

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
BENEFICIAL USE FIELD REPORT

**Please direct inquiries to Ed Squires at (208) 342-8369.*

A. GENERAL INFORMATION

Permit No. 63-31138

1. Owner Meridian Water Delivery Service Area Phone No. (208) 898-5500

Current address 33 East Broadway Avenue, Meridian, Idaho 83642

2. Examiner's name Ed Squires, CWRE No. 10-125 EXAM DATE November 9, 2005

3. Accompanied by Mr. Chip Hudson Email

Address Meridian Water Department, 2235 NW 8th Street, Meridian, Idaho 83642

Relationship to permit holder Asst. Superintendent - Meridian Water Dept. Phone No. (208) 888-5242

4. Source Groundwater - City of Meridian Supply Well #22 tributary to N/A

B. OVERLAP REVIEW

1. Other water rights with the same place of use The City of Meridian's integrated portfolio of municipal water rights.

2. Other water rights with the same point of diversion 63-31858

C. DIVERSION AND DELIVERY SYSTEM

1. Point(s) of Diversion:

Ident. No.	Gov't Lot	¼	¼	¼	Sec	Twp	Rge	County	Method of Determination/Remarks
#22	N/A	SW	SW	NE	24	3N	1W	Ada	Site visit, GPS, and USGS maps.
									GPS N 43° 35.038'
									W 116° 24.198'
									IDWR Tag #D0018240

2. Place(s) of Use: Method of determination As approved by the Meridian City Council

Twp	Rge	Sec	NE				NW				SW				SE				Totals
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
			Meridian Water Delivery Service Area																

3. **Delivery System Diagram:** Indicate all major components and distances between components. Indicate weir size/ditch size/pipe diameter (inside), as applicable. Use the space provided or ☒ see attached.

Scale: 1" = _____

- ☒ Copy of USGS Quadrangle attached showing location(s) of point(s) of diversion and place(s) of use (required)
☒ Aerial photo attached (required for irrigation of 10+ acres)
☒ Photo 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
City Well #22	US Electrical - HT	150	E08-AA63A-M C3	FloWay Pumps	SN 45721-1
	Emerson			Model 15DKL-3	3-Stage 10" discharge

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

D. FLOW MEASUREMENTS

1.

Measurement Equipment	Type	Make	Model No.	Serial No.	Size	Calib. Date
McCrometer Flow Meter	Propeller	MW500	E7000-000	01-07482-10	10-Inch	10/2/2001

2. Measurements:

Discharge measurements for this examination were made using the propeller flow-meter listed above (Figure 3). The minimum piping installation recommendations of the manufacturer (Appendix A) are met because a 60-Inch length of straight-run pipe, without obstructions, is available upstream of the meter and 12-inches downstream (Figures 4 and 5). The instantaneous flow rate needle was observed to be steady at all discharge rates and the observed flow-rates match well with the pump performance curve and, therefore, it is generally believed likely that the flow-meter was reading correctly.

E. NARRATIVE/REMARKS/COMMENTS

The field examination for this permit was carried out on November 9, 2005 by me, Ed Squires, accompanied by Mr. Chip Hudson of the City of Meridian Water Department. Also present, were Loren Pearson (hydrogeologist with Hydro Logic, Inc.) and Jamie Allen (lead operator with the Meridian Water Department). The Meridian #22 well is housed inside of a 28-foot by 28-foot cinder block pump house (Figure 6). The 18-inch diameter well (Figure 7) is equipped with a 'FloWay' Pumps Company 3-stage, Model 15DLK-3 deep well turbine pump (Figure 8) set on 118-feet of 10-inch pump column with a 16-foot long pump/Intake assembly. The design point of the pump is 2,000 gallons per minute (gpm) at 234-feet of total dynamic head (Figure 9). It should be noted that the metal pump identification tag on the discharge head of the pumping plant does not match the records we obtained from the City water Department's records. I checked several documents including the O&M manuals for the facility and all of those documents identified the pump I list above. Furthermore, we had the pumping plant removed from the well on October 26, 2010 for repairs and the metal identification tag on the pump itself showed the pump I list above (Figure 10). The same pumping plant was re-installed back in the well. I believe the discharge head may have been used from a previous installation without removal of the tag and I am fairly certain that I have identified the correct pump installed in the well. The pump is driven by a 150 hp, 460 volt, 1800 rpm, U.S. Electrical Motors - High Thrust motor (Figures 4 and 11). The 10-inch diameter discharge-piping is comprised of a series of 10-inch plumbing fittings and fixtures, including check-valve, tees, couplings, flow-meter, and control valve (Figure 4 and 5) prior to exiting through the pump-house floor. Approximately 8 feet after the 10-inch line exists the pump house, it increases to 12-inch diameter and then interconnects into the City's 12-inch mainline running down Stoddard Road (Figure 12). The pumping plant is equipped with a variable speed drive unit (Figure 4) designed to pump directly to the pressurized water distribution system. For the purposes of this examination, we need only be concerned with one flow-meter on the 10-inch discharge which records all discharges from the Well # 22. The well pump is set to operate within a predetermined pressure range in the distribution system that varies with demand; typically 70-to-90 psi. Of course the well produces more water against less system pressure compared to when system pressure is higher.

When we arrived on-site, the Well #22 pump was not operating and the line pressure was 80.5 psi (Figure 3). According to Jamie Allen, the well was not run continuously during the winter months owing to a relatively low water demand at this time of year but the pumping plant was on standby such that a lowering of line pressure would automatically actuate the pump. Non-pumping water level in the well was measured at 18.32 feet below measuring point (bmp) which is 2.4 feet above pump house floor; very similar to the measured non-pumping water level of four years earlier (see calculations section of this report). The non-pumping water level remained essentially the same for the half hour prior to activating the well pump (Appendix B). The totalizing read-out of the flow-meter on our arrival was 306,216,000 gallons. We had the system operators turn on the pump into the water system and we measured pumping water levels and line pressures at various discharge rates during the ramp up of the pumping plant up to 2,250 gpm over the course of about an hour. The water level was drawn down to 61.5 feet bmp at a discharge of 2,100 gpm, a system pressure of 98 psi, and a calculated speed of 1,622 rpm out of 1,770 rpm; an observed frequency of 55.1 Hertz (Hz) out of 60 Hz available. In other words, the pump was not running at full speed because the operators were concerned about the high system pressures that would be increased at full speed at this time of year. According to the Water Department personnel, the system pressure is higher in the winter months owing to lowered water demand and they were concerned about continuing to pump above these line pressures at the level of system demand during our examination without opening fire hydrants or flushing lines (which we did not want because it would not show actual operating conditions). Water-level measurements are facilitated through a 3-inch diameter measuring port protruding from the thrust block (Figure 4, Appendix B). The pump was operating almost exactly on its performance curve (Figure 9). Plotting the measured TDH against the observed flow rate on the "original" design pump curve (Figure 9) shows that the pumping plant is very close to design and performance parameters (see calculations below) and the well has a slightly higher specific capacity than was measured during the original hydraulic testing of the well I had carried out in 2001 (Figure 13). The field examination was conducted during the winter low-demand season when system pressures are higher. Our review of the available production records for this well were essentially unhelpful to our calculations of summer time production and discharge rates. Therefore we are relying on in-well measurements which are, fortunately, quite good.

According to the pump performance curve (Figure 9), installed HP, observed pumping rates, and available discharge piping, it appears that Well #22 should easily be capable of sustained instantaneous discharge rates of Permit No. 63-31138 (5 cfs or 2,244 gpm) pumping against reasonable summertime system pressures in the range of 65-to-70 psi. The pumping water levels and calculated specific capacity measured during the field-licensing examination correspond almost exactly to those measured during the initial hydraulic testing of the new well in 2001. Therefore, the installed capacity (pumping plant) and the well itself are both capable of the instantaneous discharge rate requested. The well would likely produce short-term discharge rates in excess of 2,244 gpm during flushing operations or a fire-flow situation (pumping against zero-to-65 psi) but these instances are not considered typical. Indeed, according to the pump performance curve, and using a conservative specific capacity of 50 gpm/ft, the installed plant should produce the full rated discharge of the pump (3,000 gpm) at ~20 psi which is the fire-flow pressure requirement. I recommend that the City of Meridian water right No. 63-31138 be licensed for its permitted rate of 5 cfs (2,244 gpm). Permit No. 63-31138 lists three (3) points of diversion. From the field licensing examination, only one of the three proposed wells has been drilled, constructed, and used by the City. Therefore, I recommend that only one of the PODs, in the SW 1/4, NE 1/4, Section 24 be listed on the License.

Has the permit holder met all conditions of permit approval, including any mitigation requirements and/or measuring device installation requirements? ☒ Yes ☐ No If no, what must be done to meet the permit requirements?

F. FLOW CALCULATIONS

✓ Additional computation sheets attached

Measured Method:

Instantaneous flow rates are based on field-observed readings of a high-quality, calibrated, impeller flow-meter installed within manufacturer's specifications. These readings are supported by: 1) discussions with the pump operators responsible for upkeep of the well, 2) by the operating conditions and pump performance curve, and 3) by the well-documented capacity of the City's #22 groundwater well during previous pumping tests. According to Mr. Allen, the pump does not run continuously, especially during winter months, because it automatically shuts off during periods of lower demand and higher system pressures. The requested, observed, calculated, and recommended maximum flow rates for the well appear to be justified.

G. VOLUME CALCULATIONS

1. Volume Calculations for Irrigation:

$V_{I.R.} = (\text{Acres Irrigated}) \times (\text{Irrigation Requirement}) = \text{Not applicable to a municipal water right}$
 $V_{D.R.} = [\text{Diversion Rate (cfs)}] \times (\text{Days in Irrigation Season}) \times 1.9835 = \text{N/A}$
 $V = \text{Smaller of } V_{I.R.} \text{ and } V_{D.R.} = \text{N/A}$

2. Volume Calculations for Other Uses:

See attached calculations of diversion rate, specific capacity, and total dynamic head.

H. RECOMMENDATIONS

1. Recommended Amounts

Beneficial Use	Period of Use		Rate of Diversion Q (cfs)	Annual Volume V (afa)
	From	To		
Municipal	Jan. 1	Dec. 31	5.0 cfs	N/A
Totals:			5.0 cfs	5.0 cfs

2. Recommended Amendments

- ☒ Change P.D. as reflected on page 1
 ☐ Add P.D. as reflected on page 1
 ☐ None
☐ Change P.U. as reflected on page 1
 ☐ Add P.U. as reflected on page 1
 ☐ Other

I. AUTHENTICATION

Field Examiner's Signature

Edward Squires
Edward Squires CWRE No. 10-125

Date Mach 23, 2011



SEAL

Reviewer

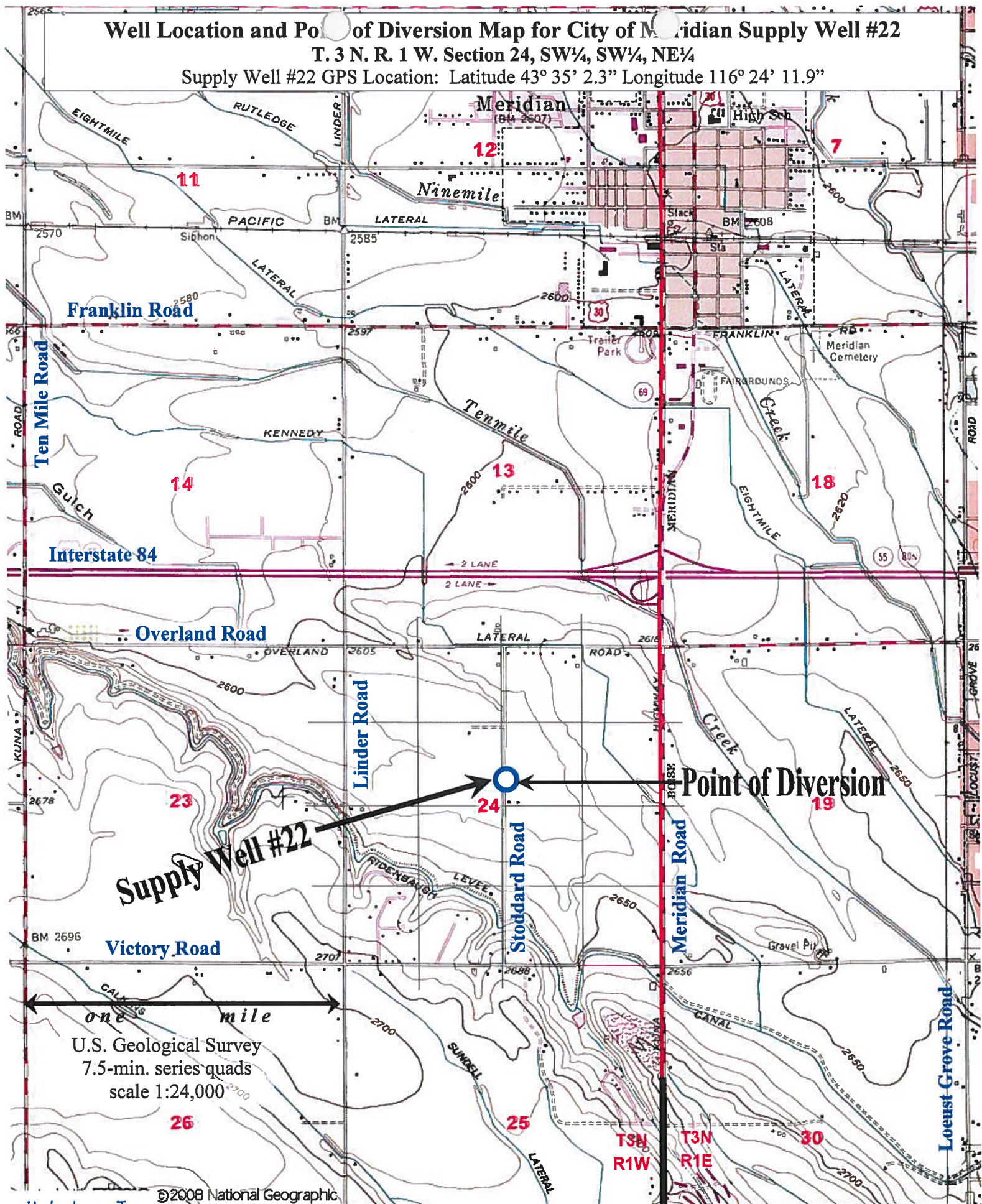
Date

FIGURES

Well Location and Point of Diversion Map for City of Meridian Supply Well #22

T. 3 N. R. 1 W. Section 24, SW¼, SW¼, NE¼

Supply Well #22 GPS Location: Latitude 43° 35' 2.3" Longitude 116° 24' 11.9"





Map from Google Earth Pro
Image from USGS aerial photo
acquired 10-2006

Figure 2.

Figure 2. Annotated aerial photograph of the Meridian #22 well site showing the location of the Meridan Supply Well #22 with respect to other area facilities.

Figure 3. Photos of the 10-inch flow meter and line-pressure gauge for Meridian Supply Well #22

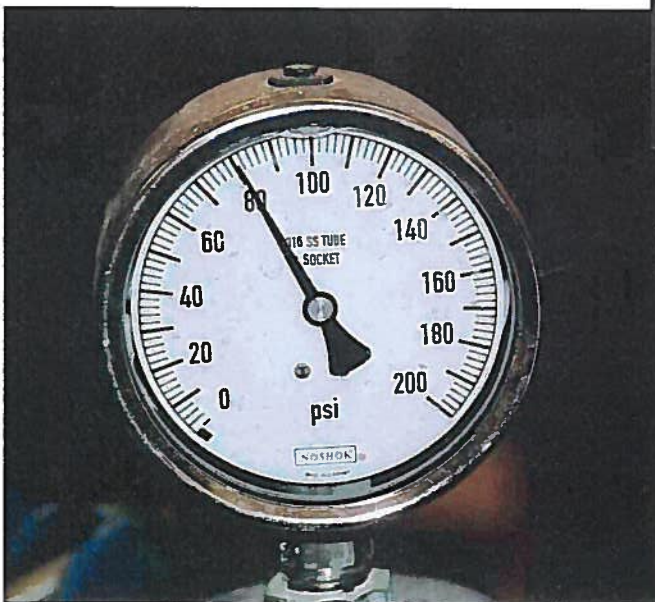
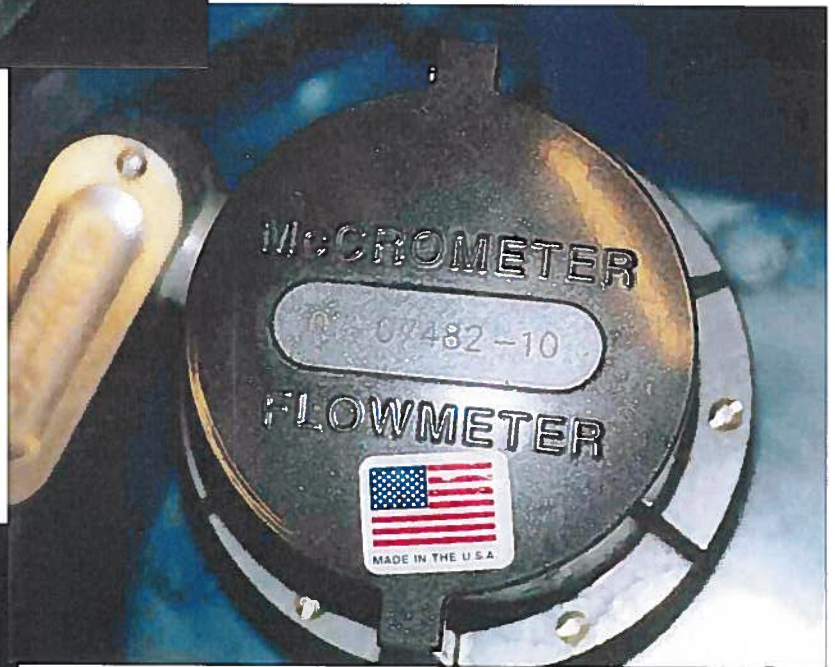
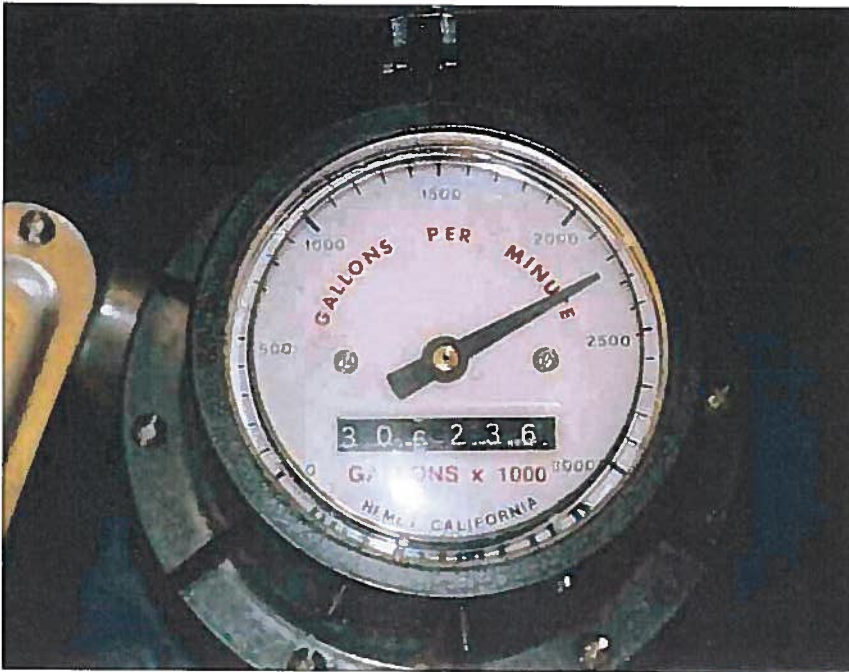
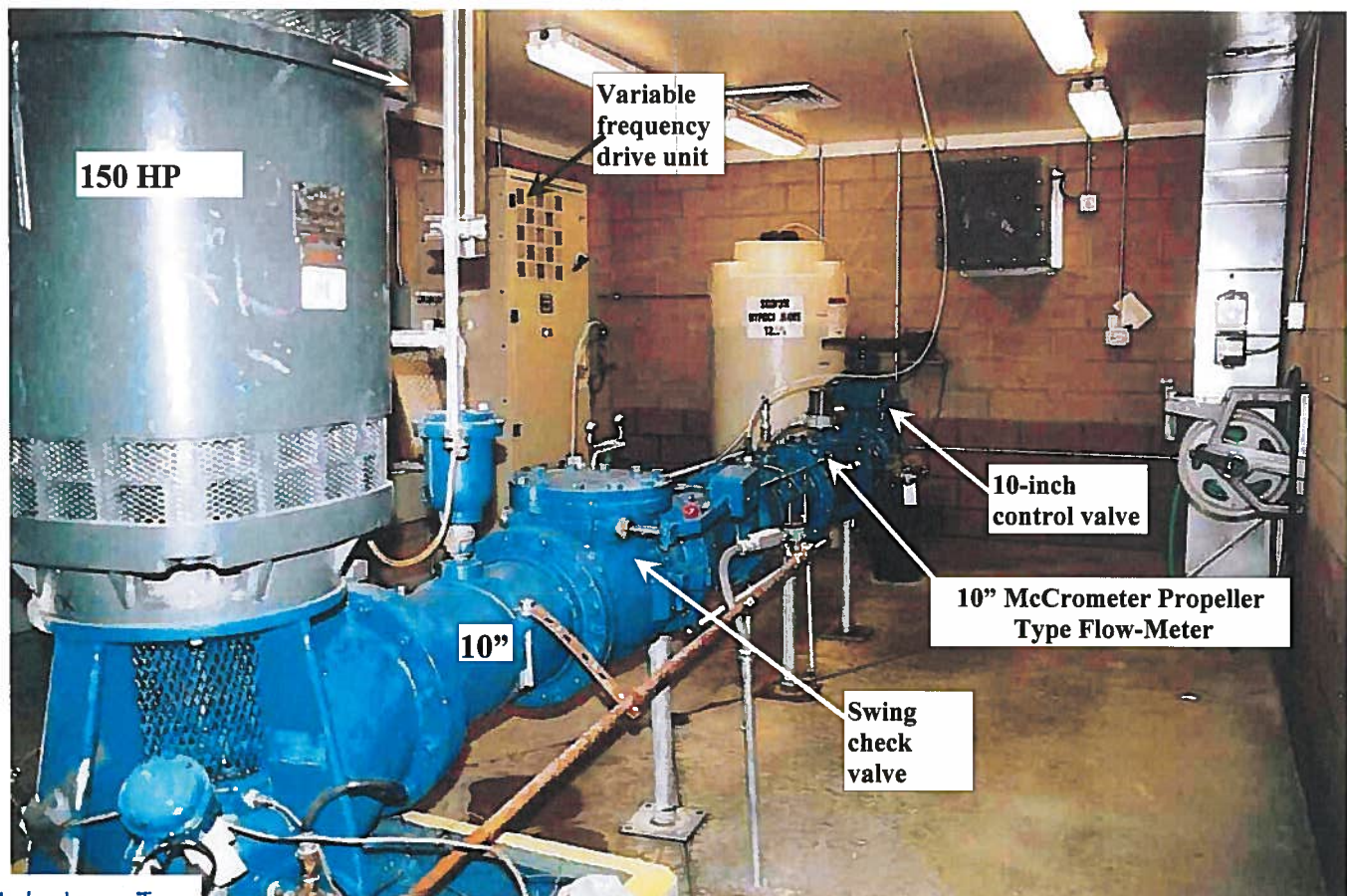
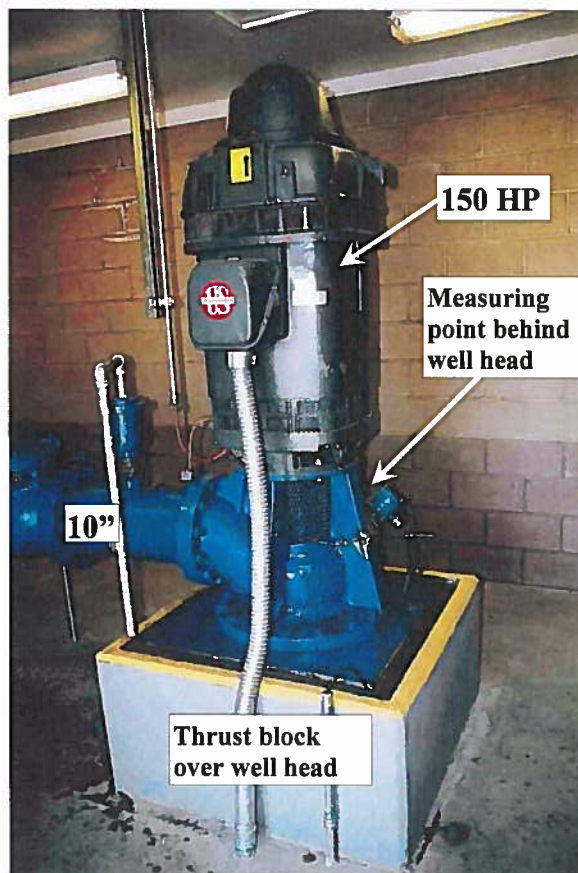


Figure 3. November 9, 2005 photographs of the “McCrometer” 10-inch propeller flow-meter and “Noshok” line pressure gauge in the City of Meridian Well #22 discharge piping.

Figure 4. Photos of the Well Head and Discharge Piping for Meridian Supply Well #22



Hydro Logic, Inc.
Boise, Idaho

Figure 4.

Figure 5. Photos of Wellhead and Discharge Piping During Beneficial Use Exam of Meridian Well #22

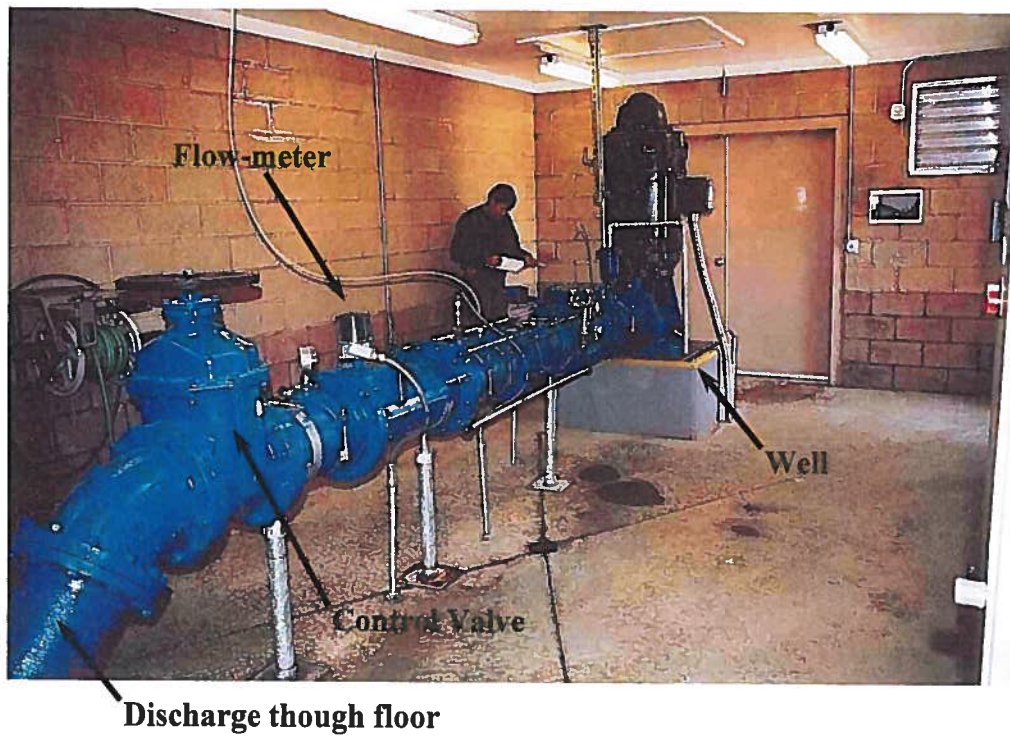
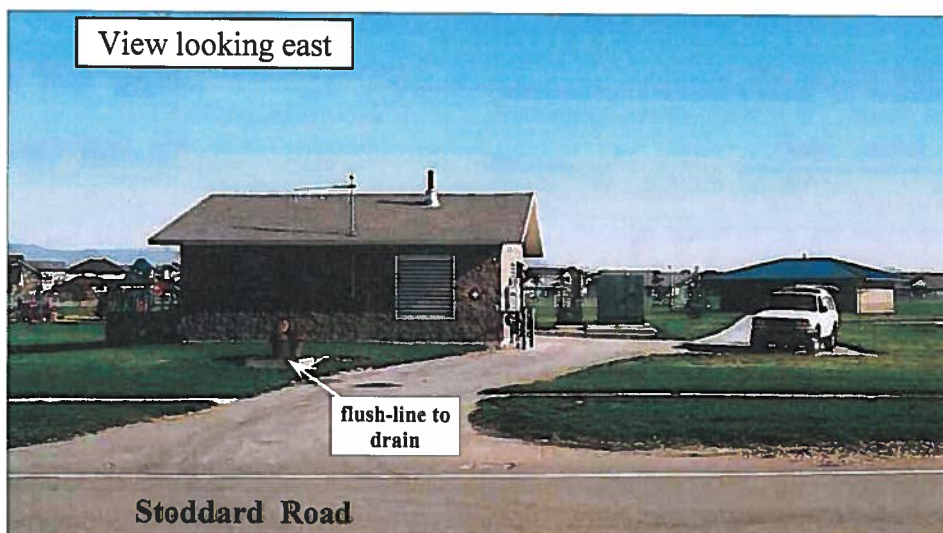
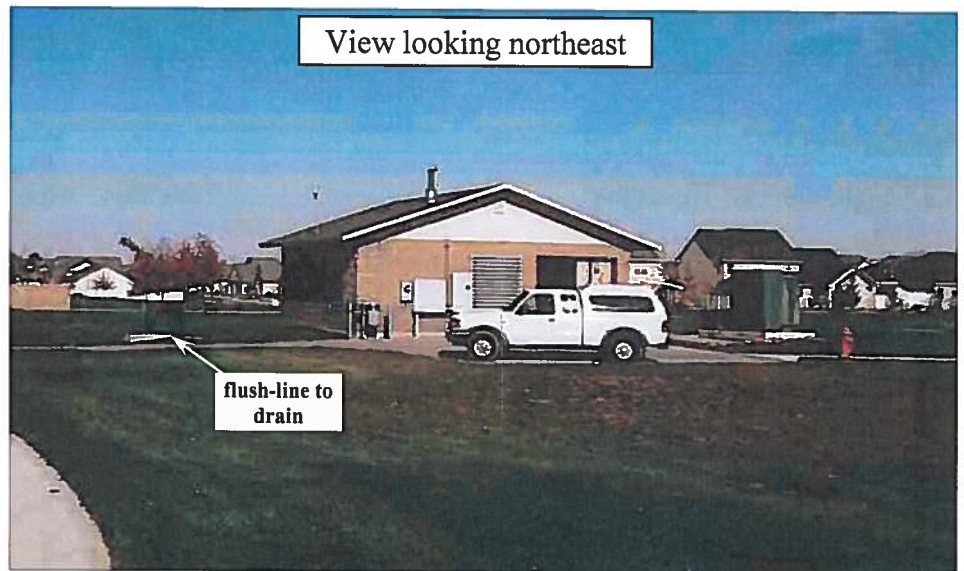
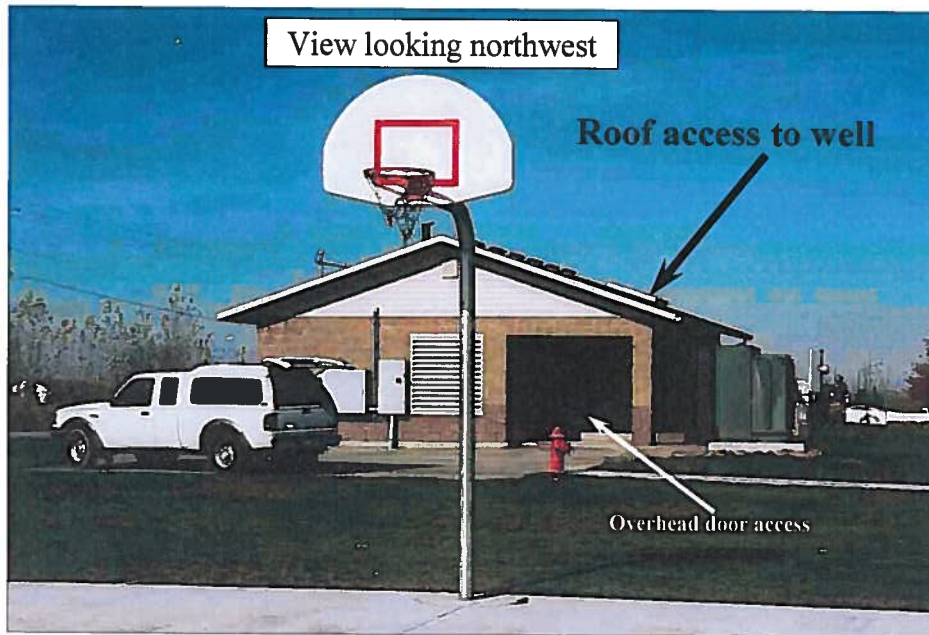


Figure 6. November 9, 2005 Photographs of Meridian #22 Pump/Control House



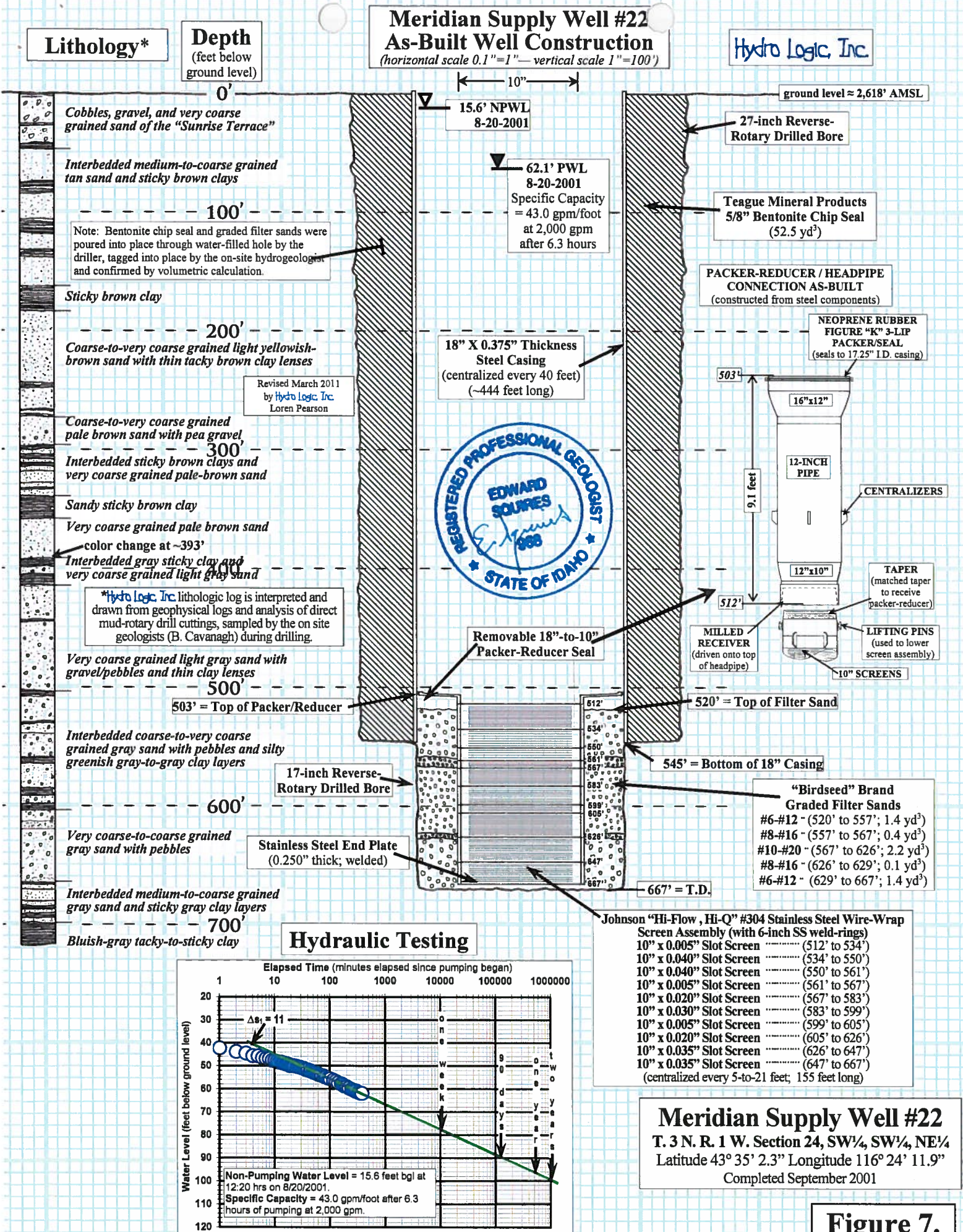


Figure 7.

Figure 8. Diagram of Installed Pumping Plant at Meridian Supply Well #22



D-1094-G

VERTICAL TURBINE PUMP

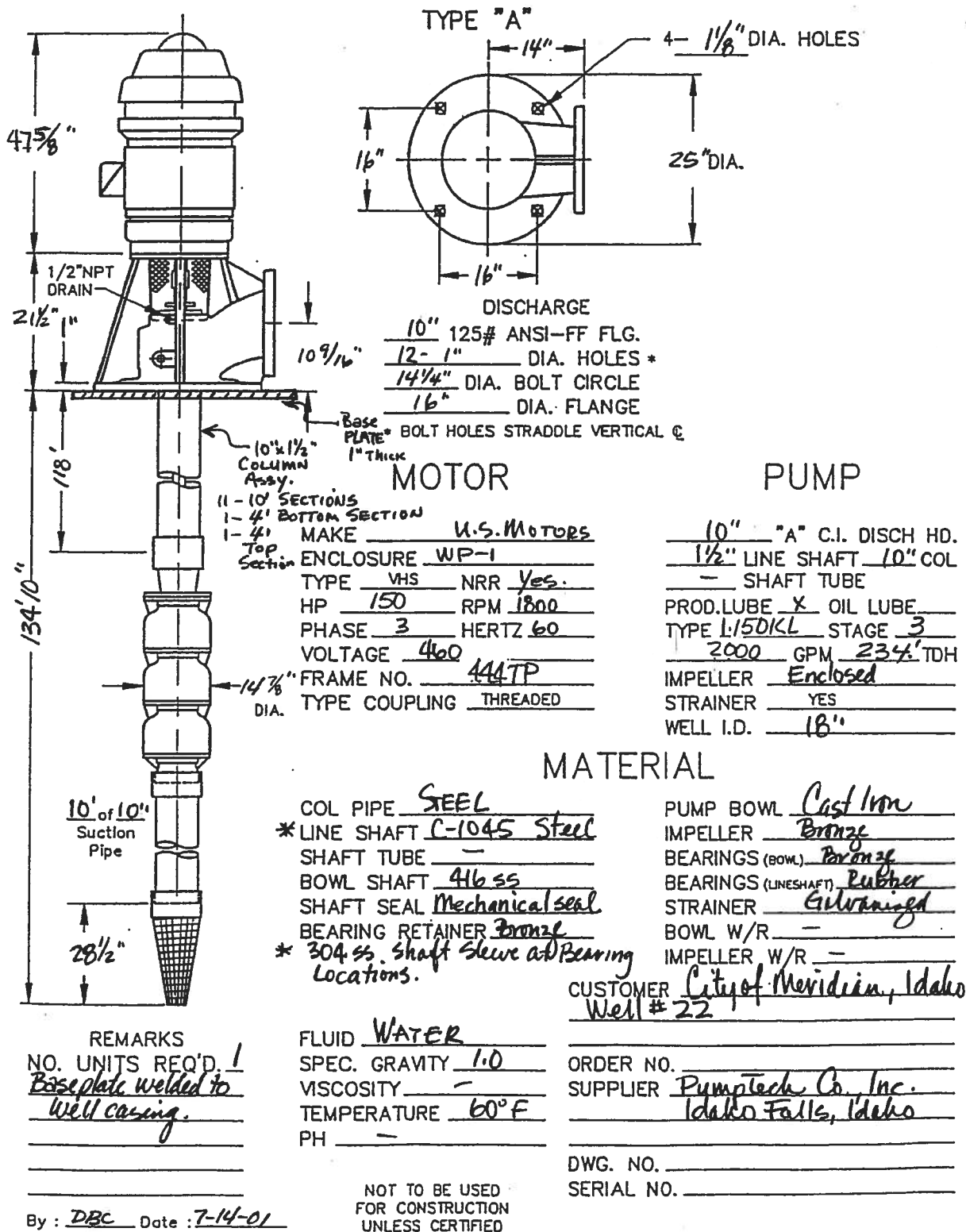


Figure 9. Pumping Plant Performance Curve at Design Point for Meridian Supply Well #22

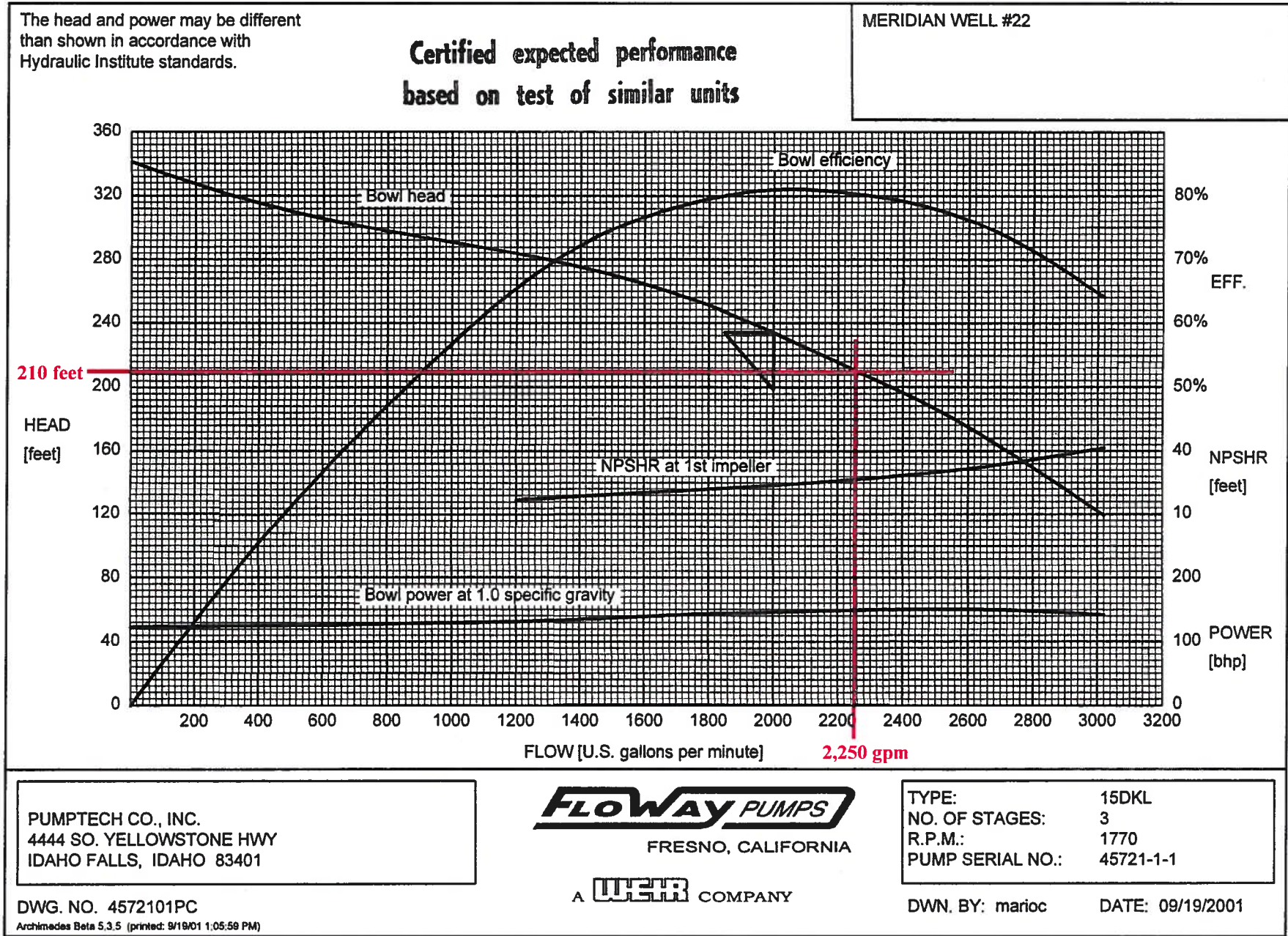


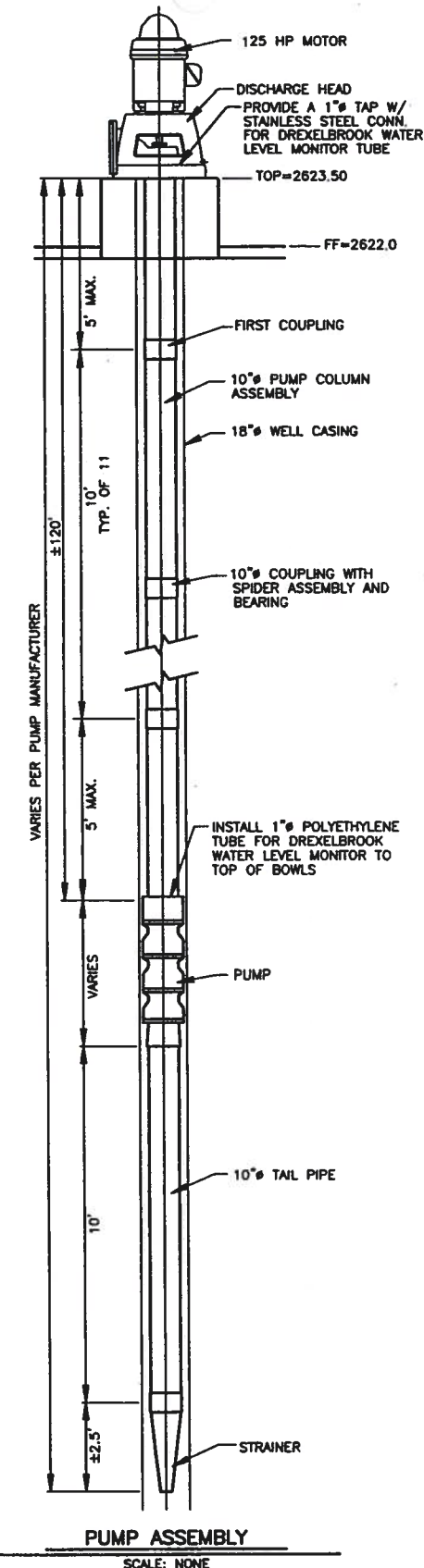
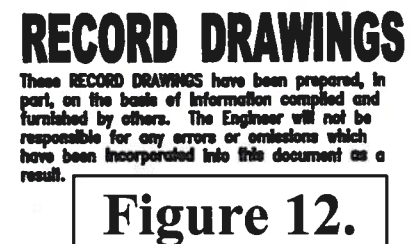
Figure 10. Photos of Conflicting Pump Identification Tags For Meridian Well #22



Metal identification plate for the installed pump riveted to the line-shaft turbine discharge head of the City of Meridian Well #22. This tag is in disagreement to the literature within the City's well files and HLI's onsite measurements.



Metal identification plate riveted to the line-shaft turbine pump discharge bowl of the City of Meridian Well #22 photographed when the pumping plant was removed from the well for repairs. This tag is in agreement to the literature within the City's well files and HLI's onsite measurements and is a 15-inch bowl assembly confirming this is the correct installed pump..



CITY OF MERIDIAN WELL No. 22 PUMPING FACILITIES SITE PLAN	CIVIL SURVEY CONSULTANTS, INC. CONSULTING ENGINEERS AND LAND SURVEYORS 100 South Adkins Way Suite 101 MERIDIAN, IDAHO 83642 (208)888-4312		PROJECT NO. 01022	
			DESIGNED TAB	
			DRAWN tab	
			CHECKED	
			APPROVED	
DATE: 8/5/01		NO.		
DRAWING: SHT02		ITEM		
JOB NO: 01022		DATE		
SHEET 2 OF 13				

APPENDICES

Appendix A.

**Installation Requirements for the 10-inch Diameter McCrometer Flow-Meter
Installed in the Well Head Discharge Piping of the City of Meridian Well #22**



CONFIGURATION SHEET MAIN LINE FLOWMETER

MODEL MW500 / MZ500

DESCRIPTION

Model MW500 and MZ500 Main Line Propeller Flowmeters are manufactured to comply with the applicable provisions of the American Water Works Association Standard No. C704-02 for propeller type flowmeters. The model MW500 is designed for a maximum continuous working pressure of up to 150 psi and is fitted with AWWA Class D flanges. The model MZ500 is designed for a continuous working pressure of up to 300 psi and is fitted with ANSI B16.5 Class 300 flanges. The impeller and drive assembly are easily removed through the top flange connection. The meter flow tubes are coated with fusion-bonded epoxy for maximum corrosion protection, and integral flow straightening vanes reduce upstream flow turbulence. As with all McCrometer propeller flowmeters, standard features include a magnetically coupled drive, instantaneous flowrate indicator and straight reading, six-digit totalizer.

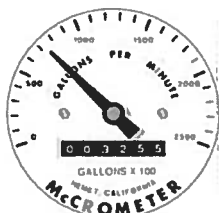
Impellers are manufactured of high-impact plastic, capable of retaining their shape and accuracy over the life of the meter. Each impeller is individually calibrated at the factory to accommodate the use of any standard McCrometer

register. The MW500 and MZ500 can be field-serviced without the need for factory recalibration. Factory lubricated, stainless steel bearings are used to support the impeller shaft. The shielded bearing design limits the entry of materials and fluids into the bearing chamber providing maximum bearing protection.

The instantaneous flowrate indicator is standard and available in gallons per minute, cubic feet per second, liters per second and other units. The register is driven by a flexible steel cable encased within a protective vinyl liner. The register housing protects both the register and cable drive system from moisture while allowing clear reading of the flowrate indicator and totalizer.

INSTALLATION

Standard installation is horizontal mount. If the meter is to be mounted in the vertical position, please advise the factory. A straight run of full pipe the length of five diameters ahead and one diameter behind the meter is the minimum normally recommended.



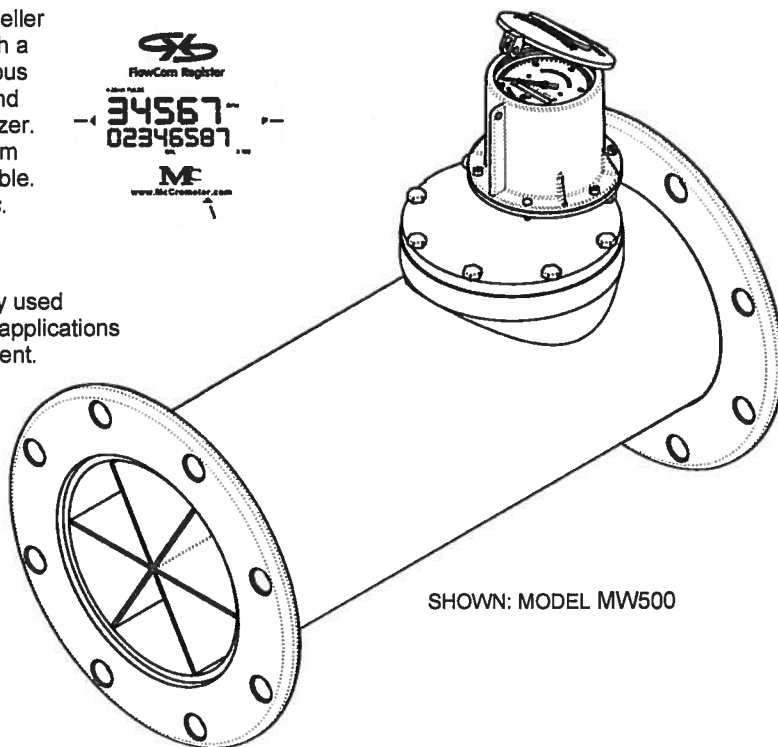
The McCrometer Propeller flowmeter comes with a standard instantaneous flowrate indicator and straight-reading totalizer. An optional FlowCom register is also available.
Typical face plates.



APPLICATIONS

The McCrometer propeller meter is the most widely used flowmeter for municipal and wastewater treatment applications as well as agricultural and turf irrigation measurement. Typical applications include:

- Water and wastewater management
- Center pivot systems
- Sprinkler irrigation systems
- Drip irrigation systems
- Golf course and park water management
- Gravity turnouts from underground pipelines
- Commercial nurseries



SHOWN: MODEL MW500

MAIN LINE FLOWMETER MODEL MW500 / MZ500

SPECIFICATIONS

PERFORMANCE

ACCURACY: $\pm 2\%$ of reading guaranteed throughout range.

RANGE: See dimensions chart below

HEAD LOSS: See dimensions chart below

MAXIMUM TEMPERATURE: (Standard Construction)
160°F constant

PRESSURE RATING: Model MW500: 150 psi
Model MZ500: 300 psi

MATERIALS

BEARING ASSEMBLY: Impeller shaft is 316 stainless steel.
Ball bearings are 440C stainless steel.

MAGNETS: (Permanent type) Cast or sintered Alnico

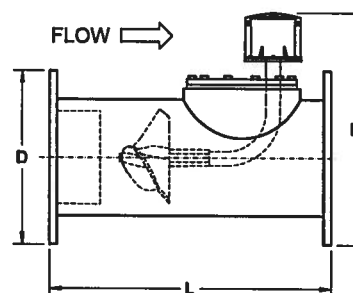
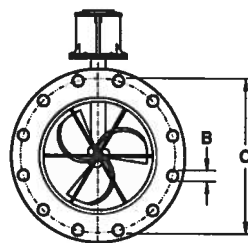
BEARING HOUSING: Brass; Stainless Steel optional

REGISTER: An instantaneous flowrate indicator and six-digit straight-reading totalizer are standard. The register is hermetically sealed within a die cast aluminum case. This protective housing includes a domed acrylic lens and hinged cover with locking hasp.

IMPELLER: Impellers are manufactured of high-impact plastic, retaining their shape and accuracy over the life of the meter. High temperature impeller is optional.

OPTIONS

- International flange standards available
- Other than standard laying lengths available
- Register extensions available
- Forward/reverse flow measurement
- All stainless steel construction
- High temperature construction
- "Over Run" bearing assembly for higher-than-normal flowrates
- Electronic propeller meter available in all sizes of this model
- A complete line of flow recording/control instrumentation
- Certified calibration test results



McCROMETER reserves the right to change design or specifications without notice.

MW500/MZ500	DIMENSIONS														
Meter and Nominal Pipe Size	2	2 1/2	3	4	6	8	10	12	14	16	18	20	24	30	36
Maximum Flow U.S. GPM	250	250	250	600	1200	1500	1800	2500	3000	4000	5000	6000	8500	12,500	17,000
Minimum Flow U.S. GPM	40	40	40	50	90	100	125	150	250	275	400	475	700	1200	1500
Approx. Head Loss in Inches at Max. Flow	29.50	29.50	29.50	23.00	17.00	6.75	3.75	2.75	2.00	1.75	1.50	1.25	1.00	1.00	1.00
MW500															
Approx. Shipping Weight-lbs.	36	36	43	54	115	135	197	325	465	530	744	890	1,293	1450	1650
B (Inches)	3/4	3/4	3/4	3/4	7/8	7/8	1	1	1 1/8	1 1/8	1 1/4	1 1/4	1 3/8	1 3/8	1 5/8
C (Inches)	4 3/4	5 1/2	6	7 1/2	9 1/2	11 3/4	14 1/4	17	18 3/4	21 1/4	22 3/4	25	29 1/2	36	42 3/4
D (Inches)	6	7	7 1/2	9	11	13 1/2	16	19	21	23 1/2	25	27 1/2	32	38 3/4	46
H (Inches)	11 3/4	12 1/4	12 1/2	15 1/4	16 1/4	18 1/2	21 3/4	24 1/4	25 1/4	28 1/2	29 1/4	32 1/2	36 3/4	42 3/4	49 1/4
L (Inches)	14	16	16	20	22	24	26	28	42	48	54	60	60	60	60
No. of Bolts per Flange	4	4	4	8	8	8	12	12	12	16	16	20	20	28	32
No. of Topplate Bolts	6	6	6	6	8	8	12	12	12	12	16	16	16	16	16
MZ500															
Approx. Shipping Weight-lbs.	50	55	62	90	145	220	340	430	650	820	1,315	1,508	2,165		
B (Inches)	3/4	7/8	7/8	7/8	7/8	1	1 1/8	1 1/4	1 1/4	1 3/8	1 3/8	1 3/8	1 5/8		
C (Inches)	5	5 7/8	6 5/8	7 7/8	10 5/8	13	15 1/4	17 3/4	20 1/4	22 1/2	24 3/4	27	32		
D (Inches)	6 1/2	7 1/2	8 1/4	10	12 1/2	15	17 1/2	20 1/2	23	25 1/2	28	30 1/2	36		
H (Inches)	12	12 1/2	12 7/8	15 3/4	17	19 1/4	22 1/2	25	26 1/4	29 1/2	32 3/4	34	38 3/4		
L (Inches)	20	20	20	24	26	28	30	32	42	48	54	60	60		
No. of Bolts per Flange	8	8	8	8	12	12	16	16	20	20	24	24	24		

Note: Flanges meet ASTM-A-181 specs. Larger flowmeters on special order.

REPRESENTED BY:

Appendix B.

**Miscellaneous Field Notes and Calculations from the Proof of Beneficial Use Field
Licensing Examination for City of Meridian water right No. 63-31138.**

CALCULATIONS AND DESIGN DATA		PREPARED BY L. Pearson
SUBJECT Meridian #22 Supply		DATE 11/9/05
Beneficial Use Exam Data		SHEET 1 OF 1

onsite 1300hrs

Flowmeter

0-3000 GPM McCrometer
SN# 01-07482-10
Totalizer: 306216000

1322hrs

Flow = 600 gpm
PSI = 90

1335hrs

Flow = 950 gpm
PWL = 42' bmp mp = 2.4' aphf $\approx$ ground level

1346 hrs

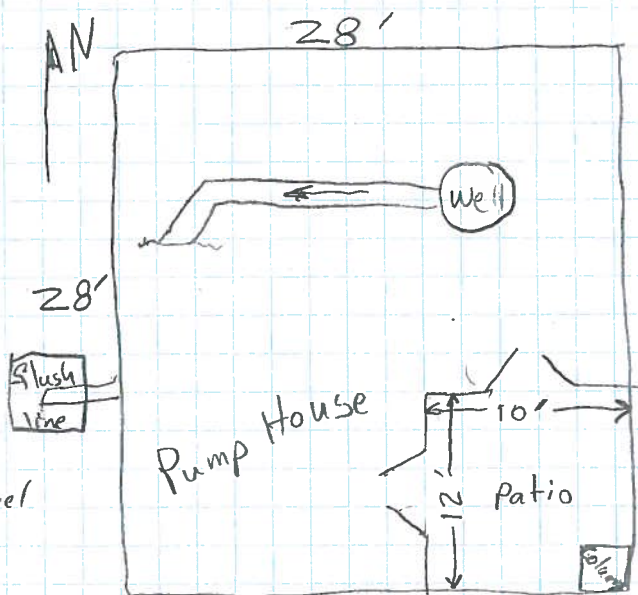
Flow = 1350
PWL = 48' bmp

1350hrs

Flow = 2100 gpm
PWL = 61.5' bmp

System from discharge head

- 10" discharge piping with air relief valve
- 10" swing check valve
- chlorine injection
- pressure transducer
- Electromechanical McCrometer flowmeter with elec output to system
- 0-200 PSI NOSHOK pressure gauge
- 10" gate valve



Well Location

N 43° 35' 02.1" $\pm$ 19ft ck. 2655'
W 116° 24' 11.9" $\pm$ 19ft ck. 2655'

Motor

U.S. Electrical Motor
CAT# H0150V2SLG
Mod. # AA63A
3-phase ID# E08-AA63A-M C3 ✓
150 HP 1785 RPM SF1.15 ✓
460 V 170 Amps

IDWR Tag# D0018240

Pump Tag on discharge head

Pump Tech Co., Inc
Idaho Falls, ID 83402
(208) 529-6868
Mod # 14DKH SN# 2K10532
38TG

Does not match records

- 51 feet = PWL after 30 minutes of pumping at 2000 gpm.
 - 16 feet = Non-pumping water level
 35 ft of drawdown

$$\begin{array}{r} 57 \text{ gpm/ft} = \text{Specific Capacity} \\ 35 \overline{) 2000 \text{ gpm}} \\ \underline{175} \\ 250 \\ \underline{245} \\ 5 \end{array}$$

$$\begin{array}{r} 57 \text{ gpm/ft} \overline{) 39.9 \text{ feet drawdown}} \\ \underline{111} \\ 540 \end{array}$$

$$\begin{array}{l} 39.9 \text{ feet of drawdown} \\ + 16 \text{ ft} = \text{non-pumping water level} \\ 55 = \text{pumping water level at 2,250 gpm} \end{array}$$

$$75 \text{ psi} \times 2.31 \text{ ft/psi} = 173 \text{ ft of head}$$

$$\begin{array}{l} 173 \text{ feet} \\ + 55 \text{ feet of pumping lift at 2,250 gpm} \\ 228 \text{ feet of total dynamic head} \end{array}$$

CALCULATIONS AND DESIGN DATA		PREPARED BY <u>L. PARKER</u>
SUBJECT <u>MERIDIAN WELL #22 LICENSING EXAM</u>		DATE <u>15 Nov 2016</u>
<u>PRESSURE / FLOW / PRODUCTION CALCULATIONS</u>		SHEET <u>1</u> OF <u>1</u>

SYSTEM PRESSURE 75 psi LOWEST VALUE IN PEAK SEASON

$$\frac{75 \text{ psi}}{\text{psi}} \times 2.31 \frac{\text{ft}}{\text{psi}} = 173.3 \text{ ft}$$

$$\begin{array}{r} 173.3 \text{ ft} \\ + 43.2 \text{ ft DD ON TEST DATE (11/9/05)} \\ \hline 216.5 \text{ ft TDH} \end{array}$$

80.5 psi EXAM TEST DATE

$$\frac{80.5 \text{ psi}}{\text{psi}} \times 2.31 \frac{\text{ft}}{\text{psi}} = 187 \text{ ft}$$

$$\begin{array}{r} 187 \text{ ft} \\ + 45.2 \text{ ft DD ON TEST DATE (11/9/05)} \\ \hline 232.2 \text{ TDH} \end{array}$$

11/9/05 43.2 ft DD @ 2,250 gpm $\frac{2250 \text{ gpm}}{43.2 \text{ ft}} = 52 \text{ gpm/ft @ 30 MIN.}$

8/20/01 34.9 ft DD @ 2,000 gpm $\frac{2000 \text{ gpm}}{34.9 \text{ ft}} = 57 \text{ gpm/ft @ 30 MIN.}$

AUG 20, 2001 NPWL = $\begin{array}{r} 16.09 \text{ ft BMP} \\ - 1.30 \text{ ft MP ABOVE GROUND LEVEL (BEFORE PUMP HOUSE IS BUILT)} \\ \hline 14.79 \text{ ft BGS} \end{array}$

Nov 9, 2005 NPWL = $\begin{array}{r} 18.32 \text{ ft BMP} \\ - 2.30 \text{ ft MP ABOVE FINISHED FLOOR} \\ - 2.00 \text{ ft FINISHED FLOOR ABOVE ORIGINAL GROUND SURFACE} \\ \hline 14.02 \text{ ft BGS} \end{array}$

VERY LITTLE DIFFERENCES

SYSTEM PRESSURE 75 psi LOWEST VALUE IN PEAK SEASON

$$75 \text{ psi} \times 2.31 \frac{\text{ft}}{\text{psi}} = 173.3 \text{ ft.}$$

$$\begin{array}{r} 173.3 \text{ ft} \\ + 43.2 \text{ ft DD @ 1785 RPM @ 60 Hz} \\ \hline 216.5 \text{ TDH @ 1785 RPM @ 60 Hz} \end{array} \quad 2,000 \text{ gpm}$$

SYSTEM PRESSURE 80.5 psi EXAM DATE

$$80.5 \text{ psi} \times 2.31 \frac{\text{ft}}{\text{psi}} = 187 \text{ ft.}$$

$$\begin{array}{r} 187 \text{ ft} \\ + 43.2 \text{ ft DD @ 1785 RPM @ 60 Hz} \\ \hline 232.2 \text{ TDH @ 1785 RPM @ 60 Hz} \end{array} \quad 2,250 \text{ gpm}$$

$$11/9/05 \quad \begin{array}{r} 43.2 \text{ ft DD} \\ 2,250 \text{ gpm} \end{array} \quad \frac{2,250 \text{ gpm}}{43.2 \text{ ft}} = 52 \text{ gpm/ft @ 30 min}$$

$$8/20/01 \quad \begin{array}{r} \del{57} 34.9 \text{ ft DD} \\ 2,000 \text{ gpm} \end{array} \quad \frac{2,000 \text{ gpm}}{34.9 \text{ ft}} = 57 \text{ gpm/ft @ 30 min}$$

AUG 2001 NPWL = 16.09 ft BMP

$$\begin{array}{r} 1.30 \text{ ft MP ABOVE GROUND LEVEL} \\ \hline 14.79 \text{ ft BGL} \end{array}$$

BEFORE PUMP HOUSE

Nov 2005 NPWL = 18.32 ft BMP

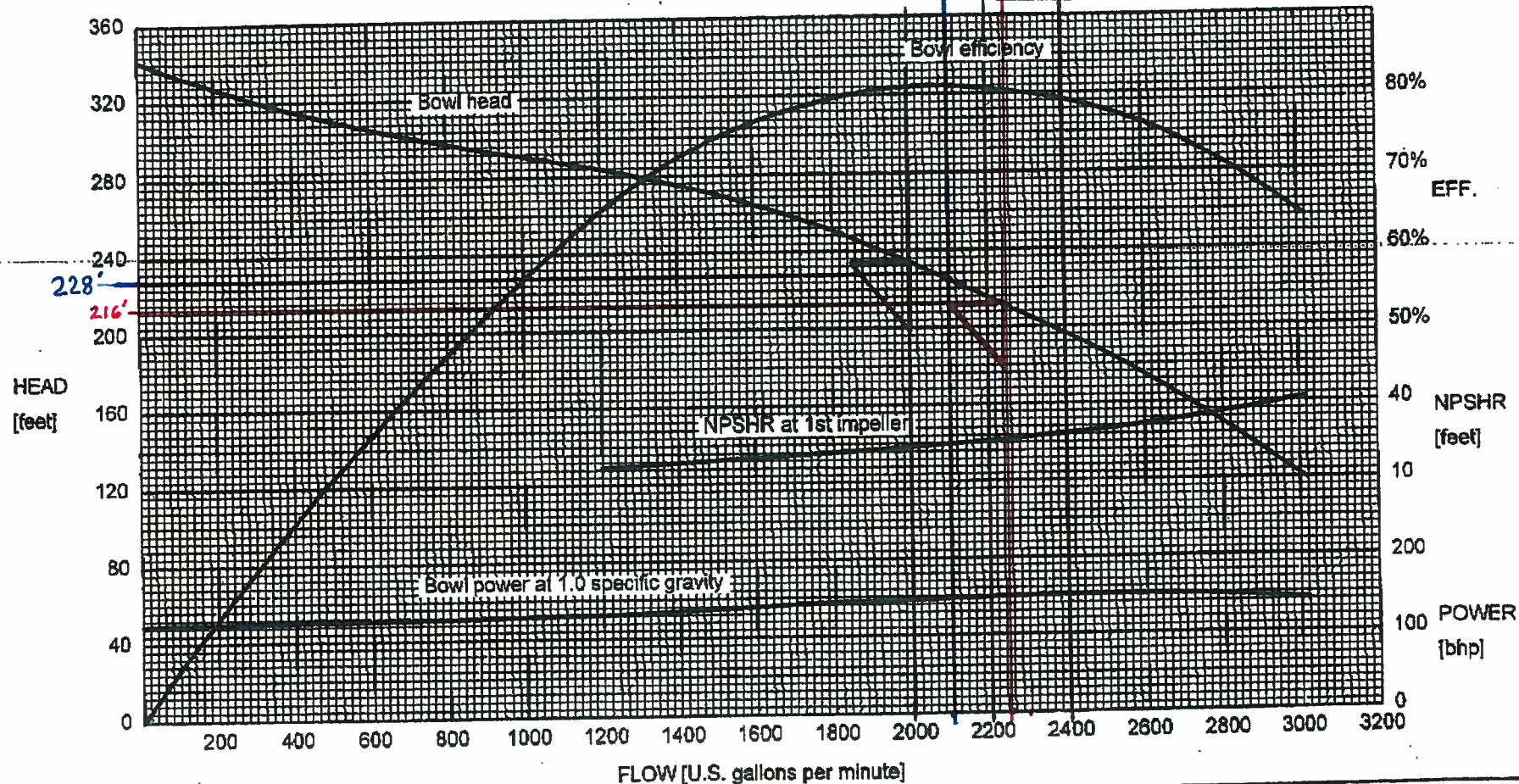
$$\begin{array}{r} -2.30 \text{ ft MP ABOVE FINISHED FLOOR} \\ -2.00 \text{ ft FINISHED FLOOR ABOVE ORIGINAL GRADE} \\ \hline 14.02 \text{ ft BGL} \end{array}$$

VERY LITTLE DIFFERENCE

The head and power may be different than shown in accordance with Hydraulic Institute standards.

Certified expected performance based on test of similar units

MERIDIAN WELL #22



PUMPTech CO., INC.
4444 SO. YELLOWSTONE HWY
IDAHO FALLS, IDAHO 83401

Floway Pumps

FRESNO, CALIFORNIA

A **WEHR** COMPANY

TYPE: 15DKL
NO. OF STAGES: 3
R.P.M.: 1770
PUMP SERIAL NO.: 45721-1-1

DWN. BY: marloc

DATE: 09/19/2001

DWG. NO. 4572101PC

Autodesk AutoCAD 5.3.5 (printed 09/19/01 1:05:59 PM)

PERFORMANCE DATA WORKSHEET

(NOTE: The Performance Data Worksheet should be completed at design condition to properly select required components and sizing of equipment – i.e., motor, shaft diameter, column, required pump efficiency, etc.)

PUMP MODEL: 15DKL-3 S.O. NUMBER: _____ CUSTOMER: CITY OF MERIDIAN : WELL #22
 IMPELLER DIAMETER: 9.50" NO. OF STAGES: 3 SPEED: 1800 RPM TYPE: ☒ VERTICAL ☐ SUBMERSIBLE
 MOTOR HP: 150 PHASE: 3 HZ: 60 VOLTAGE: 460 CABLE SIZE: — LENGTH: _____ FT.
 MOTOR MFR: US MOTORS COLUMN DIAMETER: 10" TUBE DIAMETER: — SHAFT DIAMETER: 1 1/2" WELL DIAMETER: 18"

A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	U
CAPACITY (GPM)	TOTAL HEAD (FT.) (Note #1)	HD. & COL FRICTION LOSS (FT.)	BOWL HEAD (TDH)	HEAD PER STAGE (FT)	BOWL EFF. %	BOWL HP	THRUST BEARING & SHAFT LOSS HP	CABLE LOSS HP	PUMP HP	CABLE LOSS %	PUMP EFF. %	ELECTRIC MOTOR EFF %	NET ELEC. EFF %	INPUT HP	OVERALL EFF. %	KW INPUT	KW HRS PER 1000 GAL PUMPED
2000	234	6	240	80	.81	149.6	1	—	150.6	—	78.5	96.2	96.2	156.5	75.5	116.8	1.00

A. Pump capacity in gpm

* B. Total head in feet to be developed by pump (exclusive of pump losses)

C. Friction loss in feet of head = Discharge head and Column friction loss

D. Bowl head (TDH) = B + C

E. Head per stage = $\frac{D}{\text{No. of Stages}}$

F. Bowl efficiency (from performance curve)

G. Bowl HP = $\frac{A(B + C)}{3960 \times F}$

H. Thrust bearing and/or shaft loss (HP)

Thrust bearing loss (HP) = (Note #2) $\times \frac{\text{RPM}}{100} \times \frac{\text{THRUST}}{1000}$

For shaft loss, see "Mechanical Friction Lineshafts" chart on page IV-14.

J. Cable loss in HP from surface plate to motor (submersibles only)

K. Pump HP = G + H

L. Cable loss in percent = $\frac{J}{K} \times 100$

M. Pump efficiency = $\frac{A \times B}{3960 \times K}$

N. Electric motor efficiency (from motor data sheet)

P. Net electrical efficiency = $N \times (1.00 - L)$

R. HP input = $\frac{K}{P}$

S. Overall efficiency = $M \times P$

T. KW input = $\frac{.746 \times K}{P}$

U. KW hr. per 1000 gallons = $\frac{D \times 0.00315}{S}$

NOTES: Change efficiency to decimal form before using.

1. (Col. B) Total head in feet developed by the pump includes head below datum and head above datum. Head above datum must include velocity head losses at point of head measurement.

2. Thrust bearing losses in HP per 100 RPM per 1,000 lbs. thrust:

FR. 182TP-215TP - .0059 FR. 254TP - .0071

256TP-258TP - .0085 324TP -326TP - .0132

364TP-365TP - .0148 404TP -425TP - .0165

444TP-505TP - .0170 Stacked Brgs.

Spherical roller and Kingsbury bearing - refer to factory.