

JAN 23 2013

DEPARTMENT OF
WATER RESOURCES

Form 219 07/11

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
BENEFICIAL USE FIELD REPORT

A Beneficial Use Field Report is prepared by a water right examiner as the result of an examination to clearly confirm and establish the extent of the beneficial use of water established in connection with a permit during the development period authorized by the permit and any extensions of time previously approved.

★ Please direct inquiries to Ed Squires at 342-8369.

A. GENERAL INFORMATION

1. Owner: The City of Meridian, Idaho

Permit No. 63-31318

Phone No. (208) 898-5500

Current Address: 33 East Broadway Avenue, Meridian, Idaho 83642

2. Examiner's name: Edward Squires, CWRE 13-125

EXAM DATE: December 22, 2011

3. Accompanied by: Mr. Tracy Ballantyne

Email ed@hydrologicinc.net

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

Relationship to Permit Holder: Water Quality Program Manager

Phone No. (208) 888-5242

4. Source: Ground Water – City of Meridian Supply Well #24

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 – City of Meridian – Supply Well #26

C. DIVERSION AND DELIVERY SYSTEM

1. Point(s) of Diversion:

Ident. No.	Govt Lot	¼	¼	¼	Sec	Twp.	Rge.	County	Method of Determination/Remarks
City Well #24		SE	NE	NE	2	3N	1W	Ada	Site visit, USGS 7 ½-minute Topographic Series maps and GPS
									GPS N 43° 37' 50.5" W 116° 24' 51.1"
									IDWR Well Tag D0019265

2. Place(s) of Use: City of Meridian's Service Area Indicate 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	

City of Meridian Water Delivery Service Area

3. **Delivery System Diagram:** Indicate all major components and distances between components. Indicate weir size / ditch size / pipe I.D. as applicable. Use space provided or ☒ see attached.

Refer to photographs and
appendices of this report

Scale: 1" = _____

- ☒ Copy of USGS Quadrangle Attached showing location(s) of point(s) of diversion and place(s) of use
☒ Aerial Photo Attached (required for irrigation of 10+ acres).
☒ 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
City of Meridian Supply Well # 24	U.S. Electrical Motors – HT (Emerson)	150	F03-AA63-H A6	FlowWay Pumps Model: 14DKH	14-inch bowls to 10-inch column and discharge piping

*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
McCrometer Flow-meter	Propeller	MW500	E7000-000	E04-00963-10	10-inch	8/6/2004

2. **Measurements** Discharge measurements for this examination were made using the installed propeller flow-meter listed above (Figure 3) which was last calibrated in October of 2009. The minimum length of straight pipe in the downstream direction is 1 pipe diameter (10-inches in this case). The minimum length of straight pipe in the upstream direction is 5 pipe diameter (50-inches in this case). Although the minimum piping installation recommendations of the manufacturer (Appendix A) are met downstream of the meter by the 18-inch length of straight-run pipe without obstructions, the straight-run pipe available upstream of the meter is only 39.5-inches (Figures 4 and 5) which is about 10-inches short of manufacturer's specifications. The instantaneous flow rate needle, however, was observed to be steady at all discharge rates and the meter is equipped with flow "straightening vanes. . I spoke with the technical service folks at McCrometer (Chere Kimrey 1-800-800-8804) and described the installation. "The straightening vanes of this meter are designed to compensate for such irregularities" but McCrometer would not speculate on what the accuracy could be.

E. NARRATIVE/REMARKS/COMMENTS

see 1/16/20
email from
Ed Squires

The field examination for this permit was carried out on December 22, 2011 by Ed Squires and Carlton Parker (hydrogeologists with Hydro Logic, Inc), accompanied by Mr. Tracy Ballantyne, Water Quality Program Manager with the Meridian Water Department (Appendix B). The Meridian #23 well is housed inside of a 29.5-foot by 28-foot cinder block pump house (Figure 6). The 17.4-inch (outside) diameter PVC well (Figure 7) is equipped with a "FloWay Pumps", 4-stage, Model 14DKH deep well turbine pump (Figure 8) set on 129.5-feet of 10-inch pump column with a 13.5-foot long pump/ intake assembly (includes 11-feet of suction pipe). The pump is driven by a 150 hp, 460 volt, 1785 rpm, U.S. Electrical Motors – High Thrust motor (Figure 4). 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 (Figures 4 and 5) prior to exiting through the pump-house floor where it joins with the City's distribution system mainline running along and under North Linder Road. The pumping plant is equipped with a variable speed drive (VFD) unit designed to pump directly to the pressurized water distribution system. The flow-meter on the 10-inch discharge records all discharges from the Well # 24 to the distribution system. The well pump is set to operate within a predetermined pressure range in the distribution system that varies with demand; typically 60-to-90 psi. Of course the pump produces more water against less system pressure compared to when system pressure is higher.

When we arrived on-site, the Well #24 pump was operating at 850 gpm, a line pressure of 75 psi, a pumping water level of 22.5 feet below ground level (26.12 feet below measuring point), and with a motor frequency of 47.5 Hertz (cycles per second) which is approximately 80% of full speed on the VFD . Water-level measurements are facilitated through a 2-inch diameter measuring port protruding from the thrust block (Figure 4). Well #24 is the primary (lead) well in this distribution system pressure zone and apparently could not be shut off at the time of the licensing examination according to Tracy Ballantyne with the Meridian Water Department. However, Ed Squires measured the non-pumping water level in the Well #24 on 11-29-2011 at 14.1 feet above ground level after the water level in the well had recovered for 26 days while the well was being cleaned (Figure 9) and HLI recorded additional non-pumping water levels on 11/3/2011 and 7/30/2002 (Appendix B). Therefore, we use an average non-pumping water level of 10.87 feet above ground level for all calculations of this report to best simulate actual conditions. The volume-pumped totalizer read-out of the flow-meter was 510,364,500 gallons when we arrived at the site for the licensing exam (Figure 3). We had the system operators manually increase the pumping rate to simulate higher demand (summer) conditions and we measured pumping water level and line pressure for about a half hour when the pumping water level was drawn down to 66.39 feet bgl (70.51 feet bmp) at a discharge of 1,800 gpm, a system pressure of 76 psi, and full speed on the pump at an observed frequency of 60 Hertz (Hz) out of 60 Hz available (Appendix B). In other words, the pump motor was running at full speed, an important distinction because we do not need to compensate for motor speed in the determination of maximum yield; i.e. one less variable. According to our observations, the pump should have been operating on its "full speed" performance curve (Figure 10) because we observed that the VFD was operating at full speed of 60 Hz. However, when comparing our site measurements to the pump performance curve supplied by the City, for the originally installed pump that had just been refurbished within manufacturer's impeller tolerance, our measurements did not fit the curve (Figure 11). Indeed, the indicated design point on the City-furnished curve did not precisely comport with the performance curve itself? We considered whether the pressure gage on the water main may have been in error so we obtained pressure recordings (Figure 12) from the City from an in-line

40123
5th.

pressure sensor (separate from the installed pressure gage) and determined that the readings for the same day as our POBU exam were the same thusly validating the on-site pressure gage. The more detailed performance curve (Figure 10) for the same pump, in concert with our on-site measurements, tells us that the measured performance fits with a 7.9-inch diameter impeller trim (Figure 10). Therefore, we can now know what the pumping plant would produce at lower and higher system pressures. We were able to obtain over one year of system pressure readings for Well #24 that showed the line pressure varied within a relatively small range of 69-to-76 psi winter-to-summer; 76 psi being the measured pressure during our field licensing exam. Figure 10 shows the pump would be produce 1,930 gpm (4.3 cfs) at an operating pressure of 69 psi after correcting for the additional drawdown that would occur at that pumping rate.

Loren Pearson and Carlton Parker conducted hydraulic testing of the Well #24 on December 22, 2011. The resulting hydrograph is shown on Figure 13 with respect to three other pumping tests of the Well #24. From these tests it is clear that the Meridian Well #24, itself, is easily capable of productive yields up to several thousands of gpm. The pumping water levels and calculated specific capacity measured during the field-licensing examination correspond to essentially the same as those measured during the initial hydraulic testing of the new well in 2002. The well does produce short-term discharge rates in excess of 2,240 gpm during flushing operations or a fire-flow situation (pumping against zero-to-20 psi) but these instances are not considered typical or a beneficial use of the water right. As equipped, and given the available pressure records (not from within the proof of beneficial use period), our calculations suggest that the Well #24 was likely produced to the Meridian water system at a maximum instantaneous discharge rate of 1,930 gpm. This calculation agrees well with hand-written recordings of 2,000 gpm during June 24th and 25th of 2004 during the POBU period (Figure 14). The 2,000 gpm (4.46 cfs) is 244 gpm (0.54 cfs) less than the permitted rate of 5.0 cfs. Proof of Beneficial Use was submitted by the City on December 1, 2006 (Appendix C).

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?

All conditions of the Permit No. 63-31318 have been met (Appendix C).

F. FLOW CALCULATIONS

☒ Additional Computation Sheets Attached

Measured Method:

Instantaneous flow rates are based on field-observed readings of a high-quality, calibrated, propeller flow-meter installed close to manufacturer's specifications. These readings are supported by: 1) discussions with the pump operators responsible for upkeep of the well, 2) by the observed operating conditions and pump performance curve, 3) discussion with the flow-meter manufacturer, 4) by the documented specific capacity of the City's #24 groundwater well during previous pumping tests, and historical records from the City during the proof of beneficial use period. Therefore, the requested, observed, calculated, and recommended maximum flow rates for the well appear to be justified.

G. VOLUME CALCULATIONS

1. Volume Calculations for Irrigation:

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

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

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

2. Volume Calculations for Other Uses:

Not applicable to a municipal water right.

H. RECOMMENDATIONS

1. Recommended Amounts

Beneficial Use	Period of Use From	To	Rate of Diversion Q (cfs)	Annual Volume V (afa)
<u>Municipal</u>	<u>Jan 1</u>	<u>Dec 31</u>	<u>4.46 cfs</u>	<u>N/A</u>
	Totals:		<u>4.46 cfs</u>	<u>N/A</u>

3. Recommended Amendments

- ☒ Change P.D. as reflected above ☐ Add P.D. as reflected above ☒ Remove one POD on the same lot.
☐ Change P.U. as reflected above ☐ Add P.U. as reflected above ☐ Other

I. AUTHENTICATION

Field Examiner's Name Edward Squires, RPG, CWRE No. 13-125 Date January 24, 2013

SEAL

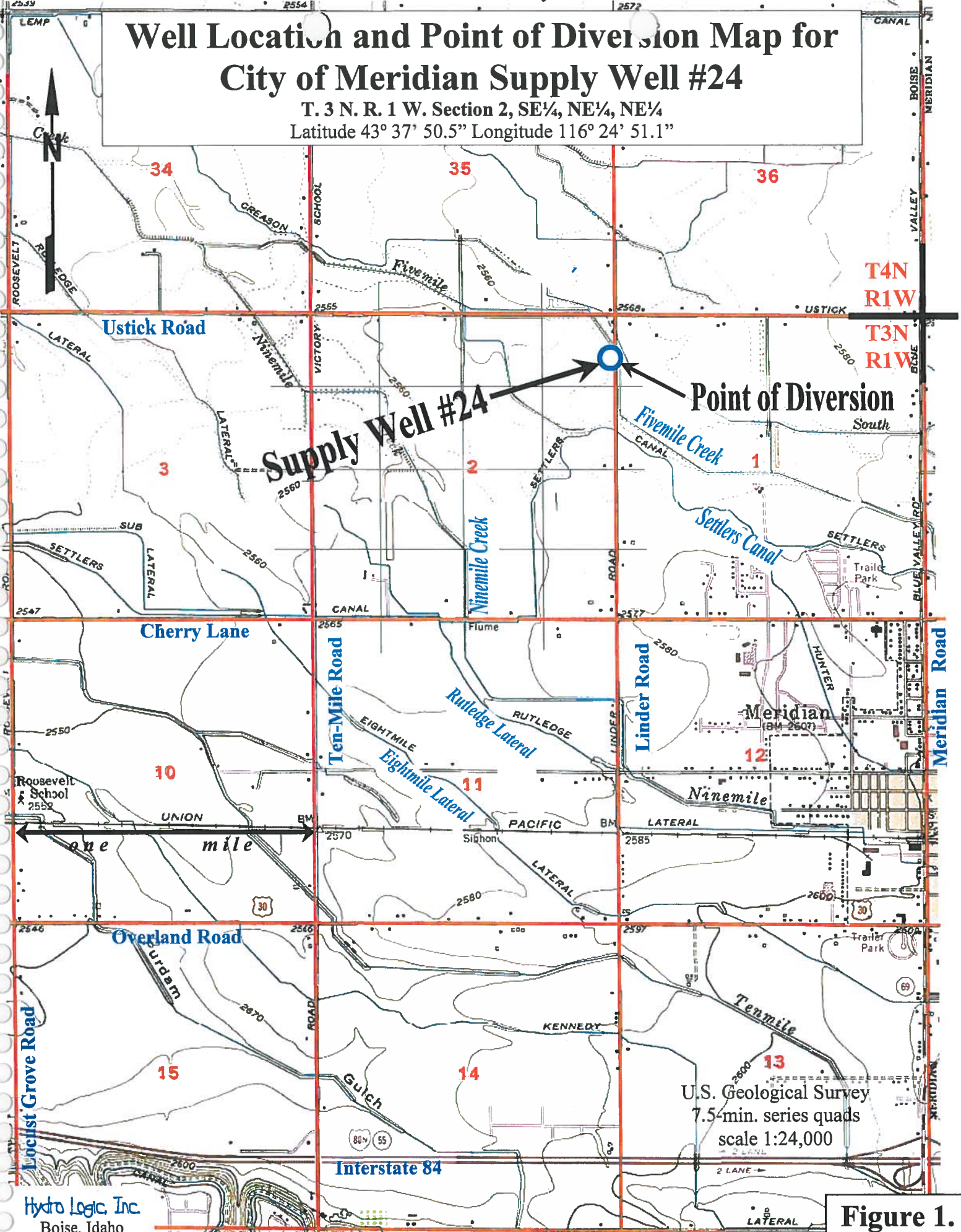
Reviewer *Jandy Hemenway* Date 1/15/2014



FIGURES

Well Location and Point of Diversion Map for City of Meridian Supply Well #24

T. 3 N. R. 1 W. Section 2, SE¼, NE¼, NE¼
Latitude 43° 37' 50.5" Longitude 116° 24' 51.1"



Aerial Photo of Meridian #24 Well Site

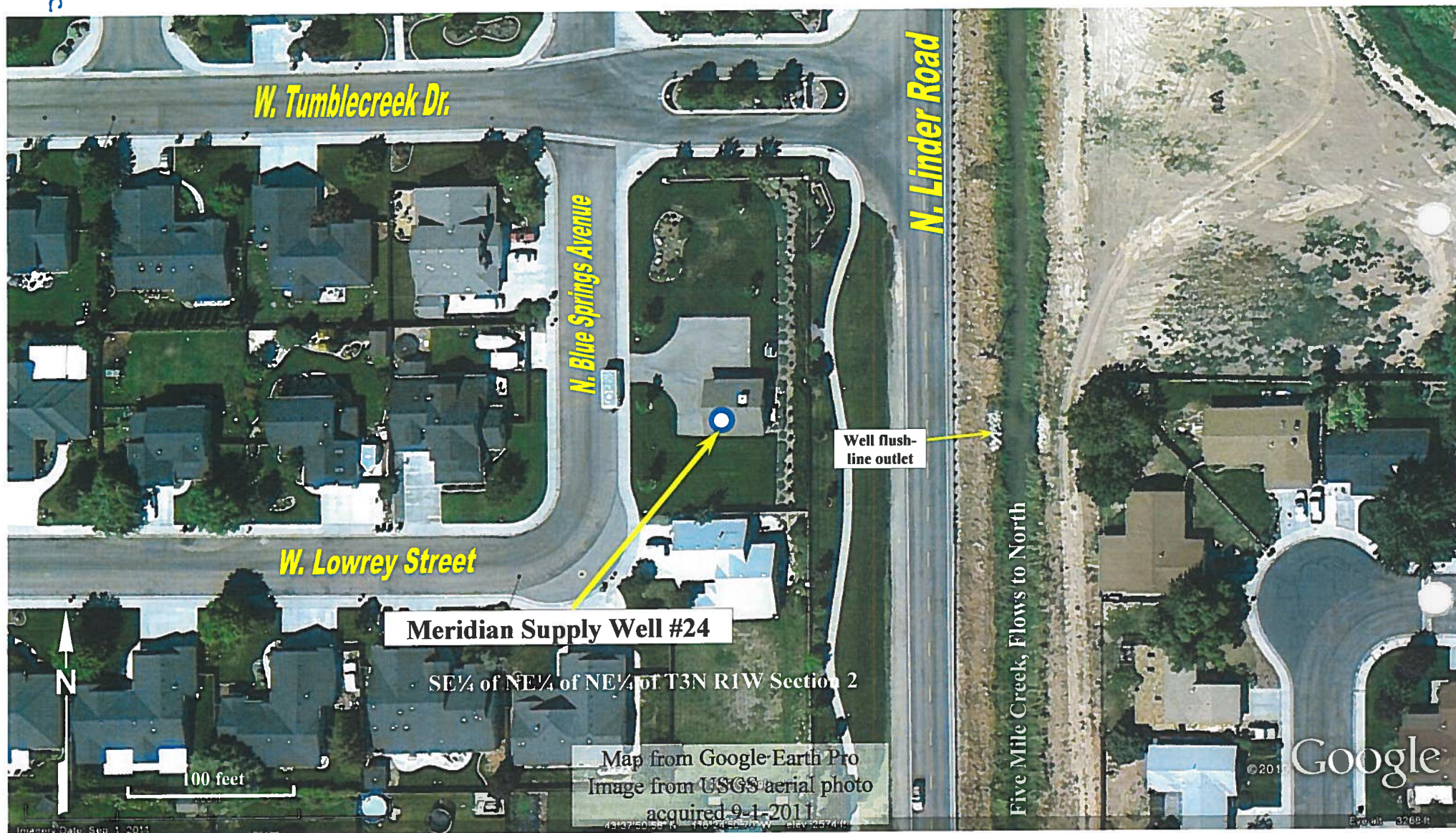


Figure 2. Annotated aerial photograph of the Meridian #24 well site showing the location of the Meridian Supply Well #24 with respect to other area facilities, roads, and creek.

Photographs of the 10-inch Flow-Meter and Line-Pressure Gauge for Meridian Supply Well #24

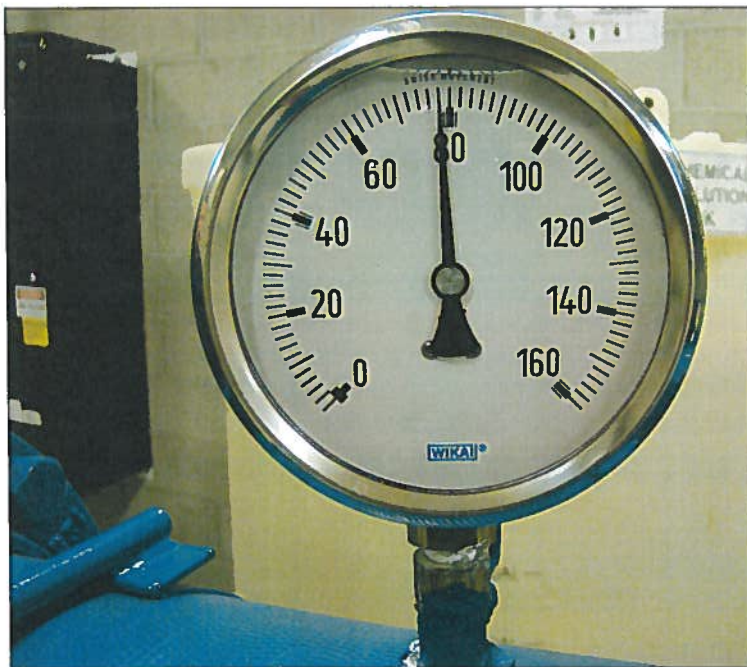
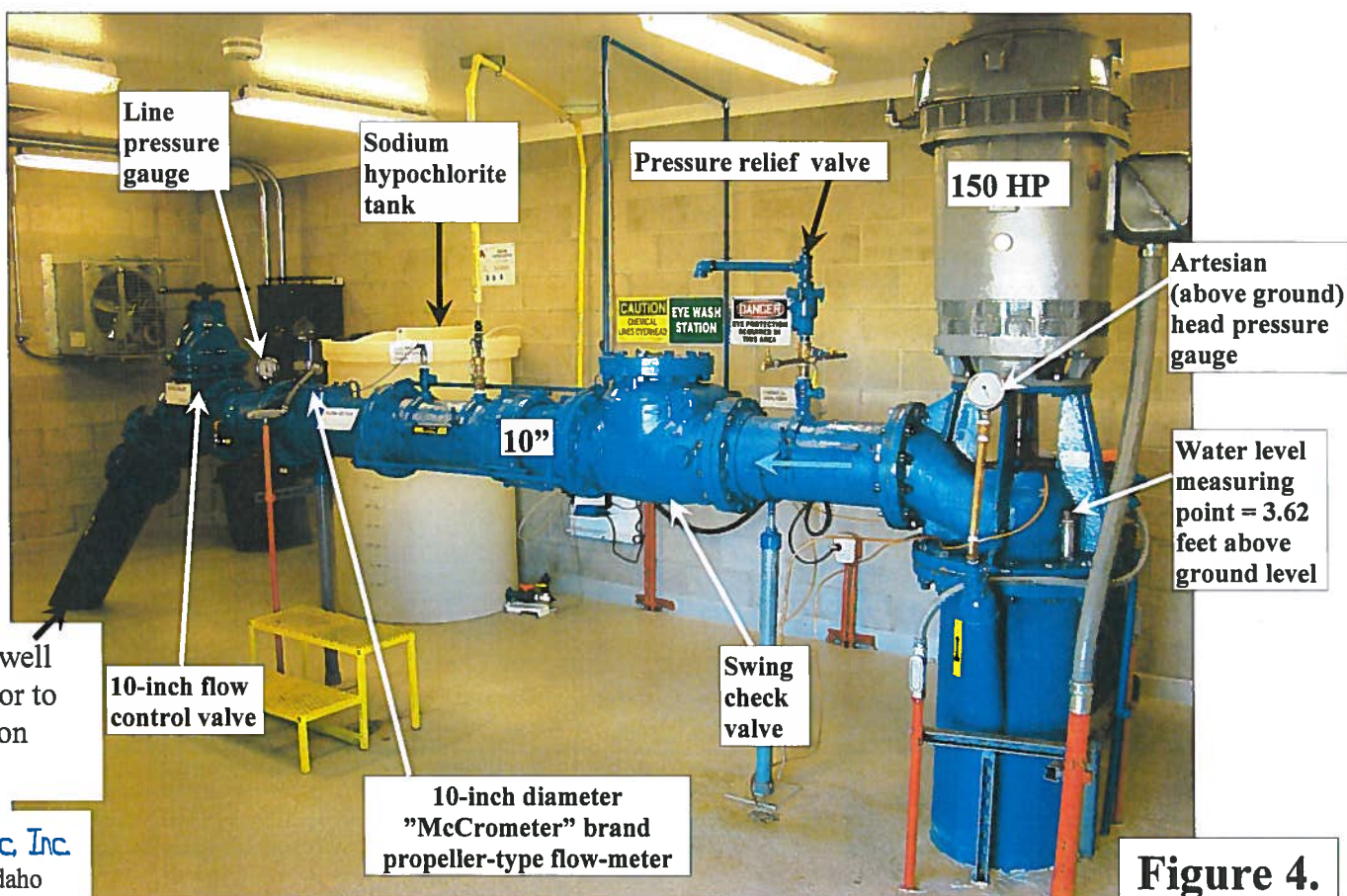
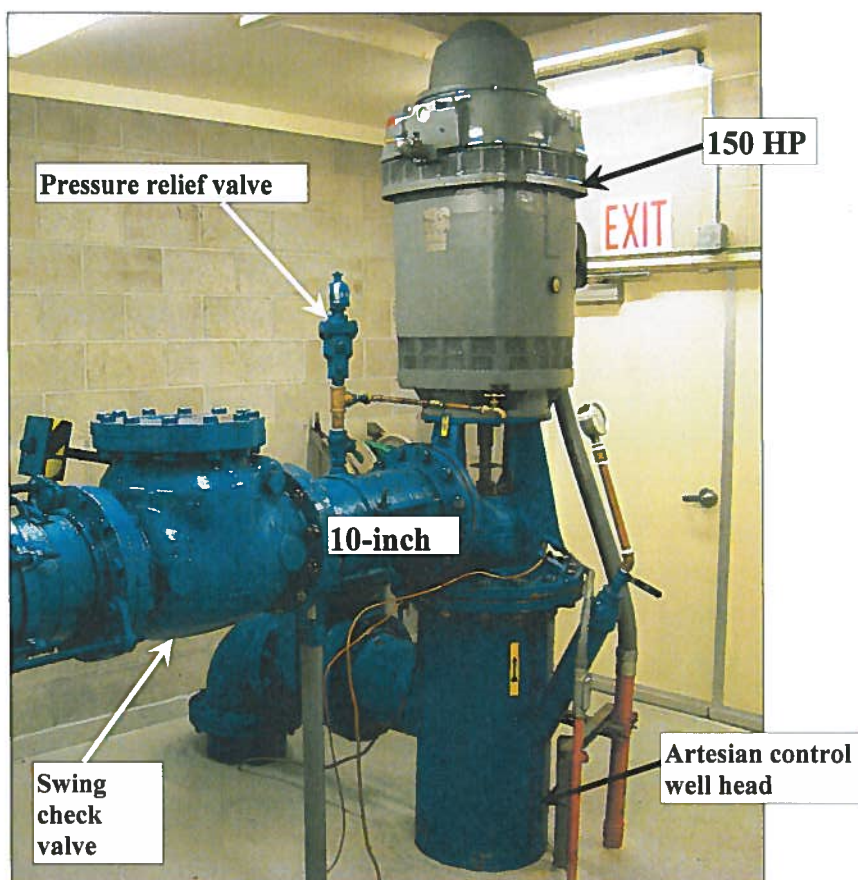
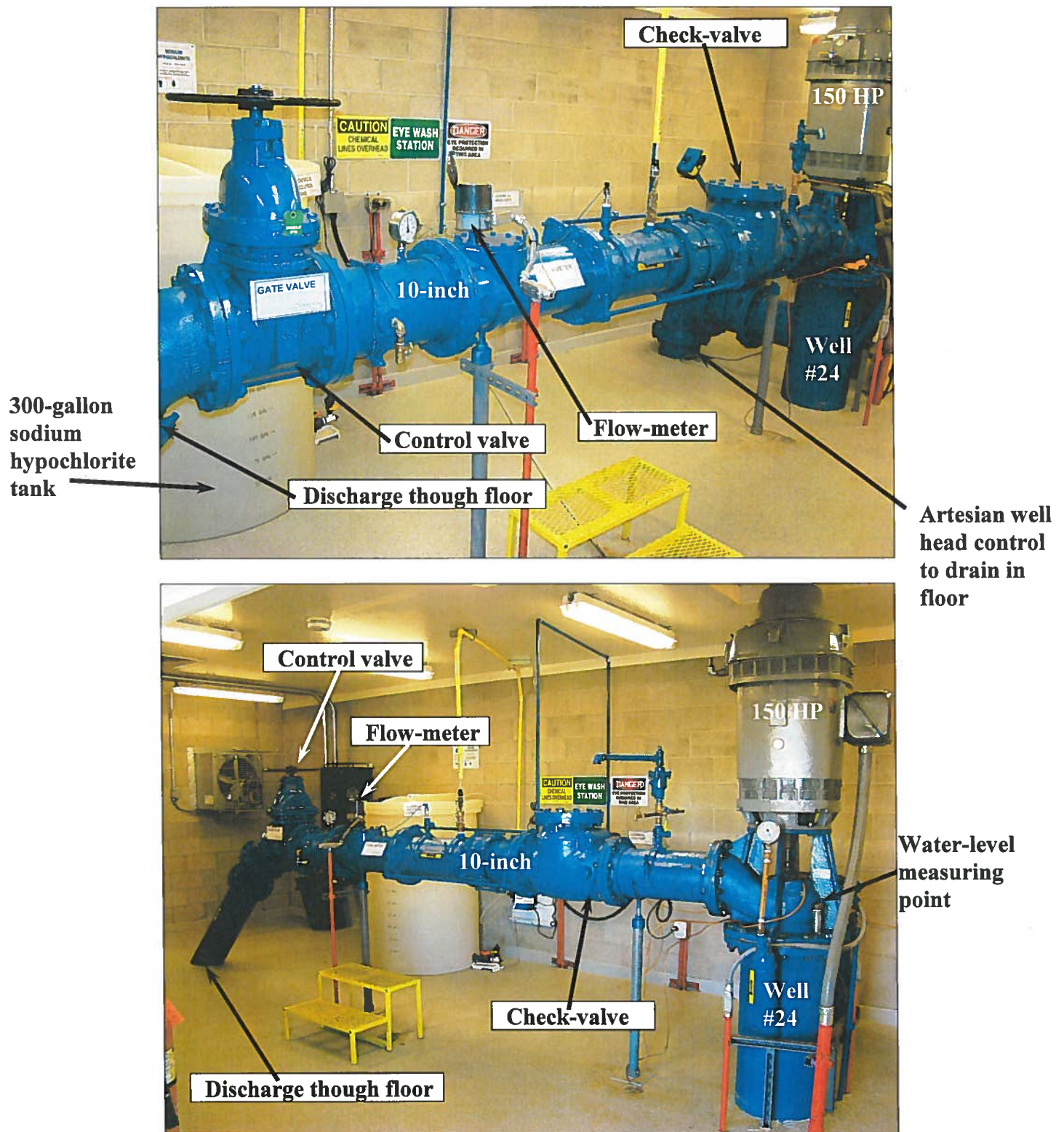


Figure 3. December 22, 2011 photographs of the “McCrometer” 10-inch propeller flow-meter and “Wika” line pressure gauge in the City of Meridian Well #24 discharge piping.

Photographs of the Well Head, Pump Motor, and Discharge Piping for Meridian Supply Well #24



Photographs of Wellhead, Pump Motor and Discharge Piping During Beneficial Use Exam of Meridian Well #24



**December 22, 2011 Photographs of Exterior of Meridian #24
Pump/Control House**

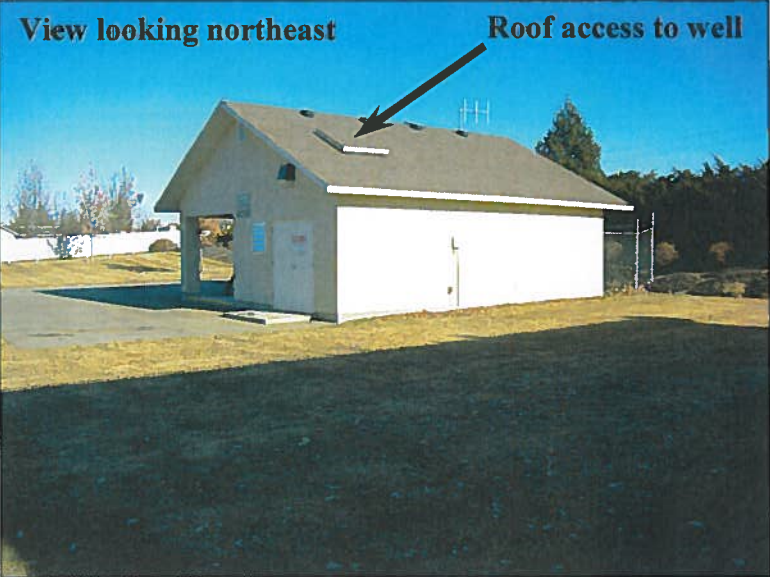
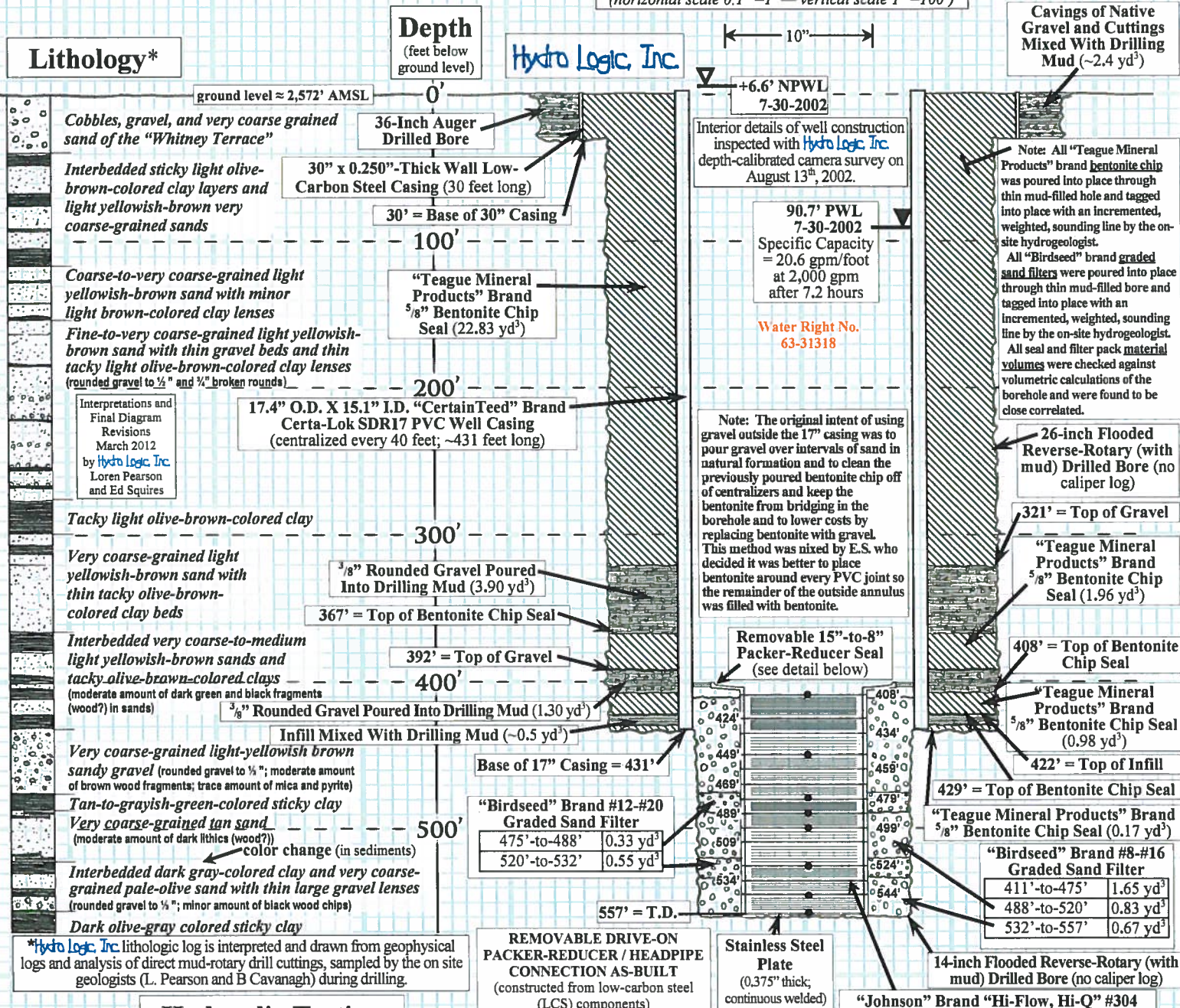
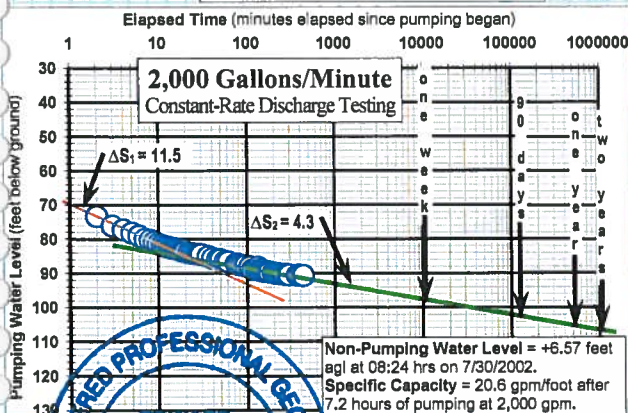


Figure 6.

Meridian Supply Well #24 As-Built Well Construction (horizontal scale 0.1"=1'—vertical scale 1"=100')

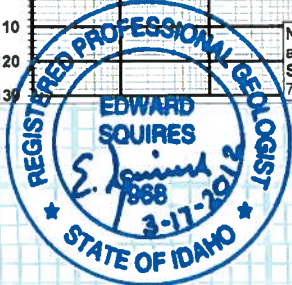


Hydraulic Testing



Meridian Supply Well #24
T. 3 N. R. 1 W. Section 2, SE $\frac{1}{4}$, NE $\frac{1}{4}$, NE $\frac{1}{4}$
Latitude 43° 37' 50.55" Longitude 116° 24' 50.84"
Completed July 2002

Figure 7.





As-Built Vertical Turbine Pumping Plant in Meridian Supply Well #24

November 2003 – to June 5, 2012

Hydro Logic, Inc.

NOT TO SCALE

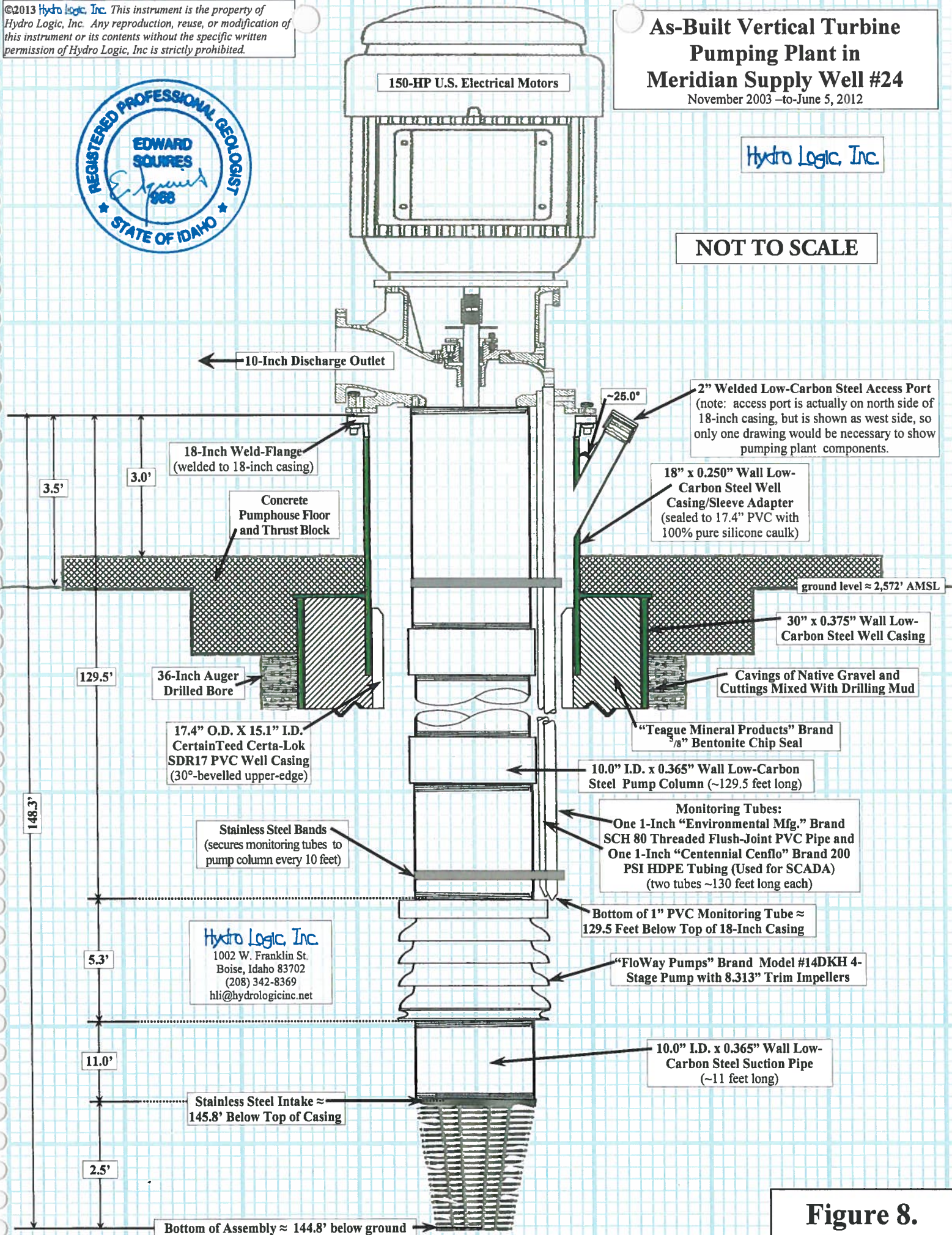


Figure 8.

CALCULATIONS AND DESIGN DATA		PREPARED BY <u>L. Pearson</u>
SUBJECT <u>Meridian Supply Well #24</u>		DATE <u>11-29-2011</u>
<u>Reinstall pumping plant</u>		SHEET <u>1</u> OF <u>4</u>

on site 09:04 Jamie Allen is here to let us into building supervisor Chris Salazar
 9:10hrs Mel Jackson and Cass Cook on site crew { Bryan Rushing
 9:22hrs finished a safety meeting with Mel and Cass { Jared Holt
 9:33hrs Jamie leaves to turn off Well #20-B
 09:53hr Layne crew on site
 * 10:18hrs NPWL = 13.6' aqhf (phf = 0.5' aqf so NPWL = 14' ft aqf)
 10:20hrs open main flush line valve to waste
 10:25hrs begin setting pumping plant
 10:45hrs Suction intake and pump are loaded in well
 * All pump column, "spiders", shafting and pump have been steam cleaned and
 disinfected by spraying everything down with a chlorine solution.
 - the trailers and tools have also been steam cleaned and sprayed down with chlorine solution
 11:14hrs Tracy Ballantyne stops by to observe operations
 11:15hrs Pump is now set with the 5-foot and 1st 10-foot lengths of column
 11:24hr 2nd 10-foot joint is landed
 11:31hrs 3rd " " " " ; now raising pump assembly to install
 monitor tubes above pump
 12:01hrs finished mounting monitor tubes just above pump coupler and
 band tubes to column already installed
 12:14hrs 4th 10-foot joint is landed
 * We are wiping down the black poly tube as it is installed with a heavily chlorinated
 rag, since there is no way to avoid touching the ground with the roll of poly tubing.
 * 12:45hrs 6th 10-foot joint is landed; Chris says the pump is getting "tight" in
 the well like maybe the well is crooked
 12:59hrs 7th 10-foot joint is landed
 13:08hrs 8th " " " "
 13:19hrs 9th " " " "
 13:31hrs 10th " " " "
 13:47hrs 11th " " " "
 14:00hrs 12th " " " "
 14:15hrs Discharge head is mounted with the 4.5' piece
 14:31hrs Discharge head is landed with monitoring tubes attached
 14:40hrs Successfully tagged bottom of 1" SCH80 PVC tube with 5/8" x 1' steel rod
 15:14hrs Finished bolting together discharge head and plumbing
 15:20hrs motor has been set into place on discharge head
 16:01hrs finished wiring motor, reinstalling SCADA, and miscellaneous plumbing
 16:02hrs Jamie Allen on site; checked rotation of motor; it is correctly wired
 16:20hrs Chris finishes clutching motor
 16:31hrs begin test pumping
 17:14 finish test pumping
 17:29hrs off site

Figure 9. November 29, 2001 hand-written field notes of Hydro Logic, Inc.'s
 Loren Pearson during inspection of the refurbished Meridian Well #24
 pumping plant. This is the original plant installed in the well in Nov. 2003.

Standard Performance Curve for Pump in Meridian Supply Well #24

1770 RPM

ENCLOSED TYPE IMPELLER

14DKH

NUMBER OF STAGES	EFFICIENCY CHANGE (NO. OF POINTS)
1	-3
2	-1
3	-0

HORSEPOWER WILL BE AFFECTED BY CHANGE IN EFFICIENCY

PUMP DATA

Shaft Dia. (IN)	1 15/16
Maximum Sphere (IN)	1 1/4
Maximum Head (FT)*	767
Min. Submergence (IN)**	24
Impeller Weight (LBS)	26.9
Thrust Constant (K)	16.5
Thrust Bal Const. (K)	N/A
Bowl O.D. (IN.)	13 5/16
Bowl Height (IN.)	12
Bell DIA. (T) (IN.)	13 1/16
Strainer height (IN.)	10 3/4
Impeller C-line(X) (IN.)	9 1/2
Eye Area (IN ²)	36.2

NOTES

Performance indicated based on cold water with specific gravity of 1.0.

* Standard Construction.

** Minimum submergence over lip of bell to prevent vortexing.

Efficiency improvements are available in certain instances. Please contact the factory.

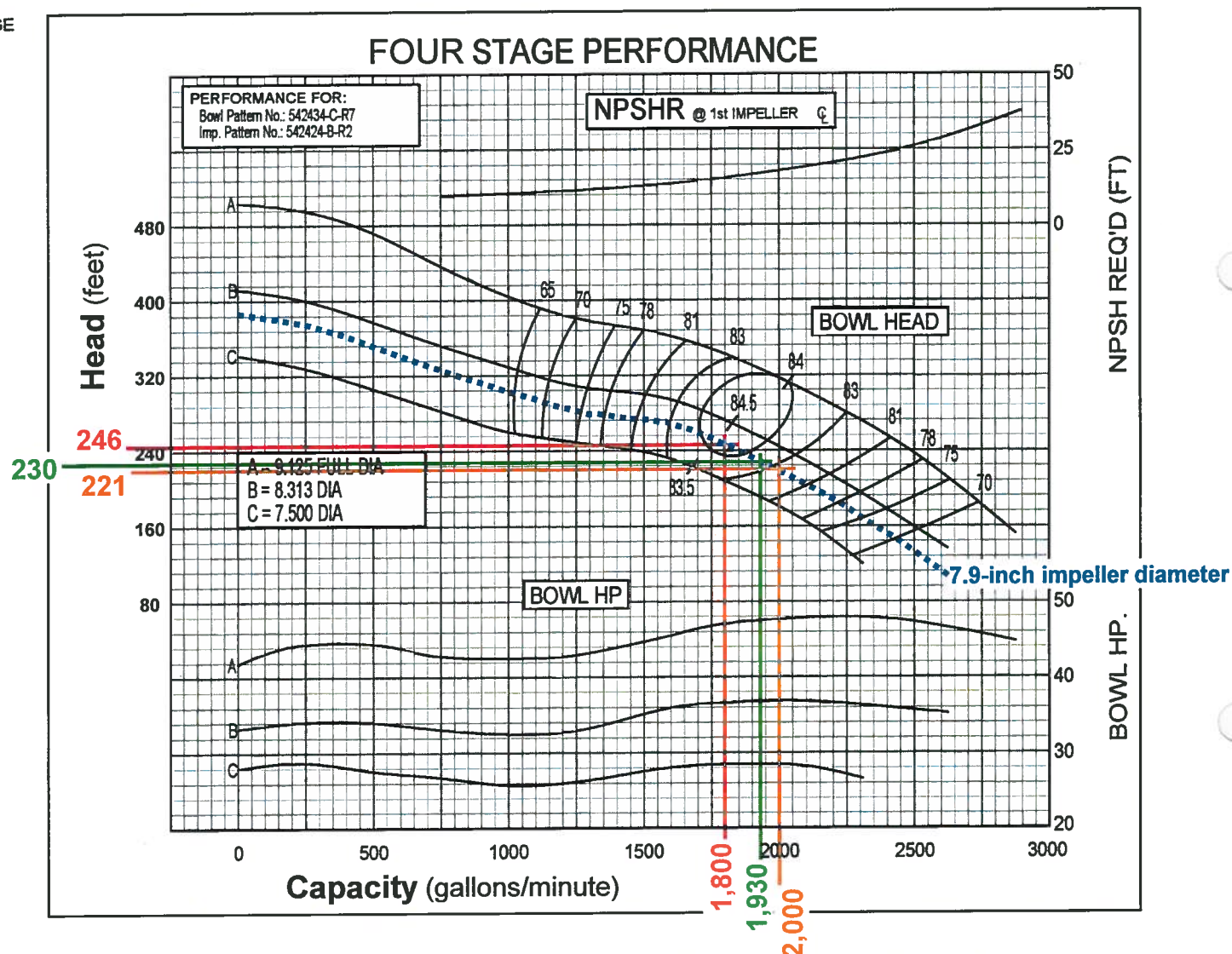


Figure 10.

Figure 10. Pumping plant performance curve for the 7.9-inch impeller trim believed to equip the Meridian Well #24 pump bowl assembly based on on-site measurements of performance (the impeller trim is not listed on the available specifications sheets). On the POBU field exam date (red lines) pumping plant performance was 1,800 gpm with 248 feet of head. The green lines represent the calculated output of the pump at the recorded (by City) line pressure of 69 psi. The orange lines show the performance at 2,000 gpm during the beneficial use period documented by the City (Figure 14).

Pumping Plant Performance Curve at Design Point for Meridian Supply Well #24

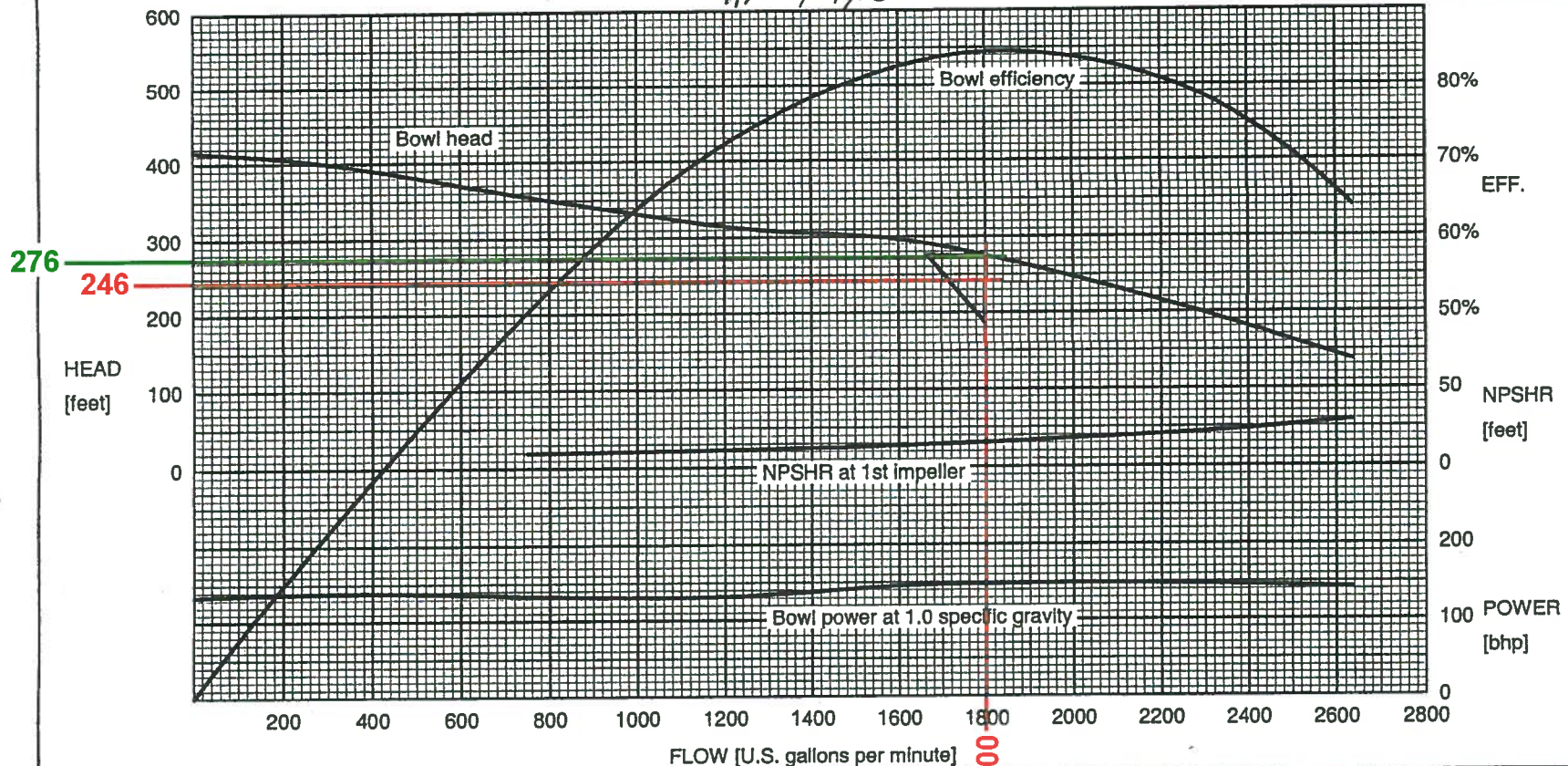
Hydro Logic, Inc.
Boise, Idaho

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

CERTIFIED PERFORMANCE BASED ON TESTS OF SIMILAR PUMPS

PUMPTech CO., INC.
City of Meridian Well #24
(1) 4 STAGE 14 DKH BOWL ASSY
1800 GPM @ 266' TDH

AP 4/17/03



PUMPTech CO., INC.
4444 S. YELLOWSTONE HWY.
P.O. BOX 512259
IDAHO FALLS, ID. 83405

Floway Pumps
FRESNO, CALIFORNIA

TYPE: 14 DKH
NO. OF STAGES: 4
R.P.M.: 1770
PUMP SERIAL NO.: ---

DWG. NO. 5128101PC
Archimedes Professional 1.1.3 (printed: 4/17/2003 10:52:18 AM)

A WEIR COMPANY

Copyright © 2002 Floway Pumps All Rights Reserved

DWN. BY: kev/inc DATE: 04/17/2003

Figure 11. Original design-point pump performance curve for the Meridian Well #24 line-shaft turbine pump. HLI's measurements show the actual installed pump performance does not fall exactly on this curve, most likely due to impeller sizing which is not shown but which is referenced on Figure 10.

INFORM HANSEN8

1/22/2013 13:57

Well System PSI History

4

Well 24

Date Value Work Order

6/21/2011	75.000	12211
6/22/2011	72.000	12333
6/23/2011	78.000	12353
6/27/2011	74.000	12496
6/28/2011	75.000	12516
6/29/2011	75.000	12538
6/30/2011	75.000	12556
7/1/2011	74.000	12578
7/5/2011	74.000	13130
7/6/2011	74.000	13150
7/7/2011	74.000	13170
7/8/2011	74.000	13190
7/11/2011	74.000	13210
7/12/2011	74.000	13230
7/13/2011	76.000	13454
7/14/2011	78.000	13474
7/15/2011	72.000	13494
7/18/2011	74.000	13763
7/19/2011	72.000	13783
7/20/2011	73.000	13803
7/21/2011	75.000	13823
7/22/2011	73.000	13843
7/26/2011	75.000	13988
7/26/2011	74.000	14008
7/27/2011	74.000	14028
7/28/2011	76.000	14048
7/29/2011	74.000	14068
8/1/2011	73.000	14569
8/2/2011	75.000	14589
8/3/2011	73.000	14609
8/4/2011	75.000	14829
8/5/2011	74.000	14849
8/8/2011	75.000	14922
8/9/2011	76.000	14942
8/10/2011	74.000	14962
8/11/2011	75.000	14982
8/12/2011	74.000	15002
8/15/2011	75.000	15047
8/16/2011	72.000	15067
8/17/2011	72.000	15087
8/18/2011	75.000	15107
8/19/2011	73.000	15127
8/22/2011	75.000	15572
8/23/2011	75.000	15592
8/24/2011	74.000	15612
8/25/2011	75.000	15632
8/26/2011	75.000	15652
8/29/2011	74.000	15774
8/31/2011	76.000	15794
8/31/2011	76.000	15814
9/1/2011	73.000	15834
9/2/2011	74.000	15854
9/6/2011	76.000	16425
9/7/2011	70.000	16445
9/8/2011	75.000	16465
9/9/2011	72.000	16485
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9/13/2011	69.000	16629
9/14/2011	72.000	16649

9/13/2011 69 PSI 16629

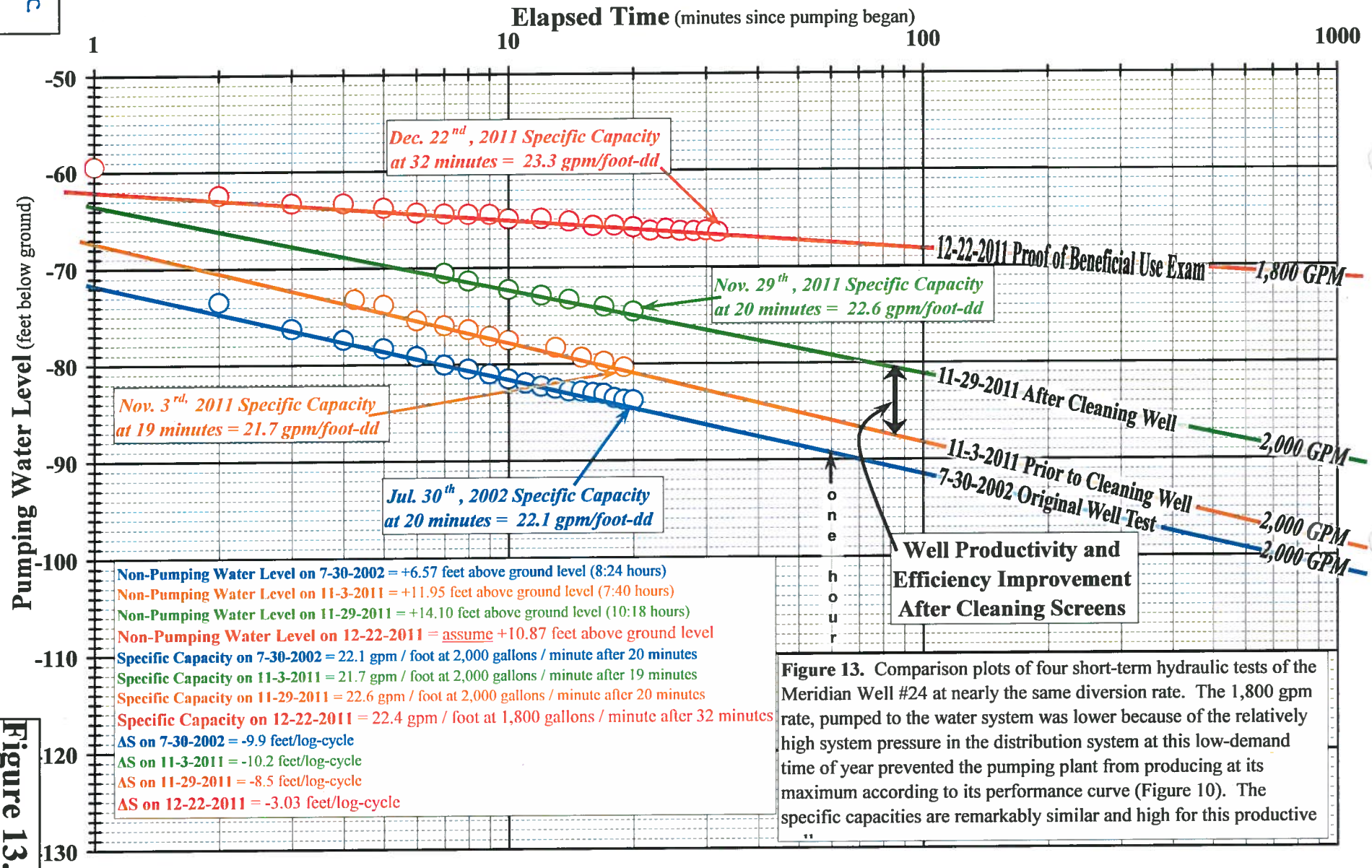
<http://hansen/h8prod/print.htm>

1/22/2013

Figure 12. One page printout of the City's "Hansen" monitoring software of line pressure in the Well #24 pump house during 2011. We used this independent recording to verify the on-site pressure gage reading during the POBU exam and to verify the low end of system pressures at this well.

Figure 12.

Short-Term Pumping Water Levels Measured During Meridian Supply Well #24 Constant-Rate Discharge Test Pumping of Newly Built Well in 2002, Before and After Cleaning Well in 2011, and During Proof of Beneficial Use Field Exam on December 22, 2011



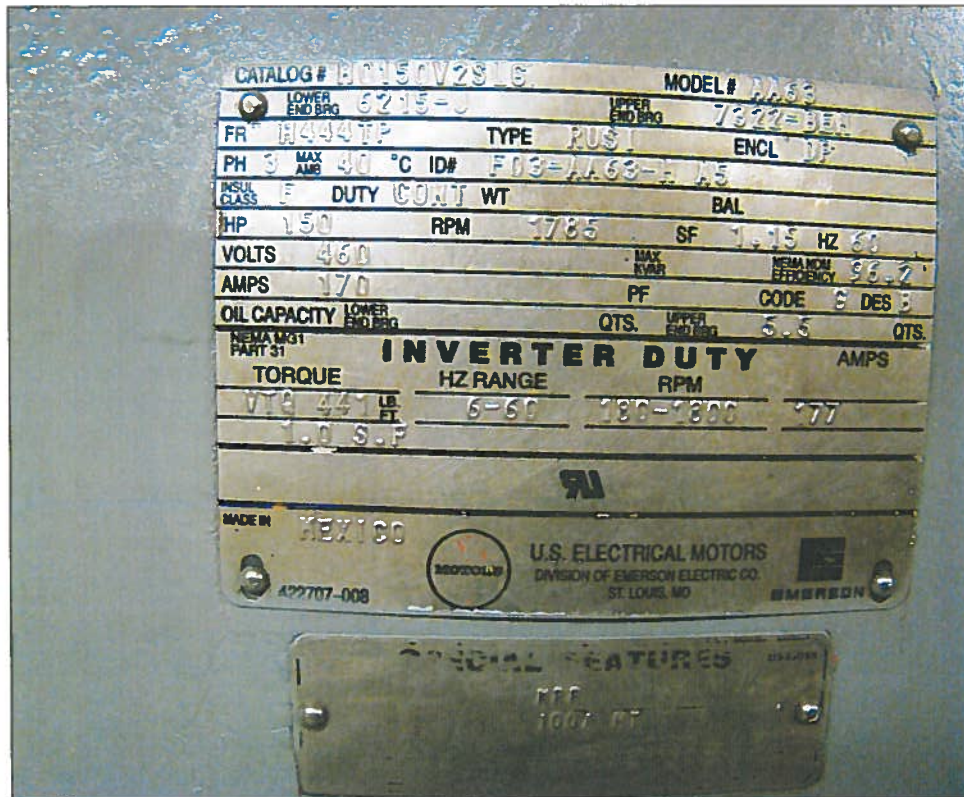
DATE	READING	STATIC LEVEL	DRAWDOWN	QPM	MAINTENANCE NOTES
1	065812 000			800	
2	065810 000			800	
3	067374 000			900	
4	068794 000			600	
5	X				
6	X				
7	071347 200			600	
8	071421 000				
9	071758 000			600	
10	072655 000				
11					
12	X				
13	X				
14	076186 000				
15					
16	079438 000			900	
17					
18	080753 000			1600	
19	X				
20	X				
21	084725 000			900	
22	086935 000			1500	
23					
24	091241 000			2000	
25	093367 000			2000	
26	X				
27	X				
28					
29	098560 000			1200	
30	099682 000			800	
31					
PRORATIO					
LAST RECD	064511 000				
7-1-04	100921 000			600	
TOT	35,171,000				

4.46
AFS
SH.

Figure 14. Hand-written "pump-house" chart for Meridian supply Well #24 during June of 2004 (within the beneficial use period of Permit No. 63-31318) showing the well being produced at 2,000 gpm on two consecutive days. The total volume pumped recordings show an average 24-hour production closer to 1,500 gpm as pumping rate varies between night and day.

Figure 14.

December 22, 2011 Photographs of Motor Plate and IDWR Well Tag



Meridian Well #24 hollow shaft turbine pump motor plate.



City of Meridian Well #24 IDWR Well ID Tag No. D0019265 located on pump discharge head.

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 #24**

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.



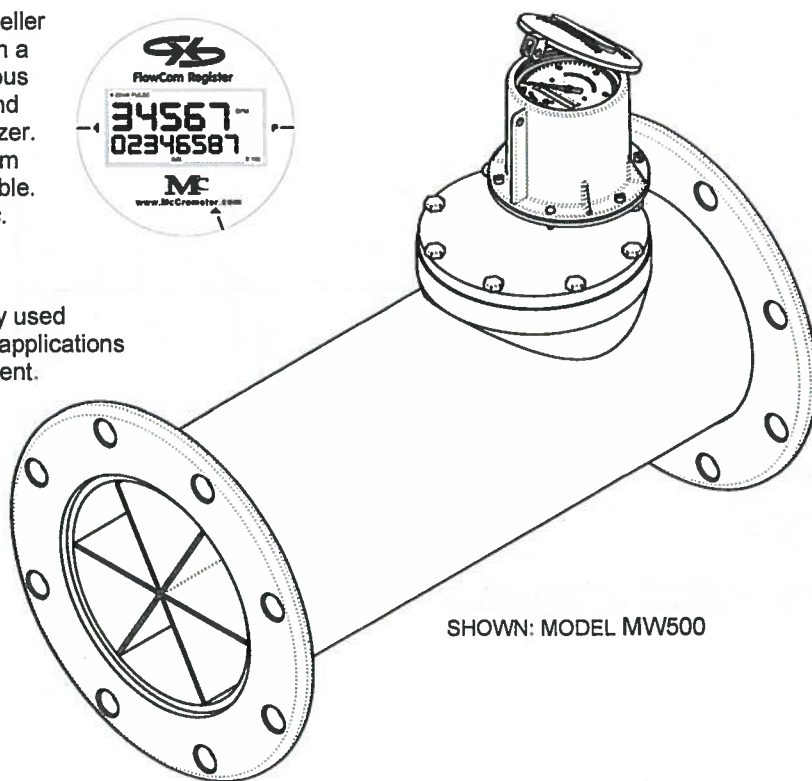
The McCrometer Propeller flowmeter comes with a standard instantaneous flowrate indicator and straight-reading totalizer. An optional FlowCom register is also available. Typical face plates.



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



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

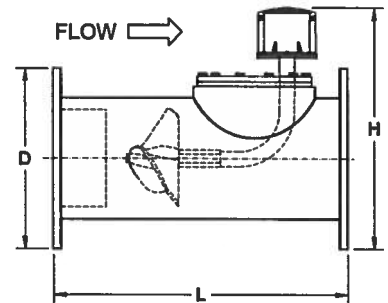
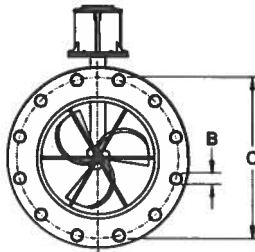
BEARING HOUSING: Brass; Stainless Steel optional

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. 63-31318**

Proof of Beneficial Use CalculationsAverage of Non-Pumping Water Levels (NPWL)

$$\begin{array}{r}
 11-29-2011 \quad +14.10 \text{ feet agl} \\
 11-3-2011 \quad +11.95 \text{ feet agl} \\
 + 7-30-2002 \quad +6.57 \text{ feet agl} \\
 \hline
 \quad \quad \quad +32.62 \text{ feet agl} \\
 \div \quad \quad \quad 3 \\
 \hline
 \quad \quad \quad +10.87 \text{ feet agl} = \text{average non-pumping water level}
 \end{array}$$

Specific Capacities for Well #24

12-22-2011 1,800 gpm, 32 minutes, 77.26 feet of drawdown*
 (* assuming the average non-pumping water level of +10.87)

$$1,800 \text{ gpm} / 77.26 \text{ ft} = \underline{23.3 \text{ gpm/ft dd}}$$

11-29-2011 2,000 gpm, 30 minutes, 90.21 feet of drawdown

$$2,000 \text{ gpm} / 90.21 \text{ ft} = \underline{22.2 \text{ gpm/ft dd}}$$

~~11-3-2011 2,000 gpm, 19 minutes, 92.30 feet of drawdown~~
 * not a valid time $\rightarrow$ for comparison to the 30 minute mark

7-30-2002 2,000 gpm, 30 minutes, 91.17 feet of drawdown

$$2,000 \text{ gpm} / 91.17 \text{ ft} = \underline{21.9 \text{ gpm/ft dd}}$$

Total Dynamic Head (TDH)

1,800 gpm at 76 PSI at PWL = 70.51 ft bmp on 12-22-2011

$$76 \text{ PSI} \times 2.31 \text{ feet/PSI} = 175.6 \text{ feet}$$

$$\begin{array}{r}
 + 70.5 \text{ feet PWL} \\
 \hline
 \underline{246.1 \text{ feet TDH at 1,800 gpm}}
 \end{array}$$

Meridian Supply Well #24

1-23-2013

Proof of Beneficial Use Calculations

2

Calculation of System Pressure if Well #24 was Pumped at 2,000 gpm

$$\begin{array}{l} \text{Average non-pumping water level} = +10.87 \text{ above ground} \\ - \text{measuring point} = 3.62 \text{ above ground} \\ \hline \phantom{\text{measuring point}} = +7.25 \text{ above measuring point} \end{array}$$

Pumping water level at 2,000 gpm at specific capacity of 22.2 gpm/ftdd

$$2,000 \text{ gpm} \div 22.2 \text{ gpm/ftdd} = 90.1 \text{ feet of drawdown}$$

$$\therefore \text{Pumping water level at 2,000 gpm} = 90.1 \text{ ftdd} + 7.25 \text{ ftNPWL} = \underline{97.4 \text{ ft}}$$

Total dynamic head available from pump performance curve = 221 feet

$$\text{System pressure available} = 221 \text{ ft}_{\text{TDH}} - 97 \text{ ft}_{\text{PWL}} = 124 \text{ feet}$$

$$124 \text{ Feet} \div 2.31 \text{ ft/PSI} \approx \underline{54 \text{ PSI}} \text{ system pressure (on gauge)}$$

Therefore the 2,000 gallons/minute diversion rate recorded in June 24th and June 25th of 2004 is substantiated.

SUBJECT

Meridian Supply Well #24

DATE

12-22-2011

Proof of Beneficial Use Field Exam

SHEET

1

OF 5

onsite 12:00hrs

12:06hrs Tracy Ballantyne and E. Squires on site
(Water Quality Program Manager)

Well Location

43° 37' 50.5" W

116° 24' 51.1" N

Well is 5' east of point

12:20hrs Well #24 is pumping at 850 GPM @ 75 PSI @ 47.7 Hz

— the well has been pumping at this rate constantly since Nov 29th

• Well #24 is the lead well in this zone.

• Normal winter flow is approximately 900 gallons/minute (T. Ballantyne)

• Normal summer flow " " 1,500-to-2000 gpm (" ")

13:00hrs unscrewed monitoring port cap and well has a high vacuum
★ Need well vent

13:00hrs Tracy is turning well down and switching to manual mode

13:11hrs Begin ramping pump up to 60 Hz (Full speed)

13:13hrs Tracy calls operations to let them know of changes.

13:21hrs Flow meter needle remains steady at 1,800 gpm

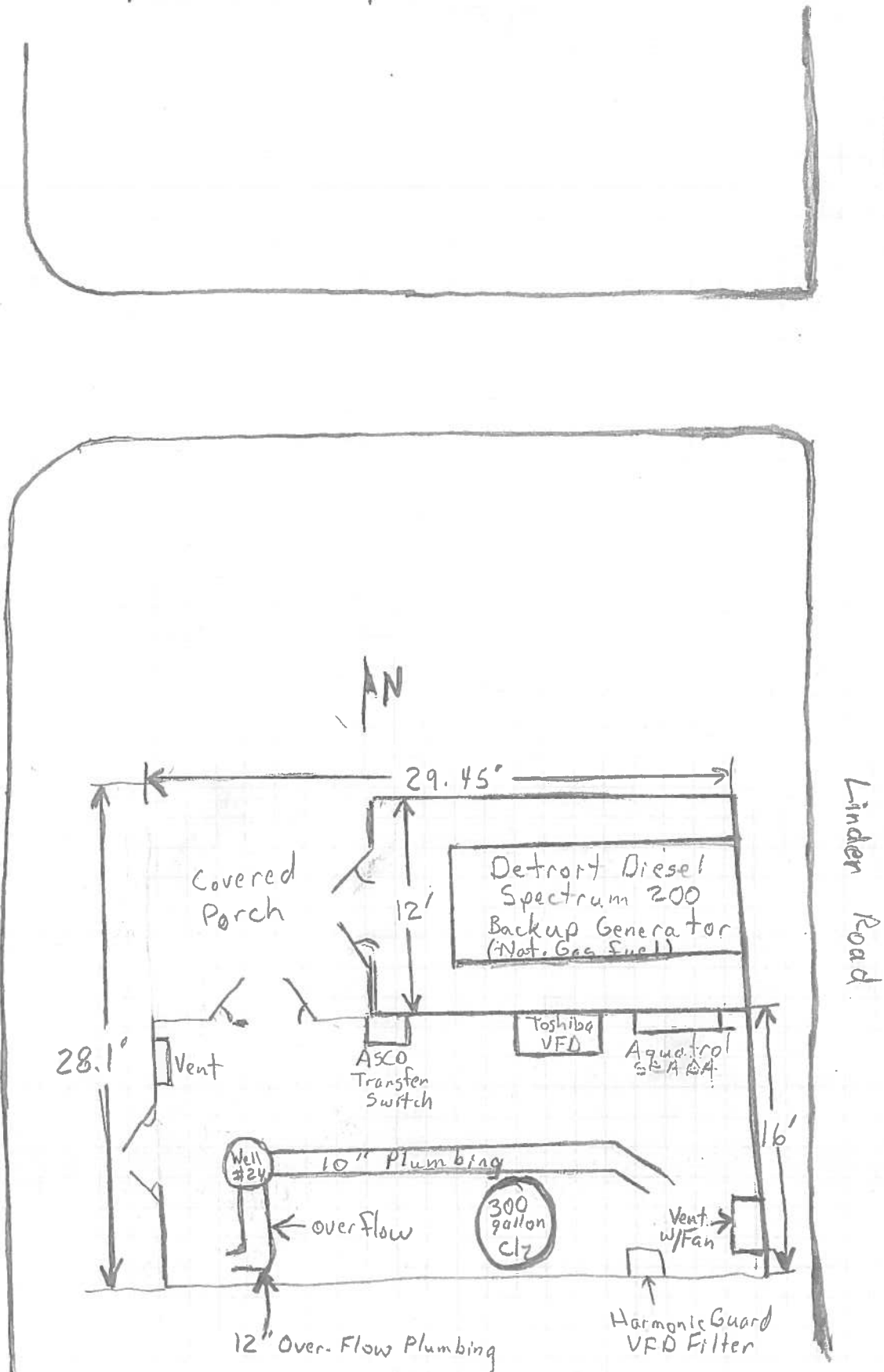
13:27hrs At this low demand time of year nothing seems to be affecting pressure at Well #24 which has been between 74.5 PSI-to-76.5 PSI

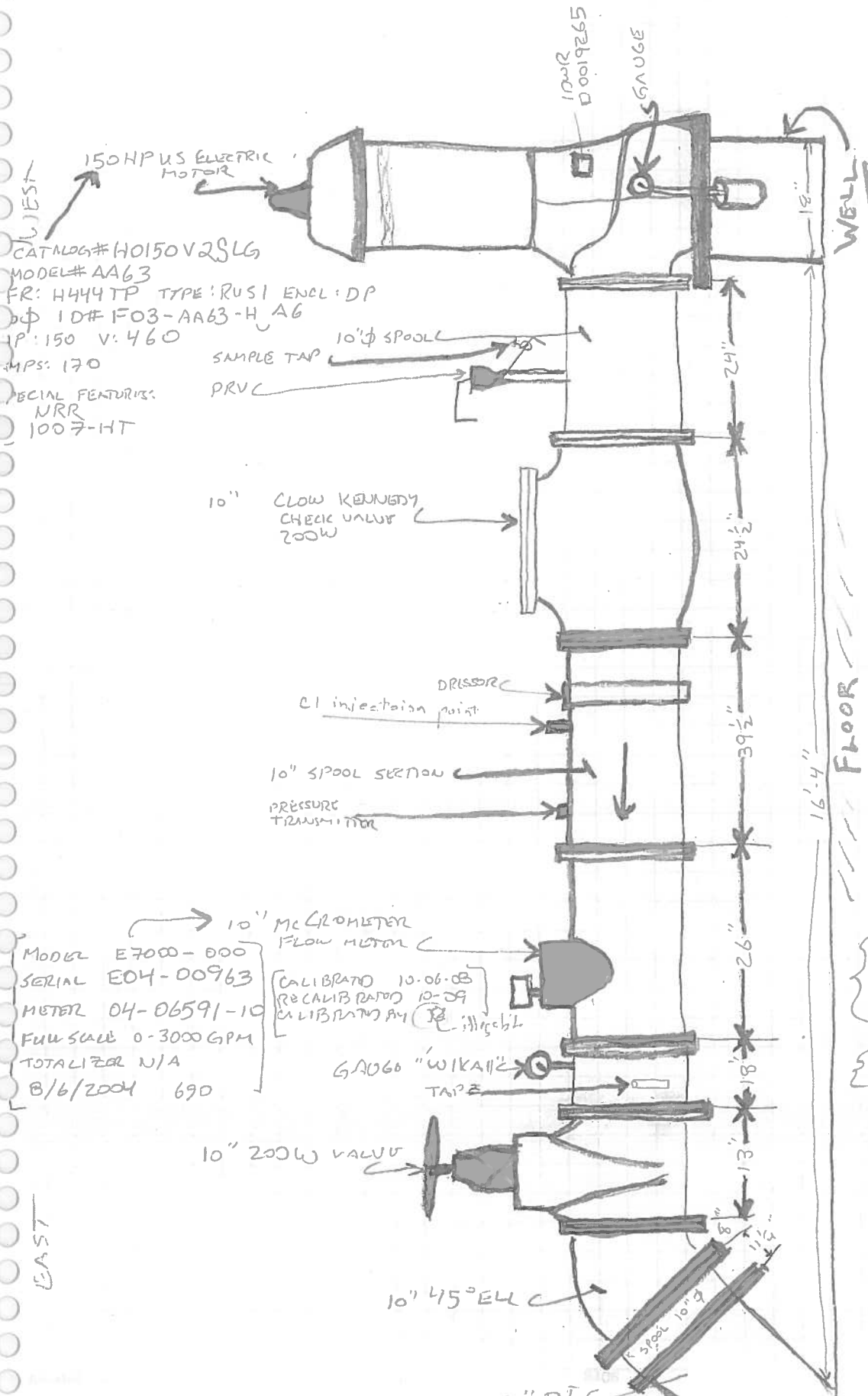
13:43hrs Tracy Ballantyne switches Well #24 back to "Auto"

14:01hrs offsite

Summary: Ed Squires and Carlton Parker conducted a "Proof of Beneficial Use Field Exam" with City of Meridian Water Department employee Tracy Ballantyne. Ed and Carlton took photographs of the pump house and plumbing along with drawings and notes.

A pump test was conducted at 1,800 gallons/minute, which was the maximum flow that could be attained this time of year. If the system pressure could have been lowered below 75 PSI, the flow from the well could have been somewhat higher.

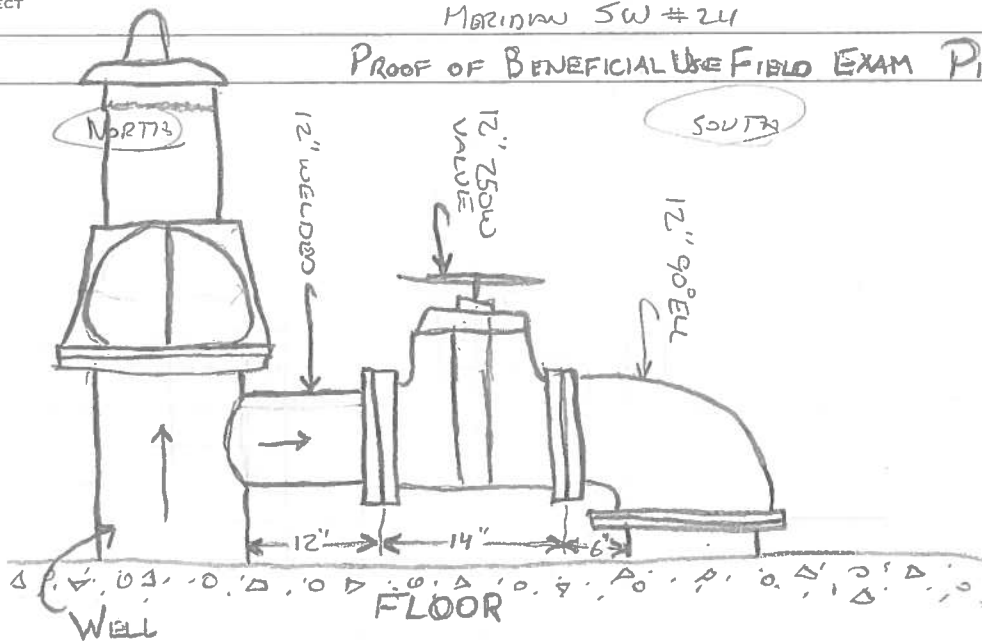




{ 510339 x 1000
@ 12137120
@ 8504PM }

{ READ W/ 74 PSI }

EAST



ARTESIAN CONTROL OF WELL HEAD

CALCULATIONS AND DESIGN DATA

PREPARED BY

C PARKER

SUBJECT

MAXIMUM SW # 24

DATE

22 DEC 2011

PROOF OF BENEFICIAL USE FIELD EXAM PUMP TEST

SHEET

5 OF 5

MP = 3.62 FT ABOVE PUMP HOUSE FLOOR (1 1/4" PORT)

NIPWL = NOT MEASURABLE AT THIS TIME

TOTALIZER @ START 510,364.500

START: 13:10

ELAPSED TIME	WATER LEVEL	FLOW	PSI	H ₂	TOTALIZER
1:06 PM	26.12' BMP	850 GPM	74 1/2	47.5	510,364.500
13:10 off					
13:10.10 on					
13:11					
1:00	63.53	1,800	78	60	
2:00	66.56	1,810	76	60	
3:00	67.40	1,800	76 1/2	60	
4:00	67.42	1,800	76 1/2	60	
5:00	67.89	1,800	76	60	
6:00	68.41	1,800	76	60	
7:00	68.53	1,800	76	60	
8:00	68.58	1,790	76 1/2	60	
9:00	68.60				
10:00	69.09	1,800	75 1/2	60	
12:00	69.05	1,800	76	60	
14:00	69.35	1,790	76 1/2	60	
16:00	69.82	1,800	75 1/2	60	
18:00	69.81	1,790-1,800	75 1/2	60	
20:00	69.99	1,790	75 1/2	60	
22:00	70.34	1,800	75	60	
24:00	70.19	1,800	75 1/2	60	
26:00	70.40	1,800	74 1/2	60	
28:00	70.42	1,790	75 1/2	60	
30:00	70.36	1,800	75	60	
32:00	70.51	1,790	76	60	
32:30					
35:00	64.30	1,600	75	57.8	
36:00	61.66			57.8	
37:00	61.32	1,590	74	57.8	
TOTALIZER = 510,444.000 @ 13:52					

1400 offsite

Appendix C.

**Permit to Appropriate Water No. 63-31318
Proof of Beneficial Use for Permit No. 63-31318**

State of Idaho
Department of Water Resources
Permit to Appropriate Water

NO. 63-31318

Priority: 08/29/2001

Maximum Diversion Rate: 5.00 CFS

This is to certify, that CITY OF MERIDIAN
33 E IDAHO AVE
MERIDIAN ID 83642

has applied for a permit to appropriate water from:

Source: GROUND WATER

and a permit is APPROVED for development of water as follows:

<u>BENEFICIAL USE</u>	<u>PERIOD OF USE</u>	<u>RATE OF DIVERSION</u>
MUNICIPAL	01/01 to 12/31	5.00 CFS

LOCATION OF POINT(S) OF DIVERSION:

GROUND WATER L1 SE 1/4 NE 1/4 Sec. 2, Twp 03N, Rge 01W, B.M. ADA County

CONDITIONS OF APPROVAL

1. Proof of application of water to beneficial use shall be submitted on or before December 1, 2006.
2. Subject to all prior water rights.
3. Project construction shall commence within one year from the date of permit issuance and shall proceed diligently to completion unless it can be shown to the satisfaction of the Director of the Department of Water Resources that delays were due to circumstances over which permit holder had no control.
4. Right holder shall comply with the existing permit requirements of Section 42-235, Idaho Code.
5. After specific notification by the Department, the right holder shall install a suitable measuring device or shall enter into an agreement with the Department to determine the amount of water diverted from power records and shall annually report the information to the Department.
6. The Director retains jurisdiction to require the right holder to provide purchased or leased natural flow or stored water to offset depletion of lower Snake River flows if needed for salmon migration purposes. The amount of water required to be released into the Snake River or a tributary, if needed for this purpose, will be determined by the Director based upon the reduction in flow caused by the use of water pursuant to this permit.
7. The right holder shall not provide water diverted under this right for the irrigation of land having appurtenant surface water rights as a primary source of irrigation water except when the surface water rights are not available for use. This condition applies to all land with appurtenant surface water rights, including land converted from irrigated agricultural use to other land uses but still requiring water to irrigate lawns and landscaping.
8. Place of use is within the service area of the City of Meridian municipal water supply.
9. Water bearing zone to be appropriated is 300 to 900 feet.

This permit is issued pursuant to the provisions of Section 42-204, Idaho Code. Witness the signature of the Director, affixed at Boise, this 7th day of December, 2001.

MICROFILMED

Karl J Dreher
for KARL J DREHER, Director

RECEIVED

DEC 01 2006

DEPARTMENT OF
WATER RESOURCES

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

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

PROOF OF BENEFICIAL USE

The Idaho Department of Water Resources considers this form a statement that the permit holder(s) has/have completed all development that will occur under this permit and that water has been applied according to the provisions of the permit for the beneficial use(s) described below. This form must be accompanied by a license examination fee, when necessary, or be accompanied by a completed field examination report prepared by a certified water right examiner.

1. Permit No. 63 - 31318 Telephone No. (208) 898-5500

2. Name(s) of Permit Holder(s): The City of Meridian, Idaho

3. Mailing Address: 33 East Idaho Street, Meridian, Idaho 83642

4. Source of Water: Groundwater (Well #24) If GROUNDWATER (well), Date Drilled: mo. 7 /yr. 2002

a. Well Driller: Riverside, Inc. Drilling Permit Number: Metal Tag No. D0019265

5. Use(s) (as authorized by the water right permit): * *Please refer to attached cover letter and field report*

Domestic (No. of households): _____ Stockwater (No. and type of stock): _____

Irrigation (no. of acres): _____ Other: Municipal

6. Total rate of diversion and / or volume for which proof is submitted: 5 cfs OR N/A acre feet

7. Measuring Device Requirement: (refer to the approval conditions on your permit and respond accordingly)

(This question is not optional. Please check either yes or no. Proofs returned not checked accordingly, will be considered incomplete)

Measuring Device: Is a measuring device required? Yes _____ or No X

Has the measuring device been installed? Yes X or No _____

* *a measuring port has been provided*

Flow Measurement Port: Is a flow measurement port required? Yes _____ or No X

Has the measurement port been installed? Yes X or No _____

8. Fee Enclosed: \$ 200.⁰⁰ (See Fee Schedule on back of the instructions for the filing proof of beneficial use)

9. Person to contact to accompany the Department representative during field examination of the water system.

Name: Mr. Chip Hudson, Assistant Water Department Superintendent Telephone Number: 888-5242

Address: 2235 N.W 8th Street, Meridian, Idaho 83642

10. The information given on this form is my true statement of the extent to which the above numbered permit has been developed and I relinquish any undeveloped portion of the permit to the State of Idaho.

Signature of permit holder: Brad R. Watson Date: November 30th, 2006