

[illegible]

3. **Delivery System Diagram:** Indicate all major components and distances between components. Indicate weir size / ditch size / pipe I.D. as applicable.

See attached sheets, appendices, and figures:

XX Copy of USGS Quadrangle Attached showing location(s) of point(s) of diversion and place(s) of use (Figure 1).

XX Aerial Photo Attached (Figure 2)

XX Photos of Diversion and System Attached

4.

Well or Diversion Identification No.*	Motor Make	Hp	Motor Serial No.	Pump Make	Pump Serial No. or Discharge Size
Back-9 Well	Hitachi 10"	60	G8918702H	Goulds 11CLC	FR373677 6-inch discharge
Front-9 Well	Franklin	20		Goulds 7TLC	6-inch discharge
Club House Well	General Electric	100	GAJ 714160	Goulds 10RJMC	6-inch discharge
Johnson Ranch Flowing Wells	none		none	none	8-inch discharge pipe (all wells) at pond

*Code to correspond with No. on map and aerial photo

D. FLOW MEASUREMENTS

1.

Measurement Equipment	Type	Make	Model No.	Serial No.	Size	Calibration Date
(Back-9) McCrometer	Propeller		MW 506	95-3598-6	6-inch	5-26-95
(Front-9) McCrometer	Propeller		MW 506	95-1876-6	6-inch	4-3-95
(Club House) Water Specialties	Propeller		ML 04	93-3821-6	6-inch	10-15-93

2. Measurements: Discharge measurements for this examination were made using the impeller flow-meters listed above (Figures 3-5) and a visual estimate of pipe flow for the Johnson Ranch artesian flowing wells where the collector/discharge pipe for these wells discharges to the Club House pond (Figure 6). The minimum piping installation recommendations of the manufacturer (Appendix A) do not appear to be precisely met at the Club House well because a 30-inch length of straight-run pipe, completely without obstructions, is not available upstream of the meter (Figure 7). The Model ML -04 meter does, however have integral straightening vanes which greatly compensate for pipe irregularities (an upstream coupling within 5 pipe diameters). Calls to the Engineering Departments of McCrometer and Water Specialties determined that if turbulent flow (which could cause meter inaccuracy) was present within the flow stream, then the instantaneous flow rate needle would fluctuate erratically. This was not observed to be the case, therefore, it is generally believed likely that the flow-meter was reading correctly (Figure 3). Although the pipe distances are acceptable at both Back-9 and Front-9 wells, the accuracy of the metering would likely be improved by installing the control valve down-stream of the flow-meters (to create some back pressure) rather than up-stream. These meter needles did not appear to be fluctuating significantly to question the readings (Figures 3-5).

E. NARRATIVE/REMARKS/COMMENTS

Permit No. 63-12596 seeks an instantaneous diversion rate **only** and does not change the volume, place of use, nature of use, or points of diversion for Crane Creek Country Club's (CCCC) main irrigation water right; License No. 63-03108. The previous IDWR field examinations for water right No. 63-03108, for associated Transfer No. 4248, and for storage water right No. 63-12152 were detailed and thorough with respect to the description of CCCC's water system and wells. Those descriptions are not repeated, or needed, here. Rather, the combined instantaneous diversion capacity of CCCC's well field, with all wells pumping at the same time, was the goal of this examination.

The field examination for this permit was carried out on April 9, 2003 by me, Ed Squires, accompanied by Mr. Gerald Flaherty, Golf Course Superintendent. Also present, were Sunny Healey, Daniella Makram Morgos Abdelmasih, and Tom Anderson (hydrogeology students at Boise State University). The field exam consisted of visiting three pumped wells and the discharge pipe for a series of flowing artesian wells (the so called Johnson Ranch wells) the combined discharge of which is piped to the golf course "Club House" pond (Figure 6). None of the well pumps were operating during the first round of measurements. After recording non-pumping water level and totalized flow at each well head, and after starting the pump for each well to monitor flow rate and pumping water level, a second round of measurements was conducted to explore for well interference effects between wells that might have the effect of diminished combined flow from the wells compared with individual well yields. As each individual well pump was started, it was left running for the length of the entire field exam (1½ -to-2 hours). For the second round of measurements, the totalized gallons pumped readings were compared to the instantaneous flow rates of two of the wells to verify that they had remained pumping throughout the measurement period for all of the wells. None of the CCCC irrigation wells are housed inside of pump houses.

Front Nine Well (1:20 PM). The CCCC Front-9 well is an 8-inch diameter well completed to 407.5 feet below ground level (bgl) and open to the aquifer between 347-to-399 feet bgl (Figure 8) The well is equipped with a Goulds Pumps Model 7TLC, 2-stage, deep-well submersible turbine pump set on 140 feet of 5-inch diameter black steel pump column (Figure 9) The design point of the pump is 550 gpm at about 124 feet of total dynamic head. The pump is driven by a 20 HP, 3450 rpm Franklin submersible motor at 77% efficiency at design point. This pumping plant was installed in April of 1995. The 6-inch diameter discharge-piping consists of a 90 degree curved discharge head, a butterfly-type control valve, and a flow-meter mounted in 6-feet of smooth 6-inch pipe and discharging to atmosphere with an air gap of several feet above full pond level (Figure 3) estimated at 1.5 acre-feet in total storage volume. The well pump is set to a float-control switch that causes the pump to shut off at full pond level.

When we arrived on site, the well pump was not operating. A chalked steel tape and an electric water-level sounder were used to measure non-pumping water-level at 61.81 feet below top of casing (btoc) at 1:27 P.M. Prior to tuning on the pump, the flow-meter totalizer showed total gallons pumped as 287391 X 100. Pump was turned on at 1:29 P.M. At 1:43 P.M. the instantaneous flow-rate needle on the flow-meter (Figure 3) indicated the well was producing 545-to-550 gpm from a pumping water level of 94.11 feet btoc (specific capacity of ~ 16 gpm/foot).

Club House Well (1:52 P.M.) The CCCC Club House well is a 12-inch diameter well completed to 734 feet below ground level (bgl) and open to the aquifer between 194-to-734 feet bgl (Figure 10) According to CCCC records, this well is equipped with a Goulds Pumps Model 10RJMC, 12-stage, deep-well line-shaft turbine pump set on 500 feet of 8-inch diameter black steel pump column. The design point of the pump is 600 gpm at about 480 feet of total dynamic head (Figure 11). The pump is driven by a 100 HP, 1770 rpm General Electric motor (Serial No.

5K6276XC571A) at 82% efficiency at design point. This pumping plant was apparently installed in April of 1995. The 6-inch diameter discharge-piping consists of a 90 degree discharge head, a dresser coupler, and a flow-meter mounted in ~ 4-feet of smooth 6-inch pipe and discharging below ground approximately 6 feet from the well head (Figure 7). There was not a pressure gage connected to the discharge piping which diverts water directly into the Club House pond.

When we arrived on site, the well pump was not operating. A chalked steel tape and an electric water-level sounder were used to measure non-pumping water-level at 158.3 feet below measuring point (bmp) at 1:55 P.M. Water-level measurements were obtained through a 5/8-inch diameter plastic monitoring tube extending 0.8 feet above the concrete pump base. Prior to turning on the pump, the flow-meter totalizer showed total gallons pumped as 243579 X 1000 gallons. The pump was turned on at 2:00 P.M. At 2:10 P.M., the instantaneous flow-rate needle on the flow-meter (Figure 4) indicated the well was producing 850 gpm from a pumping water level of 201.3 feet bmp (specific capacity of ~ 19 gpm/foot).

Back Nine Well (2:17 P.M) The CCCC Back-9 well is a 14-inch diameter well completed to 353 feet below ground level (bgl) and open to the aquifer between 284-to-353 feet bgl (Figure 12) The well is equipped with a Goulds Pumps Model 11CLC, 5-stage, deep-well submersible turbine pump set on 300 feet of 8-inch diameter black steel pump column. The design point of the pump is 700 gpm at about 280 feet of total dynamic head (Figure 13). The pump is driven by a 60 HP, 1770 rpm Hitachi 10-inch motor at 83% efficiency at design point. This pumping plant was apparently installed in March of 1996. The 6-inch diameter discharge-piping consists of a 90 degree discharge head, a butterfly-type control valve, and a flow-meter mounted in ~7-feet of smooth 6-inch pipe and discharging below ground approximately 8 feet from the well head (Figure 5). There is a pressure gage connected to the discharge piping but it did not appear to be operative.

When we arrived on site, the well pump was not operating. A chalked steel tape and an electric water-level sounder were used to measure non-pumping water-level at 205.3 feet below measuring point (bmp) at 2:23 P.M. Water-level measurements were obtained through a 5/8-inch diameter threaded access port in the discharge head. Measuring point is 14-inches above ground level. Prior to tuning on the pump, the flow-meter totalizer showed total gallons pumped as 187845 X 100 gallons. The pump was turned on at 2:26 P.M. A few minutes later, the instantaneous flow-rate needle on the flow-meter (Figure 5) indicated the well was producing 730-to-750 gpm from a pumping water level of 234.9 feet bmp (early-time specific capacity of ~ 25 gpm/foot).

Johnson Ranch Flowing Wells (2:47 P.M.) The CCCC flowing artesian wells (the so-called Johnson Ranch wells of which there are reportedly 15 wells) were not individually visited or measured during this examination. Rather, an 8-inch discharge pipe, that is apparently the collector pipe for all of the artesian flowing wells, was measured. No flow-meter is installed in this line and owing to its discharge just above the level of the Club House Pond (Figure 6), flow measurement using a bucket or other empirical means was not possible. Therefore a visual estimate of the flow based upon experience was used. At 2:47 P.M. the flow from the pipe was estimated at 150-to-175 gpm.

The total combined instantaneous flow-rate from all well sources during the first round of measurements was 5.18 cfs (2,325 gpm). Two of the wells, the first two activated, were revisited a second time as tabulated below.

Well	Time	Elapsed Time	Rate of Flow	Totalizer	Previous Total	Average Flow
Front Nine	3:02 P.M.	93 minutes	510-520 gpm	287889 X100	287391 X 100	535.5 gpm
Club House	3:12 P.M.	80 minutes	850 gpm	243636 X 1000	243579 X 1000	712.5 gpm

According to the instantaneous flow indicators on both flow-meters, the Front-9 and Clubhouse wells were pumping at about the same rates originally observed indicating no serious well interference effects between wells. The averaged flow for the Front-9 well agrees with the instantaneous readings. The Clubhouse well's averaged flow rate, over 80 minutes, does not precisely agree with the observed instantaneous flow rates indicating that the meter is somewhat out of calibration. Speaking with the Water Specialties engineering support team, I was made to understand that it is not possible to predict which, of the flow rate or totalizer (or both), would be out of calibration. For the purposes of this examination I am assuming that the flow rate indicator was working correctly or at least fairly close to that.

From the measurements described above, it would appear that the total observed maximum flow rate from all sources is 5.18 cfs (2325 gpm) or 0.34 cfs (153 gpm) less than the requested diversion rate of 5.52 cfs (2,477 gpm). However, it was brought to my attention that the CCCC's Back-9 well has been experiencing significant water level decline in recent years (Figure 14). Declines of 20-to-30 feet per year have been documented. Given the measured specific capacity of the well (20-25 gpm/ft), it is clear that the well pump would produce more water with less lift (lower TDH). Therefore, it is reasonable to assume that within the development period of the permit, when aquifer pressures were at significantly higher levels, that the well was produced at higher flow rates. For example, using a conservative estimate of specific capacity of 20 gpm/ft of drawdown, a lowering of the pumping water level in the well of only about 8 feet could cause a loss of production of 153 gpm. Apparently, CCCC is pursuing several remedies to the lowering water table at its Back-9 well including well maintenance, pump maintenance, and "resting" of the well to allow natural recovery of the aquifer pressures to previous levels. Therefore, I am hesitant to reduce the amount of the requested rate of diversion for the water right when the well was produced at the full requested rate during the development period and because steps are underway to return the well to its full capacity. According to the pump performance curve, the well's pumping plant could produce the needed 900 gpm to prove up the water right as long as the total dynamic head does not exceed 200 feet (Figure 13). Because the well discharges to atmosphere, the frictional head losses of the pump-column and a few pipe fittings along with the pumping lift are the only components of TDH. From the long-term hydrograph (Figure 14) it is apparent that the TDH would have been less than 220 feet for much of the irrigation season for most years within the development period of the permit when the water right instantaneous diversion rate was met. This is not surprising because the applied for diversion rate was based on existing pumping wells of known capacity.

RECOMMENDATIONS:

With the installed pumping plants, the installed capacity from all of CCCC's sources is capable of producing the requested 5.52 cfs of Permit No. 63-12596. The combined simultaneous diversion rate of all sources was measured at 5.18 cfs for this examination. Because of the relatively small discrepancy (0.06 %) and because the rate almost certainly was met during the development period, when aquifer pressures were higher, I recommend that the Crane Creek Country Club's water right No. 63-12596 be licensed for its requested diversion rate of 5.52 cfs.

Have conditions of permit approval been met? X yes no

F. FLOW CALCULATIONS

_____ Additional Computation Sheets Attached

Measured Method:

Instantaneous flow rates are based on field-observed readings of good-quality impeller flow-meters installed with slightly less installation tolerances than recommended by the manufacturer. These readings are supported by: 1) the operating conditions and pump performance curves, 2) non-pumping and pumping water level measurements by the field examiner, and 3) well-documented water levels and previous pumping test measurements. Therefore, the observed, calculated, and recommended maximum flow rates for the well appear to be justified.

G. VOLUME CALCULATIONS

1. Volume Calculations for Irrigation:

$$V_{I.R.} = (\text{Acres Irrigated}) \times (\text{Irrigation Requirement}) =$$

$$V_{D.R.} = [\text{Diversion Rate (cfs)}] \times (\text{Days in Irrigation Season}) \times 1.9835 =$$

$$V = \text{Smaller of } V_{I.R.} \text{ and } V_{D.R.} =$$

B

2. Volume Calculations for Other Uses:

Not applicable to this permit.

H. RECOMMENDATIONS

1. Recommended Amounts

Beneficial Use	Period of Use		Rate of Diversion Q (cfs)	Annual Volume (afa)
	From	To		
<u>Irrigation</u>	<u>Mar. 15</u>	<u>Nov. 15</u>	<u>5.52 cfs</u>	<u>N/A</u>
Totals:			<u>5.52 cfs</u>	<u>N/A</u>

2. Recommended Amendments

☐ Change P.D. as reflected above ☐ Add P.D. as reflected above ☒ None
☐ Change P.U. as reflected above ☐ Add P.U. as reflected above ☐ Other

I. AUTHENTICATION

Field Examiner's Name Edward Squires CWRE No. 05-125 Date May 17, 2004

Reviewer _____ Date _____

SEAL

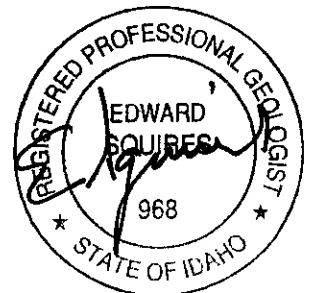
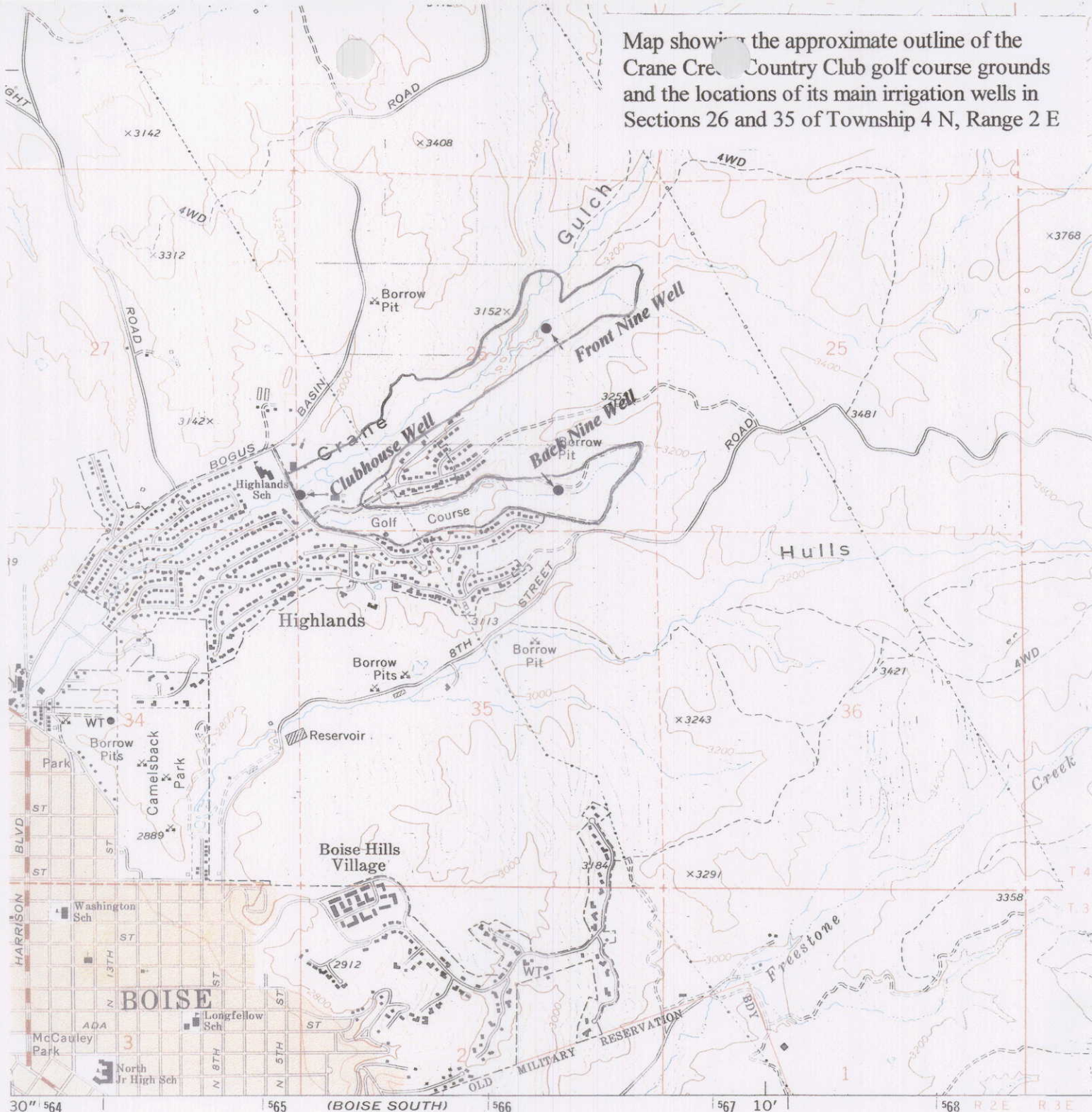




Figure 2.

Map showing the approximate outline of the Crane Creek Country Club golf course grounds and the locations of its main irrigation wells in Sections 26 and 35 of Township 4 N, Range 2 E



BOISE NORTH QUADRANGLE

CONTOUR INTERVAL 40 FEET

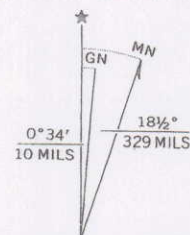
DOTTED LINES REPRESENT 20-FOOT CONTOURS

NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

IDAHO

7.5 MINUTE SERIES (TOPOGRAPHIC)



UTM GRID AND 1972 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

Map photoinspected 1976

Figure 1.



Figure 6. Photograph of the “Springs” discharge to the Crane Creek Country Club’s Clubhouse Pond (summer 2003). Actual sources of the water are a series of flowing artesian wells (Johnson Ranch wells) along Crane Creek. The natural artesian flow from these wells, which has been a source of irrigation water for the golf course since its inception, is collected and transported to the Clubhouse Pond via the 8-inch diameter flowing pipe shown above.



Figure 5. Photographs of the Crane Creek Country Club's Back-9 well head (2003). Upper view shows the Back-9 well's totalizing flow-meter after the pump was activated for the field examination. Lower photo is of the Back-9 well discharging directly to the Back-9 Pond at about 730 gpm. Visible are the pressure gage, control valve, and flow-meter. The well is equipped with a submersible pump and motor.



Figure 4. Photographs of the CCCC's Club House Well "Water Specialties" totalizing flow-meter. Upper view shows the serial number of the unit while the lower picture shows the instantaneous diversion rate of 850 gpm and a totalized gallons pumped of 243587 X 1000.

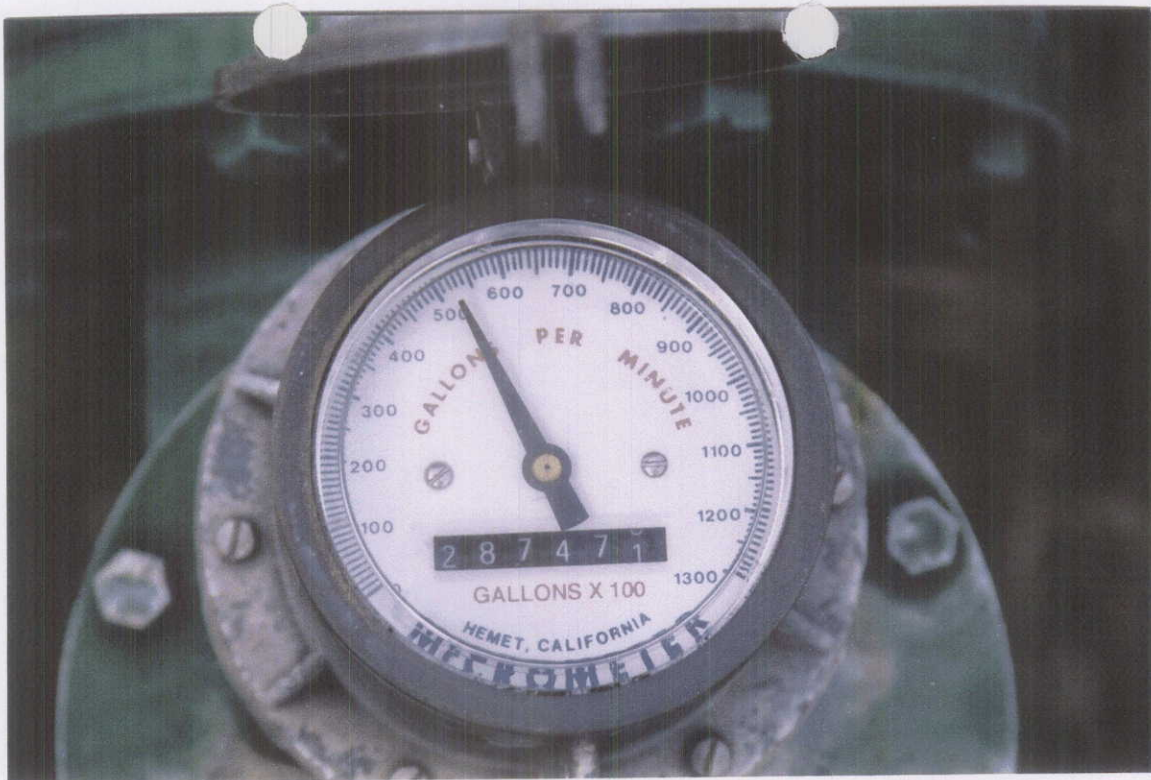


Figure 3. Photographs of the Crane Creek Country Club's Front-9 well head (2003). Upper view shows the Front-9 well's totalizing flow-meter after the pump was activated for the field examination. Lower photo is of the Front-9 well discharging directly to the Front Nine Pond at about 550 gpm. Visible are the pressure gage, control valve, and flow-meter. The well is equipped with a submersible pump and motor.

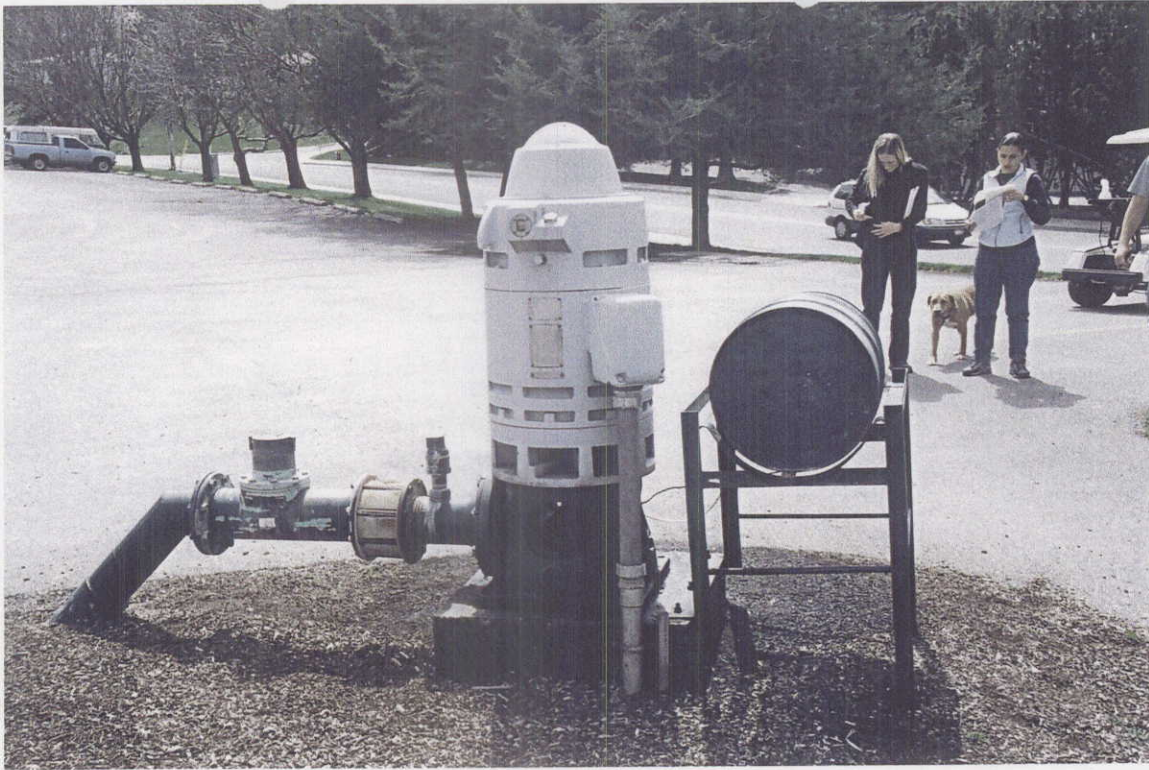
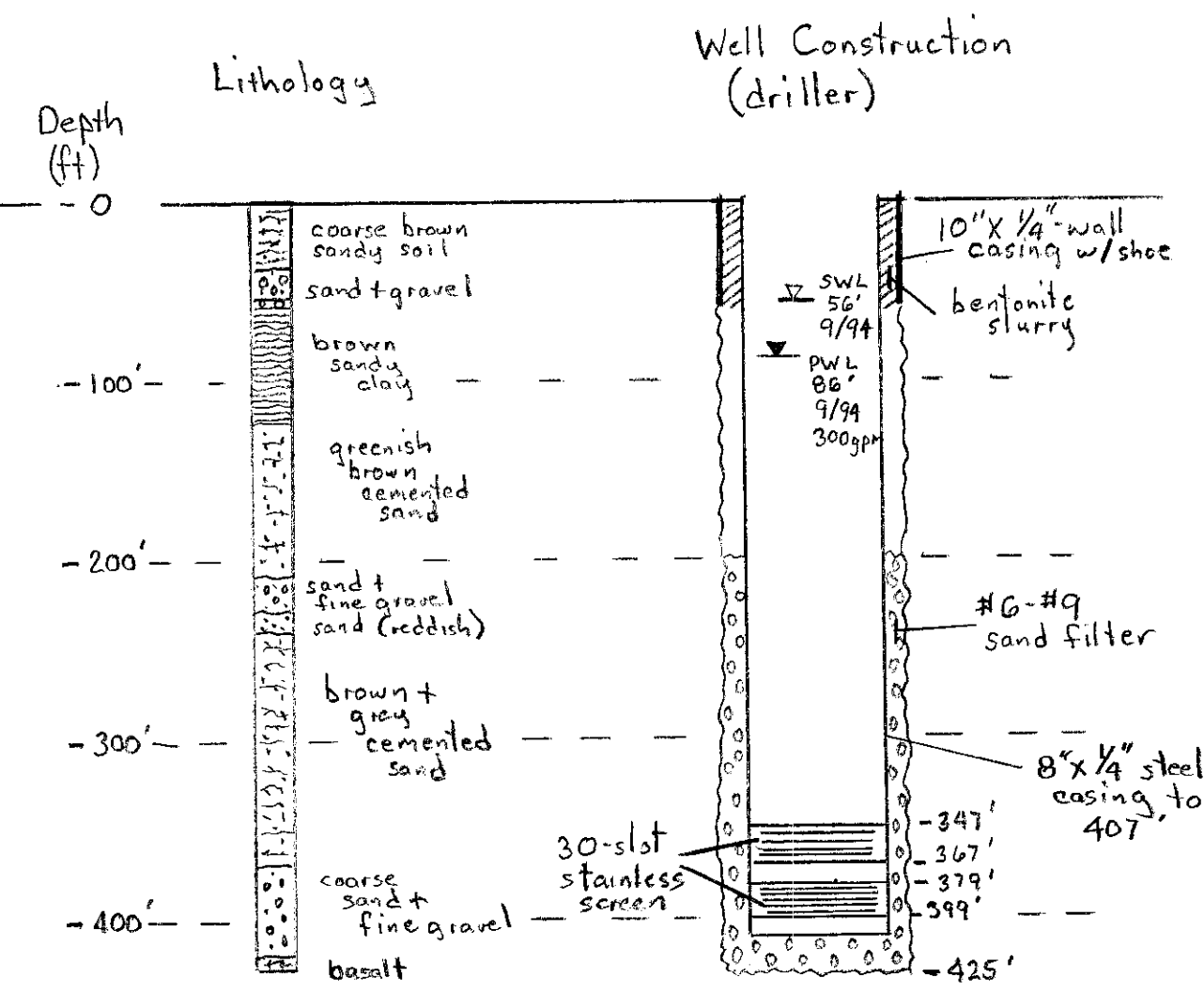


Figure 7. Photographs of the CCCC Club House Well's well head. Upper view shows the G.E. drive motor for the line-shaft turbine pump and the 6-inch diameter discharge piping which houses the totalizing flow-meter. Lower picture shows the motor specification plate for the 100 HP drive motor.



Test pumped 300gpm / 8 hours
 with 30 feet of draw down
 Specific Capacity = 10 gpm/ft

Stevens + Sons
 Well Drilling
 9/14/94
 mud-rotary

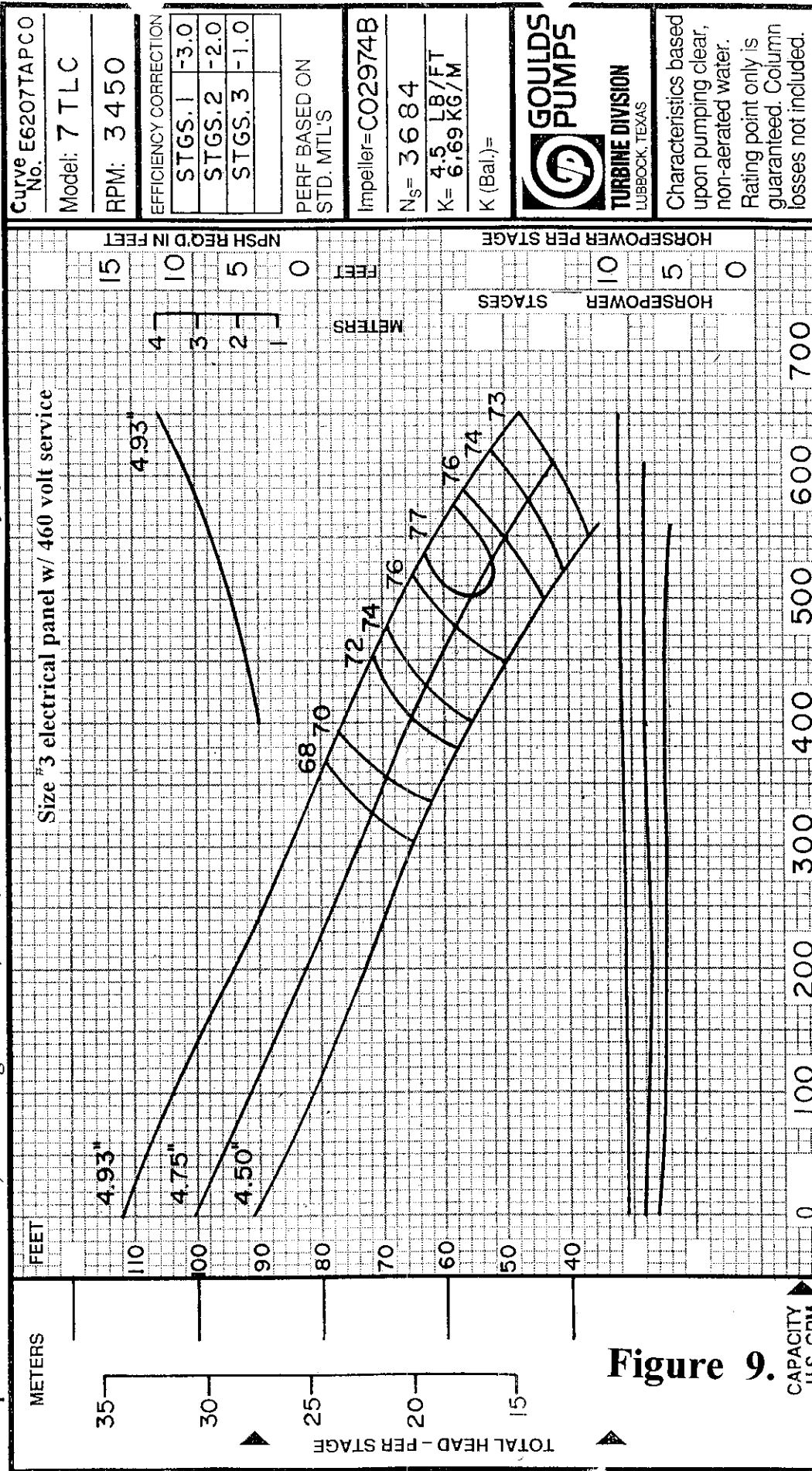
Front-9 Test-Well

Figure 8.

Crane Creek Country Club - Front Nine Well Pump

Installed April, 1995	2 stage	20 horsepower	140 feet of 5-inch black steel column w/ check valves
Franklin submersible motor	Impellers slightly below full trim		
	GPM CAPACITY	F.T. TDH	% EFFICIENCY RPM
	550	120	77 3450

Pump specifications (3/16/1995) and installed capacity test (4/26/1995) by 1/2" PVC sounding tube to 140 feet
 E. Squires and Associates, 1530 Knights Drive, Boise, ID 83712 (208) 342-8369 1/4" polyhose airline to 140 feet



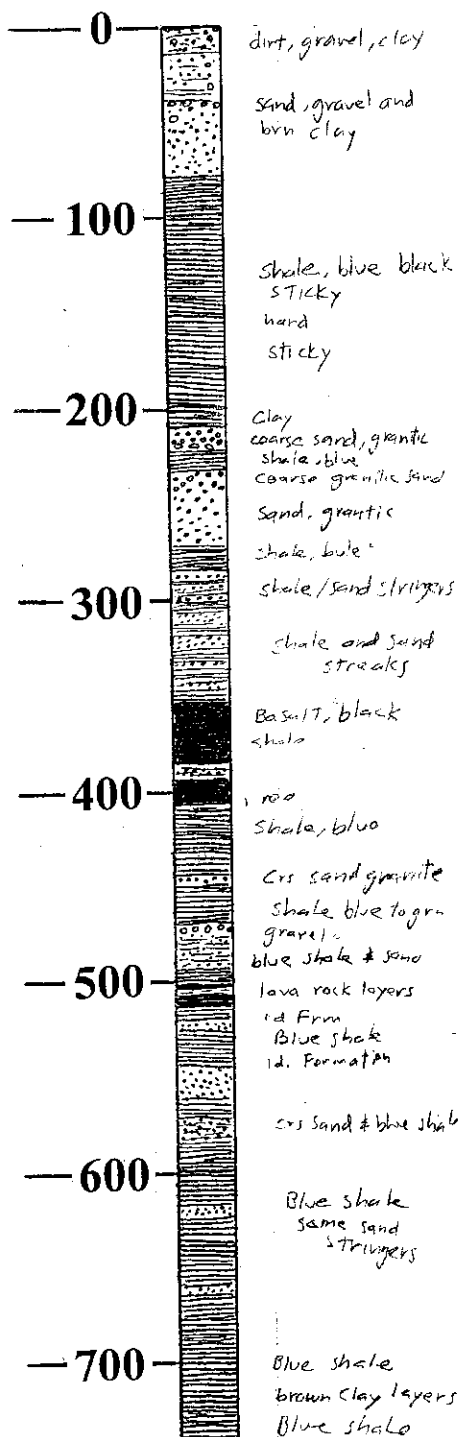
MODEL
7TLC
 DATE
 April, 1994
 SUPERCEDES

Figure 10.

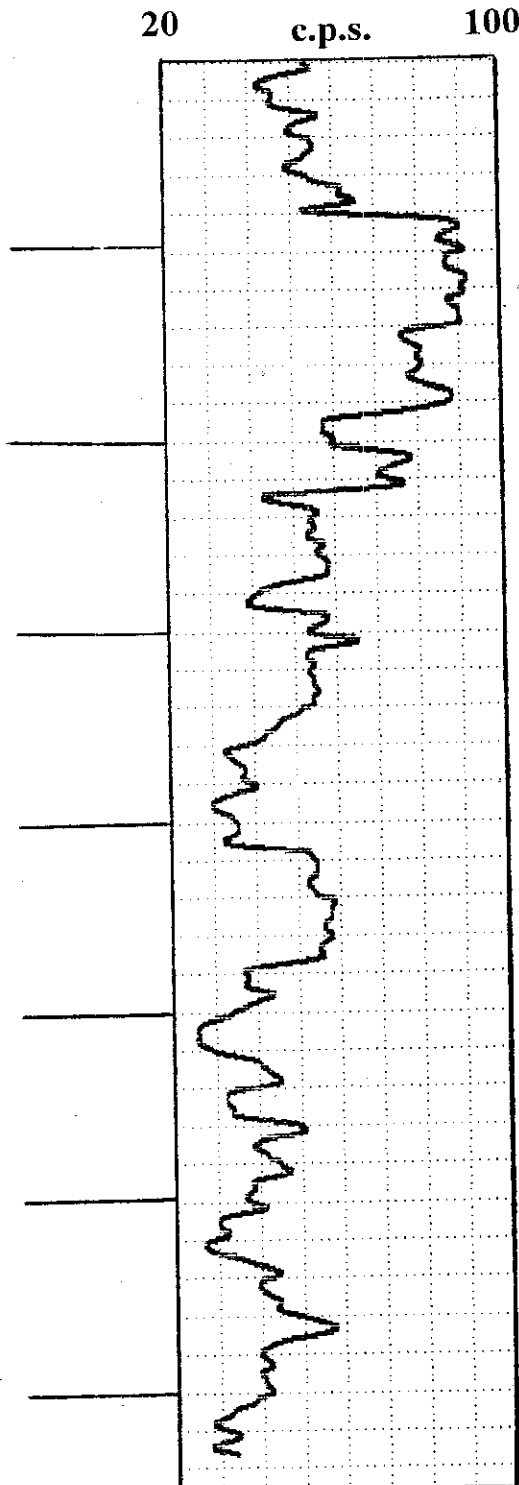
Crane Creek Country Club Clubhouse Well

Lukehart Drilling + Pump Co. 8-26-1964

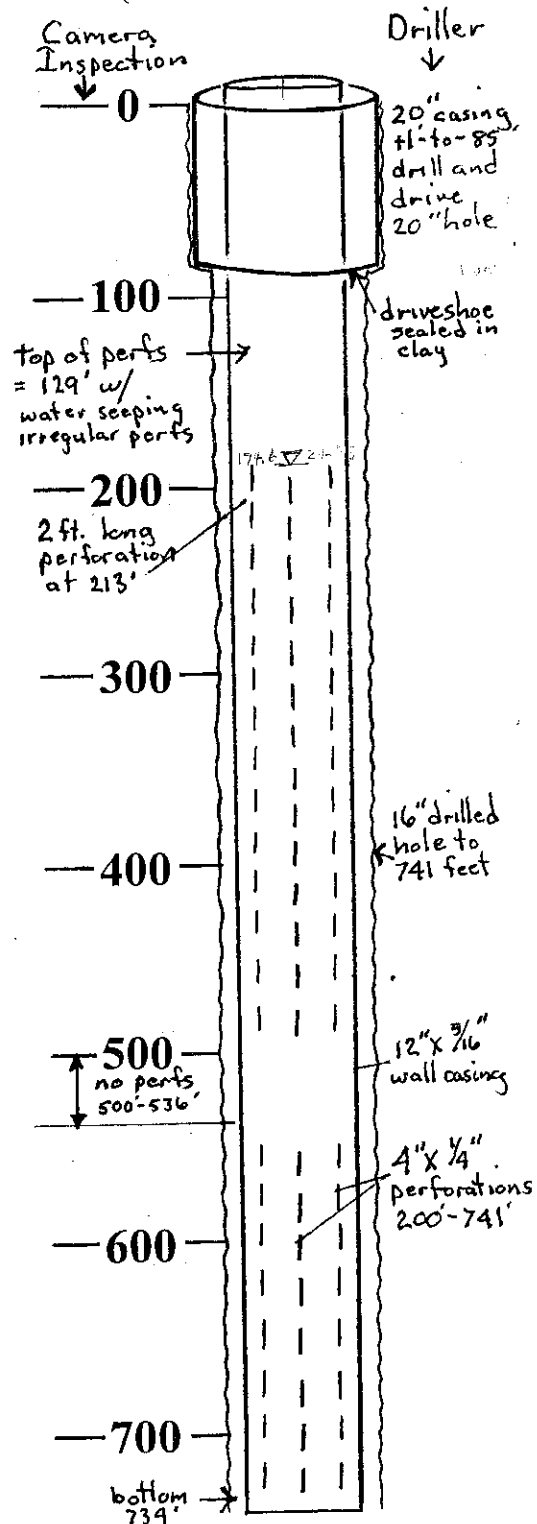
Lithologic Log (based on driller's log)



Natural Gamma Log



Well Construction (based on driller's log)

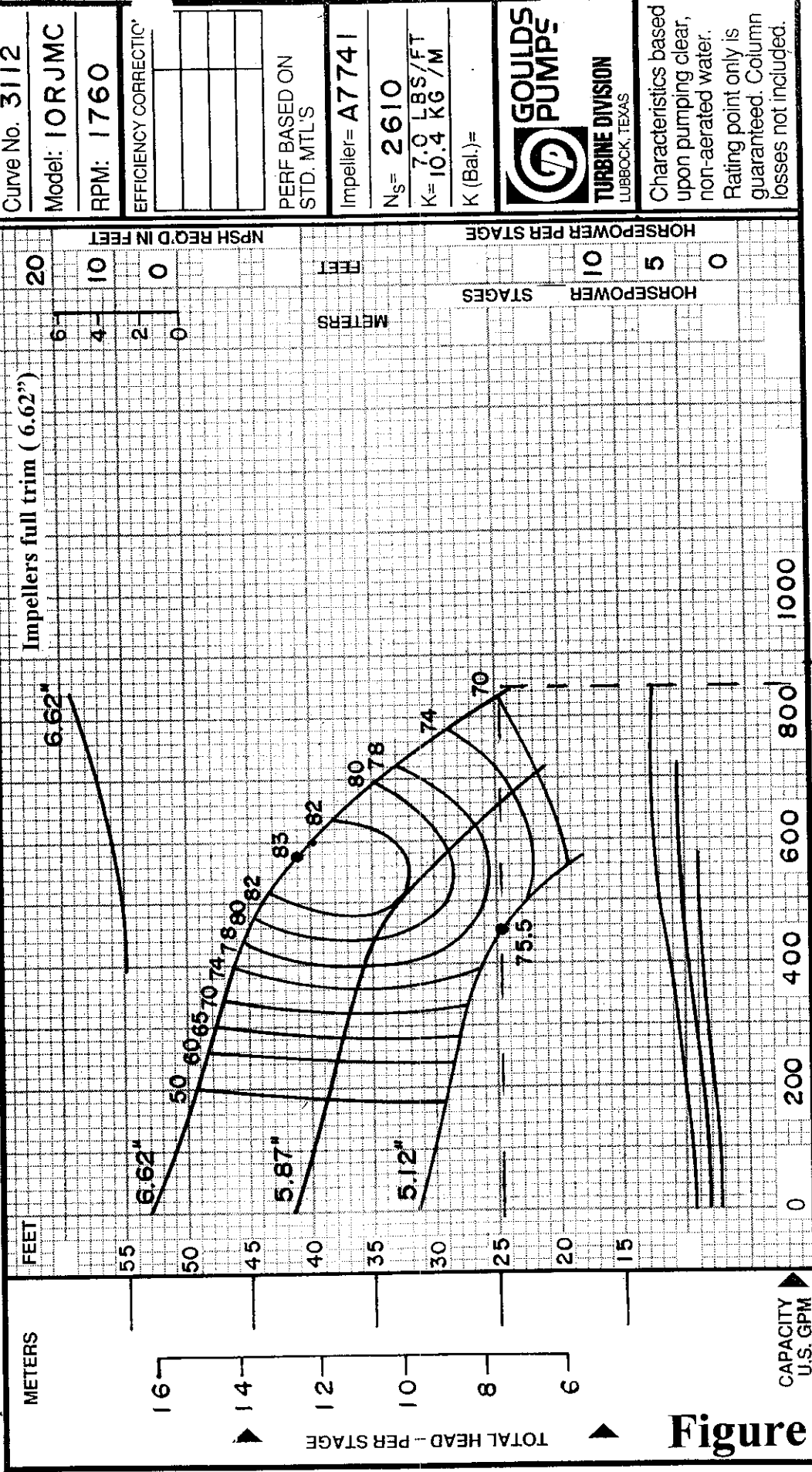


Crane Creek Country Club - Clubhouse Well Pump

Installed April, 1995	Vertical hollowshaft turbine	12 stage	500 feet of 8-inch black steel column w/ check valves
100 horsepower	Rebuilt U.S. motor	Size # 4 electrical panel	

Pump specifications (5/1/1995) and installed capacity test (5/31/1995) by
 E. Squires and Associates, 1530 Knights Drive, Boise, ID 83712 (208) 342-8369

1/2" PVC sounding tube to 500 feet
 1/4" polyhose airline to 500 feet



MODEL
10RJMC

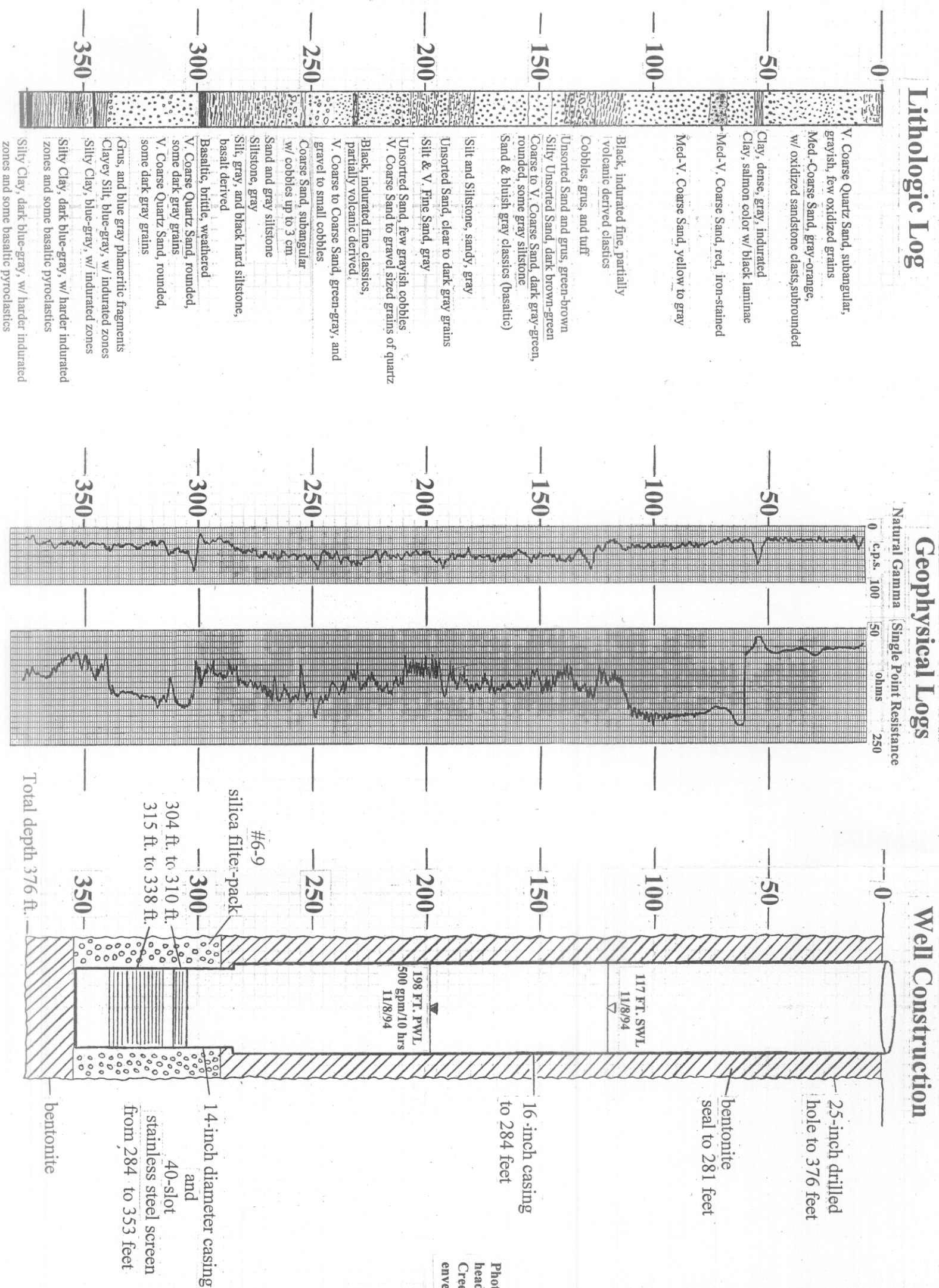
DATE
 May 2, 1988

SUPERCEDES
 July 22, 1977

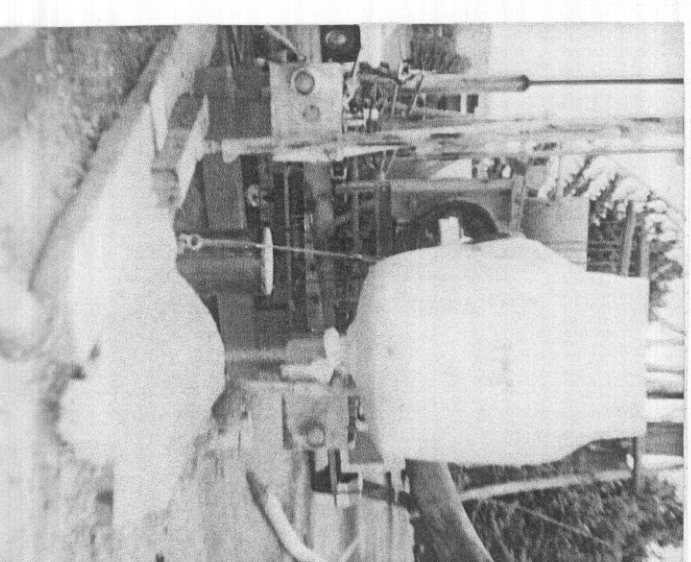
Figure 11.

Crane Creek Country Club Back-9 Well

Drilled By Riverside, Inc. 10/17/94



Photograph of the cone-reducer, from the 16-inch surface casing to the 14-inch headpipe and screened liner, during installation of the well casing of the Crane Creek Country Club's Back-9 Irrigation well. Centralizing staves, to ensure a 360° envelope of the filter sand and surface seal as shown straddling the joint.



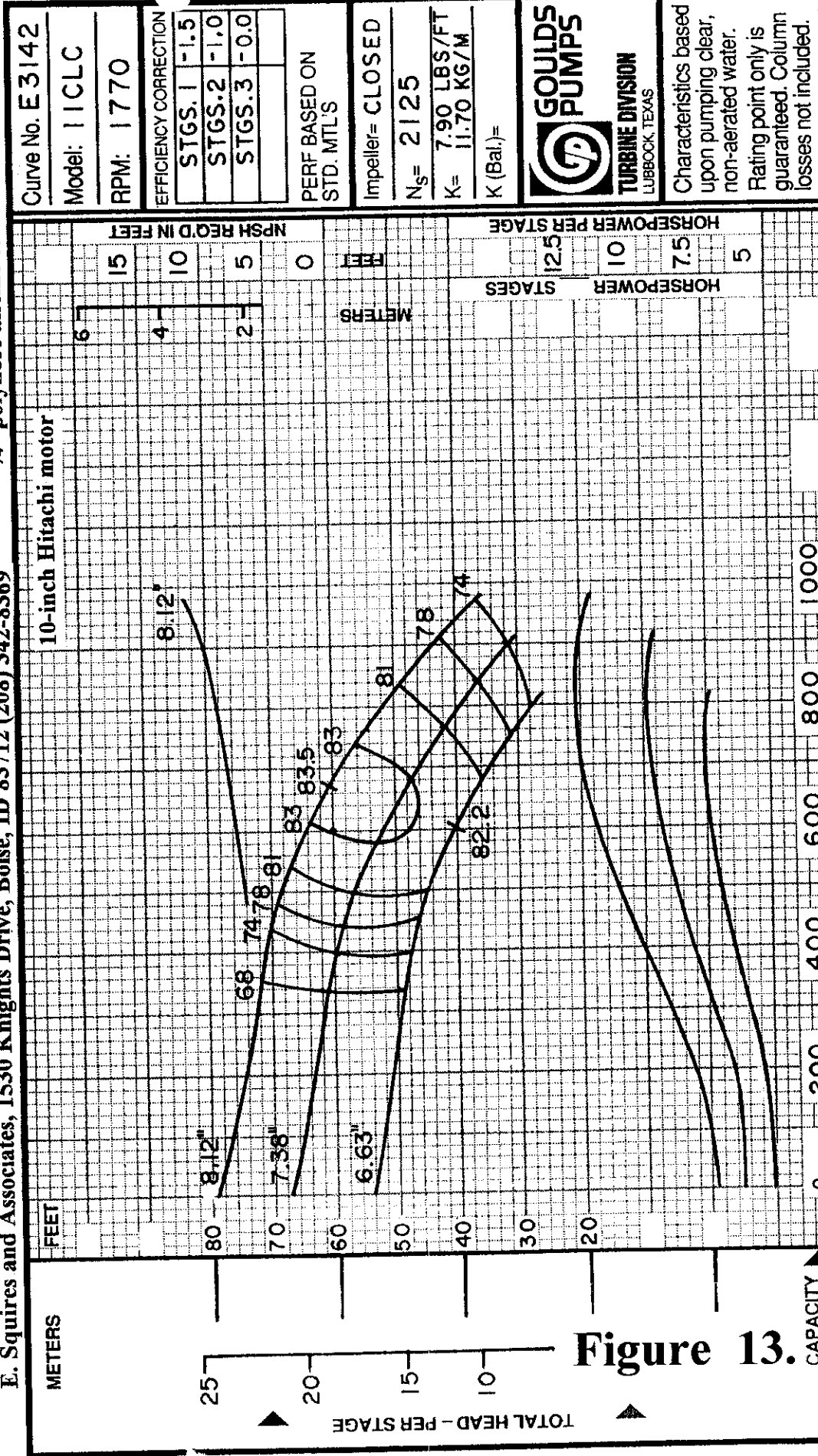
Pouring of the Back-9 well graded filter sand envelope. Cubic yard bags of sand filter are hoisted over the well and allowed to pour, through the water column and into the annular space between the drilled hole and the well screens.

Figure 12.

Crane Creek Country Club - Back Nine well pump

Installed March 5, 1996		60 horsepower		5 stages		Impellers trimmed slightly below full trim (approx. 7.85")					
PROJECT	Back Nine well pump			SERVICE		300 feet of 8-inch black steel column		GPM CAPACITY	F.T. TDH	% EFFICIENCY	RPM
						600-850		250-300	83	1800	
1/2" PVC sounding tube to 300 feet											

Pump specifications (14/11/1995) and installed capacity test (4/16/1996) by
 E. Squires and Associates, 1530 Knights Drive, Boise, ID 83712 (208) 342-8369
 1/2" PVC sounding tube to 300 feet
 1/4" polyhose airline to 300 feet



MODEL
11CLC
 DATE
 April, 1994
 SUPERCEDES
 February, 1993

Crane Creek Country Club Back Nine Well

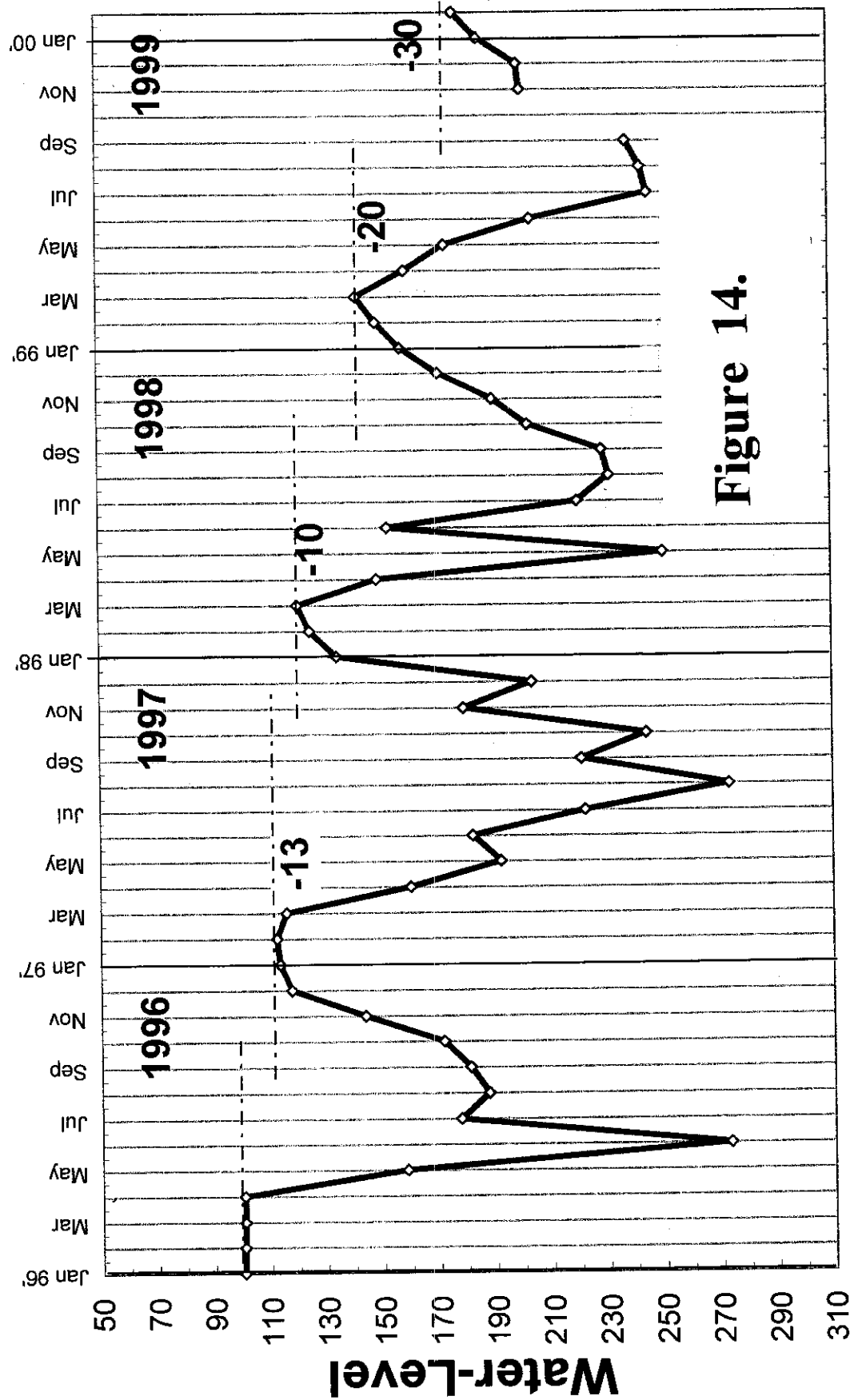
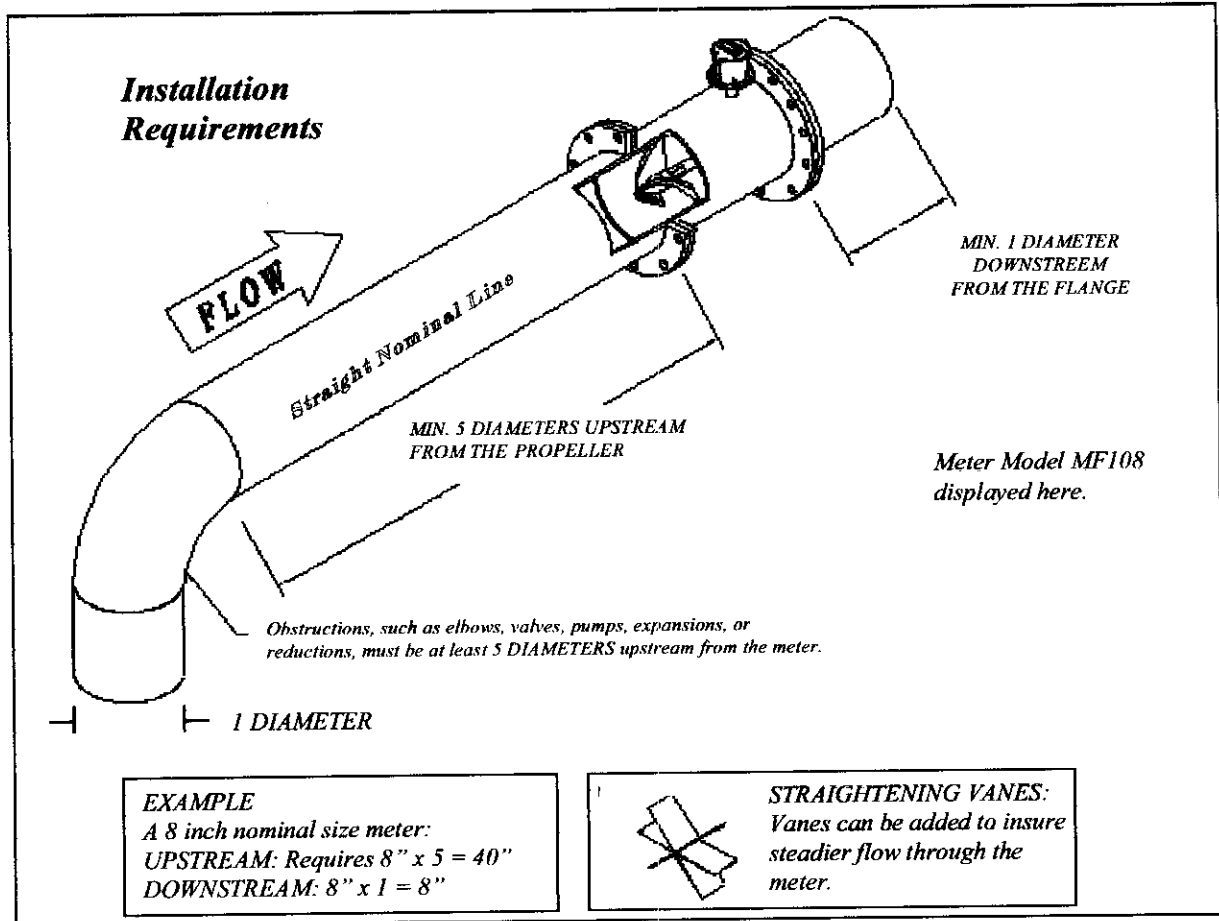


Figure 14.

INSTALLATION INSTRUCTIONS

Proper meter installation is the first step to ensure excellent meter performance. Follow these instructions closely. Consult an authorized service representative or the factory for any circumstances encountered which are not covered in this manual.

All McCrometer products are tested and inspected during manufacture and prior to shipping. An inspection should be performed at the time of unpacking to detect any damage that might have occurred during shipment.



Installation requirements

Fig. 1

McCrometer propeller meters should be installed a minimum of five diameters downstream of any obstructions. Flowmeters are velocity sensing devices and are vulnerable to certain upstream disturbances. Because of this, meters need certain lengths of straight pipe runs before and after the meter. These distances usually relate to the diameter of the pipe used. Obstructions can include elbows, valves, pumps, and changes in pipe diameter. The uneven flow created by these obstructions can vary with each system. If your application provides for more than five diameters of upstream run, use the available distance.

Downstream run should be one diameter of straight pipe length after the meter.