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INFORMAL REPORT

AQUIFER TEST AT COMORE LOMA #4, IDAHO FALLS,
IDAHO

Joel M. Hubbell



*Work performed under
DOE Contract
No. DE-AC07-76ID01570*

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AQUIFER TEST AT COMORE LOMA WELL #4,
IDAHO FALLS, IDAHO

J. M. Hubbell
Quantitative Hydrology Unit
Geosciences Group

July 27, 1991

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**Idaho National Engineering Laboratory
EG&G Idaho, Inc.
Idaho Falls, Idaho 83415**

Prepared for the
U.S. Department of Energy
Office of Environmental Restoration and Waste Management
Under DOE Field Office, Idaho
Contract AC07-76ID01570

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AQUIFER TEST AT COMORE LOMA WELL #4, IDAHO FALLS, IDAHO

ABSTRACT

An aquifer test was conducted at Comore Loma Well #4 to determine the aquifer hydraulic characteristics at this location on July 11 and 12, 1991. Water was withdrawn from Comore Loma Well #4 at approximately 850 gallons per minute for 8 hours while monitoring the water level in the pumping well and an observation well 930 ft away. The pumped well showed over 12 ft of drawdown with no discernable drawdown in the observation well. The drawdown in the pumped well was nearly instantaneous, showing little additional drawdown after 1 minute. The transmissivity was calculated to be approximately 140,000 ft^2/day using the Jacob solution. This gives a hydraulic conductivity of 1300 ft/day for the 110 ft interval tested. The high transmissivity and geologic setting suggest the aquifer may in part produce water from the Snake River Plain aquifer. However, the warm water temperature (71°F) indicates the presence of a geothermal source typical of the foothills aquifer. The storage coefficient could not be calculated since no water level decline was detected in the observation well.

AQUIFER TEST AT COMORE LOMA WELL #4, IDAHO FALLS, IDAHO

1. INTRODUCTION

Comore Loma Well #4 was drilled at the Comore Loma subdivision, approximately 5 miles east of Idaho Falls, in June 1991. The well is intended to serve as a large capacity water supply well for the subdivision. An aquifer test was conducted July 11 and 12, 1991 to estimate the transmissivity and hydraulic conductivity of the aquifer. A short step test with flow rates of 270 to 850 gallons per minute was performed and then the water level was allowed to recover to static conditions. The well was pumped with a submersible pump at a rate of 850 gallons per minute for 8 hours. The pump was turned off and the water level recovery measured. Appendix A contains the test plan for the pumping test.

2. LOCAL HYDROGEOLOGY

Comore Loma is located on the eastern edge of the Snake River Plain (SRP) in the foothills east of Idaho Falls (Figure 1). This area is located approximately 160 ft above the SRP. The area is locally covered with surficial sediments composed primarily of loess. Outcrops of volcanic ash flow deposits and rhyolite can be found in the perennial stream channels near this location.

The geology of this area indicates the wells are near the contact of Snake River Plain basalt (covered with sedimentary deposits) and Tertiary age felsic volcanics, primarily ash flow tuffs and rhyolite (Bond and Wood, 1978). The SRP aquifer consists primarily of numerous thin basalt flows interlayered with sedimentary layers and ash flows. The exact location of the contact between the rhyolite and basalt is unclear, but it is probably at the contact of the foothills and the Plain. The geology of the well site is composed of ash flows, rhyolite, and basalt flows, based on information contained in the driller's logs. Proskta and Embree (1978) suggest the area immediately north of this site is a caldera, and if their mapped area was extended south, the Comore Loma site would probably be included in this area.

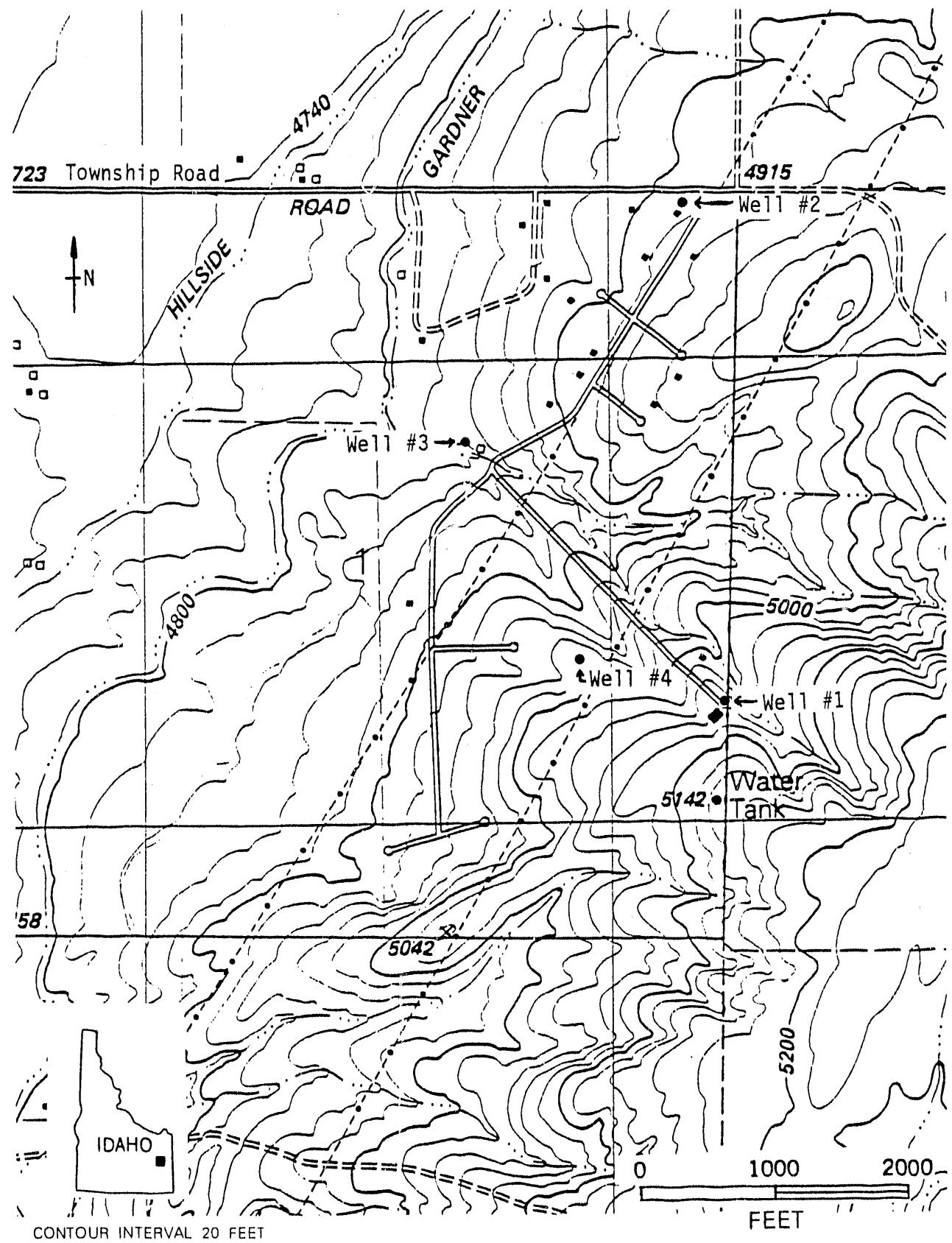


Figure 1. Location of wells.

Four wells are located in the vicinity of Comore Loma subdivision (Comore Loma #1 through #4). All of these wells have been installed for water production for the subdivision. Information from the driller's logs was used to generate a geologic cross section (Figure 2). Copies of the existing drillers logs are included in Appendix B. Water was encountered at a depth of 308 ft in well #4. The water levels in the other 3 wells appear to be at the same elevation. Elevations have not been surveyed, so this data is taken from topographic maps.

3. WELL INSTALLATION AND COMPLETION

Comore Loma #4 was drilled with an air rotary drill rig using water and polymer to remove cuttings while drilling. The completion diagram is presented in Figure 3. The driller's log indicated that the well made approximately 15 gpm of water at 335 ft, 10 gpm at 351 ft, 50-60 gpm at 415 ft, and then flow increased slowly to 491 ft. The remaining water was made from the 491 to 512 ft interval. The majority of the water came from firm and broken rhyolite at this interval. The well has a total depth of 512 ft with 12 in casing to 280 ft and 10 in casing to 490 ft. Two ten foot lengths of 10 in slotted casing are located from 400 to 410 ft and 480 to 490 ft depth. The 10 inch slotted casing is factory built with four inch long slots, 1/4 inch wide, with 10 slots around the casing, and three lengths of slots per ft. From 410 ft to 480 ft the well has torch cut slots, with 6 slots around the casing, 1/4 inch openings, four inch lengths, and two slots per ft. The well is open at the bottom of the well from 490 to 512 ft. The geology of the saturated zone is described as rhyolite to 311 ft, basalt from 311 to 321 ft, rhyolite to 408 ft, basalt to 421 ft, pumice to 491 ft, and then rhyolite to the bottom of the well to 512 ft.

A 110 horse power Pleuger submersible motor (Model V1080) with a four stage pump was placed in the well at a depth of 437 ft. Six inch casing was used to transport water to land surface. A six inch orifice and manometer were used to measure outflow from the well. Flow measurements were made every 1/2 hour. A 100 psi transducer was placed at approximately 428 ft depth and a 20 psi transducer was placed at approximately 338 ft depth. Both transducers

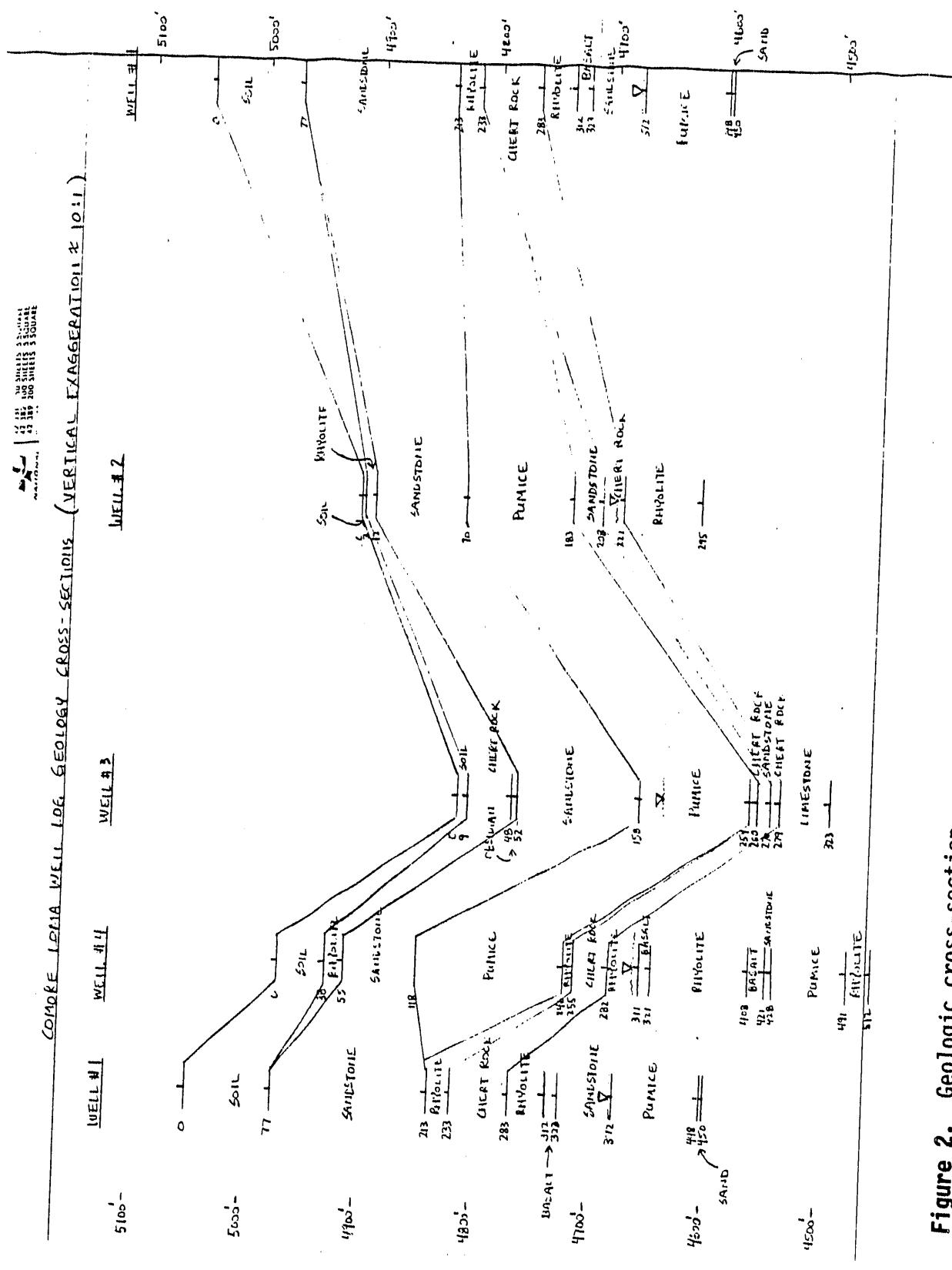
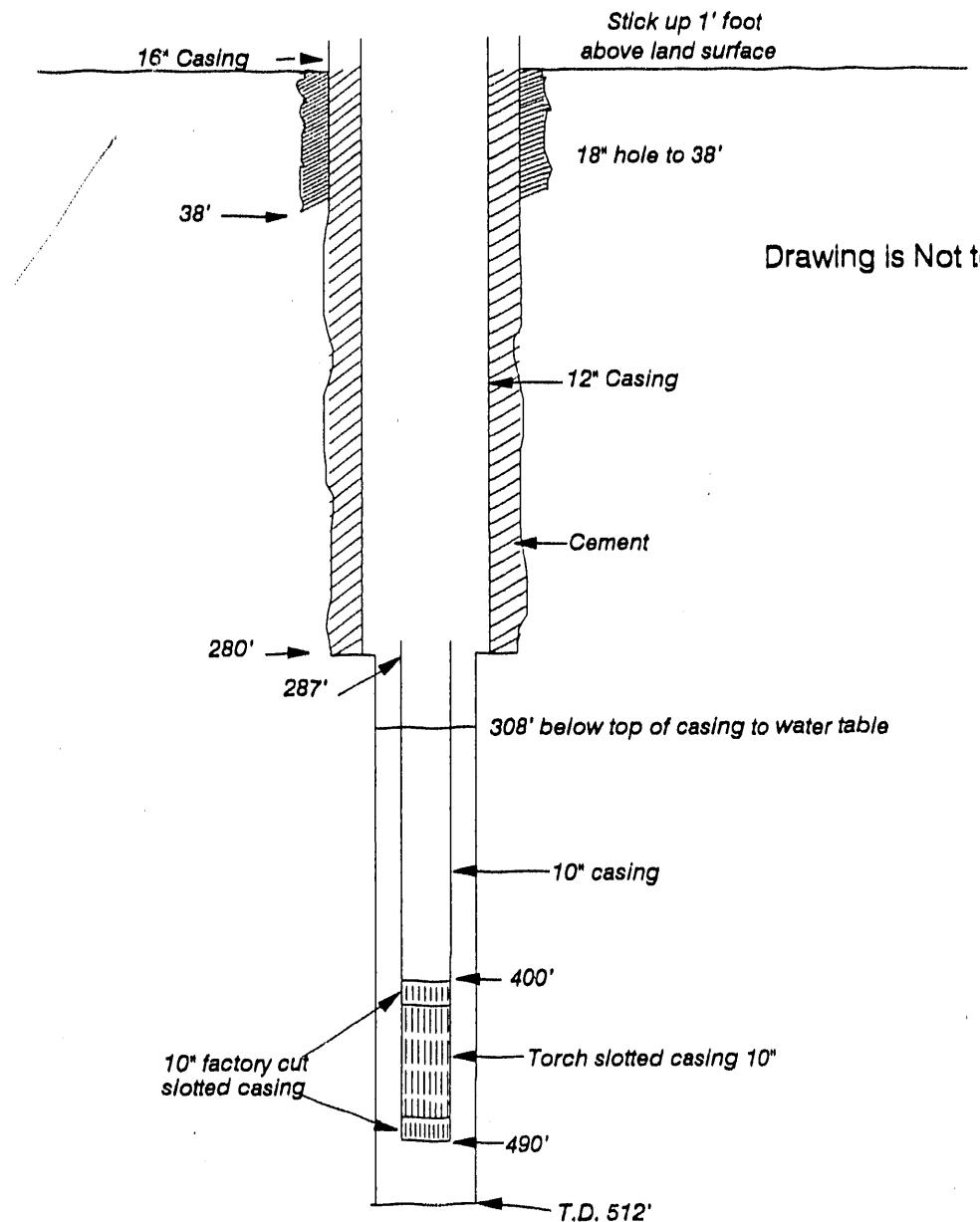


Figure 2. Geologic cross-section.



Drawing is Not to Scale

Figure 3. Well construction Comore Loma #4.

were used to monitor the water level changes during all the subsequent tests. The static water level was measured at 308.26 ft below the top of the casing at the start of the test.

The well was undisturbed for approximately seven hours following installation of the pump, then pumped for 1/2 hour at various pumping rates to test the equipment and set the pumping rate. Data from the 1/2 hour test are included in Appendix C. The well was allowed to recover for 1/2 hour and then the long term test was run at a constant outflow of 850 gpm for eight hours. The eight hour test data are included in Appendix D. The water level recovery was monitored when pumping was stopped (Appendix E).

Water level measurements were recorded from the two transducers for all portions of the tests. Only data from the 20 psi transducer is presented since this transducer gives more accurate data than the 100 psi transducer. Data from both transducers showed general agreement in the readings. Water level in well #1 was recorded during the pumping portion of the test to detect any water level response at this well. A Power's electric water level sounder was used to measure the water level. No appreciable water level change was detected in well #1. Well #1 is located 65 ft higher and approximately 930 ft to the east of well #4.

4. AQUIFER TEST DATA ANALYSIS

Data from the pumping and recovery tests is plotted in Figures 4 and 5. A transmissivity of 140,000 ft²/day was calculated using late data in Jacob's solution for both the pumping and recovery tests. The hydraulic conductivity is 1,300 ft/day based on a screened interval of 110 ft. Theis curve matching techniques did not work for these analyses due to the small amount of additional drawdown after the first few minutes of pumping and recovery. A storage coefficient could not be determined because no drawdown was detected in the observation well.

Early data (first one min pumping and two min for recovery) was not used for either test analysis. Early data for the pumping test is not usable

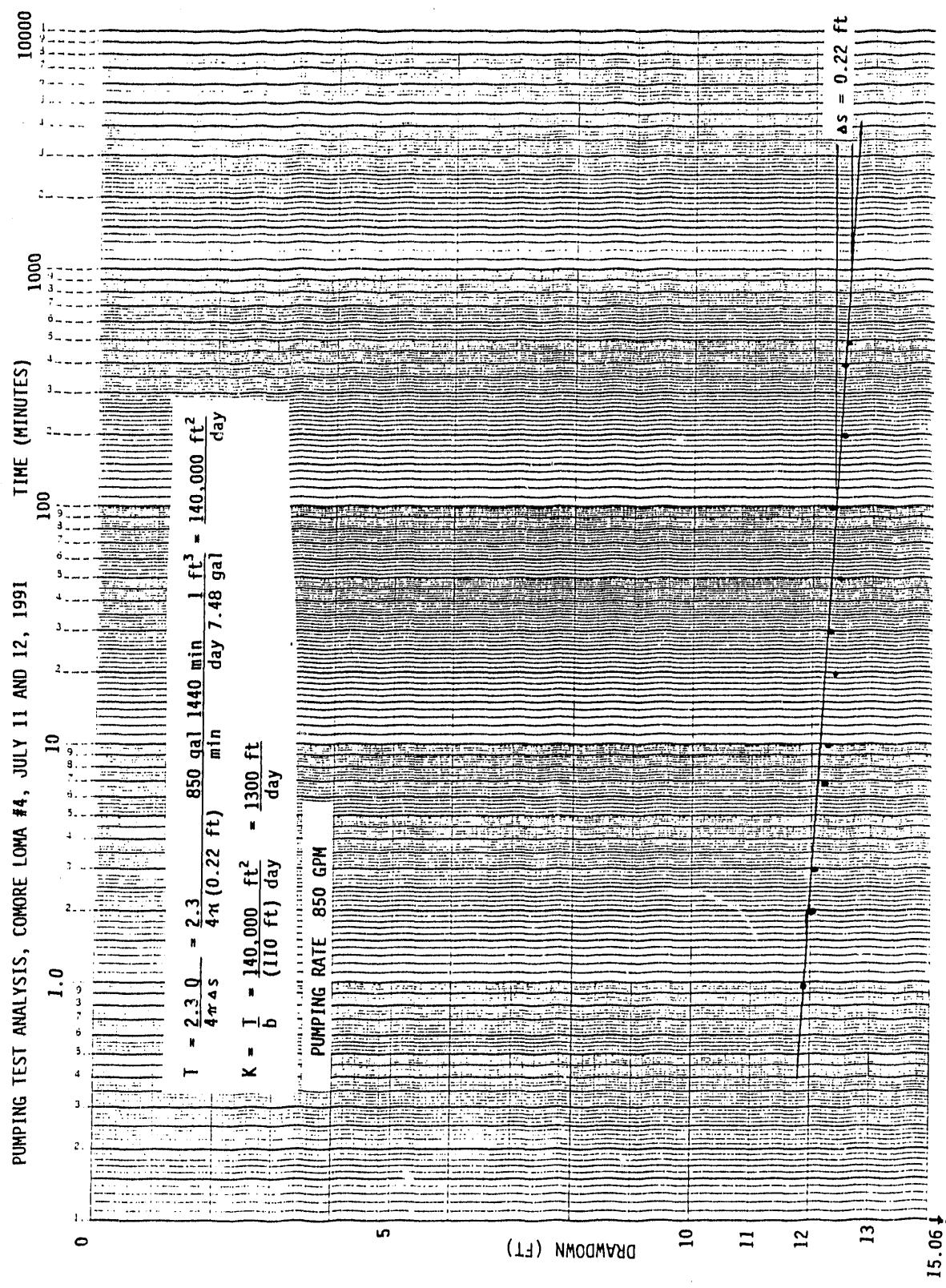


Figure 4. Drawdown versus time, pumping test.

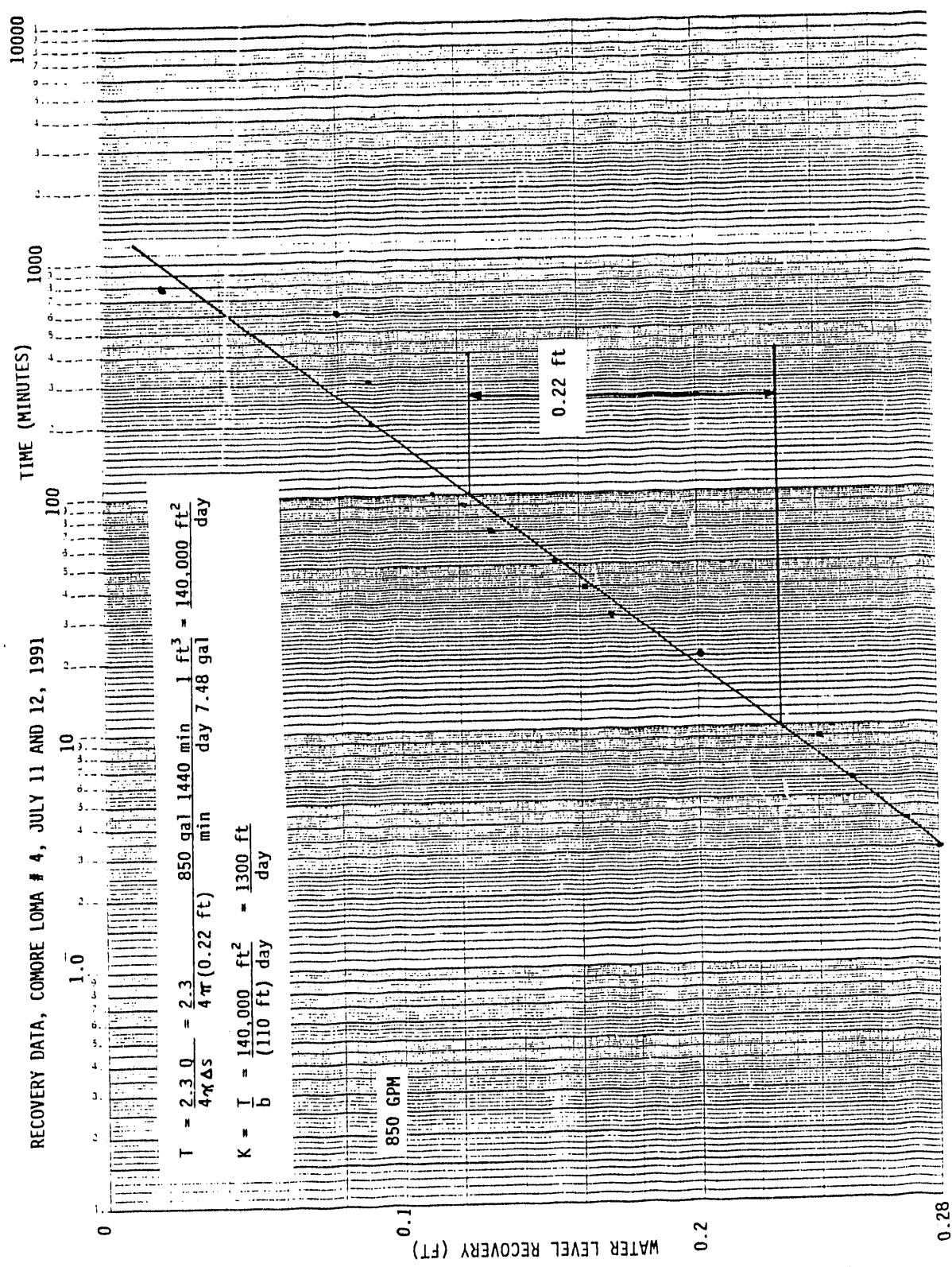


Figure 5. Drawdown versus time, recovery test.

because the pump withdraws water at a much higher flow rate at the start of the test because the pump column has not filled with water. Therefore, the higher pumping rate produces more drawdown for the first minutes of the test.

Early data from the recovery test shows the influence of recharge to the aquifer because there were no check valves in the pump column to prevent water from moving from the pump column back into the aquifer. This affects the water level in the well for a few minutes at the start of the recovery test. After a few minutes, the water level represents the true aquifer response, and the data can be used to calculate transmissivity.

The specific capacity was calculated for five pumping rates (Table 1). The specific capacity decreases by a factor of 2.4 as the pumping rate increases. The specific capacity was used to estimate a transmissivity of 15,000 to 36,000 ft²/day (Driscoll, 1986). These estimates are much lower than those determined by the more reliable methods used above.

Table 1. Specific capacity for pumping rates between 270 and 850 gpm.

Pumping Rate (gpm)	Drawdown (ft)	Specific Capacity (gpm/ft)
270	1.59	169
378	2.82	134
530	5.33	99
750	9.57	78
846	12.51	67

A water sample was collected toward the end of the pumping test. The sample had a conductivity of 800 micromhos/cm @ 25⁰C. In comparison tap water in Idaho Falls has a conductivity of approximately 500 micromhos/cm. The water from this well is slightly harder than the water available in Idaho Falls. This conductivity is similar to those measured in the Rim Rock area. Water temperature was measured at 71⁰F during the pumping test. This temperature is higher than normally measured in the Snake Plain Aquifer water.

Measurements at the INEL range from 50 to 66 with an average of 56°F (Nace et al., 1959). The foothills region (Rim Rock Subdivision) east of Idaho Falls is known to have wells with temperatures in the 70 to 80 °F range (Hubbell, 1981). This may be due to hot waters rising along faults or higher subsurface temperatures due to residual heat of volcanism.

5. CONCLUSIONS

This test was conducted to measure the hydraulic properties of the aquifer near the Comore Loma site and to determine if this site is located over the Snake River Plain Aquifer. Results from the test are conflicting, in that the aquifer properties measured from the test indicate the transmissivity is comparable to those values measured in the the Snake River Plain Aquifer but the temperature data suggest the water is from the foothills aquifer. Comore Loma well #4 is probably located on the edge of the Snake River Plain aquifer with characteristics of both aquifers.

6. REFERENCES

1. Bond, J. G. and C. H. Wood, 1978. Geologic Map of Idaho, Idaho Department of Lands, Bureau of Mines and Geology.
2. Driscoll, F. G., 1989. Groundwater and Wells, Johnson Filtration Systems Inc., St. Paul, Minnesota, Third Printing, 1089 p.
3. Hubbell, J. M., 1981. Description of Geothermal Systems in the Vicinity of the Caribou Range, Southeastern Idaho, M.S. Thesis, University of Idaho, Moscow, Idaho, 105 p.
4. Nace, R. L., J. W. Stewart, W. C. Walton and others, 1959. Geography, Geology and Water Resources of the National Reactor Testing Station, Idaho, Part 3. Hydrology and Water Resources, IDO-22034-USGS-PT3.
5. Prostka, H. J. and G. F. Embree, 1978. Geology and Geothermal Resources for the Rexburg Area, Eastern Idaho, U.S.G.S. Open-file Report 78-1009, 14p.

APPENDIX A
AQUIFER TEST PLAN PROCEDURES

Test Plan Comore Loma Aquifer Test
July 1, 1991

Introduction

The Comore Loma site is located approximately 5 miles east of Idaho Falls in the foothills. One of the proposed sites for the Bonneville county landfill is located approximately 1/2 mile to the east of the aquifer test site. A pump test will be performed on the new Comore Loma well #4 while monitoring the Comore Loma well #1, located approximately 900 ft to the east of the test well.

Aquifer Test Design

A submersible pump will be placed in the well with a 100 psi transducer attached to the riser pipe. The transducer will be set 10 ft above the submersible pump at a depth of 70 ft below the water table (the transducer set at 377 ft bsls). Another 20 psi transducer will be placed approximately 35 ft below the water table. The anticipated drawdown in the pumping well is approximately 10 to 15 feet. The submersible pump has a rated capacity of approximately 800 gpm. A 10 psi transducer is planned to be placed in the observation well (Comore Loma #1) at a depth of 15 ft below the water table (391 ft bsls). Anticipated drawdown is very small because the observation well is located approximately 900 ft from the pumping well. All equipment in contact with water in the well will be sprayed off with a high pressure steam cleaner and rinsed with methanol.

Initial set up and collection of antecedent trend.

Pumping well - The 0 - 100 psi transducer will be attached to the riser pipe above the submersible pump while the pump is being installed. The transducer will be placed a couple of feet above the pump. The pump will be set at an approximate depth of 387 ft below land surface, 80 ft below the water table. The maximum pressure rating for the transducer is 231 ft of water. The transducer will be placed at a depth of 70 ft below the water table. A second transducer will be placed at a depth of 35 feet below the water table. This transducer will be used to measure the water level if the well shows little drawdown from the pumping. The lead wire should be taped every 10 ft to the riser pipe to prevent problems. The data logger will be set up to collect data on five minute intervals to provide an antecedent water level trend in the well. The depth to water will be measured to reference the depth of water measured by the transducer (if possible).

Observation well - The depth to water will be measured in Comore Loma well #1 and the pump turned off until after the aquifer test is completed. A 1.25 in flush coupled guide pipe will be run in the well and hung to a depth of 30 ft below the water table. The 0 to 10 psi transducer will be lowered to 15 ft below the water table. The data logger will be set up to collect water level measurements on 5 minute intervals.

Data from the pumping well data logger will be down loaded for the

antecedent trend prior to starting the pumping test. The data logger in the observation well will run continuously from when it is installed to following the recovery test.

Pumping Test

Following installation of the submersible pump the pump will be started and run for approximately an hour to test the system, check the flow rate, and initially measure the response in the well, for adjusting the pumping rate. Water discharge rate will be recorded by an in-line orifice and manometer. A valve will be located near the pump to allow the flow rate to be regulated to approximately 90% of total flow. The valve will be used to restrict the flow rate slightly. As the pumping head increases, the valve can be opened to keep the flow rate constant.

Following down loading of the antecedent trend data from the pumping well, the data logger will be set up to collect data for the pumping test. The data logger will be started a second prior to starting the 8 hour test. The flow rate should not vary more than 10% over the pumping test. Hermit data loggers will collect the water level data from the wells during the pumping test. The discharge rate should be checked, recorded, and adjusted as necessary at 10 minute intervals for the first hour, then on 1 hour intervals to keep the pumping rate within 10% of the starting rate.

Recovery Test

The well will be pumped for 8 hours and then the pumping well data logger downloaded and data recorded prior to stopping the test. The data logger will be reset and then the pump turned off and the valve closed to slow water moving down the pump column.

Equipment supplied by EGG

Pumping well - Hermit #356, 0 - 100 psi Druck transducer
0 - 20 psi Druck transducer

Observation well - Hermit #646, 0 - 10 psi Druck transducer (rated to 23 ft)
Guide pipe 1.25 in diameter flush coupled, 400 ft

Transit and Surveying rod (stadias), Steel tape 300 ft

Solinst water level tape, 600 ft length.

APPENDIX B
DRILLER'S LOGS

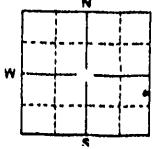
USE TYPEWRITER OR
BALL POINT PEN

State of Idaho
Department of Water Resources

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

RECEIVED
10/1/73

1. WELL OWNER		7. WATER LEVEL																																																															
Name <u>Dick Skidmore</u> Well No. <u>1</u>		Static water level <u>370</u> feet below land surface Flowing? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No G.P.M. flow <u>Good</u> Temperature <u>60</u> F. Quality <u>Good</u> Artesian closed-in pressure <u>0</u> p.s.i. Controlled by <input type="checkbox"/> Valve <input type="checkbox"/> Cap <input type="checkbox"/> Plug																																																															
Address <u>Route 3 Box 47A Idaho Falls, Idaho</u>																																																																	
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		Firm Name <u>Andrew Well Drilling Contr.</u> Firm No. <u>5</u> Address <u>1268 East 17th Street</u> Date <u>1-30-75</u> <u>Idaho Falls, Idaho 83401</u> Signed by (Firm Official) <u>Dale Wulce</u> and (Operator) <u>Dale Wulce</u>																																																															

USE ADDITIONAL SHEETS IF NECESSARY FORWARD THE WHITE COPY TO THE DEPARTMENT

State of Idaho
Department of Water Resources

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

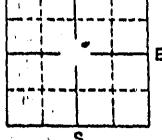
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METHOD DRILLED		10.																																																																																																		
<input type="checkbox"/> Cable <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Dug <input type="checkbox"/> Other		Work started <u>Nov. 1, 1965</u> finished <u>Dec. 1, 1965</u> Work started <u>—</u> finished <u>—</u>																																																																																																		
WELL CONSTRUCTION																																																																																																				
Diameter of hole <u>10</u> inches Total depth <u>295</u> feet																																																																																																				
Casing schedule: <input checked="" type="checkbox"/> Steel <input type="checkbox"/> Concrete																																																																																																				
Thickness	Diameter	From	To																																																																																																	
<u>.250</u> inches	<u>8</u> inches	<u>+ 1</u> feet	<u>198</u> feet																																																																																																	
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USE ADDITIONAL SHEETS IF NECESSARY

FORWARD THE WHITE COPY TO THE DEPARTMENT

WELL DRILLED & REFORC'D

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

WELL OWNER		Well # 3	7. WATER LEVEL																																																															
Name <u>Dick Skidmore</u> <u>Comore Loma</u>		Static water level <u>176</u> feet below land surface.																																																																
Address <u>Rt. 7 Box 33 Idaho Falls, Ida. 83401</u>		Flowing? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No G.P.M. flow _____																																																																
Owner's Permit No. _____		Artesian closed-in pressure _____ p.s.i.																																																																
NATURE OF WORK		Controlled by: <input type="checkbox"/> Valve <input type="checkbox"/> Cap <input type="checkbox"/> Plug																																																																
<input checked="" type="checkbox"/> New well <input type="checkbox"/> Deepened <input type="checkbox"/> Replacement <input type="checkbox"/> Abandoned (describe method of abandoning) _____		Temperature <u>50</u> °F. Quality <u>good</u>																																																																
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Sealing procedure used: <input type="checkbox"/> Slurry pit <input type="checkbox"/> Temp. surface casing <input type="checkbox"/> Overbore to seal depth																																																																		
Method of joining casing: <input type="checkbox"/> Threaded <input type="checkbox"/> Welded <input type="checkbox"/> Solvent <input type="checkbox"/> Weld <input type="checkbox"/> Cemented between strata																																																																		
Describe access port _____																																																																		
LOCATION OF WELL		10.																																																																
Sketch map location must agree with written location.		Work started <u>1-22-74</u> finished <u>1-25-74</u>																																																																
 N S E W		Subdivision Name <u>Comore Loma</u> <u>Well # 3</u> Lot No. <u>1</u> Block No. <u>6</u> Division # <u>2</u> County <u>Bonneville</u> W <u>1/4</u> NE <u>1/4</u> Sec. <u>1</u> , T. <u>1</u> , N/S, R. <u>38</u> E/W																																																																
		11. DRILLERS CERTIFICATION																																																																
		I/We certify that all minimum well construction standards were complied with at the time the rig was removed.																																																																
		Firm Name <u>Andrew Well Drilling</u> Firm No. <u>Contractors</u> Address <u>1268 E. 17th St., Idaho Falls, Ida.</u> Date <u>1-25-74</u> Signed by (Firm Official) <u>Andrew Well Drilling</u> and (Operator) <u>John D. Miller</u>																																																																

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

ANDREW WELL DRILLING

Contractors

Phone 522-2794

1268 E. 17th St., Idaho Falls, Idaho

Pump and Well Drilling Equipment Installed

PURE DRINKING WATER IS THE ESSENCE OF LIFE, LET US DRILL YOUR WELL, AND YOU WILL BE SATISFIED.

CUSTOMER: Comarc Laram #4

DRILLER: Dale

ADDRESS: _____

RIG NO. 213 Domestic Industrial Municipal

DEPTH TO WATER: 307'

Irrigation Test Other

WELL LOCATION: _____

LEGAL DESCRIPTION: _____

DATE: 6-5-91 RIG TIME: 8:00 AM REMARKS: Moved Rig to Site

FOOTAGE: _____ FORMATION: _____

6-6 Started Drilling

0-55 - Sand 13' rock/22'

5-10 " "

10-15 " "

15-20 " "

20-25 " "

25-30 " "

30-35 " "

35-38 " "

38-40 13' rock Rolite

40-45 " "

45-50 " "

50-55 " "

55-60 Dark Gray Sandstone

60-70 Brown Sandstone

70-75 " "

CUSTOMER: Conoco Lotta

DRILLER: Paul E.

PAGE # 2

DATE:

RIG TIME:

REMARKS:

-10-91

FOOTAGE: FORMATION:

75' - 80' " " "

80' - 85' " " "

85' - 90' " " "

90' - 95' " " "

95' - 100' " " "

100' - 105' " " "

105' - 110' " " "

110' - 115' " " "

115' - 120' " " "

118' - 123' ~~125'~~ Pumice

125' - 130' " " "

130' - 135' " " "

135' - 140' " " "

140' - 145' " " "

145' - 155' " " "

155' - 165' " " "

165' - 175' " " "

175' - 185' " " "

185' - 195' " " "

195' - 205' " " "

205' - 210' " " "

210' - 220' " " "

220' - 230' " " "

230' - 240' " " "

240' - 246' " " "

246' - 252' Brown Rolite

CUSTOMER: _____

DRILLER: _____

PAGE # _____

ATE: _____

RIG TIME: _____

REMARKS: _____

-16

Caving joints

6-12 Got Ready to set 12" pipe

6-12 Setting 12" pipe (180')

6-13 Setting pipe (260')

Waited for 12" pipe changed bit
in hammer

6-14 Finished setting pipe

Cleaned out cemented pipe
in about 6 Yards

6-17 Set Drill Stems started

Drilling

Water about 15 GPM

FOOTAGE: _____

FORMATION: _____

250-255	6"	1"	1"
255-260	6"	1"	1"
260-265	6"	1"	1"
265-270	6"	1"	1"
270-275	6"	1"	1"
275-280	6"	1"	1"
280-285	13"	12"	12"
285-290	13"	12"	12"
290-295	13"	12"	12"
295-300	13"	12"	12"
300-305	13"	12"	12"
305-308	13"	12"	12"
308-311	13"	12"	12"
311			
311-315	Fir	Grey	12"
315-321	"	"	"
321-325	Fir	Grey	12"
325-330	Fir	Grey	12"
330-335	Fir	Grey	12"
335-340	Broke	"	"
340-345	Fir	"	"
345-351	Harr	"	"

JSTOMER: _____

DRILLER: _____ PAGE # _____

ATE: _____

RIG TIME: _____

REMARKS: _____

Water 10 GPM

Water 57-60 GPM

Water

6

10

10

6-18-91

Broken Coal Water
Broken ~~Stone~~~~Heavy Damaged~~6-19- Perforated 10" PIPE WITH
torch started setting

6-20 Set PIPE to Bottom

Top of Liner 281 - Bottom 565

Air surged 75 hrs

B-8

512

FOOTAGE: _____

FORMATION: _____

357-360 Broken " "

361-370 Firm " "

371-380 " " "

381-390 " " "

391-400 " " "

401-410 " " "

418-419 Black Shale Limestone

419-421 " " "

421-423 Brown Shale Limestone

428-440 Puricle " "

440-452 " " "

452-455 " " "

455-460 " " "

460-465 " " "

465-470 " " "

470-475 " " "

475-480 " " "

480-485 " " "

485-491 " " "

491-495 Brown Riolite

495-500 Firm " "

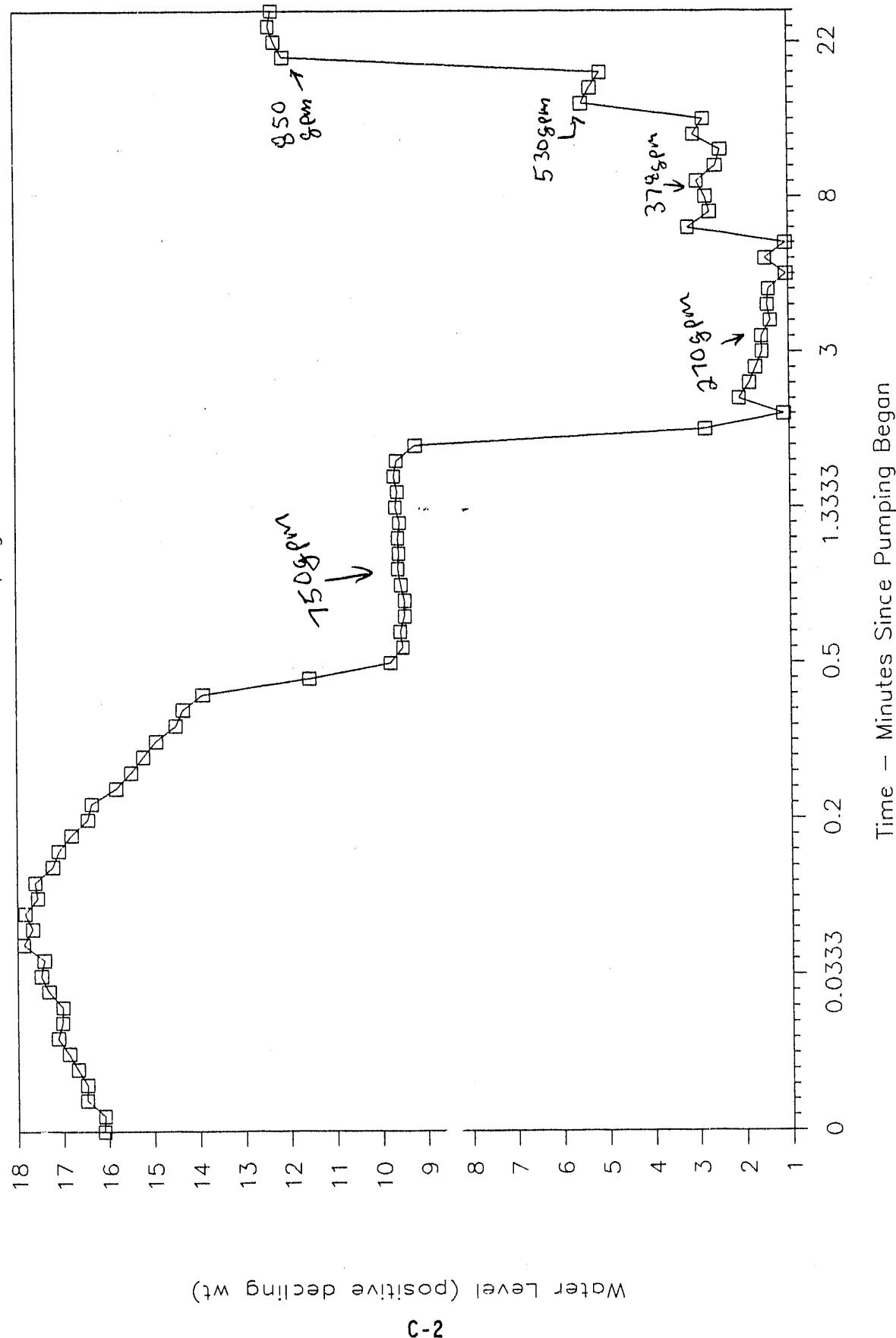
500-503 " " "

503-512 Broken " "

Water

APPENDIX C
WATER LEVEL PRETEST DATA

Comora Loma Well #4



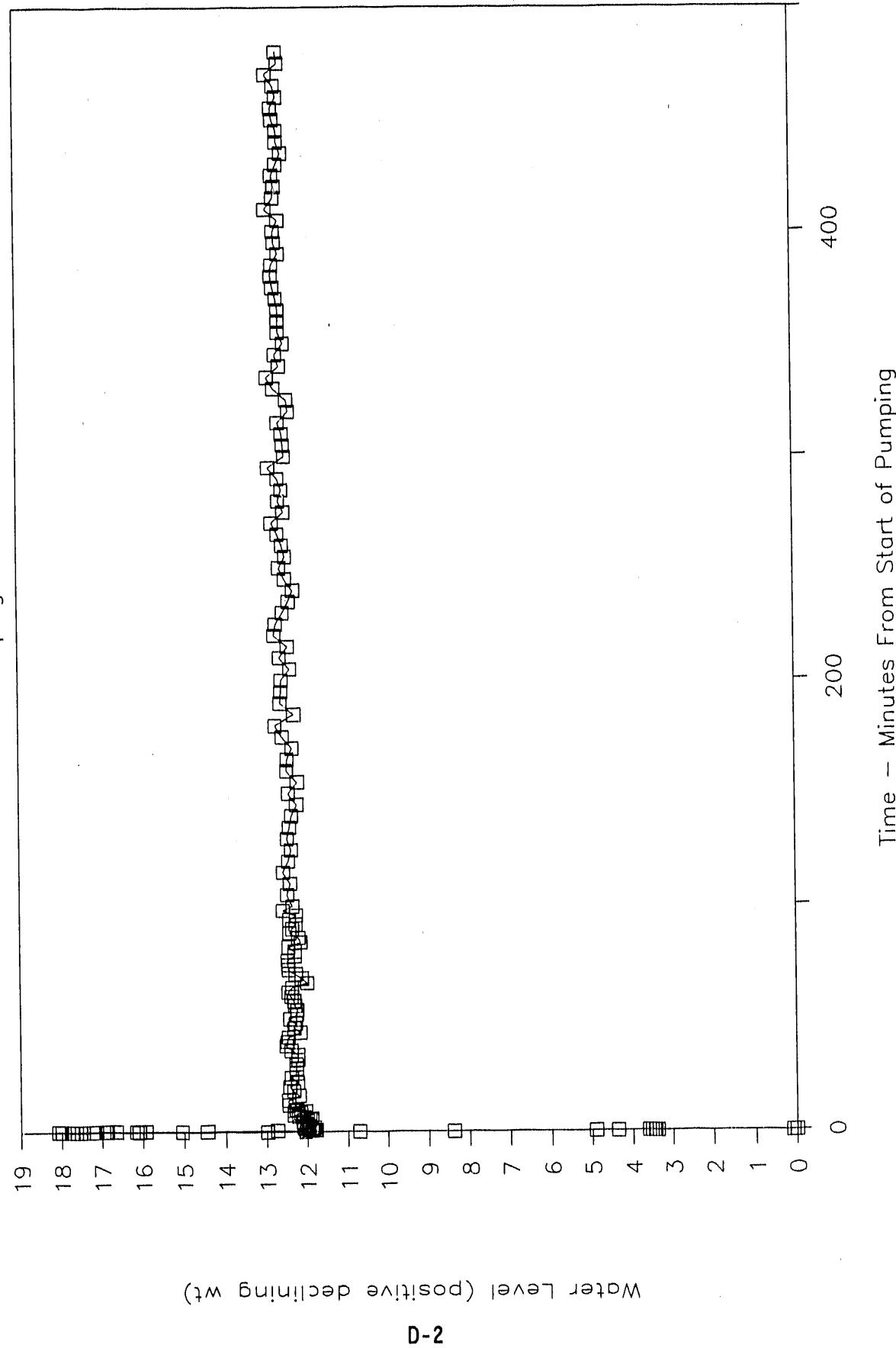
Comora Loma Prepumping test

7/11/91 start 16:24

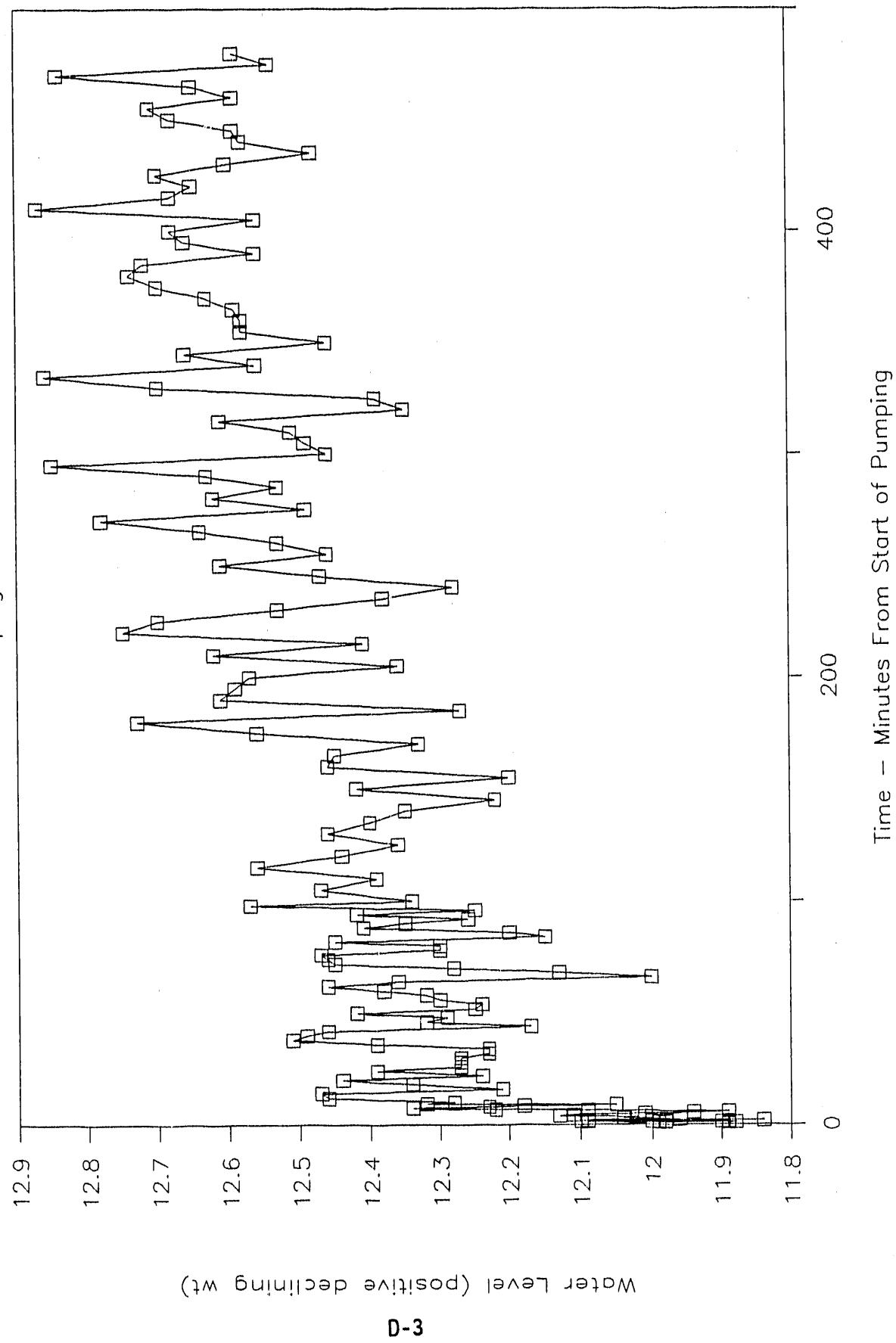
		gallons/min		
0	16.11	850	4	1.39
0.0033	16.1		4.5	1.46
0.0066	16.5		5	1.43
0.0099	16.49		5.5	1.05
0.0133	16.69		6	1.51
0.0166	16.88		6.5	1.06
0.02	17.12		7	3.2
0.0233	17.03		7.5	2.7
0.0266	17.02		8	2.8
0.03	17.31		8.5	2.99
0.0333	17.47		9	2.58
0.05	17.41		9.5	2.47
0.0666	17.86		10	3.06
0.0833	17.66		12	2.83
0.1	17.82		14	5.53
0.1166	17.54		16	5.34
0.1333	17.6		18	5.12
0.15	17.22		20	12.08
0.1666	17.08		22	12.27
0.1833	16.81		24	12.39
0.2	16.45		26	12.33
0.2166	16.37			
0.2333	15.81			
0.25	15.49			
0.2666	15.22			
0.2833	14.93			
0.3	14.5			
0.3166	14.35			
0.3333	13.92			
0.4167	11.58			
0.5	9.8	750		
0.5833	9.51			
0.6667	9.57			
0.75	9.46			
0.8333	9.46			
0.9167	9.55			
1	9.61			
1.0833	9.6			
1.16 /	9.61			
1.25	9.58			
1.3333	9.67			
1.4166	9.62			
1.5	9.7			
1.5833	9.64			
1.6667	9.21			
1.75	2.82	270		
1.8333	1.11			
1.9167	2.09			
2	1.86			
2.5	1.73			
3	1.58			
3.5	1.59			

APPENDIX D
WATER LEVEL DATA FOR PUMPING TEST

Comora Loma #4, Water Level
Pumping Test



Comora Loma #4, Water Level
Pumping Test



F13:

READY

Regression Output:

X Coefficient(s) 0.001192
Std Err of Coef. 0.000081

x is time
y is water level

$$\text{Water Level} = 0.001192 \times \text{Time (min)} + 12.19408$$

Regression of water level Data

15-Jul-91 11:53 AM

Comora Loma Pumping Test

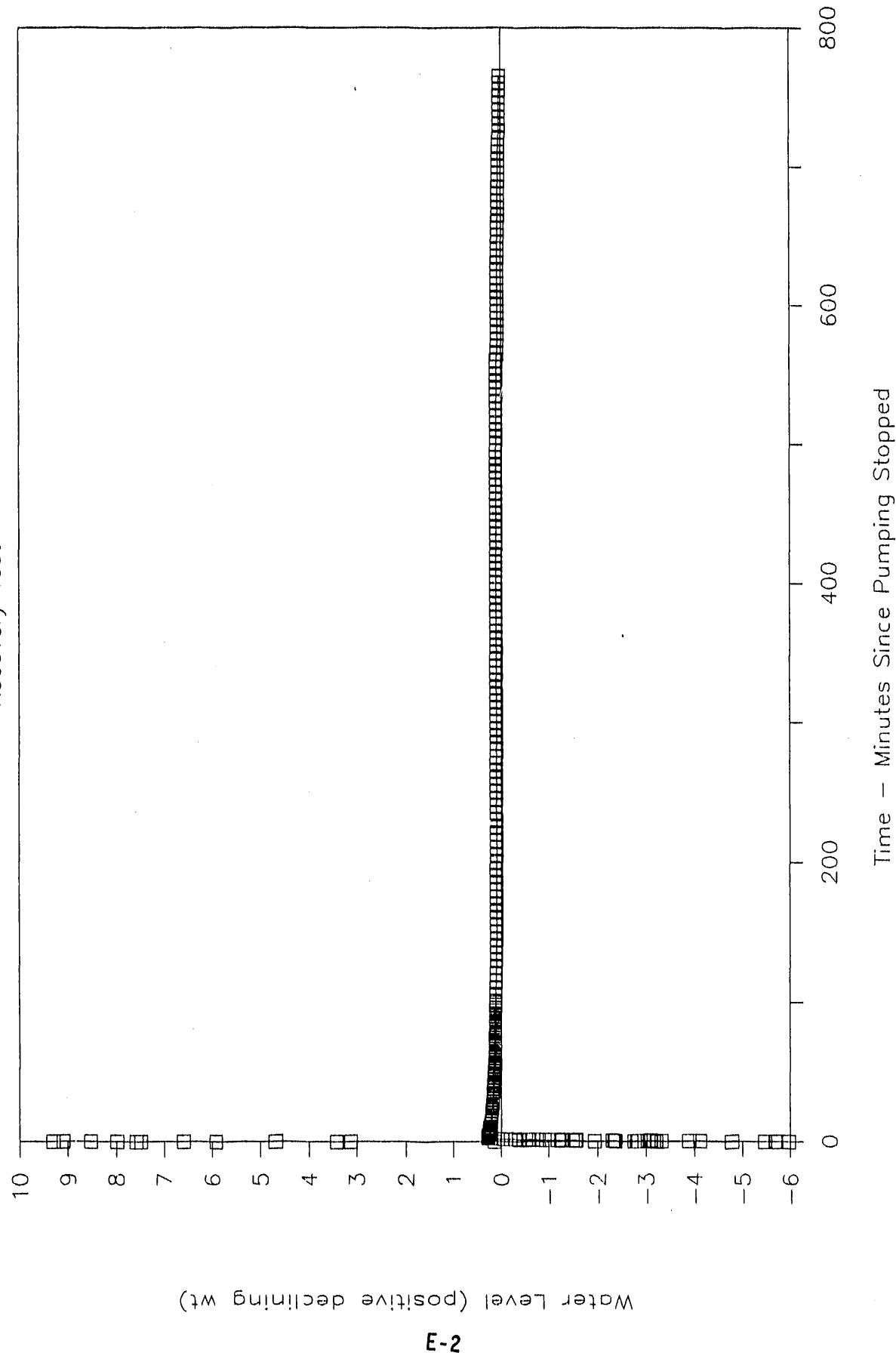
7/11/91 Start 17:30

20 psi XD 850 gpm

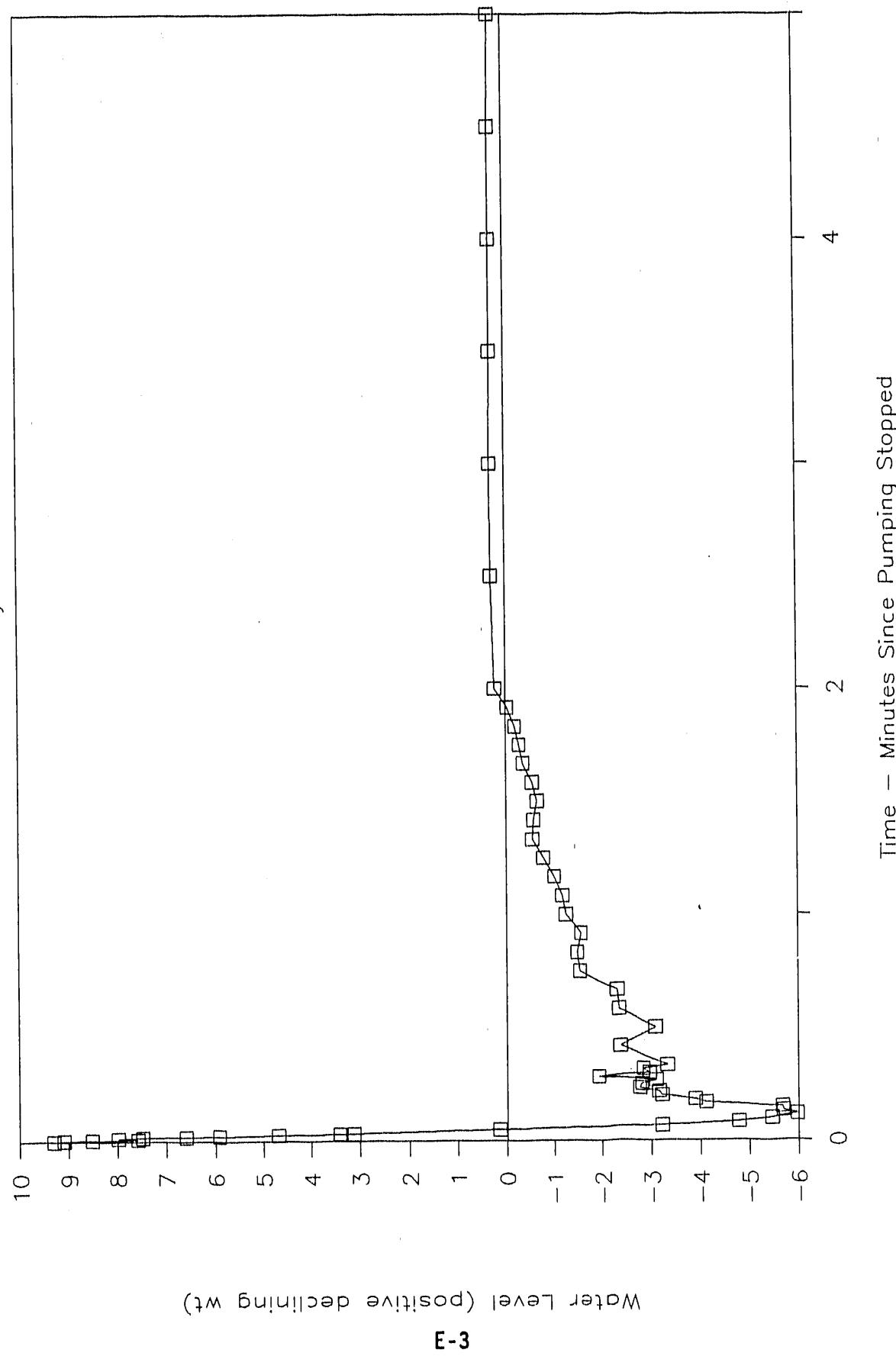
0	0			84	12.15	335	12.86
0.0033	0.09	4	12.13	86	12.2	340	12.56
0.0066	8.38	4.5	12.11	88	12.41	345	12.66
0.0099	12.06	5	12.01	90	12.35	350	12.46
0.0133	3.62	5.5	11.94	92	12.26	355	12.58
0.0166	3.48	6	11.89	94	12.42	360	12.58
0.02	3.45	6.5	12.09	96	12.25	365	12.59
0.0233	3.38	7	12.22	98	12.57	370	12.63
0.0266	3.54	7.5	12.34	100	12.34	375	12.7
0.03	4.38	8	12.23	105	12.47	380	12.74
0.0333	4.92	8.5	12.18	110	12.39	385	12.72
0.05	8.38	9	12.05	115	12.56	390	12.56
0.0666	10.72	9.5	12.32	120	12.44	395	12.66
0.0833	12.99	10	12.28	125	12.36	400	12.68
0.1	15.06	12	12.46	130	12.46	405	12.56
0.1166	16.09	14	12.47	135	12.4	410	12.87
0.1333	16.92	16	12.21	140	12.35	415	12.68
0.15	17.62	18	12.34	145	12.22	420	12.65
0.1666	17.71	20	12.44	150	12.42	425	12.7
0.1833	18.09	22	12.24	155	12.2	430	12.6
0.2	18.01	24	12.39	160	12.46	435	12.48
0.2166	17.74	26	12.27	165	12.45	440	12.58
0.2333	17.52	28	12.27	170	12.33	445	12.59
0.25	17.21	30	12.27	175	12.56	450	12.68
0.2666	17.14	32	12.23	180	12.73	455	12.71
0.2833	16.88	34	12.23	185	12.27	460	12.59
0.3	16.65	36	12.39	190	12.61	465	12.65
0.3166	16.15	38	12.51	195	12.59	470	12.84
0.3333	15.93	40	12.49	200	12.57	475	12.54
0.4167	14.44	42	12.46	205	12.36	480	12.59
0.5	12.75	44	12.17	210	12.62		
0.5833	12.04	46	12.32	215	12.41		
0.6667	11.9	48	12.29	220	12.75		
0.75	11.78	50	12.42	225	12.7		
0.8333	11.86	52	12.25	230	12.53		
0.9167	11.8	54	12.24	235	12.38		
1	11.89	56	12.3	240	12.28		
1.0833	11.88	58	12.32	245	12.47		
1.1667	11.99	60	12.38	250	12.61		
1.25	12.09	62	12.46	255	12.46		
1.3333	11.9	64	12.36	260	12.53		
1.4166	11.98	66	12	265	12.64		
1.5	12	68	12.13	270	12.78		
1.5833	11.89	70	12.28	275	12.49		
1.6667	12.1	72	12.45	280	12.62		
1.75	11.98	74	12.46	285	12.53		
1.8333	12.09	76	12.47	290	12.63		
1.9167	11.84	78	12.3	295	12.85		
2	12.09	80	12.3	300	12.46		
2.5	11.96	82	12.45	305	12.49		
3	12.04			310	12.51		
3.5	12.02			315	12.61		
			D-5	320	12.35		
				325	12.39		
				330	12.7		

APPENDIX E
WATER LEVEL DATA FOR RECOVERY TEST

Comora Loma Well #4
Recovery Test



Comorac Loma Well #4
Recovery Test



Comora Loma Pumping Test (R

7/12/91 Start 1:30 a.m.

20 psi XD Pumped at 850 gp

0	9.3	2.5	0.27	78	0.12
0.0033	9.09	3	0.28	80	0.12
0.0066	8.53	3.5	0.27	82	0.12
0.0099	7.59	4	0.27	84	0.12
0.0133	8	4.5	0.27	86	0.12
0.0166	7.49	5	0.26	88	0.12
0.02	6.6	5.5	0.26	90	0.12
0.0233	5.92	6	0.25	92	0.12
0.0266	4.69	6.5	0.25	94	0.12
0.03	3.43	7	0.25	96	0.12
0.0333	3.13	7.5	0.25	98	0.11
0.05	0.15	8	0.24	100	0.11
0.0666	-3.21	8.5	0.24	105	0.11
0.0833	-4.78	9	0.24	110	0.11
0.1	-5.47	9.5	0.24	115	0.1
0.1166	-5.97	10	0.24	120	0.1
0.1333	-5.69	12	0.22	125	0.1
0.15	-5.68	14	0.21	130	0.1
0.1666	-4.11	16	0.2	135	0.1
0.1833	-3.89	18	0.2	140	0.1
0.2	-3.21	20	0.2	145	0.09
0.2166	-3.16	22	0.19	150	0.09
0.2333	-2.76	24	0.18	155	0.09
0.25	-2.81	26	0.18	160	0.09
0.2666	-3.1	28	0.17	165	0.09
0.2833	-1.94	30	0.17	170	0.09
0.3	-2.96	32	0.17	175	0.09
0.3166	-2.84	34	0.17	180	0.09
0.3333	-3.32	36	0.16	185	0.09
0.4167	-2.37	38	0.16	190	0.09
0.5	-3.09	40	0.16	195	0.09
0.5833	-2.34	42	0.15	200	0.09
0.6667	-2.31	44	0.15	205	0.09
0.75	-1.53	46	0.15	210	0.09
0.8333	-1.48	48	0.15	215	0.09
0.9167	-1.56	50	0.15	220	0.09
1	-1.25	52	0.14	225	0.09
1.0833	-1.18	54	0.14	230	0.09
1.1667	-1.01	56	0.14	235	0.09
1.25	-0.79	58	0.13	240	0.09
1.3333	-0.56	60	0.13	245	0.09
1.4166	-0.59	62	0.13	250	0.09
1.5	-0.66	64	0.13	255	0.09
1.5833	-0.56	66	0.13	260	0.09
1.6667	-0.37	68	0.13	265	0.09
1.75	-0.29	70	0.13	270	0.09
1.8333	-0.2	72	0.13	275	0.09
1.9167	-0.04	74	0.13	280	0.1
2	0.21	76	0.12	285	0.09

290	0.09		
295	0.09	535	0.09
300	0.09	540	0.09
305	0.09	545	0.09
310	0.09	550	0.09
315	0.09	555	0.09
320	0.09	560	0.09
325	0.1	565	0.08
330	0.1	570	0.08
335	0.09	575	0.08
340	0.09	580	0.08
345	0.09	585	0.08
350	0.09	590	0.08
355	0.1	595	0.08
360	0.1	600	0.08
365	0.1	605	0.08
370	0.1	610	0.08
375	0.1	615	0.08
380	0.1	620	0.08
385	0.1	625	0.08
390	0.1	630	0.08
395	0.1	635	0.07
400	0.1	640	0.07
405	0.1	645	0.07
410	0.1	650	0.07
415	0.1	655	0.07
420	0.1	660	0.07
425	0.1	665	0.06
430	0.1	670	0.06
435	0.1	675	0.06
		680	0.06
		685	0.06
		690	0.05
		695	0.05
		700	0.05
		705	0.05
440	0.1	710	0.05
445	0.1	715	0.04
450	0.1	720	0.04
455	0.1	725	0.03
460	0.1	730	0.03
465	0.1	735	0.03
470	0.1	740	0.03
475	0.1	745	0.03
480	0.1	750	0.03
485	0.1	755	0.02
490	0.1	760	0.03
495	0.1	765	0.02
500	0.1		
505	0.1		
510	0.1		
515	0.1		
520	0.1		
525	0.1		
530	0.1		

END

DATE
FILMED
6/03/92