H = 16"	
1249	120	171.02	76.79		
1310	141	171.95	77.72	H = 16"	
1324	155	172.52	78.29		
1400	191	173.78	79.55	H = 16"	TEMP = 61°F EC = 145 m MHO/CM
1430	221	174.67	80.44	H = 16"	
1500	251	175.51	81.28	H = 16"	TEMP = 61°F
1530	281	176.13	81.90		
16:00	311	176.11	81.88	H = 16"	
16:30	341	176.65	82.42	H = 16"	TEMP = 62°F
1700	371	176.97	82.74	H = 16"	
1730	401	177.38	83.15	H = 16"	EC = 145 m MHO/CM T = 15.5°C - TSI T = 61°F - THERMOMETER

Δ 1:36 MIN

DON + 1½ MIN = NITE

PUMP TEST DATA (P)/O WELL _____

LOCATION _____

TYPE OF TEST STEP TEST

START OF TEST 3/24/84 END _____

Clock Time	t	Water Level	s	Q	Comments
09:43	37	142.50		H=49"	
09:48	42	143.50		H=50"	
09:56	50	144.50		H=50"	
10:01	55	145.05		H=50"	
10:06	60	145.47	51.0	H=50"	
10:08	↓				PUMP OFF
10:09	1	121.20			
10:10	2	121.55			
10:11	3	119.73			
10:12	4	118.12			
10:13:30	5 1/2	116.20			
10:15	7	114.72			
10:17	9	113.15			
10:20	12	110.9			
10:24	16	109.17			
10:34	26	105.93			
1041		104.38			

72.5

80

PUMP TEST DATA P/O WELL _____

LOCATION PRODUCTION WELL #1

TYPE OF TEST CONSTANT Q 5 15/16 X 8"

START OF TEST 3/24/84 END _____

Clock Time	t	Water Level	s	Q	Comments
18:00	431	177.72	93A9	H= 16"	
18:30	461	178.05		H = 16"	
1900	—	—		H = 16"	COLLECTED 2 SAMPLES 1 P/O HACH, 1 DIFFERENCE
1915	506	178.53		H= 16"	
20:56	557	178.97			
21:08	619	179.58			
22:04	675	180.06			
23:54	785	180.67			
02:02	913	181.61			
04:46	1037	182.21			60° F
06:09	1160	182.78			59° F
0800	1271	183.95		H=16"	61° F (3 SHOWER) DM
10:06		183.66		H = 15"	61°F EC=140
10:12		183.85		H = 16"	NO MORE CONTROL IN VALVE, IT IS
10:27		—			ADJUST THROTTLE
10:40	1431	192.00		H=16"	(FLOW MEASUREMENTS HAVE NOT
10:55	1446	193.37		H=16"	BEEN RELIABLE FROM ABOUT 3/24-1230 TO 3/25 1030)
11:10	1461	194.29			
12:12	1523	195.70		H=16"	TEMP=61°F EC=140 m MHO/CM at 61°F
12:30	1541	196.20		H=16" OK	
1300	1571	196.41			
1400	1631	197.11		H=16" OK	
1500	1691	197.69		H=16" OK	TEMP= 61°F EC= 140 m MHO/CM at 61°F
1600	1751	198.05		H=16" OK	
1700	1811	198.46		H=16" OK	
1800	1871	199.08		H=16" OK	
1900	1931	199.32		H=16" OK	COLLECTED 2 SAMPLES
2100	2051	200.00		H=16" OK	EC=140 TEMP=15°C
23:01	2171	199.78		H=17½"	reduced to 16"

PUMP TEST DATA P/O WELL _____

LOCATION _____

TYPE OF TEST _____

START OF TEST _____ END _____

Clock Time	t / t'	Water Level	s	Q	Comments
01:00	2291	199.71		H=16"	EC=130 @ 60°F
3:00	2411	199.68		H=16"	EC=135 @ 60°F
5:00	2531	199.68		H=16"	Same
7:00	2651	199.66		H=16"	same
8:00	2711	200.83			
8:08	2719 / 0		Recovery		stopped Q (2)
8:14	2725 / 6	153.49			
8:15	2726 7	151.89			
8:16	2727 8	150.67			
8:17	2728 9	149.38			
8:18	2729 10	148.42			
8:20	2731 12	146.32			
8:21	2732 13	145.56			
8:22	2733 14	144.70			
8:24	2735 16	143.24			
8:25	2736 17	142.44			
8:26	2737 18	141.81			
8:27	2738 19	141.17			
8:29	2740 21	140.02			
8:30	2741 22	139.46			
8:32	2743 24	138.45			
8:34	2745 26	137.49			
8:36	2747 28	136.61			
8:38	2749 30	135.75			
8:40	2751 32	135.03			
8:42	2753 34	134.38			
8:45	2756 37	133.16			
8:48	2759 40	132.43			
8:51	2762 43	131.59			

PAGE _____

PUMP TEST DATA P/O WELL _____

LOCATION _____

TYPE OF TEST _____

START OF TEST _____ END _____

ft/t	Clock Time	t		Water Level	s	Q	Comments
60	8:54	2765	46	130.79	◯		
56	8:57	2768	49	130.12			
53	9:00	2771	52	129.42			
49	9:05	2776	57	128.37			
45	9:10	2781	62	127.41			
42	9:15	2786	67	126.42	◯		
39	9:20	2791	72	125.77			
34	9:30	2801	82	124.38			
30	9:40	2811	92	123.15			
28	9:50	2821	102	122.11			
25	10:00	2831	112	121.13			
13	12:00	2951	232	114.40			
8	14:36	3107	388	110.40			
4271 3	10:00	4271	1552	101.60			

PUMPING TEST DATA
ZOLEZZI-3
DURING PUMPING OF
PRODUCTION WELL 1

PUMP TEST DATA P/(O) WELL OBS WELL

LOCATION TEST HOLE #3

TYPE OF TEST STEP TEST

START OF TEST 3/24/84 END

Clock Time	t	Water Level btoc	WL - 97.02 s	Q gpm	Comments
3-23 11:50 AM		98.85			
-24 7:35 AM		97.02			
Startup 8:05	0:00			~200	
8:06	1	101.80			
8:07	2	102.76			
8:08	3	103.48			
8:09	4	104.09			
8:10	5	104.61			
8:11	6	105.06			
8:12	7	105.54			
8:14	9	106.25			
8:16	11	106.89			
8:18	13	107.38			
8:20	15	108.00			
8:22	17	108.47			
8:25	20	108.99			
8:28	23	~109.45			
8:35	30	110.75			
8:40	35	111.41			
8:45	40	112.01			
8:50	45	112.49			
9:00	55	113.33			
9:07	62	113.89	16.87		Sp Cap = 200/16.87 = 11.9 gpm/ft
9:08	63			~325	
9:09	64	115.44			
9:10	65	116.90			
9:11	66	118.10			
9:12	69	118.75			
9:13	68	119.49			

PUMP TEST DATA P/O WELL obs well

LOCATION TEST HOLE #3

TYPE OF TEST step test

START OF TEST 3/24/84 END

Clock Time	t	Water Level	s	Q	Comments
9:14	69	120.00			
9:15	70	120.49			
9:16	71	120.96			
9:17	72	121.39			
9:19	74	122.11			
9:21	76	122.78			
9:23	78	123.51			
9:25	80	124.00			
9:27	82	124.53			
9:30	85	125.26			
9:34	89	126.10			
9:38	93	126.73			
9:43	98	127.57			
9:48	103	128.32			
9:53	108	128.89			
9:58	113	129.50			
10:05	120	130.23			
10:10	125	130.64	33.62	pump off	Sp Cap = $\frac{325}{33.62}$ = 9.7 gpm/ft
10:10					
10:11	126	124.85			
10:12	127	122.72			
10:13	128	120.09			
10:14	129	119.70			
10:15	130	118.58			
10:16	131	117.63			
10:17	132	116.71			
10:18	133	115.95			
10:19	134	115.23			
10:21	136	114.00			

PUMP TEST DATA P/O WELL obs well

LOCATION test hole #3

TYPE OF TEST step test / constant Q

START OF TEST 3/24/84 END

Clock Time	t	Water Level	s	Q	Comments
10:23	138	112.96			
10:25	140	112.06			
10:28	143	110.86			
10:31	146	109.88			
10:35	150	108.75			
10:40	155	107.57			
10:44	159	106.81			
10:45	160	106.65			
10:50	165	105.86			
* 10:51	166			~600	Δ Q ~
10:53	168	114.22	17.20		
10:54	169	116.84	19.82		
10:55	170	119.42	22.40		
10:56	171	120.70	23.68		
10:57	172	122.03	25.01		
~10:58	173	124.25	27.23		adj Q
10:59	174	125.41	28.39		
11:00	175	126.90	29.88		
11:01	176	127.47	30.45		
11:02	177	128.48	31.46		
11:03	178	129.31	32.29		
11:04	179	130.09	33.07		
11:05	180	130.88	33.86		
11:06	181	131.47	34.45		
11:07	182	132.13	35.11		
11:09	184	133.19	36.17		
11:11	186	134.28	37.26		
11:13	188	135.00	37.99		
11:15	190	135.83	38.81		

PUMP TEST DATA P/O WELL ob well

LOCATION test hole #3

TYPE OF TEST constant Q

START OF TEST 3/24/84 END

Clock Time	t	Water Level btoc	s	Q	Comments
11:17	192	136.58	39.56	~ 600	
11:19	194	137.30	40.28		
11:21	196	137.94	40.92		
11:24	199	138.78	41.76		
11:27	202	139.95	42.93		
11:31	206	140.40	43.38		
11:37	212	141.52	44.50		
11:42	217	142.34	45.32		
11:47	2	143.10	46.08		
12:04		145.11	48.09		
12:09		145.58	48.56		
12:16		146.26	49.26		
12:34		147.48	50.46		
12:50		148.45	51.43		
13:13		149.48	52.46		
13:27		150.08	53.06		
14:01		151.25	54.23		
14:32		152.16	55.14		
15:01		152.91	55.89		
15:31		153.55	56.53		
16:01		153.88	56.86		
16:31		154.30	57.28		
17:01		154.70	57.68		
17:31		155.10	58.08		
18:01		155.45	58.43		
18:31		155.77	58.75		
19:16		156.25	59.23		
20:09		156.69	59.67		
21:03		157.20	60.18		

PAGE _____

PUMP TEST DATA P/O WELL _____

LOCATION TEST HOLE #3

TYPE OF TEST _____

START OF TEST _____ END _____

	Clock Time	t	Water Level	s	Q	Comments
	22:02		157.69	60.67		
	23:57		158.41	61.39		
3/25	01:56		159.23	62.21		
	04:02		159.90	62.88		
	06:07		160.43	63.41		
	08:02	1437	160.82	63.80		
	10:09	1564	161.40	64.38		
	10:45		166.97	69.95		FLOW HAS BEEN ADJUSTED
	11:12		167.55	70.53		
	12:14	1689 1525	168.95	71.93		
	13:02	1573	169.65	72.63		
	14:02		170.27	73.25		
	15:02	1693	170.78	73.76		
	16:02		171.15	74.13		
	17:03	1814	171.54	74.52		
	18:02		171.96	74.94		
	19:01	1932	172.29	75.27		
	21:01	2052	172.89	75.87		
	23:01	2172	173.06	76.04		minor flow adj
3/26	00:54	2285	173.05	76.03		
	03:02	2413	173.24	76.22		
	05:02	2533	173.62	76.60		
	07:02	2653	173.96	76.94		
	08:05	2716	174.09	77.07		Sp Cap = 600/77.07 = 7.8 gpm/ft
(7)	08:08	t / t'				stopped
2720	08:09	2720 1	167.48	70.46		
1360	08:10	2721 2	163.15			
(7	08:11	2722 3	160.55			
681	08:12	2723 4	158.38			

PAGE _____

PUMP TEST DATA P/O WELL _____

LOCATION _____

TYPE OF TEST _____

START OF TEST _____ END _____

t/t	Clock Time	t	Water Level	s	Q	Comments
248	8:19	2730 11	149.16			
182	8:23	2734 15	145.75			
137	8:28	2739 20	142.57			
119	8:31	2742 23	140.95			
110	8:33	2744 25	140.00			
102	8:35	2746 27	139.05			
95	8:37	2748 29	138.28			
89	8:39	2750 31	137.54			
83	8:41	2752 33	136.76			
78	8:43	2754 35	136.06			
72	8:46	2757 38	135.05			
67	8:49	2760 41	134.30			
63	8:52	2763 44	133.50			
59	8:55	2766 47	132.68			
55	8:58	2769 50	132.04			
52	9:01	2772 53	131.31			
48	9:06	2777 58	130.38			
44	9:11	2782 63	129.44			
41	9:16	2787 68	128.66			
38	9:21	2792 73	127.89			
34	9:31	2802 83	126.50			
30	9:41	2812 93	125.30			
27	9:51	2822 103	124.32			
25	10:01	2832 113	123.39			
13	12:04	2952 233	116.85			
8	14:37	3108 389	112.82			
3/27 3	10:01	4272 1553	105.15			

Prod. Well # 2
Test Data.

PUMPING TEST DATA

PRODUCTION WELL 2

PUMP TEST DATA (P)/O WELL #2

LOCATION Zolezzi Well Field

TYPE OF TEST STEP DRAWDOWN #2

START OF TEST 6-14-84 END 6-14-84

Clock Time	t	Water Level	s	Q	Comments
1708	00	Static =	130.03	124 gpm	=5"
1716	1.00	147.81	-2.14	5"	
1717	2.00	147.92			
1718	3:00	149.59		5"	
1719	4:00	150.21			
1720	5:00	150.73			
1721	6.00	151.16		5"	
1722	7:00	151.26			
1723	8.00	151.57			
1725	10 00	152.28			
1727	12.00	153.79			
1729	14.00	154.25			
1731	16.00	154.68			
1733	18.00	154.71			adjust gate valve
1737	22.00	157.57			
1739	24.00	157.43			
1742	27.00	157.75			
1745	30.00	158.13			
1750	35.00	158.68			
1755	40.00	159.40			
1800	45.00	160.00			
1805	50.00	160.40			
1810	55.00	160.58			
1815	60.00	160.			
1816	130	178.47		=18"	=236
1819	4.00	181.00			
1820	5.00	181.72			
1821	6.00	181.83		= 15"	adj Q

checked 6-15

PUMP TEST DATA (P)O WELL #2

LOCATION Zolezzi Well Field

TYPE OF TEST STEP DRAWDOWN #2

START OF TEST 6-14 END 6-14

Clock Time	t	Water Level	s	Q	Comments
1823	8.00	185.64			Q adj
1825	10.00	186.93			adj Q
1827	12.15	190.70			
1829	14.00	191.45			adj Q
1831	16.00	192.23		Q=18"	
1833	18.00	192.75			adj Q
1836	21.00	194.83		Q=18'	falling at times
1839	24 00	195.25			adj Q
1842	27.00	197.05			
1845	30.00	198.15			
1848	33:00	199.00		Q=18"	≈236 gpm
1850	35.00	199.61			adj Q
1855	40.00	201.02		Q=18"	
1900	45.00	201.30			
1905	50:00	201.86			adj Q ≈ 236
1915	60:00	205.52			
1925	70:00	206.58			
1930	75:00	208.06			
1934	79.00	208.88			
1935	80.00	2			change Q ≈ 305
1937	2:00	218.27		Q=30"	≈305 gpm
1939	4:30	220.42			
1941	6:00	221.75			
1943	8:00	225:27			
1945	10:60	225.85			
1947	12:00	225.94			
1949	14:00	226.96			
1951	16:00	227.86			

3.42

4.48

5.52

checked 6-15

PUMP TEST DATA (P)/O WELL #2

LOCATION Zolezzi Well Field

TYPE OF TEST STEP DRAWDOWN #2

START OF TEST 6-14 END 6-14

Clock Time	t	Water Level	s	Q	Comments
1953	18:00	228.29		Q=30"	
1955	20:00	229.45		Q=30"	
1957	22:00	229.76			
1960	25:00	230.40			adj Q
1965	30:00	232.27		Q=30"	
1970	35:00	233.40			
1975	40:00	234.77			
1980	45:00	235.85		Q=30"	~305
1985	50:00	235.41			adj RPM
1995	60:00	235.27			
2000	65:00	235.80			
2005	70:00	236.37			
2015	80:00	239.48			
2020	85:00	240.10			
2025	90:00	240.57			shut down

checked 6-15

PUMP TEST DATA (P)/O WELL #2

LOCATION Zolezzi LANE

TYPE OF TEST Constant 2nd

START OF TEST 6/16/84 END 6/17/84

Clock Time	t	Water Level	s	Q	Comments
0812	0	130.90			
0814	0				
0815	1				
0818	4	153.00		Q=24"	=292.4
0821	7	157.00		Q=26"	=283.5
0823	9:30	175.70		Q=26"	
0825	11:00	182.48		=26"	
0826	12:00	184.13		<26"	adj RPM
0828	14:00	187.83		=26"	
0829	15:00	188.39			
0831	17:00	189.48			
0832	18:00	190.88		=26"	adj RPM
0835	21:00	193.97		=26"	
0837	23:00	195.12			
0839	25:00	196.21			adj RPM
0841	27:00	197.93		=26"	
0843	29:00	198.55			
0845	31:00	199.68			
0847	33:00	200.45			
0849	35:00	201.39		=25½	adj RPM
0851	37:00	202.31			
0854	40:00	203.67			
0859	45:00	205.55			adj RPM.
0904	50:06	208.68			
0909	55:00	210.07			
0914	60:00	211.89		=26"	adj RPM
0919	65:30	214.30			
0924	70:00	215.21			57°F c=190 mohs @ 25°C
0934	80:00	217.31			

PUMP TEST DATA @/O WELL #2

LOCATION Zolezzi Well Field

TYPE OF TEST Constant Q #2

START OF TEST 6-16-84 END 6-17-84

Clock Time	t	Water Level	s	Q	Comments
0944	90:00	221.94			
0954	100:00	225.56			
1004	110:00	220.28 → ?		≈25"	Q=230 reduced
1009	115:00	207.40		=17"	
1014	120:00	206.50			
1024	130:00	205.74		=17"	* 229
1034	140:00	205.85			
1044	150.00	206.39			57°F cond=198 mHas
1054	160.0	209.45			SAND = 0.05 cc/60min.
1059	165.0	212.12			
1104	170.0	213.10			
1114	180.0	214.09			
1134	200.0	215.03			adj Q
1144	210.0	216.50		=17"	
1154	220.0	216.64			
1214	240.0	217.65			
1234	260.0	219.05			
1254	280.0	219.90			
1314	300.0	220.10			
1344	330.0	220.95		=17"	cond=175@58°F
1415	360.0	221.70			
1455	4.0000	222.64			
1555	4600	224.03			
1700	525.0	225.08			adj RPM
1800	585.0	225.55		=17"	T=57°F cond=175 micros
1900	645.8	225.30			
2230	735.0	225.45		17"	
2210	835.0	225.45		17"	
2300	900	225.90		17"	

PAGE 3

PUMP TEST DATA P/O WELL #2

LOCATION

TYPE OF TEST

START OF TEST END

-25 +25 SPAN

Clock Time	t	Water Level	s	Q	Comments
02:00	1065	226.83			17"
04:00	1185	226.51			
06:10	1315	226.60			
	*		*/*		TURNED OFF PUMP @ 6:11
06:12	1	191.85	1316		
6:14	3	191.70	440		
6:17	6	196.95	220		
6:19	8	176.40	165		
6:20	9	175.5	147		
6:22	11	174.35	120		
6:23	12	173.35	110		
6:24	13	172.48	102		
6.26	15	171.50	89		
6:27	16	170.80	83		
6:28	17	170.00	78		
6:29	18	169.56	74		
6:32	21	168.57	64		
6:34	23	167.39	58		
6.37	26	166.45	52		
6:39	28	165.63	48		
6:42	31	164.72	43		
6.47	36	163.02	38		
6:51	40	161.93	34		
6:54	43	161.24	32		
6:57	46	160.45	30		
7:00	49	159.42	28		
7:04	53	158.82	26		
7:07	56	158.05	25		

PUMP TEST DATA P/O WELL #2

LOCATION

TYPE OF TEST

START OF TEST END 6/17/84

Clock Time	t	Water Level	s	Q	Comments
7:12	61	157.08	22.5		
7:16	65	156.29	21		
7:24	73	154.60	19		
7:32	81	153.53	17		
7:42	91	152.11	15.5		
7:50	99	151.07	14.3		
7:56	105	150.22	13.5		
8:05	114	149.33	12.7		
8:15	124	148.27	11.6		
8:29	138	147.00	10.3		
8:50	159	144.82	9.3		
9:25	194	143.11	7.8		
10:16	245	140.67	6.4		
1:47	456	135.96	3.9		

Prod Well #3
Test Data..

PUMPING TEST DATA

PRODUCTION WELL 3

PUMP TEST DATA (D)O WELL #3

LOCATION STM6ID

TYPE OF TEST DEVELOPMENT

START OF TEST 9/6/84 END

PUMP BOWLS @ 487'

Clock Time	t	Water Level	s	Q gpm	Comments
0800		159.68		—	drawdown tube cleaned
0825	0	159.68		2½" ≈ 85	4" Q tube 3" orifice plate
0830	5	171.82	12.14	≈85	2½"
0835	10	172.09	12.41	≈85	57°F
0840	15	172.10	12.42	≈85	
0845	~20	171.85		≈80 gpm	2" adj Q
0850	25	173.45		≈85	2½"
0855	30	173.34		≈85	
0900	35	173.47			clean
0900		increase Q to		120 gpm	≈5"
0901	36	174.66		≈120	5"
0905	40	174.66			
0910	45	174.57			
0911	increase to		9" ≈ 167 gpm		
0912		~~174.65~~			
0915		184.93			95 minutes @ 56°F
0920		185.73			
0925		186.98		9"	
0930		187.90			
0935		188.83			
	increase to		20" ≈ 250 gpm		
0940	5	195.70			
0945	10	195.75			
0947	12	204.0			
0950	15	205.50			
0955	20	207.11			
1000	25	208.36			
1005	30	209.60			
1010	35	210.50			

PUMP TEST DATA (PW) WELL #3

LOCATION STAGED

TYPE OF TEST DEVELOPMENT

START OF TEST 9/6 END 9/6/84

Clock Time	t	Water Level	s	Q	Comments
10 11	Increase Q ≅	300 gpm	≈ 30"		
1015		222.90			
1020		223.23			
1025	15	225.84			
1030	20	227.80			
Began surging			same RPM		
4" initial (111 gpm)			10" final (176 gpm)		
Sand ≤ 50 ppm			to see after final surge		
11:05	increase RPM		H = 13" Q = 200		
12½" initial (195 gpm)		(14")	12½" final	Q ≅ 195	
Sand ≤ 100 ppm			12½" final		
11:55	increase RPM		Q = ~20" ≈ 250 gpm		
1202	"	"	Q ≈ 30" ≈ 300 gpm		
12:12	"	"	Q ≈ 41" ≈ 360 gpm		
1300	shut down pump to change discharge tubes				
1345		176.10			
1347		210.0 (?)		Q = 7" =	400 gpm
1350	13	195.48			
1400	15	195.70			
1405	20	210.71			
1415	began surging				
7½ initial			12" final		Q ≈ 210'-215' — plugged
1500	raised flow to 19"	≈ 650 gpm			
18½" initial			final 19½"		Q ≈ 214
1530	raised flow to 29"	≈ 800 gpm			
1551	26½" initial				
1556	Q ≈ 850				
1646	1000 gpm → 950 gpm		@ 2½ min air in discharge		
1653	650 gpm				

PUMP TEST DATA (P/O WELL #3

LOCATION STMGID

TYPE OF TEST STEP DRAWDOWN STEP #1 Q = 124 gpm

START OF TEST 9/7/84 END

76' available drawdown from inner tube

Clock Time	t	Water Level	s	Q	Comments
0934		164.37			
1052		164.15			
1100	0	~164.10	—	124	5" manometer
1102	2:00	174.51	10.41		
	3:00	174.49			
	4:00	174.52			
	5:00	175.14	11.04		
	6:00	175.27			
1108	8:00	175.87			
1110	10	176.57	12.47		
1113	13	174.45	10.35	adjusted Q	4½"
1116	16	174.60	10.50		56°F cond: 110 mmhos
1120	20	178.40	14.30		
1123	23	178.74	14.64		
1125	25	178.87	14.77		
1130	30	179.00			
1135	35	179.61			
1140	40	179.83	15.73		
1145	45	180.25			
1150	50	180.91			
1200	60	181.55	17.45		56°F 96 cond Sample taken
1210	70	182.24	18.14		
1219	79	182.88	18.78		spCap = 124 gpm / 18.78 ft = 6.6 gpm/ft

PUMP TEST DATA (P)O WELL #3

LOCATION STMGID

TYPE OF TEST STEP DRAWDOWN STEP 2 Q = 249gpm

START OF TEST 9/7 END 9/7

Clock Time	t	Water Level	s	Q	Comments
1220	80 0			249	H = 20"
1222	2				
	3	192.52			
	5	193.67	29.57		
	7	194.47			
1229	9	195.80			
	11	196.44			
1235	95 15	197.30			
	20	198.30			
1245	25	199.44			
	110 30	200.32			
	35	201.02			
	40	201.72			20"
	50	202.82	38.82		adj Q
	140 60	203.99	39.9		20"
	70	205.02			
	80	205.80			
1350	170 90	206.38	42.28		Sp Cap - 249gpm / 42.28ft = 5.9 gpm/ft

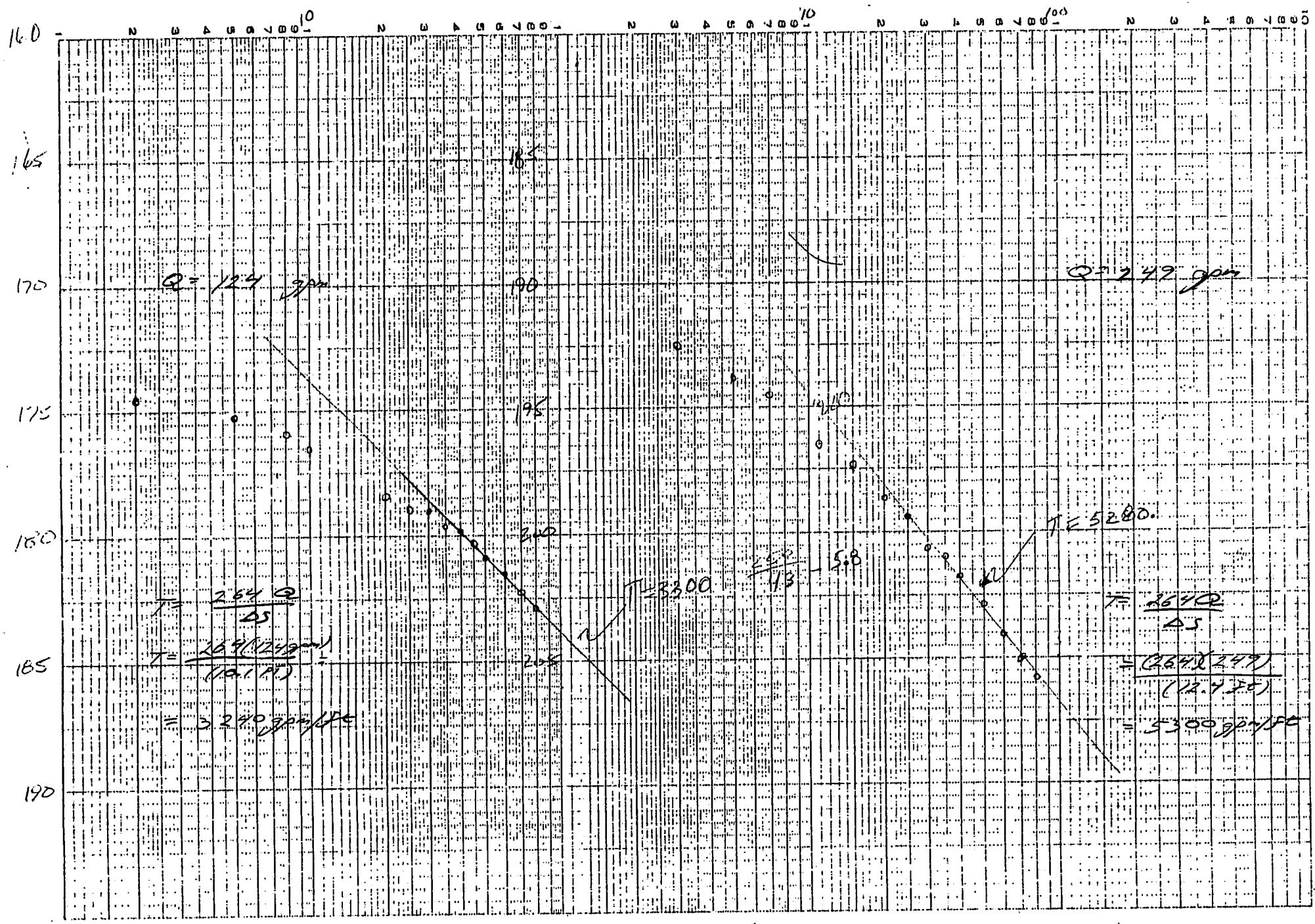
PUMP TEST DATA @/O WELL #3

LOCATION STN 16 TD

TYPE OF TEST STEP DRAWDOWN STEP #3

START OF TEST 9/7 END 9/7

Clock Time	t	Water Level	s	Q	Comments
1350	170		42.28	Q = 387	H = 50"
1352	2	216.48			
1354	4	216.80	(?)		adj Q
	175 5	220.71	56.61		
1357	7	221.81			
	9	222.72			
	11	223.45			
	13	224.26			
1405	185 15	224.89	60.79		
	17	225.44			
1410	20	226.20			
1415	25	227.32			
	200 30	228.20	64.10		
	35	229.28			
	40	229.90			
	45	230.72			
	2 50	231.33			
1450	260 60	232.84	68.74		
	↳ 230'				



STMGID PW#3 STEP DRAWDOWN 9/7/84

PUMP TEST DATA (P/O WELL #3

LOCATION STAGG

TYPE OF TEST CONSTANT Q

START OF TEST 5/7/84 END 5/9

Clock Time	t	Water Level	s	Q	Comments
1450	260 0 230	232.84	68.74	387	H = 50" Sp Cap = 387 gpm / 68.14 ft = 5.6
	1	227.40		305	H = 30"
	2	226.67			
	3	226.28			
	4	226.04			
	5	225.95			
	7	225.78			
1500	270 10 240	224.65	60.5		H = 30"
1510	20 250	223.98			H = 50"
	30 260	224.05			
1530	100/40 290	224.31			started sander
1540	~~110~~ 50 ? 270	224.69			
1550	~~120~~ 60 290	225.00			
1600	~~130~~ 70 300	225.23			Sand less than 1 ppm
1610	350 ~~140~~ 80 310	225.48	61.38		cond = 970 58°F
1620	~~150~~ 90 320	225.72			
1630	~~160~~ 100 330	225.85			H = 29½
1650	390 ~~180~~ 120 350	226.67	62.57		
1710	410 ~~200~~ 140 370	226.92			H = 30
17:27	~~217~~ 157 387	227.26			
1800	~~250~~ 190 420	227.85			
1830	480 ~~280~~ 220 450	228.10	(228.10?)		
1900	510 ~~310~~ 250 480	228.61	64.51		
1930	~~340~~ 280 510	228.96			
2000	~~370~~ 310 540	229.43			96 cond 58°F H = 30
2030	60° ~~400~~ 340 570	229.94	65.84		
2120	~~450~~ 390 620	229.88			
2210	700 ~~500~~ 440 670	230.75	66.65		H = 30¼"
2300	~~550~~ 490 720	231.16			Sample, cond = 98, 58°F

4.12" =

PUMP TEST DATA (P)/O WELL #=

LOCATION STM61D

TYPE OF TEST Constant Q

START OF TEST 9/7 END 9/9/84

Clock Time	t	Water Level	s	Q	Comments
2400	81° ~~610~~ 780 550	231.08 760	66.98		
9/8 0115	885 ~~[illegible]~~ 625	232.21 855			adjust Q = 30"
0229	959 ~~755~~ 699	232.14 929			
0430	1080 ~~880~~ 820	232.05 1050	67.95		
0610	1160 ~~960~~ 900	231.67 1150			
0738	1260 ~~1060~~ 1008	231.76 1238			H = 30½"
0920	1370 ~~1170~~ 1110	232.23 1340			H = 30"
1100	1470 ~~1270~~ 1210	232.36 1440		H=30"→305	cond 978 58°F sample taken
1310	1600 ~~1400~~ 1340	232.45 1570	68.35		H = 30" Adj Q
1450	1720 ~~1520~~ 1460	232.62 1670			
1630	1800 ~~1600~~ 1540	232.79 1770	68.69		H = 30"
1810	1900 ~~1700~~ 1640	232.15 1879			cond 980 58°F
1950	2000 ~~1800~~ 1740	233.37 1970	69.27		H = 31½
2130	2100 ~~1900~~ 1840	233.28 2070			
2300	2190 ~~1990~~ 1930	232.15 2160		<H: 30"	cond 960 58°F Sample
9/9 0100	2310 ~~2110~~ 2050	232.58 2280		H = 30"	
0340	2470 ~~2270~~ 2410	233.72 2440	69.62	H = 32"	adjust
0645	2655 ~~2455~~ 2595	232.75 2625		H = 29"	adjust
0855	2785 ~~2585~~ 2725	231.79 2755		H = 30"	
1020	2870 ~~2670~~ 2810	232.80 2840	68.70		cond 110 0 58°F

Agr

$\frac{\text{Sp Cap} = 305 \text{ gpm}}{68.70 \text{ ft}} = 4.4 \frac{\text{gpm}}{\text{ft}}$

PUMP TEST DATA PUMP WELL #6 (MONITORING WELL

LOCATION S7N16E

TYPE OF TEST Constant Q

START OF TEST 9/7 END 9/9

Clock Time	t	Water Level	s	Q	Comments
0440		156.93			PUMP MUST HAVE
1137	37	156.95			STARTED @ 11:00
1156	56	156.95			
1215		156.94			
1248		156.94			ΔQ 1220 hrs
1314		157.00	(?)		
1318	138	156.94			ΔQ 1350 hrs
1428	208	157.02			
1448	228	157.10			ΔQ 1450 hrs
1505	245	157.12			
1523	263	157.15			
1535	275	157.17			
1555	295	157.19			
1615	315	157.20			
1645	345	157.24			
1715	375	157.29			
1850	470	157.38			
1926	506	157.42			
1955	535	157.41			
2028	568	157.44			
2118	618	157.45			
2206	666	157.44			
2240	700	157.41			
2355	775	157.44			
9/8 0925	1345	157.41			
1052	1432	157.41			
1302	1562	157.42			
1449	1669	157.37			
1615	1755	157.36			

PUMP TEST DATA P(6) WELL #6

LOCATION STN 16.1D

TYPE OF TEST Constant Q

START OF TEST 9/7 END 9/9

Clock Time	t	Water Level	s	Q	Comments
1753	1853	157.39			
2006	1960	157.40			
2130	2070	157.41			
2245	2145	157.44			
9/9 0115	2280	157.42			
0342	2442	157.48			
0446	2626	157.42			
0550	2750	157.41			
1010	2630	157.45			
	t'		RECOVERY		
1020	0				
1031	11	157.42	259		
1035	15	157.43	190		
1039	19	157.45	150		
	23	157.44	124		
	27	157.42	106		
	32	157.44	89		
	37	157.43	78		
	42	157.40	69 Used new tape		
	47	157.43	61		
	52	157.41	56		
	57	157.47	51		
	63	157.46	46		
	67	157.44	43		
	72	157.44	40		
	81	157.43	36		
	91	157.43	32		
	102	157.42	29		
1210	110	157.44	27		

PUMP TEST DATA P/O WELL #6

LOCATION STMGID

TYPE OF TEST Constant Q — Recovery

START OF TEST 9/7 END 9/10

Clock Time	t'	Water Level	t/t' s	Q	Comments
1222	122	157.45	24		
1242	142	157.45	21		
1332	192	157.45	16		
1538	318	157.46	10		
9/10 0812	1312	157.49	3		
9/11 0812	2752	157.47	2		

Otten-Wycoff Well
Pump Test Data

Appendix E

PUMPING TEST OF OTTEN-WYCOFF WELL

Washoe County
Department of
Water Resources
4930 Energy Way
Post Office Box 11130
Reno, NV 89520-0027
Tel: (702) 954-4600
Fax: (702) 954-4610

5 October 1998

MEMO TO: John Collins, Paul Orphan, Jess Coffman

FROM: Dan Dragan

SUBJECT: STMGID well No.4 (Otten/Wycoff well).

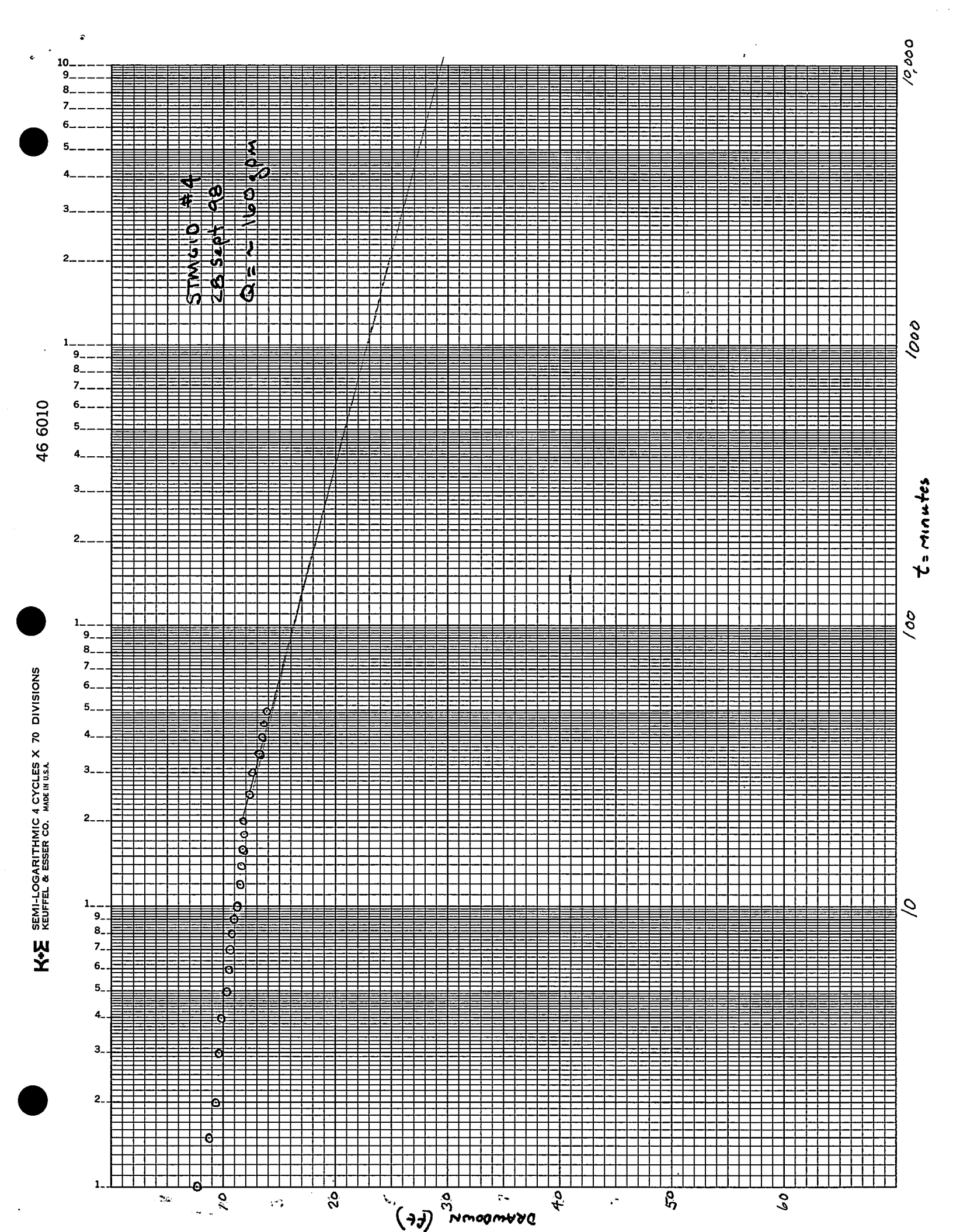
Because of aquifer dewatering, It appears STMGID well No. 4 is nearing the end of it's use as a municipal supply well. It will still function as a backup if we limit the pumping to emergency or peak use period. We will need to monitor the well closely if it is pumped continuously for more than a couple of days.

The static water level in the well was about 495 feet below ground surface when we tested it in 1984. Now the static is about 695 feet. The pump intake is set at 735 feet and, according to Dan Trampe of Carson Pump, the bottom of the useful casing is about 750 feet (It was originally thought to be about 830 feet deep). Drawdowns at the current pumping rate of about 160 gallons per minute approach the pump intake after about 10 days of continuous pumping.

We will keep track of water levels and monitor it closely if the well needs to be pumped for any length of time. Hopefully we will see some recovery this winter that will allow us to use the well when we need it next summer.

It does affect our decision to drill a new well at that site. Mike and I have discussed the situation and feel it would be better to drill at a site Mike has selected northwest of Well No.4. Number 4 would remain as a backup or peaking source (or perhaps that truck-fill station we are always looking for).

For your information, the CH2M Hill report in 1984 predicted a pumping level of 720 feet after 20 years of continuous pumping at 200 gpm. Not too bad a prediction but unfortunately erred on the optimistic side.


STMG'D #4
28 Sept 68
Q = ~ 1400 GPM
DRAWDOWN (FT)
t = minutes
SEMI-LOGARITHMIC 4 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 6010

WASHOE COUNTY

DEPARTMENT OF WATER RESOURCES
UTILITY SERVICES DIVISION

Department of Water Resources

WELL STMGID #4 (Formerly known @ Otten/Wycoff)
(PUMPING) / OBSERVATION WELL
(PUMPING) / RECOVERY DATA
PAGE 1 OF _____

PUMPING TEST DATA

TYPE OF PUMPING TEST Discharge to system
HOW Q MEASURED Flow meter
HOW WL's MEASURED Well Sounder
PUMPED WELL NO. _____
RADIUS of PUMPED WELL _____
DISTANCE from PUMPED WELL _____

M.P. for WL's Top of 3/4" PVC elev. _____
DEPTH OF (PUMP) AIRLINE 740 ft wrt _____
% SUBMERGENCE: initial _____ pumping _____
PUMP ON: date 28 Sept 98 time _____
PUMP OFF: date _____ time _____

TIME t = at t'=O					WATER LEVEL DATA STATIC WATER LEVEL = 692.54					WATER PRODUCT		COMMENTS
CLOCK TIME	ELAPSED TIME mins/hrs	t	t'	t /t'	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	S or S'			Q	(NOTE ANY CHANGES IN OBSERVERS)
1					700.28			7.74				
2					701.24			8.70				
3					701.80			9.26				
4					702.17			9.63				
5					702.49			9.95				
6					702.71			10.17				
7					702.96			10.42				100 gal 36 sec = gpm
8					703.12			10.58				
9					703.32			10.78				100 gal @ 36 sec
10					703.54			11.00				
12					703.74			11.20				100 gal @ 37 sec
14					704.01			11.47				
16					704.27			11.73				
18					704.45			11.91				100 gal @ 36.5
20					704.38			11.84				
25					704.84			12.30				100 gal @ 36.5
30					705.23			12.69				
35					705.68			13.14				
40					705.99			13.45				
45					706.23			13.69				100 gal @ 36.5
50					706.45			13.91				
												8220 gal / 50 min
												= 164 gpm
				RECOVERY								
51		1	51		700.09			7.55				
53		3	17.7		697.94			5.40				
55		5	11		697.09			4.55				
56		6	9.3		696.85			4.31				
58		8	7.25		696.44			3.90				
60		10	6		696.19			3.65				
62		12	5.2		695.97			3.43				
64		14	4.6		695.79			3.25				
66		16	4.1		695.66			3.12				
68		18	3.8		695.57			3.03				
70		20	3.5		695.45			2.91				
75		25	3		695.22			2.68				
80		30	2.7		695.02			2.48				
90		40	2.3		694.79			2.25				
101		51	2.0		694.58			2.04				

UTIL-16

28 Sept 98 - well Test

STMGID Production		494.48	Jun 82	4940108	Time (min)	W.L.	
Well # 4		496.35	10Jan84		1.	700.28	
Mt. Rose Highway		495.35	14Feb84		2.	701.24	
Well ID =		492.97	20Sep84		3.	701.80	
Elev. Corr =		540.00	13Oct89		4.	702.17	
M.P. = t.o.c. =		536.94	20Nov89		5.	702.49	
Survey =	(gps)	546.72	09Jul90		6.	702.71	
T. D. =		542.10	12Apr91		7.	702.96	
Perf. =		588.28	05Aug91		8	703.12	100 @ 36
Aquifer =		544.50	04Dec91		9	703.32	
Diam =		538.42	16Apr92		10	703.54	100 @ 36
Type = Production		556.12	04Aug92		12	703.74	100 @ 37
Wellog =		550.66	16Nov92		14	704.01	100 @ 36
		575.77	14DEC93		16	704.27	
		595.12	26APR94		18	704.45	100 @ 37
	ON	643.80	24FEB95		20	704.38	
	ON	718.24	21Sep95		25	704.84	100 @ 36.5
	OFF	648.38	22Jan96		30	705.23	
	ON	694.35	24Apr96		35	705.68	
	ON	694.30	03Mar97		40	705.99	
	off	692.54	28 Sept 98		45	706.23	100 @ 36.5
	off	679.85	6 Oct 98		50	706.45	
	off	673.18	13 Oct 98				

Well Investigation 28 Sept 98

8220 gals

Static W.L. = 692.54

46
- 11
35 sec = 100 gal

43,612,000
43,605,000
~~7,000~~

Trampe = pump setting
- stilling well depth

~~43,612,000~~
43,621,100 - Final
43,612,000 - Beginning

- 735 ft of 4" drop pipe
- 740 pump intake
- 756

Recovery

1	700.09
3	697.94
4.5	697.09
6.	696.85
8.	696.44
10	696.19
12.	695.97
14.	695.79
16.	695.66
18.	695.57
20.	695.45
25	695.22
30	695.02
40	694.79
[illegible]	
51	694.58

WASHOE COUNTY

DEPARTMENT OF WATER RESOURCES
UTILITY SERVICES DIVISION

Department of Water Resources

WELL STM610 #4
PUMPING / OBSERVATION WELL
PUMPING / RECOVERY DATA
PAGE 1 OF _____

PUMPING TEST DATA

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

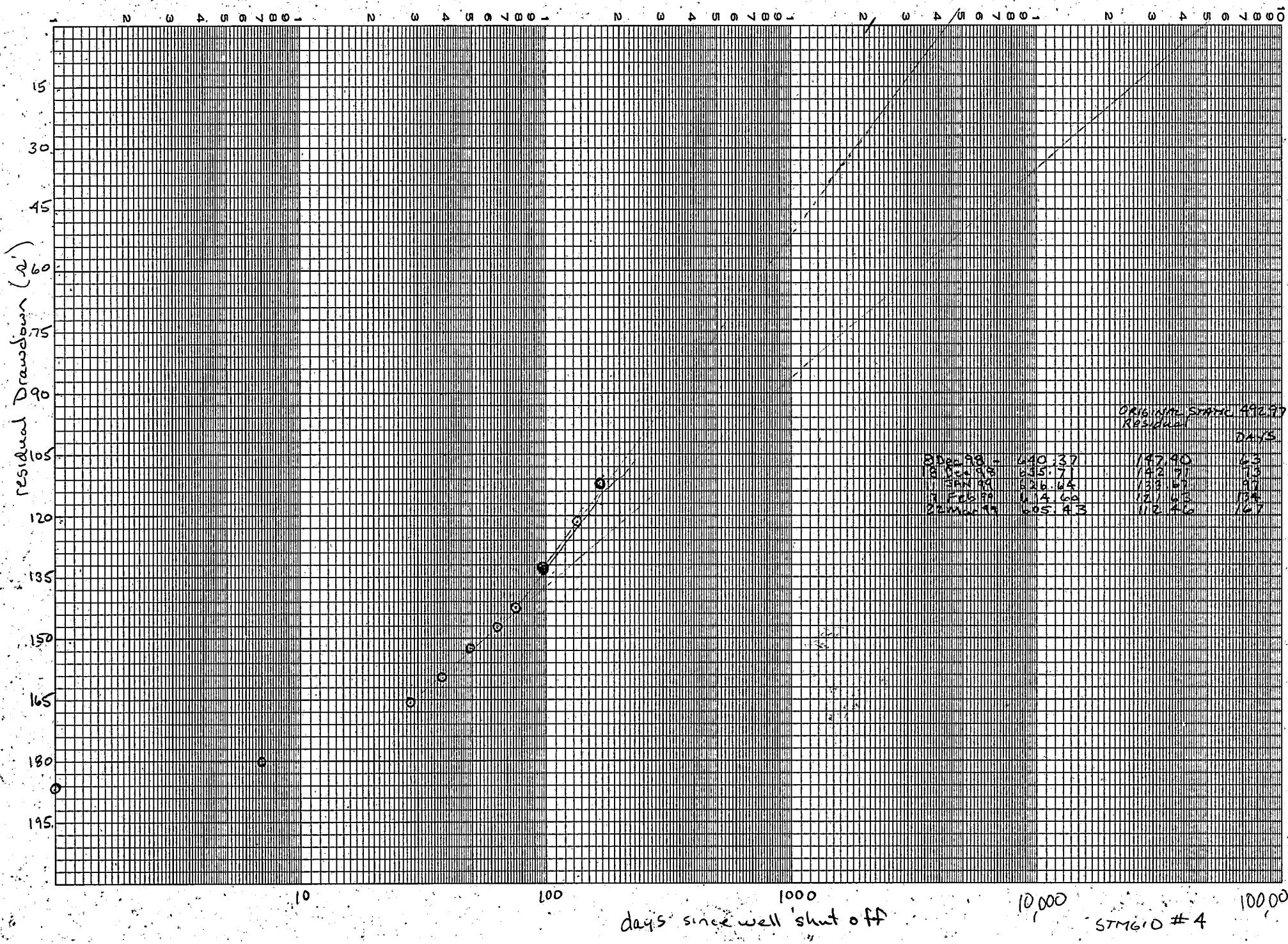
M.P. for WL's Top of 1" PVC elev. _____
DEPTH OF PUMP/AIRLINE _____ wrt _____
% SUBMERGENCE: initial _____ pumping _____
PUMP ON: date _____ time _____
PUMP OFF: date _____ time _____

TIME t = ~ at t'=O					WATER LEVEL DATA STATIC WATER LEVEL (1984) 492.97					WATER PRODUCT		COMMENTS
CLOCK TIME	ELAPSED TIME mins / hrs	t	t'	t /t'	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	S or S'		off # DAYS	Q	(NOTE ANY CHANGES IN OBSERVERS)
					679.85			186.88				6 Oct 98
					673.18			180.21				13 Oct 98
					658.68			165.71				3 NOV 98
					653.05			160.08				13 NOV 98
					645.80			152.83				24 NOV 98
					640.37			147.40				8 Dec 98
					635.67			142.71		73		18 Dec 98
					626.64			133.67		97		11 JAN 99
					614.60			121.63		134		17 ~~JAN~~ FEB 99
					605.43			112.46		167		22 MAR 99
					600.08							12 APR 99
					652.78							11 MAY 99
					603.19							10 JUN 99 P.L
					606.21							24 JUN 99 P.L
					577.47							15 JUL 99 P.L @150

UTIL-16

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

DIETZGEN CORPORATION
MADE IN U.S.A.



Dragan, Dan

To: Coffman, Jesse
Cc: Collins, John; Orphan, Paul
Subject: STMGID No. 4

Jess,

I looked at water level measurements for STMGID No. 4 and the deepest pumping level we have measured is 677.47 feet. When I tested it last year when you were having problems with the well it had a pumping level over 700 feet. You should still be able to use it without drawing down to the pump intake. However, I would like to run the well on manual overnight and measure pumping levels several times the next day. That would allow us to confirm whether or not drawdowns are nearing the pump intake. I'll come talk to you.

Dan

CH2M HILL
engineers
planners
economists
scientists

July 29, 1982

R15545.G0

Mr. John Collins
Chief Sanitary Engineer
Washoe County
1205 Mill Street
P.O. Box 11130
Reno, Nevada 89520

Dear John:

Subject: Results of Pumping Test, Otten-Wycoff Well Located in SW Sec. 30, T18N, R20E

Enclosed herewith are the drawdown, recovery, and water quality data from the pumping test recently conducted on the Otten-Wycoff Well. In my opinion, the long-term (20 year) yield of the well is at approximately 200 gpm. The water quality from the well is good. The total dissolved solids concentration is low, ranging from 150 mg/l to 210 mg/l depending on the method of determination. Arsenic, boron, or other trace elements were below detectable limits. We still have not received the results of the analyses performed at the state lab. However, we anticipate that no quality problems will be found.

Discussion of results:

The test was begun at 0754 on June 19, 1982, at approximately 355 gpm. The discharge was reduced to about 246 gpm at 1521 on June 20, 1982. This discharge was maintained continuously until the conclusion of the test at 0807, June 29, 1982. The drawdown and recovery curves are plotted on the attached figures.

The well apparently draws its water from fractures in the bedrock between 700 and 831 feet. The drawdown and recovery curves show a few small changes in slope, but generally the curves correspond to those that would be obtained in an homogeneous isotropic aquifer of infinite areal extent. No pronounced barriers or recharge boundaries were observed.

Water levels were also monitored in several nearby wells (see map). No response was observed in any of these wells. The O'Bryan well, located about 1,500 feet north of the pumped well may have had some response, but unfortunately this well was unmeasurable.

We have analyzed the test results using the Theis equation and have found that the drawdown and recovery curves can be approximated using the following aquifer parameters:

T = Transmissivity = 1,500 gpd/ft.

S = Storativity = 10^{-3}

R = Effective well radius = 45 ft.

B = Well loss coefficient = 1.6×10^{-4} ft/(gpm)^2

There is considerable uncertainty in the estimates, of in the storativity and effective well radius. This is because no data were available from observation wells.

The large apparent effective well radius is possibly a consequence of the well intersecting relatively large fractures associated with the fault immediately east of the well.

The well-loss coefficient was estimated from a step-drawdown test conducted on June 17, 1982.

We believe that the test results can be used to give a reasonable prediction of the long-term yield of the well. We estimate that the pumping water level after 20 years of continuous pumping at 200 gpm will be about 720 feet below ground level. Obviously, extrapolating a 10-day test to 20 years involves some uncertainty. The water level in the well should be monitored to determine if there is a significant departure from the predicted curves.

Please note that if several large capacity wells are drilled in the area, the yield per well will decrease due to well interference. The exact amount of interference cannot be determined with the data from the pumping test, because we have no observation well data.

Sincerely,

Fritz R. Carlson

Fritz Carlson
Department Manager
Ground Water

jc/060
Enclosure
cc: John Bell, Gail Szecsody/University of Nevada - Reno
Mike Campana/Desert Research Institute
Frank Yeamans/Phillips Petroleum Co.
Don Mahin/RAPA
Fred Cooper/Cooper Associates, Inc.
Phil Marshall/CES
Fred Arteaga/U.S. Geological Survey

CH2M HILL PUMPING TEST DATA

WELL Otten #1 - Mt Rose Alluvial Fan
(PUMPING) / OBSERVATION WELL
(PUMPING) / RECOVERY DATA
PAGE 1 OF 6

TYPE of PUMPING TEST Water Supply Well - Washoe County
HOW Q MEASURED 6⅛"x5" Orifice Plate + Flow meter
HOW WL's MEASURED Powers Well Sounder
PUMPED WELL NO. —
~~RADIUS~~ of PUMPED WELL 10" diameter - TD. = 831 ft.
DISTANCE from PUMPED WELL —

M.P. for WL's Top of PVC tube elev. —
DEPTH of (PUMP) / AIRLINE 730 ft. wrt —
% SUBMERGENCE : initial —; pumping —
PUMP ON : date 19 June 82 time 0754
PUMP OFF : date 29 June 82 time 0807

PERSONNEL (field) Dan Dragan

TIME t = ___ at t' = 0					WATER LEVEL DATA STATIC WATER LEVEL 504.12*				WATER PRODUCT.		COMMENTS
CLOCK TIME	ELAPSED TIME mins/hrs	t	$\sqrt{t}$	t/t'	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	S or S'		Q	(NOTE ANY CHANGES IN OBSERVERS)
0754	0/0	0					504.12	0	GPM	354	READING BY DAN DRAGAN
0755.5	1.5/0	1.5	1.22				547.60	43.48		354+	HIGHER Q AT START ADJUST ASAP
0756	2.0/0	2.0					546.88	42.76			
0757	3.0/0	3.0	1.73				547.39	43.27	GPM	354	Flow meter
0758	4/0	4.0					548.25	44.13			
0759	5/0	5.0	2.24				549.35	45.23			
0800	6/0	6.0					550.07	45.95			
0801	7/0	7.0	2.65				551.20	47.08			
0802	8/0	8.0					552.55	48.43			
0803	9/0	9.0	3.00				553.73	49.61			
0804	10/0	10.0					554.69	50.57			
0805	11/0	11.0	3.32				555.60	51.48			
0806	12/0	12.0					556.12	52.00			
0807	13/0	13.0	3.61				556.66	52.54			
0808	14/0	14.0					558.05	53.93			T = 21°C
0809	15/0	15.0	3.87				558.96	54.84			
0810	16/0	16.0					559.31	55.19			
0811	17/0	17.0	4.12				559.69	55.57	GPM	358	Q = 356 gpm @ 8"
0812	18/0	18.0					560.12	56.00			
0813	19/0	19.0	4.36				560.69	56.57			
0814	20/0	20.0					561.19	57.07			
0816	22/0	22	4.69				562.15	58.03			
0818	24/0	24					563.04	58.92			E.C. 173 μmhos.
0820	26/0	26	5.10				564.38	60.26			
0822	28/0	28					565.50	61.38			
0824	30/0	30	5.48				566.18	62.06			
0829	35/0	35					568.68	64.56	GPM	35[illegible]	Flow meter
0834	40/0	40	6.32				570.71	66.59			
0839	45/0	45					572.89	68.77			
0844	50/0	50	7.07				574.64	70.52	GPM	355	Flow meter
0849	55/0	55					576.68	72.56			
0854	0/1	60	7.75				578.32	74.20	GPM	353	Flow meter
0859	5/1	65					580.10	75.98			
0904	10/1	70	8.37				581.60	77.48			
0909	15/1	75					583.02	78.90			
0914	20/1	80	8.94				584.34	80.22			
0919	25/1	85					585.74	81.62			
0924	30/1	90	9.49				587.56	83.44	GPM	353	Flow meter
0929	35/1	95					588.94	84.82			
0934	40/1	100	10.0				590.14	86.02	GPM	351	Flow meter

* Well was pumped 4 hrs day before - Had not fully recovered at start of test (orig static = 494.48')

JOB NO. R15545.60

CH2M HILL PUMPING TEST DATA

WELL _____
(PUMPING) / OBSERVATION WELL
(PUMPING) / RECOVERY DATA
PAGE 3 OF 6

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 _____

TIME t = _____ at t' = 0					WATER LEVEL DATA STATIC WATER LEVEL _____					WATER PRODUCT.		COMMENTS
CLOCK TIME	ELAPSED TIME mins / hrs	t	1/t	t/t'	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	S or S'			Q	(NOTE ANY CHANGES IN OBSERVERS)
0602	8 / 22	1328	36.44				670.32	1166.20				ADJUST Q
0658	4 / 23	1384					671.35	167.23				T= 21°C - COND = 170 μmhos
0754	0 / 24	1440	37.95				672.10	167.98			OK	COLLECTED H_2O SAMPLE T= 21°C COND. 170 μmhos
0917	18 / 25	1518					673.28	169.16			Q ↓	START READINGS BY DAN DRAGAN
1020	26 / 26	1586	39.82				674.81	170.69			Q ↑	ADJUSTED Q
1100	6 / 27	1626					675.27	171.15			O.K.	
1205	11 / 28	1691	41.12				676.30	172.18			OK	
1354	0 / 30	1800					677.55	173.43			OK	T = 21°C EC = 177 μmhos
1454	0 / 31	1860	43.13				678.17	174.05			OK	
1520	26 / 31	1886					678.36	174.24		GPM	252	DROPPED Q @ 1521 hrs. 4" ON MANOMETER 252 gpm
1525	31 / 31	1891	43.49				662.05	157.93				
1530	36 / 31	1896					660.70	156.58				
1535	41 / 31	1901	43.60				659.76	155.64				
1545	51 / 31	1911					658.25	154.13				
1555	1 / 32	1921	43.83				657.35	153.23			↓	
1610	16 / 32	1936					655.53	151.41		4"	4" Q=OK	
1635	41 / 32	1961	44.28				653.12	149.00				START READINGS BY DON MAHIN
1655	1 / 33	1981					651.33	147.21			4" Q=OK	
1715	21 / 33	2001	44.73				650.00	145.88.				
1731	37 / 33	2017					649.12	145.00			4" Q=OK	
1801	6 / 34	2046	45.23				647.51	143.39				
1854	0 / 35	2100					644.75	140.63			4" Q=OK	
1930	36 / 35	2136	46.22				643.29	139.17				
2030	36 / 36	2196					641.17	137.05			↓	
2130	36 / 37	2256	47.50				639.64	135.52			4" Q=OK.	
2230	36 / 38	2316					638.21	134.09				
2330	36 / 39	2376	48.74				637.14	133.02				
21/JUNE/82						21 JUNE 82					↓	21 JUNE 1982
0030	36 / 40	2436	49.36				636.16	132.04		4"	4" Q=ok	START READINGS BY LEONARD CROWE
0130	36 / 41	2496					635.36	131.24			4" Q=ok	
0230	36 / 42	2556	50.56				634.71	130.59			4" Q=ok	
0330	36 / 43	2616					634.26	130.14			4" Q=ok	
0430	36 / 44	2676	51.73				633.76	129.64				T= 22°C E.C. = 182 μmhos
0530	36 / 45	2736					633.49	129.37				
0630	36 / 46	2796	52.88				632.88	128.76				
0735	41 / 47	2861					632.59	128.47				
0849	55 / 48	2935	54.18				632.32	128.20				START READINGS BY DAN DRAGAN
1031	37 / 50	3037					632.01	127.89				COLLECTED H_2O SAMPLE @0900 - T=21.5°C Ec=178 μmhos
1200	6 / 52	3126	55.91				631.96	127.84			↓	
1340	46 / 53	3226					631.71	127.59			Q=OK	

LOCATION
PERSONNEL
JOB NO.

CH2M HILL PUMPING TEST DATA

WELL _____
(PUMPING)/OBSERVATION WELL
(PUMPING)/RECOVERY DATA
PAGE 4 OF 6

TYPE of PUMPING TEST _____
HOW Q MEASURED _____
HOW WL's MEASURED 6⅛" x 4" Orifice Plate
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 _____

TIME t = _____ at t' = 0					WATER LEVEL DATA STATIC WATER LEVEL _____					WATER PRODUCT.		COMMENTS
CLOCK TIME	ELAPSED TIME mins/hrs	t	$\sqrt{t}$	t / t'	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	S or S'		h(")	Q	(NOTE ANY CHANGES IN OBSERVERS)
1540	46/55	3346	57.84				631.52	127.40		4"	OK	
1744	50/57	3470					631.33	127.21				START READINGS BY DON MAHIN
1944	50/59	3590	59.92				631.37	127.25				EC. 182 µmhos T= 22°C
2144	50/61	3710					631.53	127.41				
2344	50/63	3830	61.87				631.81	127.69			↓	
22 JUNE 82						22 JUNE 82				4"	OK	START READINGS BY LEONARD CROWE
0244	50/66	4010					632.09	127.97				
0544	50/69	4190	64.73				632.41	128.29				
0733	39/71	4299					632.59	128.47			↓	E.C. 182 µmhos T = 22°C
0930	36/73	4416	66.45				632.80	128.68		4"	OK	START READINGS BY DAN DRAGAN
1130	36/75	4536					633.14	129.02				Phillips PETROLEUM COLLECTED H_2O SAMPLE
1350	56/77	4676	68.38				633.38	129.26				
1550	56/79	4796					633.54	129.42			↓	
1750	56/81	4916	70.11				633.63	129.51		4"	O.K.	START READINGS BY DON MAHIN
1950	56/83	5036					633.95	129.83				EC. 184 µmhos T= 21.5°C
2150	56/85	5156	71.81				634.22	130.10				
2350	56/87	5276					634.60	130.48				
23 JUNE 82						23 JUNE 82				4"	OK	START READINGS BY LEONARD CROWE
0150	56/89	5396	73.46				634.99	130.85				
0350	56/91	5516					635.21	131.09				
0550	56/93	5636	75.07				635.45	131.33				
0750	56/95	5756					635.68	131.56			↓	
1007	13/98	5893	76.77				635.94	131.82		4"	OK	START READINGS BY DAN DRAGAN
1307	13/101	6073					636.41	132.29				
1550	56/103	6236	78.97				636.58	132.46			↓	T= 22°C E.C. 191 µmhos
1645										H=14.25"	246 gpm	4" orifice installed
1950	56/107	6476					636.83	132.71		14.25"	OK	START READINGS BY DON MAHIN
2150	56/109	6596	81.22				637.12	133.00				T= 22°C EC. 188 Hmhos
2356		6722					637.51	133.39			↓	
						24 JUNE 82						24 JUNE 82
0150	56/113	6836	82.68				637.75	133.63		14.25"	OK	START READINGS BY LEONARD CROWE
0350	56/115	6956					638.13	134.01				
0550	56/117	7076	84.12				638.39	134.27			↓	T= 22°C EC. 188 Hmhos
0853	59/120	7259					638.67	134.55			OK	START READINGS BY DAN DRAGAN
1216	22/124	7462	86.38				639.05	134.93				COLLECTED SAMPLE 0930
1531	37/127	7657					639.40	135.28			↓	T= 22°C E.C. = 188 Hmhos
1831	37/130	7837	88.53				639.98	135.86				START READINGS BY DON MAHIN
2131	37/133	8017					639.63	135.51		H=13.5"	—	ADJUST Q
2144	50/133	8030	89.61				640.40	136.28		H=14.25	OK	
2214	20/134	8060					640.61	136.49			↓	

PERSONNEL
LOCATION
NO.

CH2M HILL PUMPING TEST DATA

WELL _____
(PUMPING) / OBSERVATION WELL
(PUMPING) / RECOVERY DATA
PAGE 5 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 _____

TIME t = ____ at t' = 0					WATER LEVEL DATA STATIC WATER LEVEL _____					WATER PRODUCT.		COMMENTS
CLOCK TIME	ELAPSED TIME mins / hrs	t	$\sqrt{t}$	t / t'	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	S or S'			Q	(NOTE ANY CHANGES IN OBSERVERS)
—						25 JUNE 82				GPM	246	25 JUNE 82
0024	30 / 136	8190	90.50				641.22	137.10		14.25"	OK	READINGS BY LEONARD CROWE
0224	30 / 138	8310					641.58	137.46			↓	
0524	30 / 141	8490	92.14				642.09	137.97			↓	T = 22°C EC. = 190 µmhos
0724	30 / 143	8610					642.26	138.14			↓	
1000		—	—	—	—	—	—	—	—	—	—	Phillips Petroleum T=22°C Collected Sample E.C.=190 µmhos
1034	40 / 146	8800	93.81				642.60	138.48		14.25"	OK	D. DRAGAN
1400	6 / 150	9006					642.95	138.83			↓	↓
1700	6 / 153	9186	95.84				643.27	139.15			↓	DON MAHIN
2025	31 / 156	9391					643.80	139.68			OK	↓
2120	—	—	—	—	—	—	—	—	—	—	—	T = 22°C EC = 188 µmhos
2230	36 / 158	9516	97.55				644.18	140.06				
						26 JUNE 82						26 JUNE 82
0130	35 / 161	9695					644.76	140.64		14.25"	OK	LEONARD CROWE
0440	45 / 164	9885	99.42				645.25	141.13			↓	↓
0730	35 / 167	10055					645.52	141.40			↓	
0945	50 / 169	10190	100.95				645.70	141.58		14.25"	ok.	DON MAHIN
1110	35 / 172											EC. 190 µmhos T = 22°C
1230	35 / 172	10355					645.84	141.72			↓	↓
1445	51 / 174	10491	102.43				646.10	141.98			↓	↓
1800	6 / 178	10686					646.48	142.36		14.25"	ok.	DAN DRAGAN
2110	16 / 181	10876	104.29				646.79	142.67			↓	EC = 193 µmhos T = 22°C
2345	51 / 183	11031					647.13	143.01			↓	↓ COLLECTED SAMPLE 2130
						27 JUNE 82						27 JUNE 82
0400	6 / 188	11286	106.24				647.75	143.63		14.25"	OK	LEONARD CROWE
0700	6 / 191	11466					647.97	143.85				↓
1003	9 / 194	11649	107.93				648.30	144.18		14.25"	ok	DAN DRAGAN
1320	26 / 197	11846					648.70	144.58			↓	↓
1540	46 / 199	11986	109.48				648.97	144.85			↓	↓
1840	46 / 202	12166					649.15	145.03		14.25"	ok.	DON MAHIN
2040	46 / 204	12286	110.84				649.40	145.28			↓	↓
2335	41 / 207	12461					649.60	145.48			↓	↓
						28 JUNE 82						28 JUNE 82
0230	36 / 210	12636	112.41				649.98	145.86		14.25"	ok.	LEONARD CROWE
0530	36 / 213	12816					650.34	146.22			↓	↓
0830	36 / 216	12996	114.00				650.72	146.60		14.25"	ok	DAN DRAGAN
0910	16 / 217	13036					650.86	146.74			↓	↓
1110	16 / 219	13156	114.70				651.05	146.93			↓	↓
1420	26 / 222	13346					651.22	147.10			↓	↓ SAMPLED BY Phillips Petroleum
1815	21 / 226	13581	116.54				651.55	147.43				DON MAHIN

PERSONNEL

NO.

CH2M HILL PUMPING TEST DATA

WELL _____
PUMPING/OBSERVATION WELL
PUMPING/RECOVERY DATA
PAGE 6 OF 6

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 29 June 82 time 0807

TIME t = _____ at t' = 0					WATER LEVEL DATA STATIC WATER LEVEL _____					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)
2325	31/231	13891	117.86				651.93	147.81		14.25"	OK	DON MAHIN
						29 JUNE 82						29 JUNE 82
0230	36/234	14076	118.64				652.31	148.19		14.25"	OK	LEONARD CROWE
0530	36/237	14256	119.40				652.51	148.39			ok	
0800	6/240	14406	120.02				652.81	148.69				D. DRAGAN. COLLECTED SAMPLE
				CEASED PUMPING @ 0807 29 JUNE 82								

PERSONNEL

LOCATION

NO.

CH2M HILL PUMPING TEST DATA

WELL OTTEN #1 - MT ROSE
PUMPING / OBSERVATION WELL
(PUMPING) / RECOVERY DATA
PAGE 1 OF 3

TYPE of PUMPING TEST: WATER WELL - CONSTANT Q
HOW Q MEASURED: ORIFICE PLATE 6⅛" x 4" (5½" first)
HOW WL's MEASURED: POWERS WELL SOUNDER
PUMPED WELL NO.:
RADIUS of PUMPED WELL: 10" Diameter well
DISTANCE from PUMPED WELL:
M.P. for WL's: Top of PVC Tube elev.:
DEPTH of PUMP/AIRLINE: wrt
% SUBMERGENCE: initial ; pumping
PUMP ON: date 19 June 82 time 0754
PUMP OFF: date 29 June 82 time 0807

TIME: t = 14413 at t' = 0
WATER LEVEL DATA: STATIC WATER LEVEL 504.12 * well had been pumped day before start of test

CLOCK TIME	ELAPSED TIME mins/hrs	t	t'	t/t'	[redacted]	CONVERSIONS or CORRECTIONS	WATER LEVEL	S or (S')	$\sqrt{t}-\sqrt{t'}$	WATER PRODUCT.	Q	COMMENTS (NOTE ANY CHANGES IN OBSERVERS)
0807	13/240	14413	0		$\sqrt{t}$	$\sqrt{t'}$						MEASURED BY D. DRAWN
0811	17/240	14417	4	3604	120.07	2	625.50	121.38	118.07			* W.L. ROSE :
0812	18/240	14418	5	2884			624.98	120.86				dropped in first
0813	19/240	14419	6	2403			624.49	120.37				3 mins (water in
0814	20/240	14420	7	2060	120.08	2.65	624.02	119.90	117.43			column pipe)
0815	21/240	14421	8	1803			623.58	119.46				
0816	22/240	14422	9	1602			623.13	119.01				
0817	23/240	14423	10	1442	120.10	3.16	622.70	118.58	116.94			
0818	24/240	14424	11	1311			622.31	118.19				
0819	25/240	14425	12	1202			621.88	117.76				
0820	26/240	14426	13	1110	120.11	3.61	621.56	117.44	116.50			
0821	27/240	14427	14	1031			621.14	117.02				
0822	28/240	14428	15	962			620.77	116.65				
0823	29/240	14429	16	902	120.12	4.00	620.39	116.27	116.12			
0824	30/240	14430	17	849			620.04	115.92				
0825	31/240	14431	18	802			619.70	115.85				
0826	32/240	14432	19	760	120.13	4.36	619.40	115.28	115.77			
0827	33/240	14433	20	722			619.04	114.92				
0829	35/240	14435	22	656			618.42	114.30				
0831	37/240	14437	24	602	120.15	4.90	617.80	113.68	115.25			
0833	39/240	14439	26	555			617.18	113.06				
0835	41/240	14441	28	516			616.60	112.48				
0837	43/240	14443	30	481	120.18	5.48	616.04	111.92	114.70			
0839	45/240	14445	32	451			615.45	111.33				
0841	47/240	14447	34	425			614.95	110.83				
0843	49/240	14449	36	401	120.20	6.00	614.40	110.28	114.20			
0845	51/240	14451	38	380			613.89	109.77				
0847	53/240	14453	40	361			613.37	109.25				
0849	55/240	14455	42	344	120.23	6.48	612.85	108.73	113.75			
0851	57/240	14457	44	329			612.37	108.25				
0853	59/240	14459	46	314			611.89	107.77				
0855	1/241	14461	48	301	120.25	6.93	611.40	107.28	113.32			
0857	3/241	14463	50	289			610.92	106.80				
0902	8/241	14468	55	263			609.79	105.67				
0907	13/241	14473	60	241	120.28	7.75	608.68	104.56	112.53			
0913	19/241	14479	66	219			607.35	103.23				
0917	23/241	14483	70	207			606.58	102.46				
0922	28/241	14488	75	193	120.37	8.66	605.54	101.42	111.71			
0927	33/241	14493	80	181			604.53	100.41				
0932	38/241	14498	85	171			603.58	99.46				

CH2M HILL PUMPING TEST DATA

WELL OTTEN #1-MT ROSE
PUMPING / OBSERVATION WELL
(PUMPING) / (RECOVERY DATA)
PAGE 2 OF 3

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 _____

TIME (t = _____ at t' = 0)					WATER LEVEL DATA (STATIC WATER LEVEL _____)					WATER PRODUCT.		COMMENTS
CLOCK TIME	ELAPSED TIME mins / hrs	t	t'	t/t'	~~$\sqrt{t}$~~ READING	~~CONVERSIONS~~ or CORRECTIONS	WATER LEVEL	S or (S')	$\sqrt{t}-\sqrt{t'}$		Q	(NOTE ANY CHANGES IN OBSERVERS)
0937	43 / 241	14503	90	161	$\sqrt{t}$	$\sqrt{t}$	602.68	98.56				
0942	48 / 241	14508	95	153	120.45	9.75	601.72	97.60	110.70			
0947	53 / 241	14513	100	145			600.81	96.69				
0957	3 / 242	14523	110	132			599.06	94.94				
1007	13 / 242	14533	120	121	120.55	10.95	597.37	93.25	109.60			
1017	23 / 242	14543	130	112			595.77	91.65				
1027	33 / 242	14553	140	104			594.22	90.10				
1037	43 / 242	14563	150	97.0	120.68	12.25	592.72	88.60	108.43			
1047	53 / 242	14573	160	91.0			591.29	87.00				
1057	3 / 243	14583	170	86.0			589.90	85.78				
1107	13 / 243	14593	180	81.0	120.80	13.42	588.56	84.44	107.38			
1117	23 / 243	14603	190	76.9			587.29	83.17				
1127	33 / 243	14613	200	73.1			586.05	81.93				
1137	43 / 243	14623	210	69.6	120.93	14.49	584.85	80.73	106.44			
1147	53 / 243	14633	220	66.5			583.67	79.55				
1202	8 / 244	14648	235	62.3			581.98	77.86				
1217		14663	250	58.7	121.09	15.81	580.38	76.26	105.28			
1232		14678	265	55.4			578.87	74.75				
1247		14693	280	52.5			577.47	73.35				
1308		14714	301	48.9	121.30	17.35	575.60	71.48	103.95			
1327	33 / 245	14733	320	46.0			574.07	69.95				
1347		14753	340	43.4			572.53	68.41				
1407		14773	360	41.0	121.54	18.97	571.09	66.97	102.57			
1437		14803	390	38.0			569.09	64.97				
1507		14833	420	35.3			567.27	63.15				
1537	43 / 247	14863	450	33.0	121.91	21.21	565.61	61.49	100.70			
1607		14893	480	31.0			564.05	59.93				START READINGS BY DON MAHIN
1657		14943	530	28.2			561.80	57.68				
1722		14968	555	26.9	122.34	23.56	560.87	56.75	98.78			
1745		14991	578	25.9			560.00	55.88				
1845	51 / 250	15051	638	23.6			558.08	53.96				
1915		15081	668	22.6	122.80	25.85	557.23	53.11	96.95			
1945		15111	698	21.6			556.45	52.33				
2030		15156	743	20.4			555.22	51.10				
2130		15216	803	18.9	123.35	28.34	554.09	49.97	95.01			
2230	36 / 254	15276	863	17.7			552.89	48.77				
2330		15336	923	16.6			552.00	47.88				
						30 JUNE 82						START READINGS BY LEONARD CROWE
0100		15426	1013	15.2	124.20	31.83	550.65	46.53	92.37			
0230		15516	1103	14.1			549.66	45.54				

PERSONNEL
LOCATION
JOB NO.
TIME 82

CH2M HILL PUMPING TEST DATA

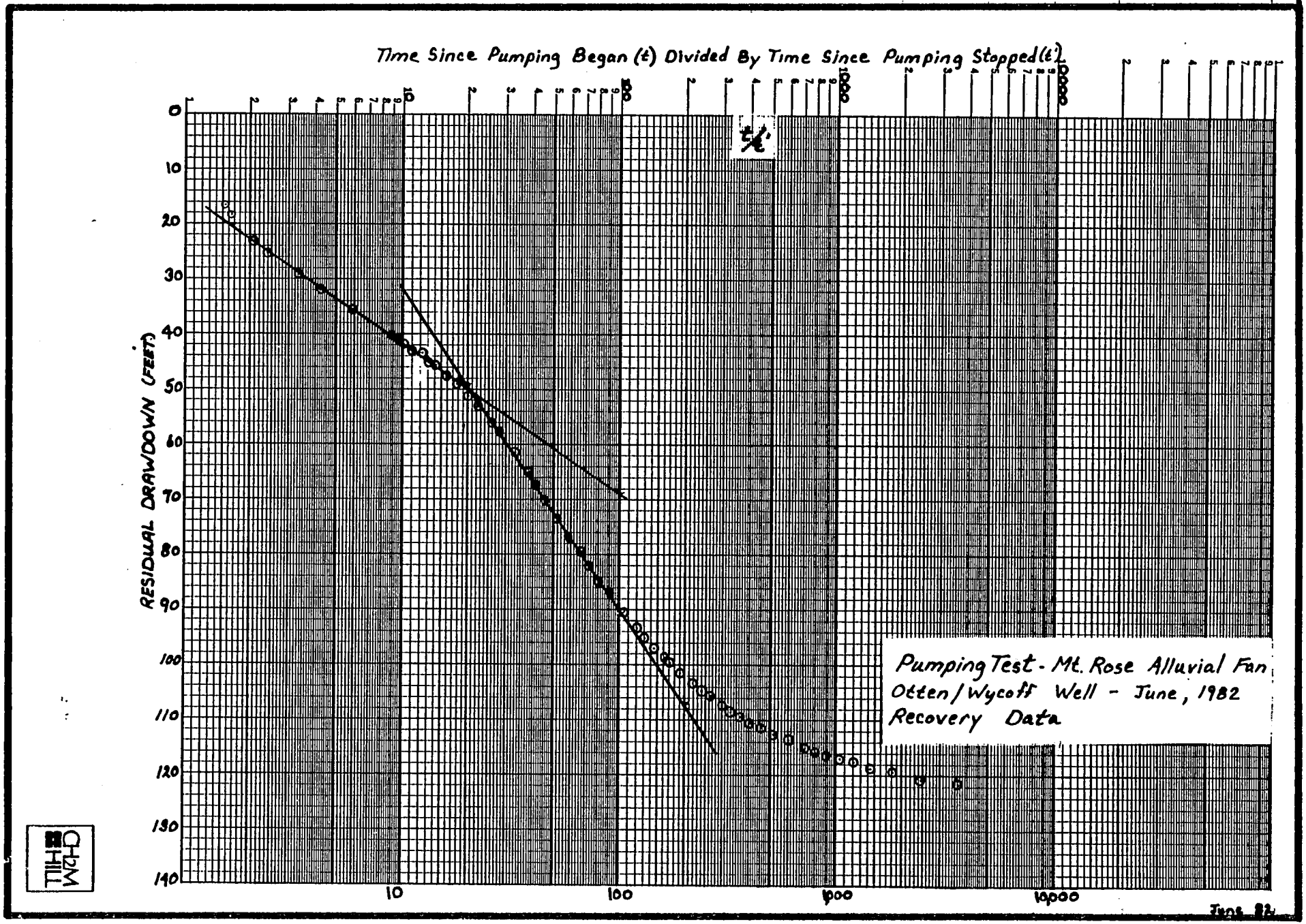
WELL OTTEN #1 - MT ROSE
PUMPING / OBSERVATION WELL
(PUMPING) / (RECOVERY DATA)
PAGE 3 OF 3

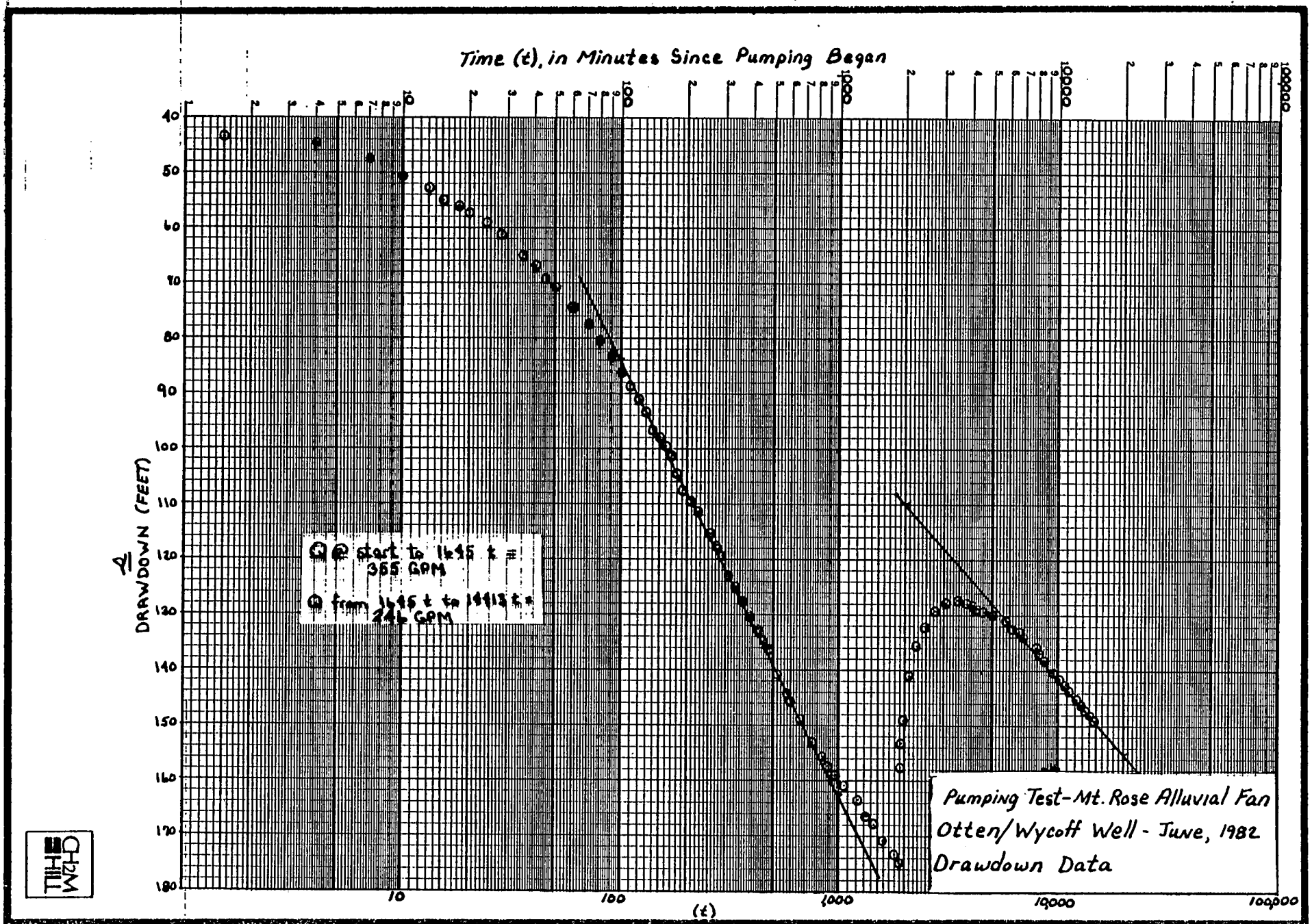
TYPE of PUMPING TEST WATER WELL
HOW Q MEASURED ORIFICE PLATE
HOW WL's MEASURED POWERS WELL SOUNDER
PUMPED WELL NO. _____
RADIUS of PUMPED WELL _____
DISTANCE from PUMPED WELL _____

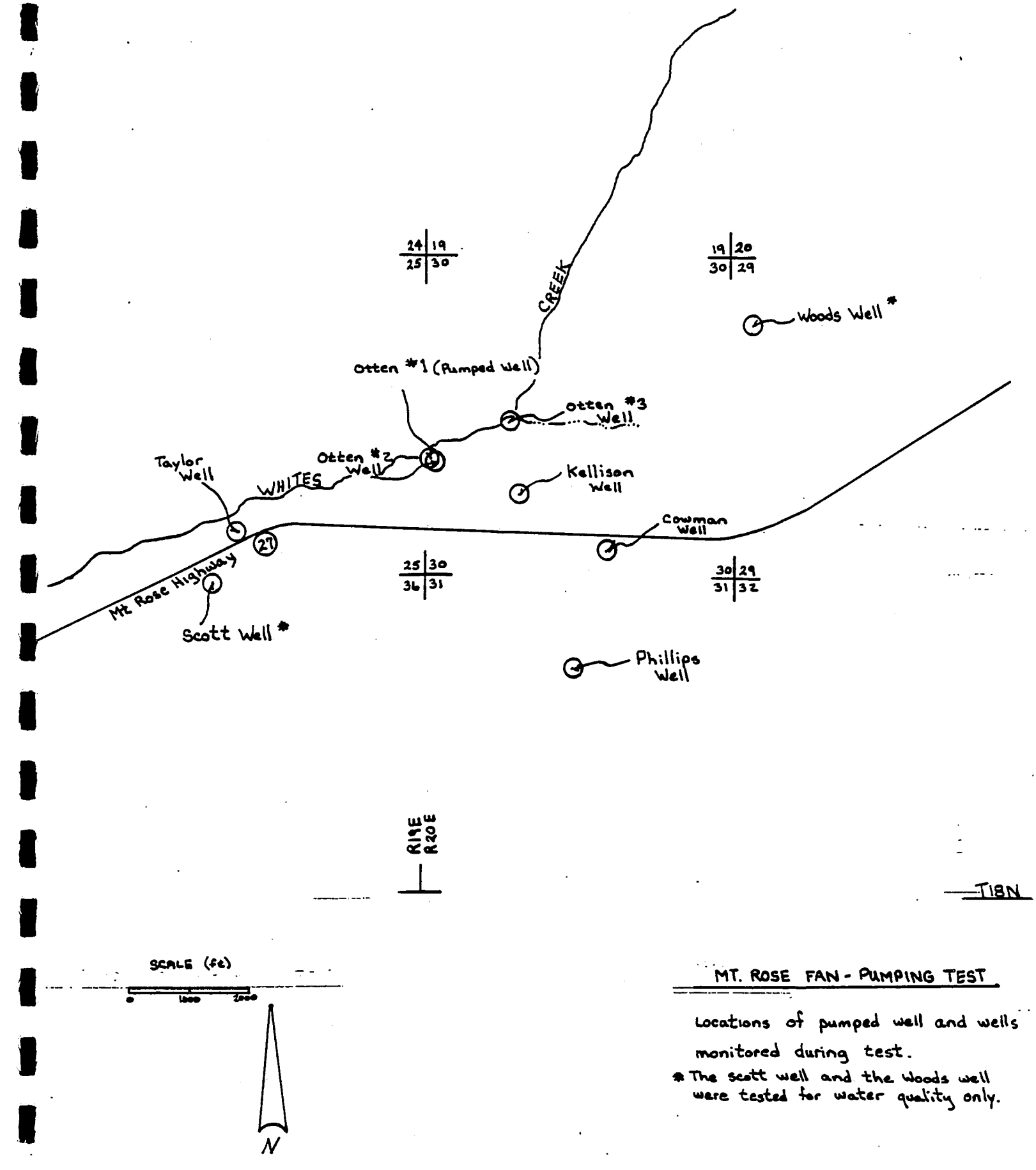
M.P. for WL's Top of Casing elev. _____
DEPTH of PUMP/AIRLINE _____ wrt _____
% SUBMERGENCE : initial _____ ; pumping _____
PUMP ON : date _____ time _____
PUMP OFF : date _____ time _____

TIME t = _____ at t' = 0					WATER LEVEL DATA STATIC WATER LEVEL _____					WATER PRODUCT.		COMMENTS
CLOCK TIME	ELAPSED TIME mins / hrs	t	t'	t / t'	READING	CONVERSIONS or CORRECTIONS	WATER LEVEL	S or S'	$\sqrt{t_E}-\sqrt{t_E'}$		Q	(NOTE ANY CHANGES IN OBSERVERS)
0400	6 / 360	15606	1193	13.1	$\sqrt{t}$	$\sqrt{t'}$	548.66	44.54				
0537		15703	1290	12.2	125.31	35.92	547.77	43.65	89.39			
0800		15846	1433	11.1	125.88	37.85	546.75	42.63	88.03			D. DRAGAN
1015		15981	1568	10.2	126.41	39.60	545.89	41.77	86.81			
1210		16096	1683	9.6	126.87	41.02	545.13	41.01	85.85			
1440	46 / 270	16246	1833	8.9	127.46	42.81	544.21	40.09	84.65			
					1	JULY 82						1 JULY 82
0905	11 / 389	17351	2938	5.9	131.72	54.20	539.80	35.68	77.52			
					2	JULY 82						2 JULY 82
0945	51 / 313	18831	4418	4.26	137.23	66.47	536.04	31.92	70.76			
					3	JULY 82						3 JULY 82
1348	59 / 341	20514	6101	3.36	143.23	78.12	533.45	29.33	65.11			
					6	JULY 82						6 JULY 82
0850	56 / 408	24536	10123	2.42	156.64	100.61	529.45	25.33	56.03			
					8	JULY 82						
1220		27626	13213	2.1	166.21	114.95	527.41	23.29	51.26			8 JULY 82
1500		36426	22013	1.65	14	JULY 82	522.30	18.18				14 JULY 82
1415		40701	26288	1.55	17	JULY 82	520.65	16.53				17 JULY 82

PERSONNEL
LOCATION
NO.


Time Since Pumping Began (t) Divided By Time Since Pumping Stopped (t')
t/t'
RESIDUAL DRAWDOWN (FEET)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
10
100
1000
10000
Pumping Test - Mt. Rose Alluvial Fan
Otten / Wycoff Well - June, 1982
Recovery Data
CH2M HILL
June 82


Time (t), in Minutes Since Pumping Began
DRAWDOWN (FEET)
(t)
@ start to 1445 t = 365 GPM
@ from 1445 t to 14413 t = 244 GPM
Pumping Test-Mt. Rose Alluvial Fan
Otten/Wycoff Well - June, 1982
Drawdown Data
CH2M HILL



MT. ROSE FAN - PUMPING TEST

Locations of pumped well and wells monitored during test.

* The scott well and the Woods well were tested for water quality only.

PHILLIPS PETROLEUM COMPANY
P. O. BOX 6256
RENO, NEVADA 89513

July 16, 1982

Mr. Fritz Carlson
CH2M Hill
P. O. Box 2088
Redding, California 96099

Dear Fritz:

Enclosed are copies of the water analyses from your pump test in the Steamboat Hills area. The analyses were done in-house. Also enclosed are copies of representative water analyses from our baseline sampling. Although there are chemical (or analytical) differences between the three waters I think they are part of the same hydrologic system and the reported trace element analyses can be extrapolated to your test well with a high degree of confidence. If there are any questions on this please feel free to contact me. I am interested in hearing about the pump test results.

Sincerely,

Frank

Frank Yeamans

FY:df
Enc.

Location	CH2M Hill	ID# 6-22
Type	Dom. Well - OTTEN # 1 Sample	Date Sampled 6-22-82
collected after 4,400 minutes of pumping 350-350gpm		Sampled By; FLY

Ec 180 μmho cm @ 27°C

pH 7.2 @ 27 °C

ANIONS	mg/l	meq/l
CO_3	Ø	Ø
HCO_3	117	1.92
Cl	2.1	0.06
F	-0.2	Ø
SO_4	2.1	0.04
NO_3-NO_2	0.16	0.003
N-NH_3	-0.1	Ø
SiO_2	42	
B	-0.1	
Total Anions	163	2.02

CATIONS	mg/l	meq/l
Na	11.0	0.48
K	2.8	0.07
Ca	26.4	1.32
Mg	0.50	0.04
Li	-0.1	Ø
Total Cations	41	1.92

TDS(calc) 204 mg/l

meq ratio c/a 0.950

Completed 7/12/82

John E Sabol

Trace metals	ppm
Ag	
Al	
As	
Au	
Cs	
Cu	
Fe Total	-0.1
Hg	
Mn	
Pb	
Rb	
Sb	
Sr	
Zn	

Location CH2M HILL	ID# 6-25
Type Dom. Well OTTEN #1 - Sampled	Date Sampled 6/25/82
after 3,600 minutes of pumping 350-350 gpm	Sampled By; Lorri

Ec 180 μmho cm @ 23°C

pH 7.1 @ 23 °C

ANIONS	mg/l	meq/l
CO_3	Ø	Ø
HCO_3	124	2.03
Cl	3.2	0.09
F	-0.2	Ø
SO_4	-1	Ø
NO_3-NO_2	0.11	0.002
N-NH_3	-0.1	Ø
SiO_2	42	
B	-0.1	
Total Anions	169.3	2.12

CATIONS	mg/l	meq/l
Na	11	0.48
K	2.5	0.06
Ca	27.7	1.36
Mg	0.49	0.04
Li	-0.1	Ø
Total Cations	41.5	1.94

TDS(calc) 211 mg/l

meq ratio c/a 0.915

Completed 7/13/82

Trace metals	ppm
Ag	
Al	
As	
Au	
Cs	
Cu	
Fe Total	-0.1
Hg	
Mn	
Pb	
Rb	
Sb	
Sr	
Zn	

Location CH2M Hill	ID# 6-28
Type Dom. Well-OTTEN #1 - Sample	Date Sampled 6/28/82
collected after 13500 minutes of pumping 250-350 gpm	Sampled By; JES

Ec 183 μmho cm @ 23°C

pH 7.2 @ 23 °C

ANIONS	mg/l	meq/l
CO_3	Ø	Ø
HCO_3	121	1.98
Cl	3.2	0.09
F	-0.2	Ø
SO_4	2.0	0.04
NO_3-NO_2	0.22	0.003
N-NH_3	-0.1	Ø
SiO_2	43	
B	-0.1	
Total Anions	169.4	2.11

CATIONS	mg/l	meq/l
Na	11	0.48
K	2.5	0.06
Ca	28.8	1.44
Mg	0.50	0.04
Li	-0.1	Ø
Total Cations	42.8	1.97

TDS(calc) 212 mg/l

meq ratio c/a 0.934

Completed 7/13/82

John E Schlotter

Trace metals	ppm
Ag	
Al	
As	
Au	
Cs	
Cu	
Fe Total	-0.1
Hg	
Mn	
Pb	
Rb	
Sb	
Sr	
Zn	

AMTECH American Technical Laboratories, Inc.
8909 Complex Drive — Suite F San Diego, California 92123 (714) 560-7717

PHILLIPS PETROLEUM COMPANY
POST OFFICE BOX 6256
RENO, NEVADA 89513

LABORATORY NO: 0198-81
DATE OF REPORT: 3/31/81
DATE RECEIVED: 2/04/81
SAMPLE NUMBER: 1880,1881

SPECIES			eq/L	mg/L
Ca		0	6.24-4	12.5
Mg		0	1.19-3	14.5
Na		0	5.66-4	13.0
K		0	1.8-4	7.0
SiO_2		0	1.0-2	64.
CO_3		E	-	-
HCO_3		E	2.38-3	145.
SO_4		E	1.1-4	5.1
Cl		E	5.1-5	1.8
SiO_2	moles/L	E	1.1-2	69.
TEMPERATURE				
Ec µmhos/cm	as rec'd	E		268.
Ec µmhos/cm	diluted			261.
DILUTION FOR Ec				1:2
pH		E		7.25
B		E	2.-6 ✓	✓ 0.02
Li		0	9.7-7	0.0067
$NO_2 + NO_3$				
NH_4				
F		E	3.-6	0.05
Ec CALCULATED			243.	
RATIO Ec	calc/obs.		.934	
CATIONS SUM			2.56-3	
ANIONS SUM			2.53-3	
RATIO CATIONS/ANIONS			1.01	
TOTAL IONS FOUND				

SPECIES		mg/L
I	E	<0.02
TDS	E	165.
As	0	<0.02
Hg	0	0.0002
Mn	0	<0.02
Fe	0	0.09
Pb	0	<0.2
Sb	0	<0.007
Rb	0	<0.001
Cs	0	<0.05
Sr	0	0.2

DATE COLLECTED: 12/16/80
BASIN NUMBER: 87- Scott dom. well

AMTECH American Technical Laboratories, Inc.
8909 Complex Drive — Suite F San Diego, California 92123 (714) 560-7717

PHILLIPS PETROLEUM COMPANY
POST OFFICE BOX 6256
RENO, NEVADA 89513

LABORATORY NO: 0254-81
DATE OF REPORT: 4/22/81
DATE RECEIVED: 2/26/81
SAMPLE NUMBER: 1944,1945

SPECIES		eq/L	mg/L
Ca	0	1.72-3	34.4
Mg	0	8.0-4	9.7
Na	0	3.0-4	7.0
K	0	1.3-4	5.0
SiO_2	0	1.0-3	62.
CO_3	E	-	-
HCO_3	E	2.52-3	154.
SO_4	E	4.0-4	19.
Cl	E	5.6-5	2.0
SiO_2 moles/L	E	1.0-3	61.
TEMPERATURE			
Ec µmhos/cm as rec'd	E		285.
Ec µmhos/cm diluted	E		287.
DILUTION FOR Ec	E		1:3
pH	E		7.67
B	E	7.-6	0.08
Li	0	1.51-6	0.0105
$NO_2 + NO_3$			
NH_4			
F		5.-7	0.06
Ec CALCULATED		294.	
RATIO Ec calc/obs.		1.02	
CATIONS SUM		2.95-3	
ANIONS SUM		2.97-3	
RATIO CATIONS/ANIONS		0.990	
TOTAL IONS FOUND			

SPECIES		mg/L
T.D.S.	E	212.
As	0	<0.02
Hg	0	0.0003
Mn	0	<00.03
Fe	0	<0.05
Pb	0	<0.2
Sb	0	<0.007
Rb	0	0.01
Cs	0	<0.05
Sr	0	0.3

DATE COLLECTED: 2/17/81
BASIN NUMBER:

Woods well

ENVIRONMENTAL LABORATORY
2218 RAILROAD AVENUE, P.O. BOX 2088
REDDING, CA 96001—TELEPHONE (916) 243-5831

REF. NO. 7977
DATE 7/23/82
PAGE 1 OF 1

Physical
Chemical &
Bacteriological
Analysis

ANALYSIS

REPORT TO Mt. Rose Fan - Otten #1 well
CH2M HILL/R15545.60

ATTN: Fritz Carlson PHONE:

SAMPLE DESCRIPTION Water - Pump Test 1600 Hr. SAMPLED BY: D. Dragan

DATE OF SAMPLE 6/23/82 DATE RECEIVED 7/1/82

MAJOR CATIONS	milligrams per liter	milli-equivalents per liter	TRACE ELEMENTS	milligrams per liter	OTHER	milligrams per liter
Calcium (Ca)			Arsenic (As)	<0.005	Phenolphthalein Alkalinity ($CaCO_3$)	
Magnesium (Mg)			Barium (Ba)	<0.1		
Potassium (K)			Cadmium (Cd)	<0.01	Methyl Orange (total) Alkalinity ($CaCO_3$)	
Sodium (Na)			Chromium (Cr) total	<0.02		
			Copper (Cu)	<0.02	Total Hardness ($CaCO_3$)	
			Fluoride (F)		pH (units)	
total milli-equivalents per liter			Iron (Fe)	<0.05	Electrical Conductivity (micromhos/cm @ 25°C)	
			Lead (Pb)	<0.05		
MAJOR ANIONS			Manganese (Mn)	<0.01	Turbidity (NTU)	
			Mercury (Hg)	<0.001	Color (units)	
Bicarbonate (HCO_3)			Selenium (Se)	<0.01	Odor (units)	
Carbonate (CO_3)			Silver (Ag)	<0.02	Total Dissolved Solids	
Chloride (Cl)			Zinc (Zn)	<0.02	MBAS	
Nitrate (NO_3)					PESTICIDES	
Phosphate (PO_4)					Endrin	
Sulfate (SO_4)					Lindane	
					Methoxychlor	
			BACTERIA	MPN/100 ml	Toxaphene	
total milli-equivalents per liter			Total Coliform		2-4-D	
			Fecal Coliform		2-4-5-TP Silvex	

COMMENTS:

All analyses by EPA or State of California recommended methods, unless otherwise noted

State Approved Water Laboratory for Chemical, Bacteriological, and Bioassay Examinations

REPORTED BY: James E. Hawley

The information shown on this sheet is test data only and no analysis or interpretation is intended or implied.

Form 121

CH2M HILL
ENVIRONMENTAL LABORATORY
2218 RAILROAD AVENUE, P.O. BOX 2088
REDDING, CA 96001—TELEPHONE (916) 243-5831

REF. NO. 7908
DATE 6/15/82
PAGE 1 OF 1

Physical
Chemical &
Bacteriological
Analysis

SPECIFIC ANALYSIS

REPORT TO MT. ROSE FAN Otten #1 well
CH2M HILL/RDD

ATTN: Dan Dragan PHONE:

SAMPLE DESCRIPTION Water SAMPLED BY: Client

DATE OF SAMPLE 6/11/82 DATE RECEIVED 6/14/82

ALL RESULTS ARE IN MG/L UNLESS OTHERWISE NOTED

ARSENIC
<0.005

COMMENTS: R15545.60
Tried to phone Dan 3 PM, 6/15/82/FRB, not in.

All analyses by EPA or State of California recommended methods, unless otherwise noted

State Approved Water Laboratory for Chemical, Bacteriological, and Bioassay Examinations

REPORTED BY: James E. Hawley

The information shown on this sheet is test data only and no analysis or interpretation is intended or implied.

Form 65

DBL. DIAMOND TEST WELL

Appendix F

DOUBLE DIAMOND RANCH TEST WELL REPORT

TESTING OF TWO WELLS AT THE DOUBLE DIAMOND RANCH NEAR RENO, NEVADA

Prepared for

COOPER & ASSOCIATES

Prepared by

CH2M HILL
1525 Court Street
Redding, California 96001

April 1984

R15545.24

1.0--CONCLUSION

The Double Diamond wells, under present conditions, are capable of a long-term yield of 330 gpm and 800 gpm for Wells DD-T-1 and DD-T-2, respectively. Higher short-term yields are acceptable if pumping stays within the constraints of available drawdown, casing diameter, and pumping duration.

2.0--AQUIFER CHARACTERISTICS

Aquifer characteristics determined by the pumping test conducted by CH2M HILL in February 1984 are consistent with the aquifer characteristics found by Hydro-Search, Inc., in December 1980 and January 1981. Table 1 summarizes the results of each test pumping.

3.0--LONG-TERM YIELD

The estimated yield of DD-T-1 is 330 gpm, and the estimated yield of DD-T-2 is 800 gpm. Many factors affect estimates of long-term yield of a well. Listed below are some of the main factors associated with predictions of long-term yield and their relationship to the Double Diamond wells. Calculations of estimated long-term yield are shown in Table 2.

1. Pumping Duration--Estimates of long-term yield may be based on continuous pumping or intermittent pumping (such as that caused by seasonal changes in demand). Estimates of long-term yield for the Double Diamond wells are based on a continuous demand for 19 years. Different values for duration of pumping and well yield may be substituted in the yield formula to estimate yield for intermittent demands.

2. Limitations of Pumping Test--Long-term yield is based on data collected during 24 hours of continuous pumping. Estimates of long-term yield are based on the assumption that the aquifer is not limited and will continue to respond under the same conditions shown in the pumping test data. Hydro-Search, Inc., ran a 72-hour pumping test in 1981. Their data indicate the aquifer associated with the Double Diamond wells is more likely to intercept recharge and may at some point during pumping reach steady-state conditions (steady-state meaning flow into the well means discharge without additional drawdown). Our long-term yield estimates are conservatively based on the 24-hour test pumping data.

Table 1
DATA SUMMARY
DOUBLE DIAMOND RANCH WELL TESTS

		Pumping	Recovery
Well No. DD-T-1 (Pumping)[a]			
1984	CH2M HILL Transmissivity (gpd/ft)	10,200	9,600
1981	Hydro-Search (gpd/ft)	9,600	10,300
	Well Efficiency at 300 gpm = 74 percent		
Well No. DD-O-1 (Observation)[a]			
1984	CH2M HILL Transmissivity (gpd/ft)	12,500	11,400
1981	Hydro-Search Transmissivity (gpd/ft)	11,900	11,300
1984	CH2M HILL Storage Coefficient	1.1×10^{-4}	
1981	Hydro-Search Storage Coefficient	4.0×10^{-4}	
Well No. DD-T-2 (Pumping)[b]			
1984	CH2M HILL Transmissivity (gpd/ft)	12,000	12,800
1981	Hydro-Search Transmissivity (gpd/ft)	10,900	13,400
	Well Efficiency at 300 gpm = 84 percent		
Well No. DD-O-2 (Recovery)[b]			
1984	CH2M HILL Transmissivity (gpd/ft)	16,200	14,400
1981	Hydro-Search Transmissivity (gpd/ft)	13,500	11,600
1984	CH2M HILL Storage Coefficient	1.7×10^{-3}	
1981	Hydro-Search Storage Coefficient	1.9×10^{-3}	

[a] Average T value = 10,800 gpd/ft
[b] Average T value = 13,100 gpd/ft

Table 2
ESTIMATES OF LONG-TERM YIELD
DOUBLE DIAMOND WELLS

Well DD-T-1

Assumptions

1. 19-year continuous pumping (7-log cycles)

2. 57 feet of available drawdown (Δs = 8.1 ft per log cycle)

3. 10,800 gpd/ft transmissivity value (T)

$$Q = \frac{T \times \Delta s}{264}$$

$$Q = \frac{10{,}800 \times 8.1}{264}$$

$$Q = 330 \text{ gallons per minute}$$

Recommended Maximum Q = 330 gallons per minute. Well efficiency for DD-T-1 at 330 gallons per minute is approximately 70 percent.

Well DD-T-2

Assumptions

1. 19-year continuous pumping (7-log cycles)

2. 114 feet of available drawdown (Δs = 16.2 ft per log cycle)

3. 13,100 gpd/ft transmissivity value (T)

$$Q = \frac{T \times \Delta s}{264}$$

$$Q = \frac{13{,}100 \times 16.2}{264}$$

$$Q = 800 \text{ gallons per minute}$$

Recommended Maximum Q = 800 gallons per minute[a]. Well efficiency for DD-T-2 at 700 gpm is approximately 70 percent.

[a]Although test pumping data indicate the aquifer will yield 800 gpm for 7-log cycles, the small diameter casing may be significant as a controlling factor.

3. Available Drawdown--Long-term yield (19 years) is estimated considering the deepest pumping level desirable. Generally, the desired maximum depth is just above the first perforated zone. For the Double Diamond wells this depth is 57 feet and 114 feet, respectively, for Wells DD-T-1 and DD-T-2. Potentiometric surfaces are just above ground surface for each well, so available drawdown is approximately 57 feet and 114 feet for Wells DD-T-1 and DD-T-2, respectively.

4. Casing Diameter--Casing diameter limits the size of the pump that may be installed in the well. High uphole velocities caused by high pumping yields from small diameter casings may cause deleterious effects on the well and pump. Based on the test pumping data from DD-T-2, long-term yields may be limited by the small diameter well casing.

5. Additional Aquifer Demand--Pumping wells within each other's area of influence compound drawdown rates. Additional well development within the radius of influence of the Double Diamond wells would reduce the long-term yield of the wells.

6. Well Efficiency--The effects of well efficiency on long-term yield are primarily economic. Additional drawdown caused by well inefficiency increases energy costs associated with pumping lift. The shallow pumping levels anticipated with the Double Diamond wells do not make well efficiency a major factor. Calculated efficiencies at various pumping rates for each well are shown in the appendix.

4.0--FIELD WORK

Field work was undertaken in February 1984. Robertson Engineering of Carson City, Nevada, provided the necessary equipment and personnel to install and operate the test pumping equipment. Water level data and field calculations were completed by a CH2M HILL hydrogeologist and Washoe County personnel.

A step-drawdown and 24-hour constant discharge pumping test was run on each well. Water was discharged away from the pumping well down a drainage channel. Water levels were measured in the pumping well and one observation well for each test. Measurements were made during pumping and recovery. Discharge rates were monitored using an orifice plate flow monitoring device. With the exception of a minor engine stall during the constant discharge testing of Well

DD-T-1, the pumping tests ran smoothly. Data and calculations for each aspect of the pumping test are included in the appendix.

5.0--WATER QUALITY

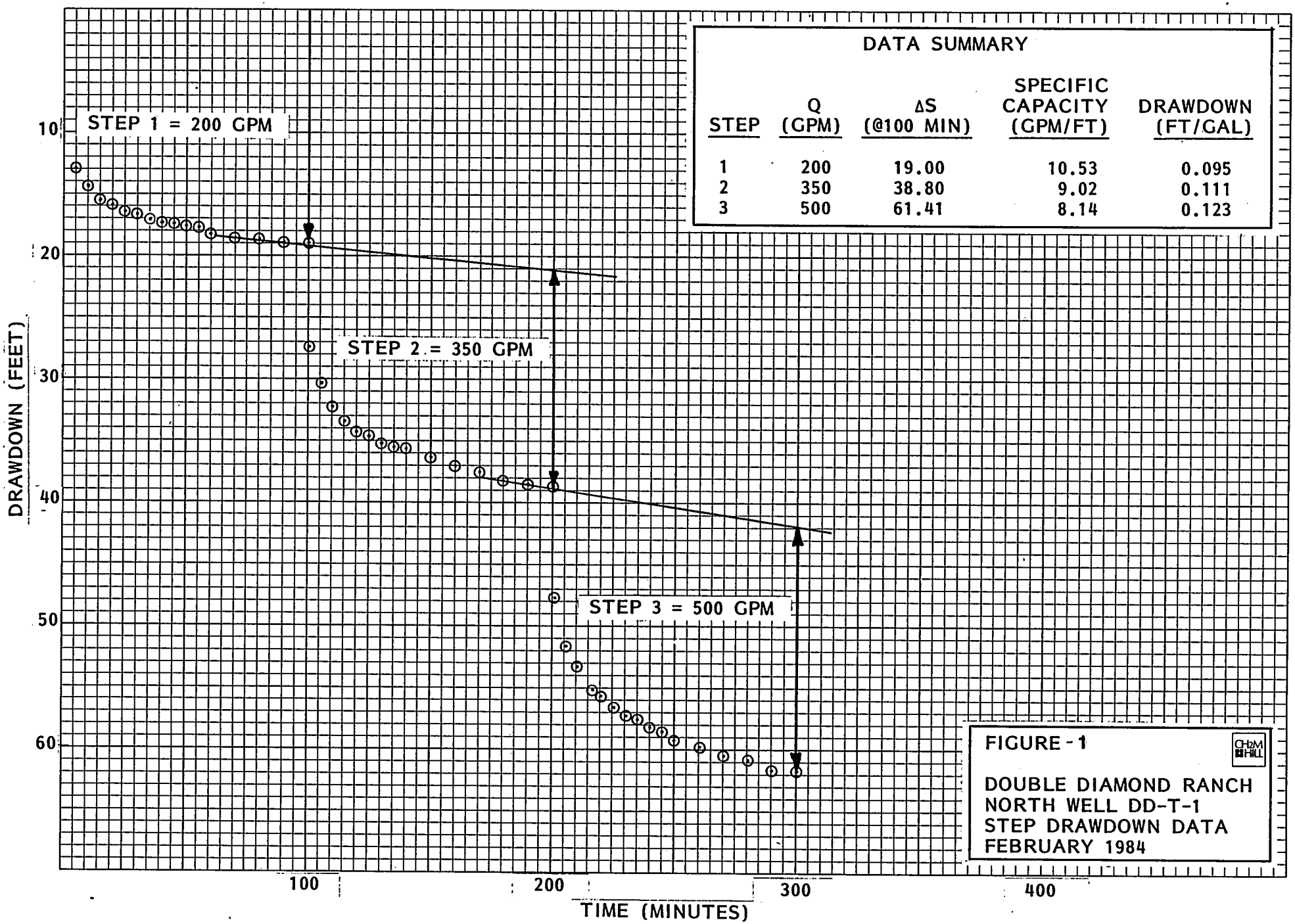
Samples were collected for water quality analysis at the end of each 24-hour constant discharge test. The samples were retained by Washoe County for analysis. Those analyses should be attached to this report when they become available.

RDR27/032

6.0--APPENDIX

CONTENTS

RDR27/034

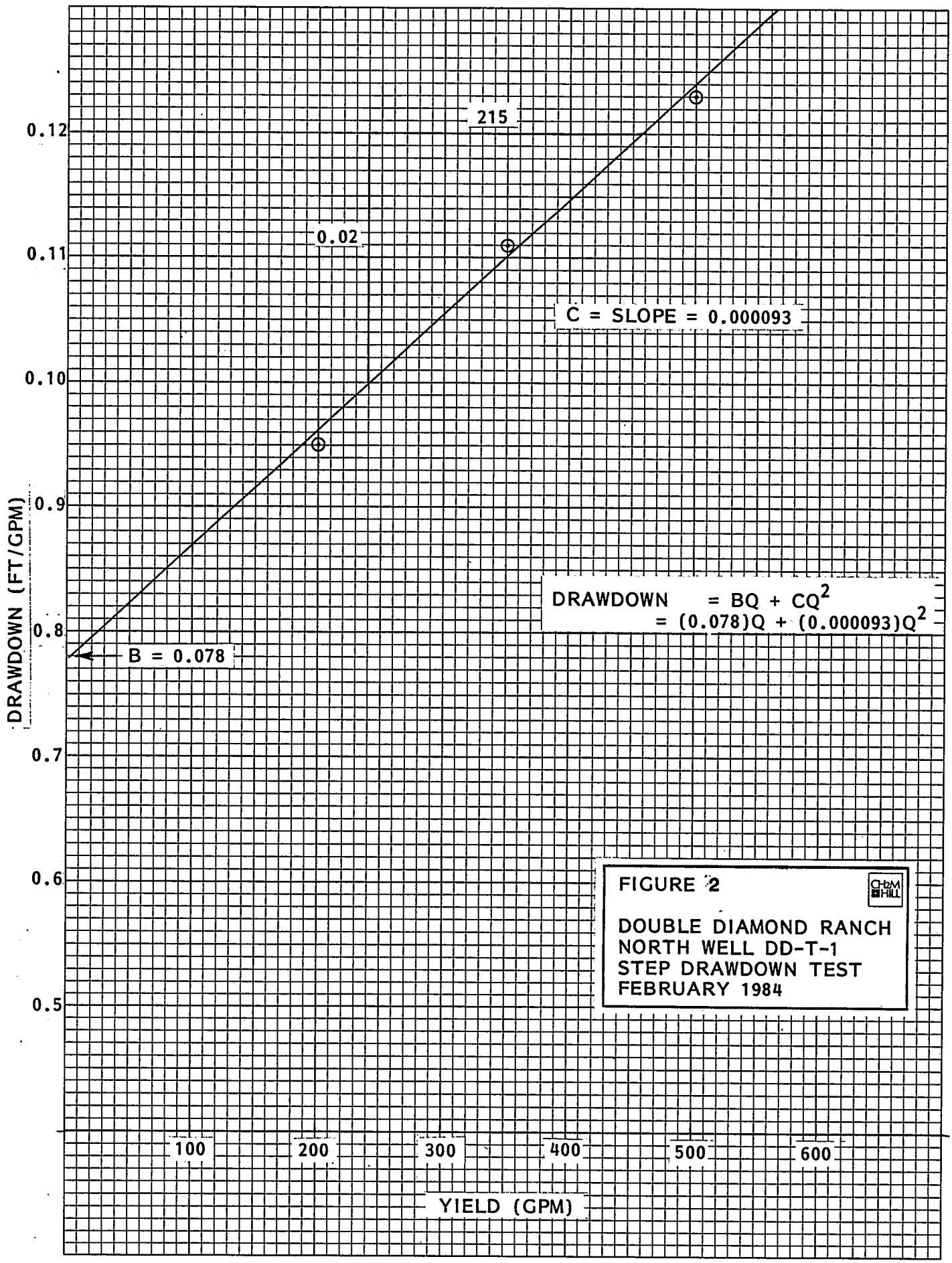


DATA SUMMARY

STEP	Q (GPM)	ΔS (@100 MIN)	SPECIFIC CAPACITY (GPM/FT)	DRAWDOWN (FT/GAL)
1	200	19.00	10.53	0.095
2	350	38.80	9.02	0.111
3	500	61.41	8.14	0.123

FIGURE - 1

DOUBLE DIAMOND RANCH
NORTH WELL DD-T-1
STEP DRAWDOWN DATA
FEBRUARY 1984


0.12
0.11
0.10
0.9
0.8
0.7
0.6
0.5
DRAWDOWN (FT/GPM)
215
0.02
C = SLOPE = 0.000093
DRAWDOWN = BQ + CQ²
= (0.078)Q + (0.000093)Q²
B = 0.078
100
200
300
400
500
600
YIELD (GPM)
FIGURE 2
CH2M HILL
DOUBLE DIAMOND RANCH
NORTH WELL DD-T-1
STEP DRAWDOWN TEST
FEBRUARY 1984
DIETZGEN CORPORATION
MADE IN U.S.A.
NO. 341-10 DIETZGEN GRAPH PAPER
10 X 10 PER INCH

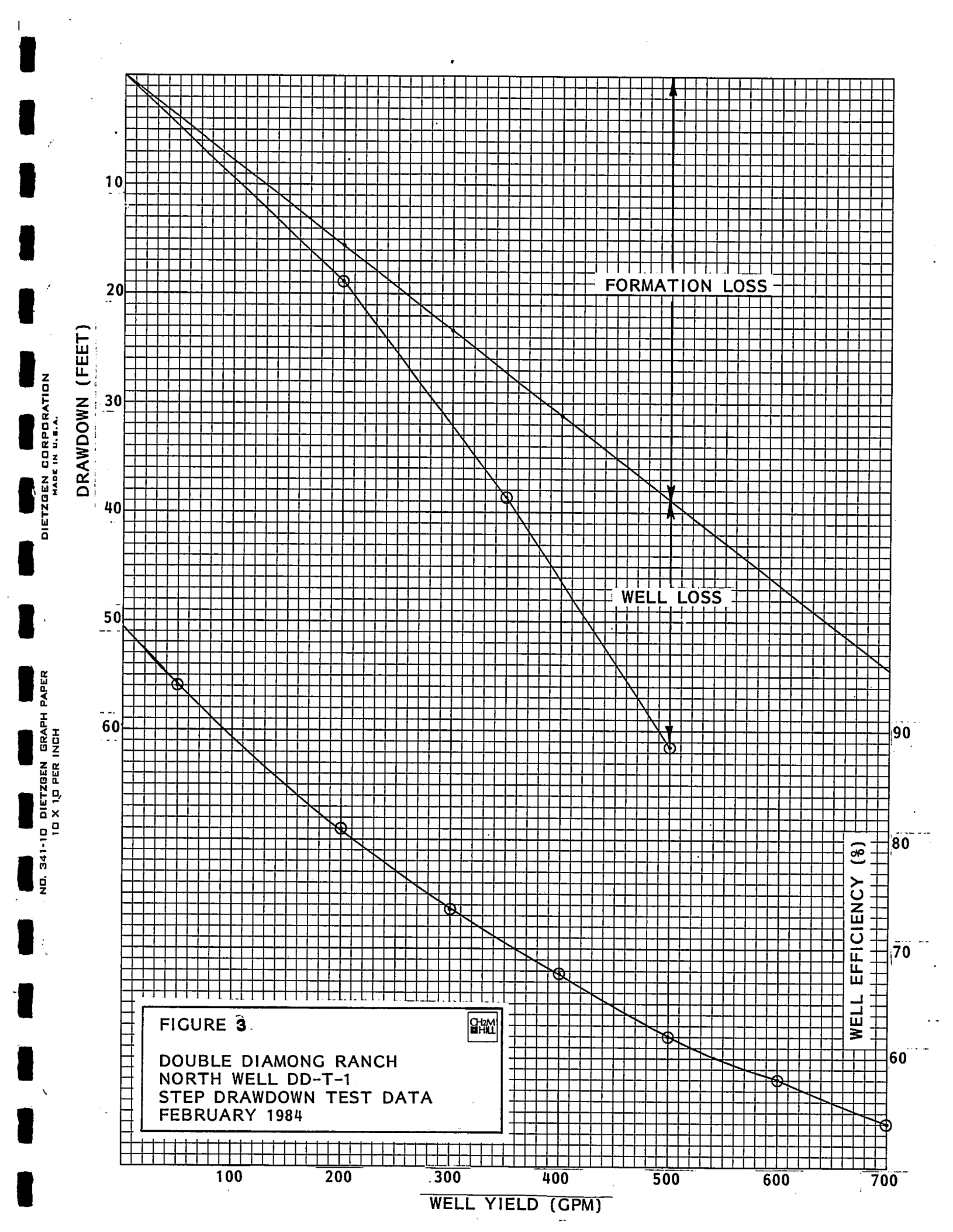


FIGURE 3

DOUBLE DIAMONG RANCH
NORTH WELL DD-T-1
STEP DRAWDOWN TEST DATA
FEBRUARY 1984

CH2M HILL

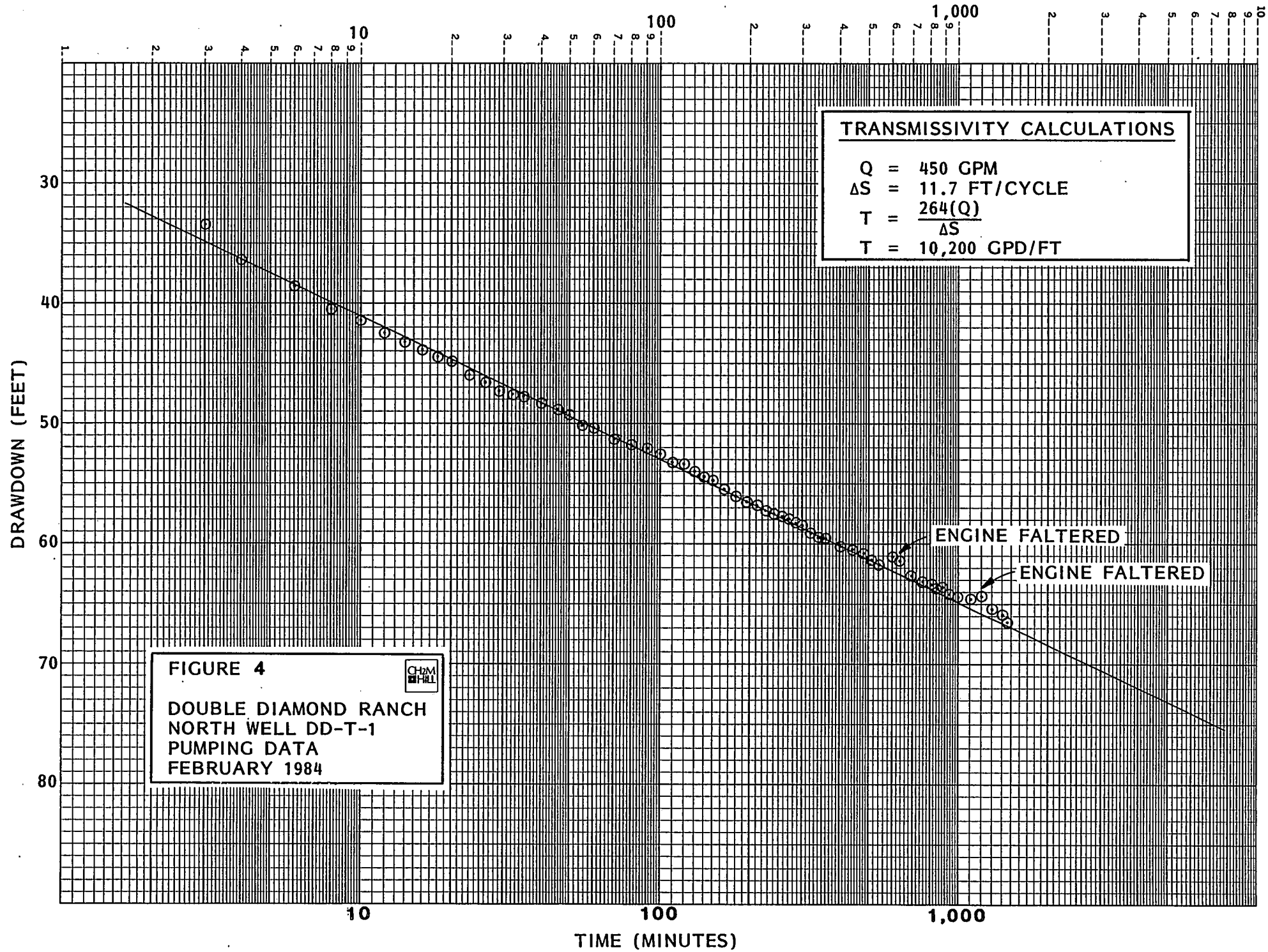


FIGURE 4

DOUBLE DIAMOND RANCH
NORTH WELL DD-T-1
PUMPING DATA
FEBRUARY 1984

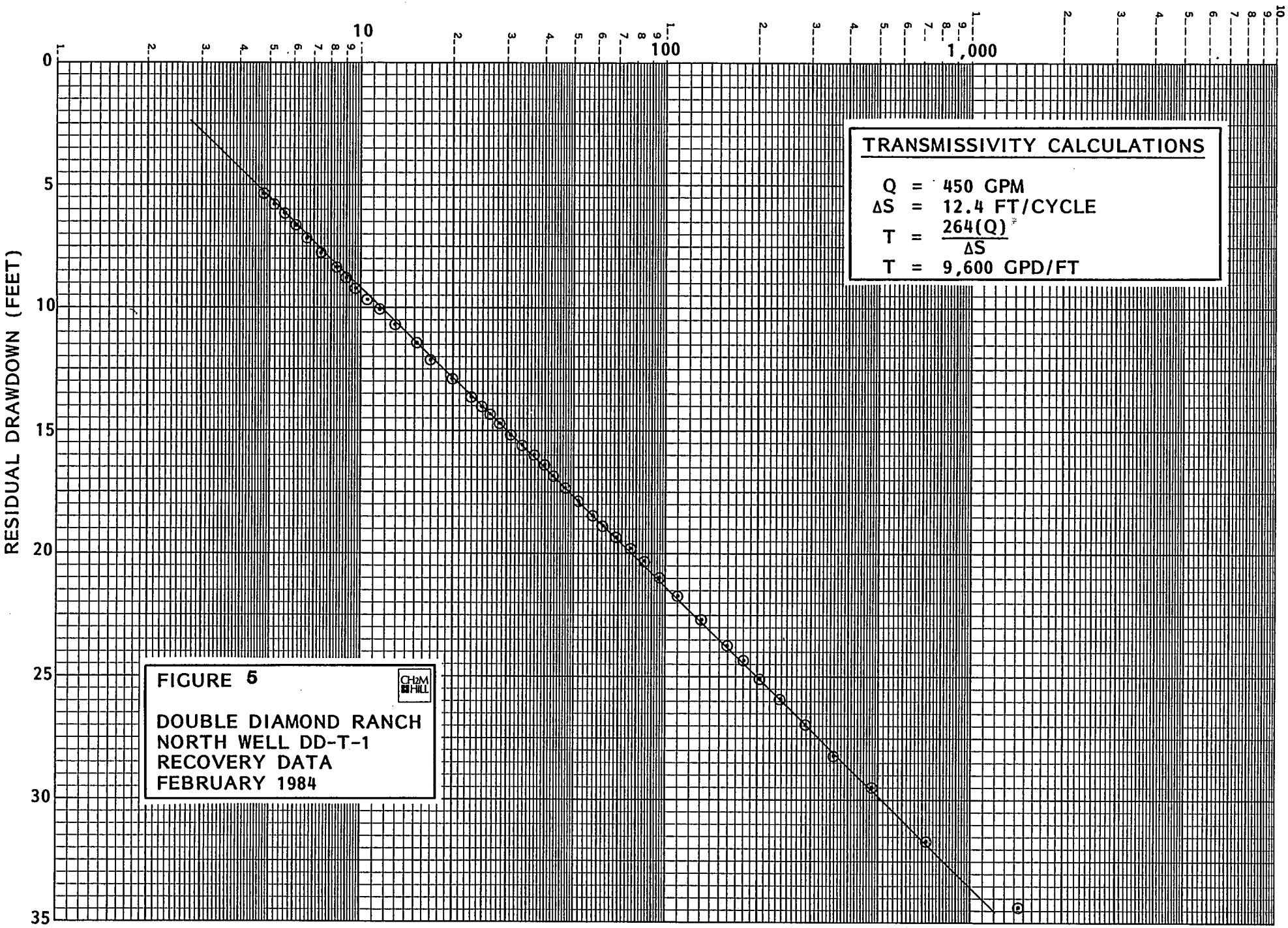


FIGURE 5

CH2M HILL

DOUBLE DIAMOND RANCH
NORTH WELL DD-T-1
RECOVERY DATA
FEBRUARY 1984

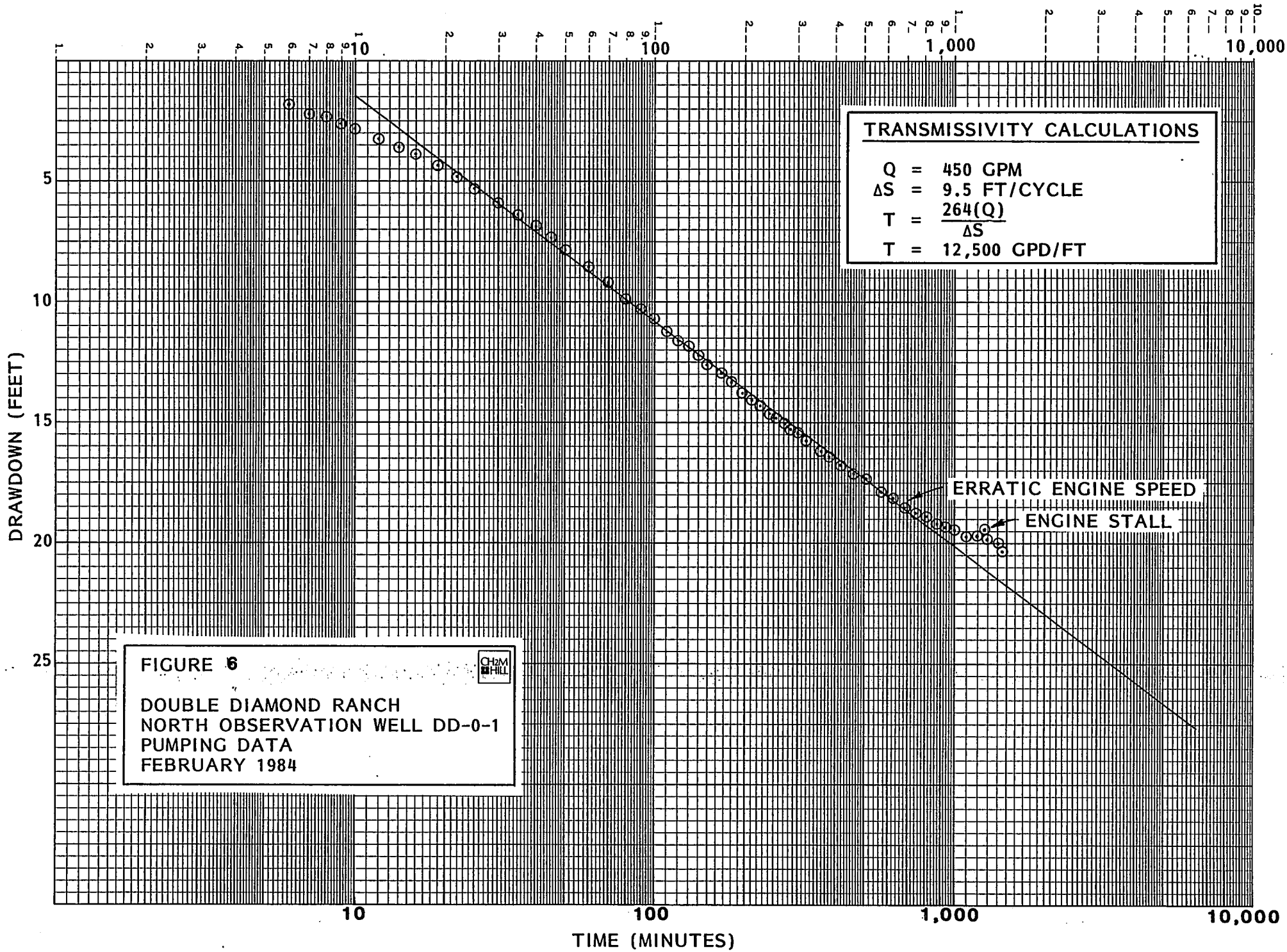


FIGURE 6

DOUBLE DIAMOND RANCH
NORTH OBSERVATION WELL DD-0-1
PUMPING DATA
FEBRUARY 1984

CH2M HILL

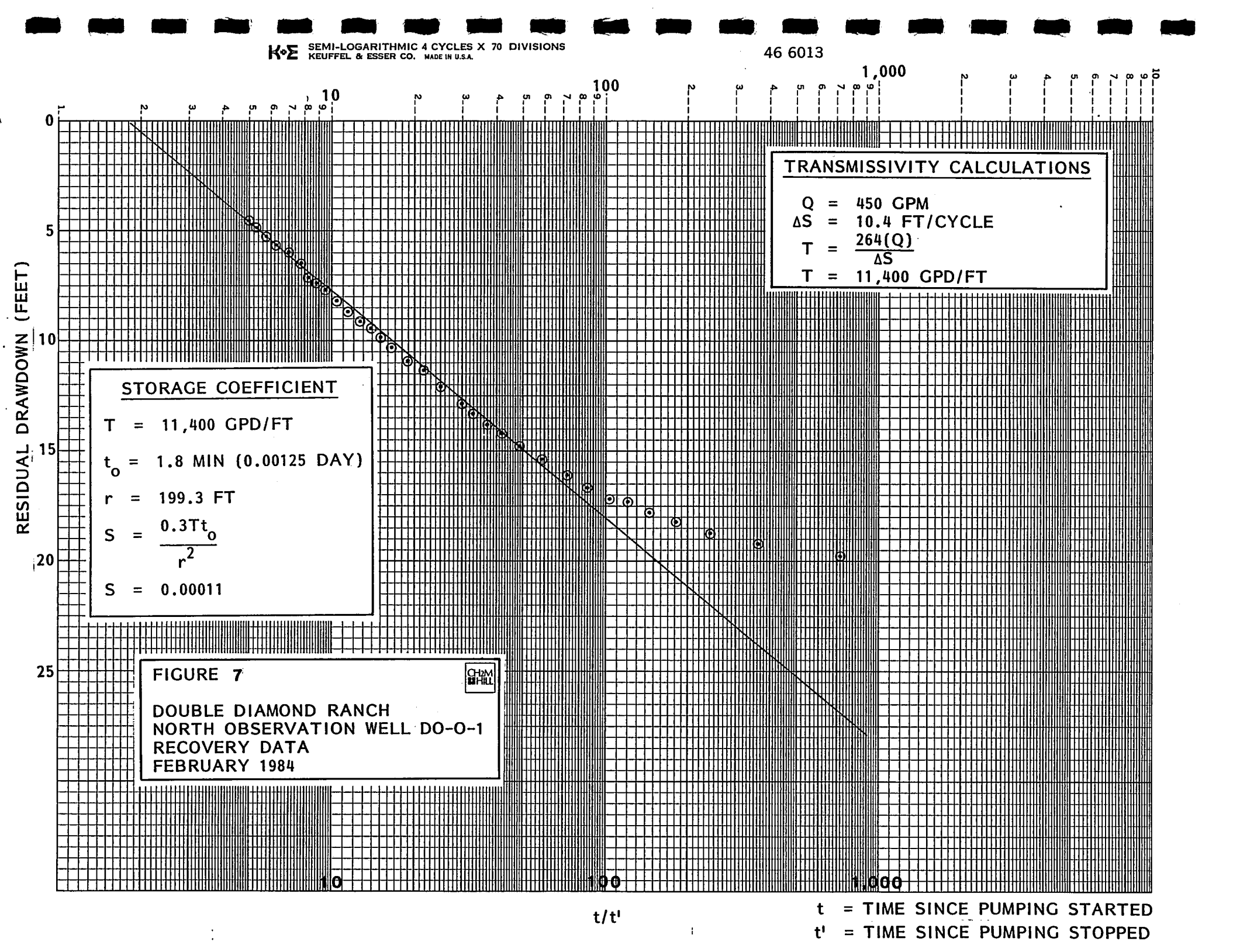
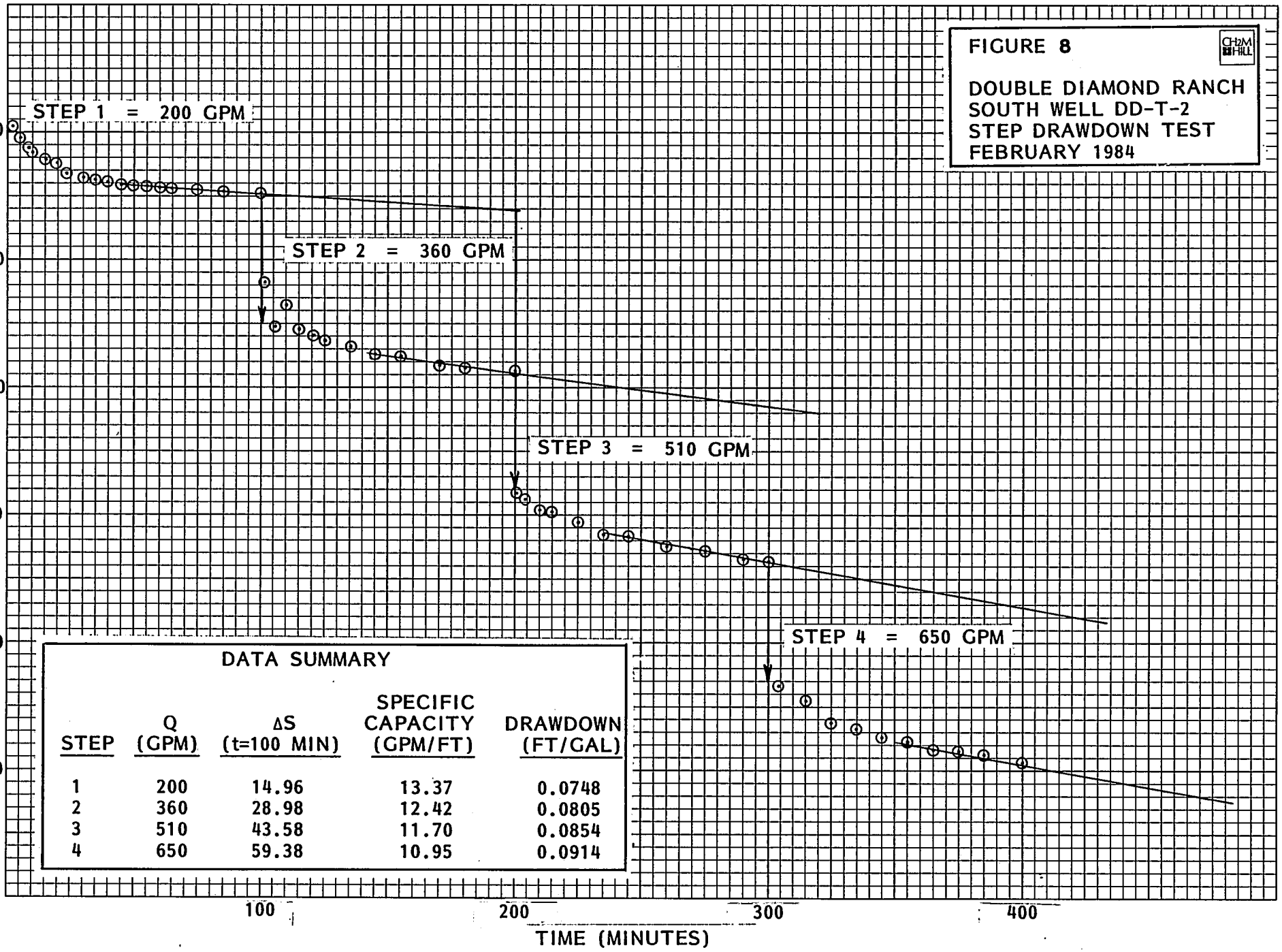

K+E SEMI-LOGARITHMIC 4 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 6013
RESIDUAL DRAWDOWN (FEET)
0
5
10
15
20
25
10
100
1,000
TRANSMISSIVITY CALCULATIONS
Q = 450 GPM
ΔS = 10.4 FT/CYCLE
T = 264(Q) / ΔS
T = 11,400 GPD/FT
STORAGE COEFFICIENT
T = 11,400 GPD/FT
t_o = 1.8 MIN (0.00125 DAY)
r = 199.3 FT
S = $0.3Tt_o / r^2$
S = 0.00011
FIGURE 7
DOUBLE DIAMOND RANCH
NORTH OBSERVATION WELL DO-O-1
RECOVERY DATA
FEBRUARY 1984
CH2M HILL
10
100
1,000
t/t'
t = TIME SINCE PUMPING STARTED
t' = TIME SINCE PUMPING STOPPED

FIGURE 8

DOUBLE DIAMOND RANCH
SOUTH WELL DD-T-2
STEP DRAWDOWN TEST
FEBRUARY 1984



DATA SUMMARY

STEP	Q (GPM)	ΔS (t=100 MIN)	SPECIFIC CAPACITY (GPM/FT)	DRAWDOWN (FT/GAL)
1	200	14.96	13.37	0.0748
2	360	28.98	12.42	0.0805
3	510	43.58	11.70	0.0854
4	650	59.38	10.95	0.0914

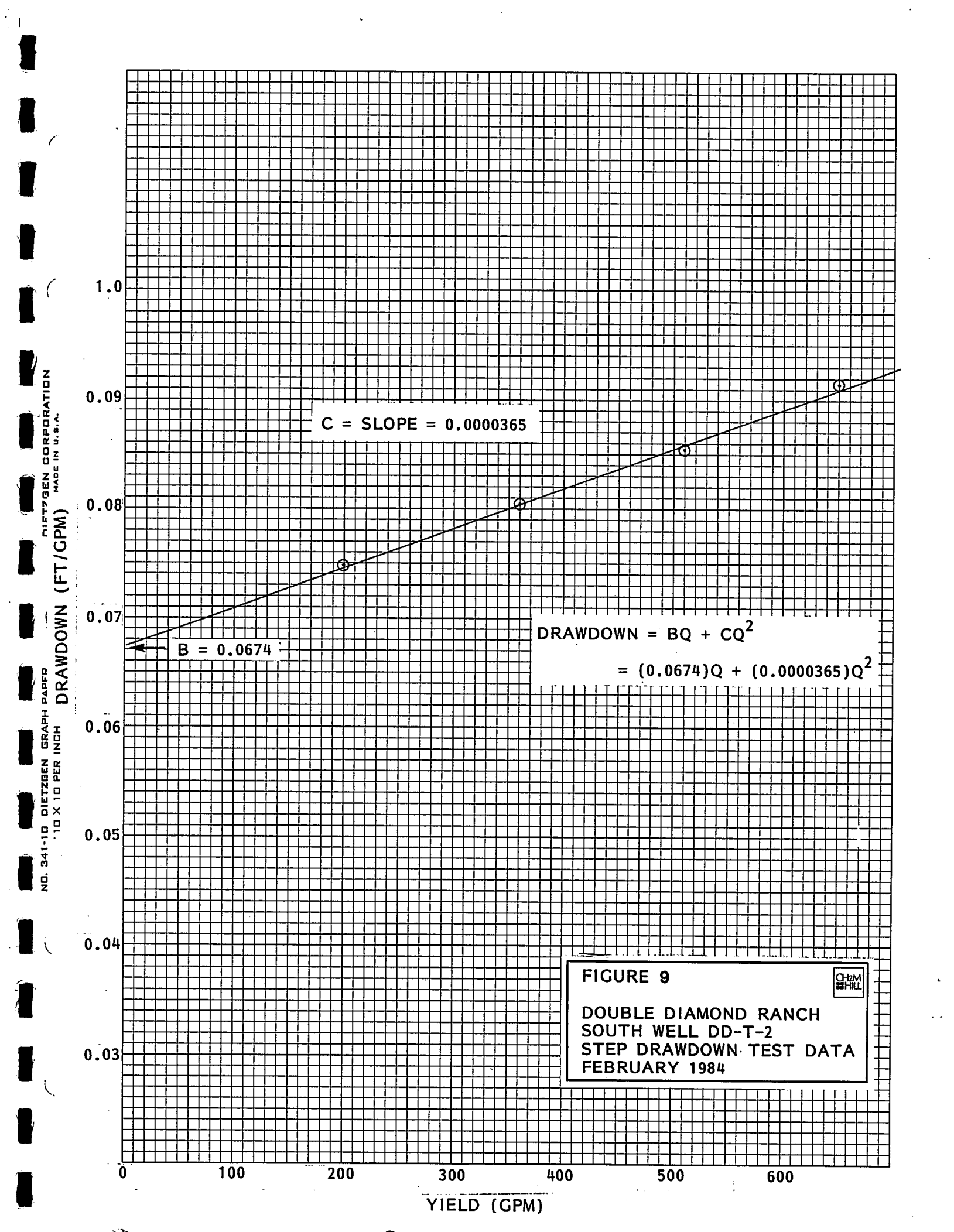


FIGURE 9

CH2M HILL

DOUBLE DIAMOND RANCH
SOUTH WELL DD-T-2
STEP DRAWDOWN TEST DATA
FEBRUARY 1984

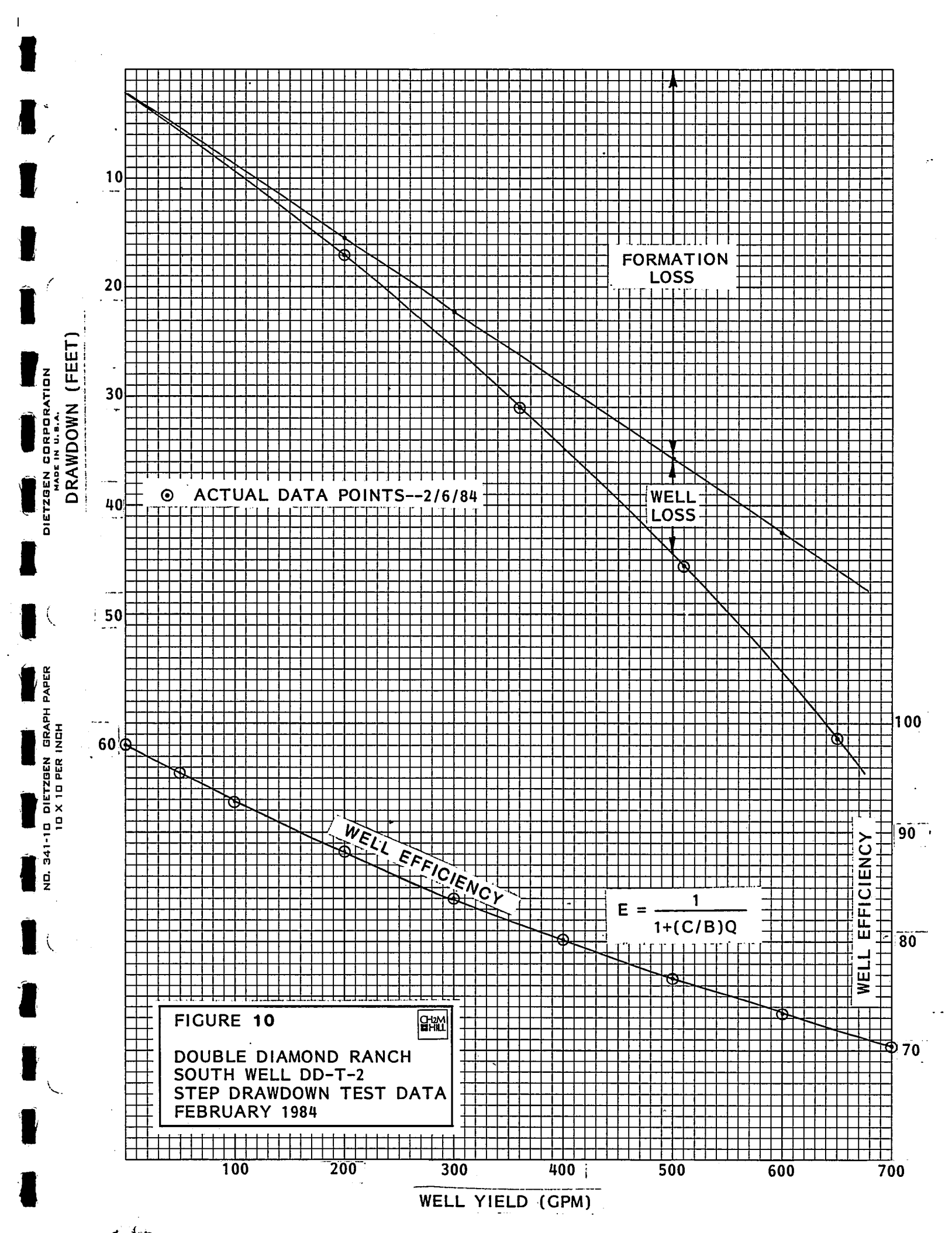
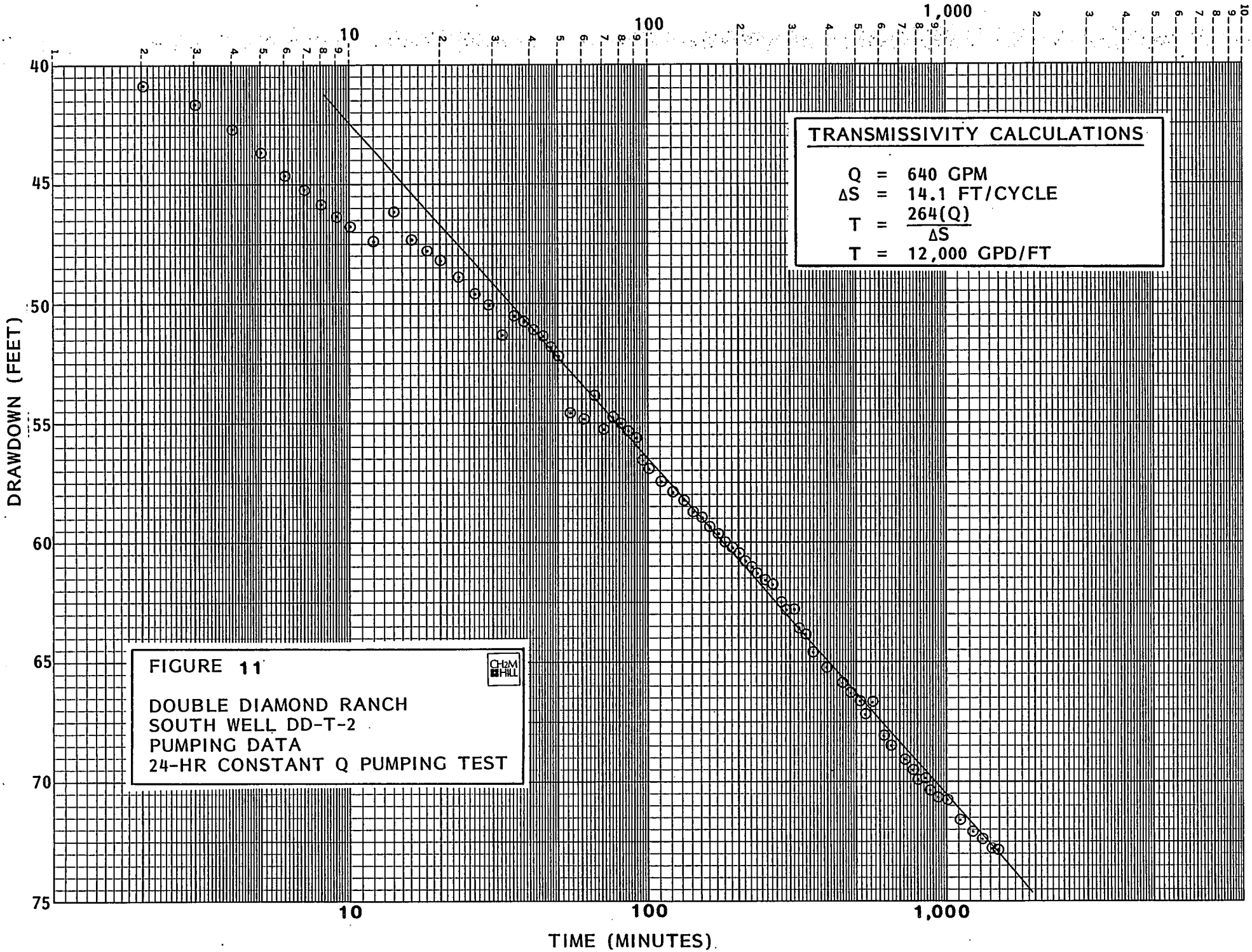
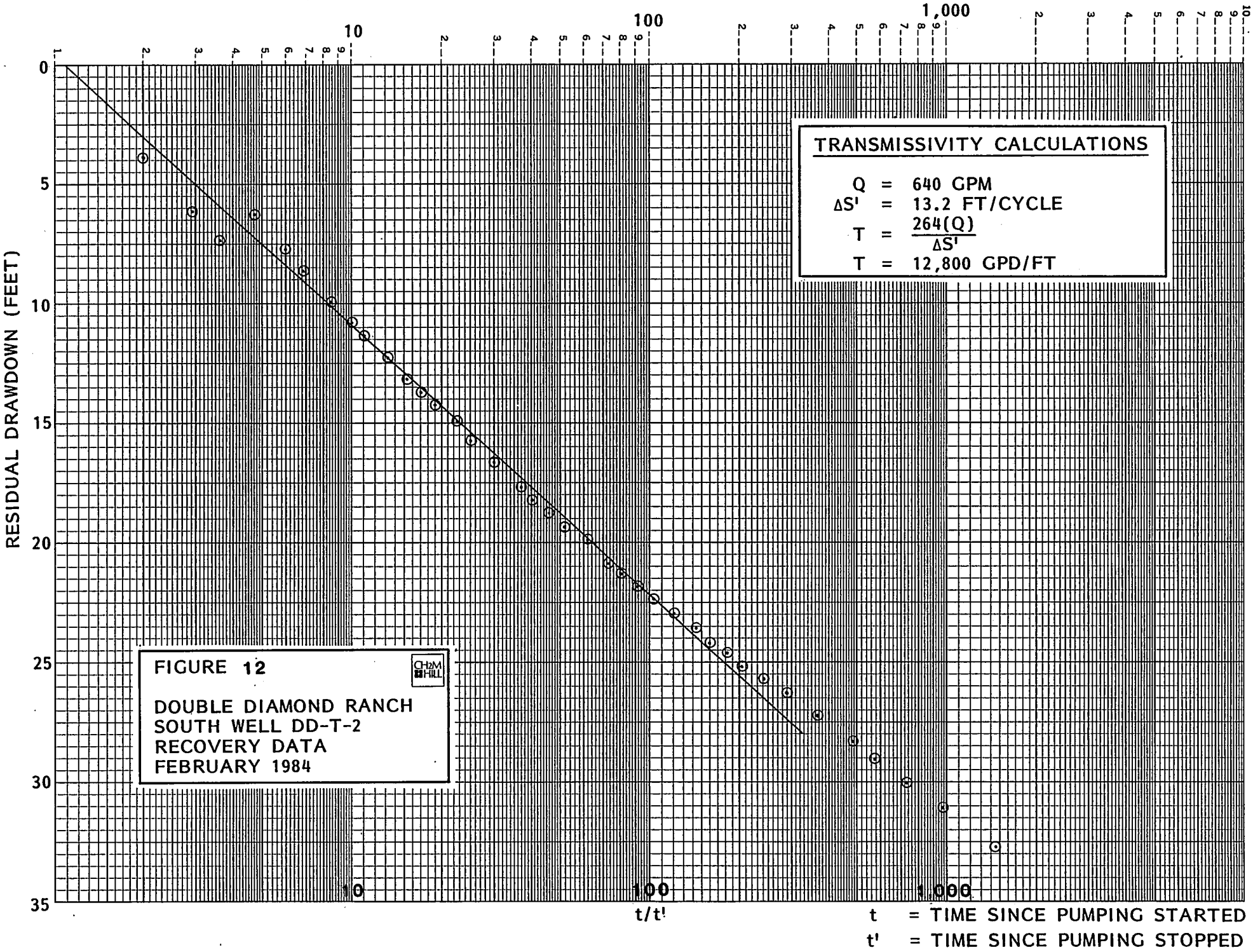
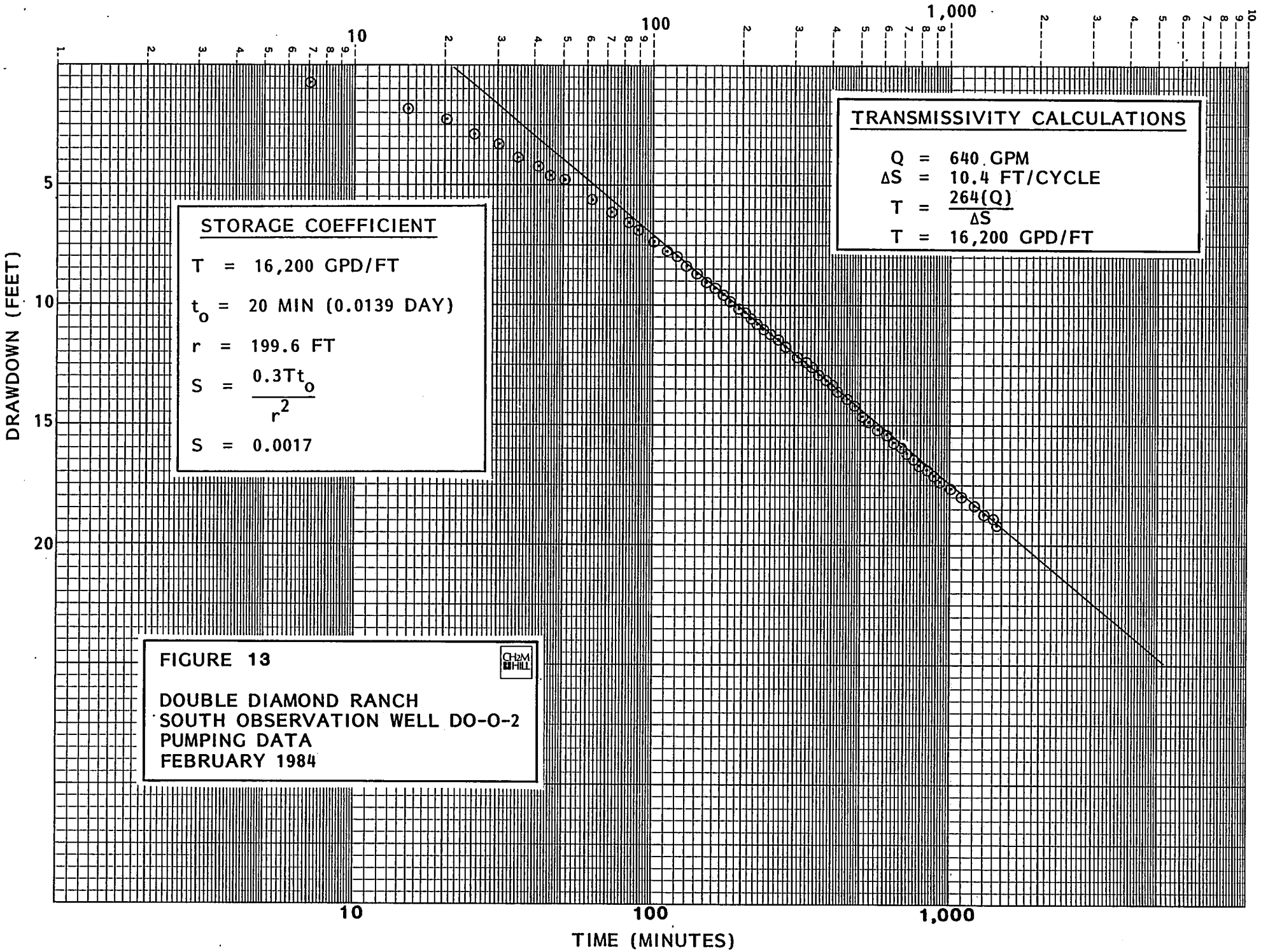


FIGURE 10

DOUBLE DIAMOND RANCH
SOUTH WELL DD-T-2
STEP DRAWDOWN TEST DATA
FEBRUARY 1984







TRANSMISSIVITY CALCULATIONS

$Q = 640$ GPM

$\Delta S = 10.4$ FT/CYCLE

$T = \frac{264(Q)}{\Delta S}$

$T = 16{,}200$ GPD/FT

STORAGE COEFFICIENT

$T = 16{,}200$ GPD/FT

$t_o = 20$ MIN (0.0139 DAY)

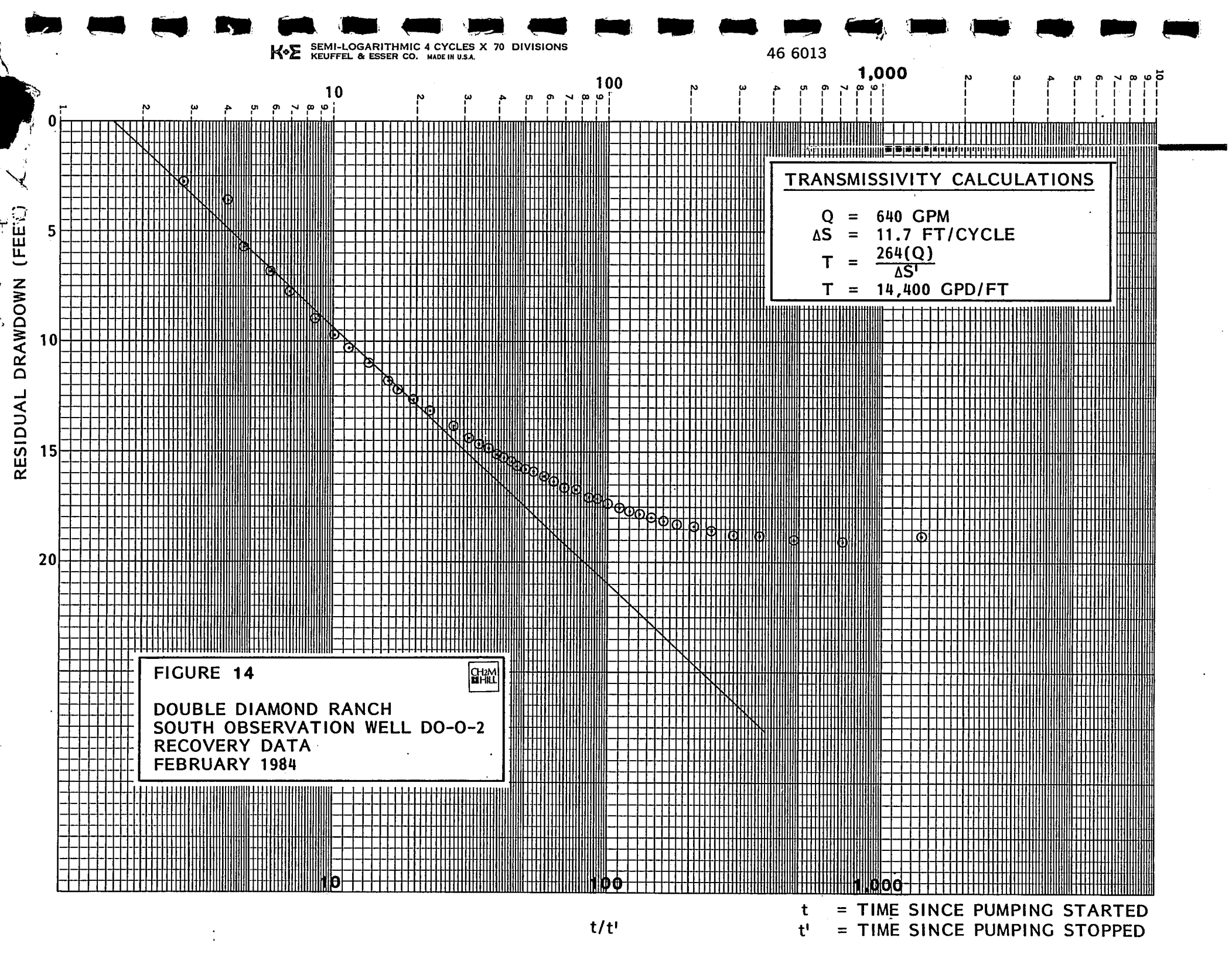
$r = 199.6$ FT

$S = \frac{0.3Tt_o}{r^2}$

$S = 0.0017$

FIGURE 13

DOUBLE DIAMOND RANCH
SOUTH OBSERVATION WELL DO-O-2
PUMPING DATA
FEBRUARY 1984


K+E SEMI-LOGARITHMIC 4 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 6013
RESIDUAL DRAWDOWN (FEET)
0
5
10
15
20
10
100
1,000
t/t'
TRANSMISSIVITY CALCULATIONS
Q = 640 GPM
ΔS = 11.7 FT/CYCLE
T = 264(Q) / ΔS'
T = 14,400 GPD/FT
FIGURE 14
DOUBLE DIAMOND RANCH
SOUTH OBSERVATION WELL DO-O-2
RECOVERY DATA
FEBRUARY 1984
CH2M HILL
t = TIME SINCE PUMPING STARTED
t' = TIME SINCE PUMPING STOPPED

GEO-HYDRO-DATA INCORPORATED

ELECTRIC WELL LOG

COMPANY WASHOE COUNTY
WELL PRODUCTION #4
FIELD RENO
COUNTY WASHOE STATE CALIF

COMPANY WASHOE COUNTY
WELL ~~PRODUCTION #4~~ PRODUCTION WELL #1
FIELD RENO
COUNTY WASHOE STATE NEVADA

LOCATION
ZOLEZZI RD.
Sec. ___ Twp. ___ Rge. ___

TYPE LOG
SP
PR
6' LATERAL

Permanent Datum GROUND LEVEL Elev. ___ Elev.: K.B. ___
Log Measured From G.L. 0 Ft. Above Perm. Datum D.F. ___
Drilling Measured From G.L. G.L. ___

Date	MARCH 1, 1984		
Run No.	one		
Depth — Driller	664 ft.	ft.	ft.
Depth — GHD	655 ft.	ft.	ft.
Btm. Log Inter.	655 ft.	ft.	ft.
Top Log Inter.	12 ft.	ft.	ft.
Casing — Driller	in. @ ft.	in. @ ft.	in. @ ft.
Casing — GHD	ft.	ft.	ft.
Bit Size	8 in. to 664 ft.	in. to ft.	in. to ft.
Bit Size	in. to ft.	in. to ft.	in. to ft.
Bit Size	in. to ft.	in. to ft.	in. to ft.
Type Fluid In Hole	poly		
Source of Sample	pit		
PPM TDS	50		
Fluid Level	full ft.	ft.	ft.
Dens. / Visc.			
pH / Fluid Loss	ml	ml	ml
Rm @ Meas. Temp.	@ °F	@ °F	@ °F
Rmf @ Meas. Temp.	@ °F	@ °F	@ °F
Rmc @ Meas. Temp.	@ °F	@ °F	@ °F
Time Since Circ.	1 hr.	hr.	hr.
Logging Speed	30 ft./min.	ft./min.	ft./min.
Tool Type and No.	combo 5		
Unit No.	3		
Location	Paso Robles		
Invoice No.	3337		
Recorded By	Kenny Renz Associate Geologist		
Witnessed By			

2508 So. Chester Ave. Bakersfield, Calif. 93304 (805) 832-4101

Fold Here

REMARKS:

DRILL METHOD: STANDARD ROTARY

DRILLED BY: SARGENT IRRIGATION
RENO, NEVADA

SCALE CHANGES			
Type Log	Depth	Scale Up Hole	Scale Down Hole

All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not guarantee the accuracy or correctness of any interpretations, and we shall not be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpreations are also subject to Clause 6 of our General Terms and Conditions as set out in our current Price Schedule.

WATER QUALITY	YIELD	FORMATION
ppm TDS EXCELLENT LESS THAN 400	SHADING INDICATES AREAS OF PROBABLE YIELD. THE INDICATED YIELD IS USUALLY RELATIVE, BEING GREATER AS SHADING AREA INCREASES.	DESCRIPTION IS GENERAL, NOT GEOLOGIC. SAND INCLUDES GRAVELS. BASED ON ELECTRICAL PROPERTIES INDICATED BY THE LOG. ADDITIONAL DATA IS ALSO CONSIDERED IF AVAILABLE.

SPON. POTENTIAL	DEPTH	POINT RESISTIVITY	6' LATERAL
− 5 ↔ MV +		20 ↔ OHMS	0 ← 50 → 100 OHMS

0 50 60 70

GEO-HYDRO-DATA

INCORPORATED

ELECTRIC WELL LOG

COMPANY	WASHOE COUNTY
WELL	TEST HOLE NO. 6.
FIELD	ZOLEZZI LANE
COUNTY	WASHOE
STATE	NEV.

COMPANY WASHOE COUNTY

WELL TEST HOLE NO. 6.

FIELD ZOLEZZI LANE

COUNTY WASHOE STATE NEVADA

LOCATION ZOLEZZI LANE

Sec. ____ Twp. ____ Rge. ____

TYPE LOG SP PR 6' LAT TEMP

Permanent Datum GROUND LEVEL Elev. ____

Log Measured From G.L. 0 Ft. Above Perm. Datum

Drilling Measured From GROUND LEVEL

Elev.: K.B. ____ D.F. ____ G.L. ____

Date	10 Jun 84		
Run No.	one		
Depth — Driller	680 ft.	ft.	ft.
Depth — GHD	675 ft.	ft.	ft.
Btm. Log Inter.	675 ft.	ft.	ft.
Top Log Inter.	20 ft.	ft.	ft.
Casing — Driller	in. @ ft.	in. @ ft.	in. @ ft.
Casing — GHD	ft.	ft.	ft.
Bit Size	7 7/8 in. to 780 ft.	in. to ft.	in. to ft.
Bit Size	in. to ft.	in. to ft.	in. to ft.
Bit Size	in. to ft.	in. to ft.	in. to ft.
Type Fluid In Hole	clay-gel		
Source of Sample	pit		
PPM TDS	100		
Fluid Level	full ft.	ft.	ft.
Dens. / Visc.			
pH / Fluid Loss	ml	ml	ml
Rm @ Meas. Temp.	@ °F	@ °F	@ °F
Rmf @ Meas. Temp.	@ °F	@ °F	@ °F
Rmc @ Meas. Temp.	@ °F	@ °F	@ °F
Time Since Circ.	3 hr.	hr.	hr.
Logging Speed	40 ft./min.	20 temp ft./min.	ft./min.
Tool Type and No.	combo 7	temp 2	
Unit No.	4		
Location	Tehachapi		
Invoice No.	3439		
Recorded By	K. Kemp Registered Geologist		
Witnessed By	M. Widmer		
other			

SCALE CHANGES			
Type Log	Depth	Scale Up Hole	Scale Down Hole

REMARKS:

DRILL METHOD: STANDARD ROTARY

DRILLED BY: SARGENT IRRIGATION RENO, NEV.

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SPONT. POTENTIAL — 5 MV + / TEMPERATURE 50 60 70 °F	DEPTH	POINT RESISTIVITY 5 OHM (Probably not 5, but 10 OHM) / 6' LATERAL 0 50 100 OHM