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Department of Water Resources

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
BENEFICIAL USE FIELD REPORT

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

A. GENERAL INFORMATION

Permit No. **63-31677**

1. Owner: **City of Meridian, Idaho** Phone No. **(208) 898-5500**

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

2. Accompanied by: Mr. Chip Hudson EXAM DATE : November 16, 2009

Address: **Meridian Water Department - 2235 N.W. 8th Street, Meridian, Idaho 83642** Phone No. **(208) 888-5242**

Relationship to Permit Holder: **Assistant Superintendent - Meridian Water Department**

3. Source: Groundwater – City Supply Well #20-B 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: **63-12416 and 63-31858**

C. DIVERSION AND DELIVERY SYSTEM

1. Point(s) of Diversion:

[illegible]

2. Place(s) of Use: City of Meridian's Service Area Indicate Method of Determination As approved by the Meridian City Council

[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 (required for irrigation of 10+ acres). (Figure 2).

XX Photos of Diversion and System Attached (Figures 3-6).

4.

Well or Diversion Identification No.*	Motor Make	HP	Motor Serial No.	Pump Make	Pump Serial No. or Discharge Size
City Well # 20-B	U.S. Electrical Motors – HT (Emerson)	250	J10-20033922-GT-01	National Pump Company M14XXHC 3-stg	SN = 9-0035 10-inch discharge head to 12-inch 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	05-07841	12-inch	8/5/2005

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 (Figure 4). 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 (Figure 5).

E. NARRATIVE/REMARKS/COMMENTS

The field examination for this permit was carried out on November 16, 2009 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 #20-B well is housed inside of a 52-foot by 32-foot cinder block pump house (Figure 6) The 17-inch diameter well (Figure 7) is equipped with a National Pump Company 3-stage, Model M14XXHC deep well turbine pump (Figure 8) set on 133-feet of 12-inch pump column with a 4-foot long pump/ intake assembly. The design point of the pump is 2,250 gallons per minute (gpm) at 284-feet of total dynamic head (Figure 9). The pump is driven by a 250 hp, 460 volt, 1800 rpm, U.S. Electrical Motors – High Thrust motor (Figure 4) The 12-inch diameter discharge- piping is comprised of a series of 12-inch plumbing fittings and fixtures, including check-valve, tees, couplings, flow-meter, and control valve (Figure 4) prior to exiting through the pump-house floor where it joins with the 16-inch mainline running down Ustick and Meridian Roads. The pumping plant is equipped with a variable speed drive unit (Figure 4) designed to pump directly to the pressurized water distribution system. A series of 3 booster pumps within the pump-house are used to pressurize water from the nearby 2 MG reservoir to the distribution system utilizing a separate variable frequency motor drive. For the purposes of this examination, however, we need only be concerned with the main line to the distribution system and the flow-meter on the 12-inch discharge which records all discharge from the Well # 20-B. 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 #20-B pump was not operating and the line pressure was 80 psi (Figure 3). Non-pumping water level in the well was measured at 11.5 feet below measuring point (bmp) which 38.25 inches above pump house floor; very similar to the measured non-pumping water level of five years earlier (see calculations section of this report). The non-pumping water level remained essentially the same for two hours prior to activating the well pump (Appendix B). The totalizing read-out of the flow-meter on our arrival was 32,318,750 gallons (Figure 3). We had the system operators turn on the pump and we measured pumping water level and line pressure for about an hour when the water level was drawn down to 47.3 feet bmp at a discharge of 1,600 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 in the system which 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). Although the pump was operating off of its "full speed" performance curve (Figure 9), plotting the measured TDH against the observed flow rate on the multi-speed performance evaluation curve (Figure 10) shows that the pumping plant is very close to design and performance parameters (see calculations below) with adjustments for pump speed (vfd) and the well was producing almost exactly according to its measured specific capacity (Figures 11 and 12) during hydraulic testing of the well five years earlier. 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.

Ed Squires and Loren Pearson conducted hydraulic testing of the Well #20-B on October 29th, 2004 and November 1st, 2005 and developed the hydrographs shown as Figures 11 - 13. According to the pump performance curves (Figures 9 and 10), installed HP, and available discharge piping, it appears that Well #20-B should easily be capable of the instantaneous discharge rate of Permit No. 63-31677 (5 cfs or 2,244 gpm) pumping against reasonable summertime system pressures in the range of 65-to-70 psi or if the well were pumped to atmospheric pressure directly to the nearby 2MG reservoir (see calculations below). 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 2004. 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-20 psi) but these instances are not considered typical.

RECOMMENDATIONS:

With the installed pumping plant (design point of 2,250 gpm at 284 feet TDH) and well head plumbing configuration, the Well #20-B appears to be capable of producing water at a variable range between 800-to-2,400 gpm depending on the system pressure and the speed at which the pump motor is operated. This is not surprising because the pumping plant and well construction were designed to that target yield and the measured conditions show that the individual elements comprising the TDH have not changed. Therefore, I recommend that the City of Meridian municipal water right No. 63-31677 be licensed for its requested diversion rate of 5 cfs (2,244 gpm).

Permit No. 63-31677 lists three (3) points of diversion all in the same location. From the field licensing examination, only two of three proposed wells have been drilled and constructed. Therefore, I recommend that one of the PODs be removed from the License.

Have conditions of permit approval been met? X yes ___ no

F. FLOW CALCULATIONS

X 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 #20-B 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. 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:

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

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

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

B

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 (afa)
<u>Municipal</u>	<u>Jan 1.</u>	<u>Dec. 31</u>	<u>5.0 cfs</u>	<u>N/A</u>
Totals:			<u>5.0 cfs</u>	<u>N/A</u>

2. Recommended Amendments

 Change P.D. as reflected above Add P.D. as reflected above XX None
 Change P.U. as reflected above Add P.U. as reflected above Other

I. AUTHENTICATION

Field Examiner's Name Edward Squires CWRE No. 09-125 Date December 18, 2009

Reviewer _____ Date _____

SEAL



Meridian Well # 20-B Licensing Exam
Pressure / Flow / Production calculations

12-18-09

System pressure of 100 psi X 2.31 ft/psi = 231 ft

$$\begin{array}{r} 231 \text{ ft} \\ + \sim 47 \text{ ft drawdown at } \sim 1700 \text{ gpm} \\ \hline 278 \text{ ft TDH at full speed } (1770 \text{ rpm} / 60 \text{ Hz}) \end{array}$$

System pressure of 70 psi X 2.31 ft/psi = 162 ft

$$\begin{array}{r} 162 \text{ ft} \\ + \sim 70 \text{ ft of drawdown at } 2,250 \text{ gpm} \\ \hline 232 \text{ ft} = \text{TDH at full speed } (1770 \text{ rpm} / 60 \text{ Hz}) \end{array}$$

For 1500 gpm / 44 ft dd / 93 psi / 53.0 Hz = measured

$$\frac{53 \text{ Hz measured}}{60 \text{ Hz possible}} = 88\% \text{ full speed}$$

$$.88 \times 1770 \text{ rpm} = \sim 1564 \text{ rpm}$$

1564 rpm on vfd multi-speed performance curve fits well for 259 ft TDH at 1500 gpm

2004 Non-Pumping Water Level = 6.05 ft ^{Oct.} below ground
2009 NPWL = 11.5 ft ^{Nov.} ~~below~~ ^{below} measuring point

$$\begin{array}{r} 11.5 \text{ ft} - 2009 \\ 6.0 \text{ ft} - 2004 \\ \hline 5.5 \text{ ft discrepancy (apparent)} \end{array}$$

$$\begin{array}{r} 5.5 \text{ ft} \times 12 \text{ in/ft} = 66 \text{ inches} \\ - 38 \text{ inches} = \text{mp above pump house floor} \\ \hline 28 \text{ inches} \end{array}$$

$$\begin{array}{r} 28 \text{ inches} \\ - 12 \text{ inches} = \text{pump house floor above ground} \\ \hline 16 \text{ inches} \end{array}$$

i.e. very little difference after ~5 years of pumping

FIGURES

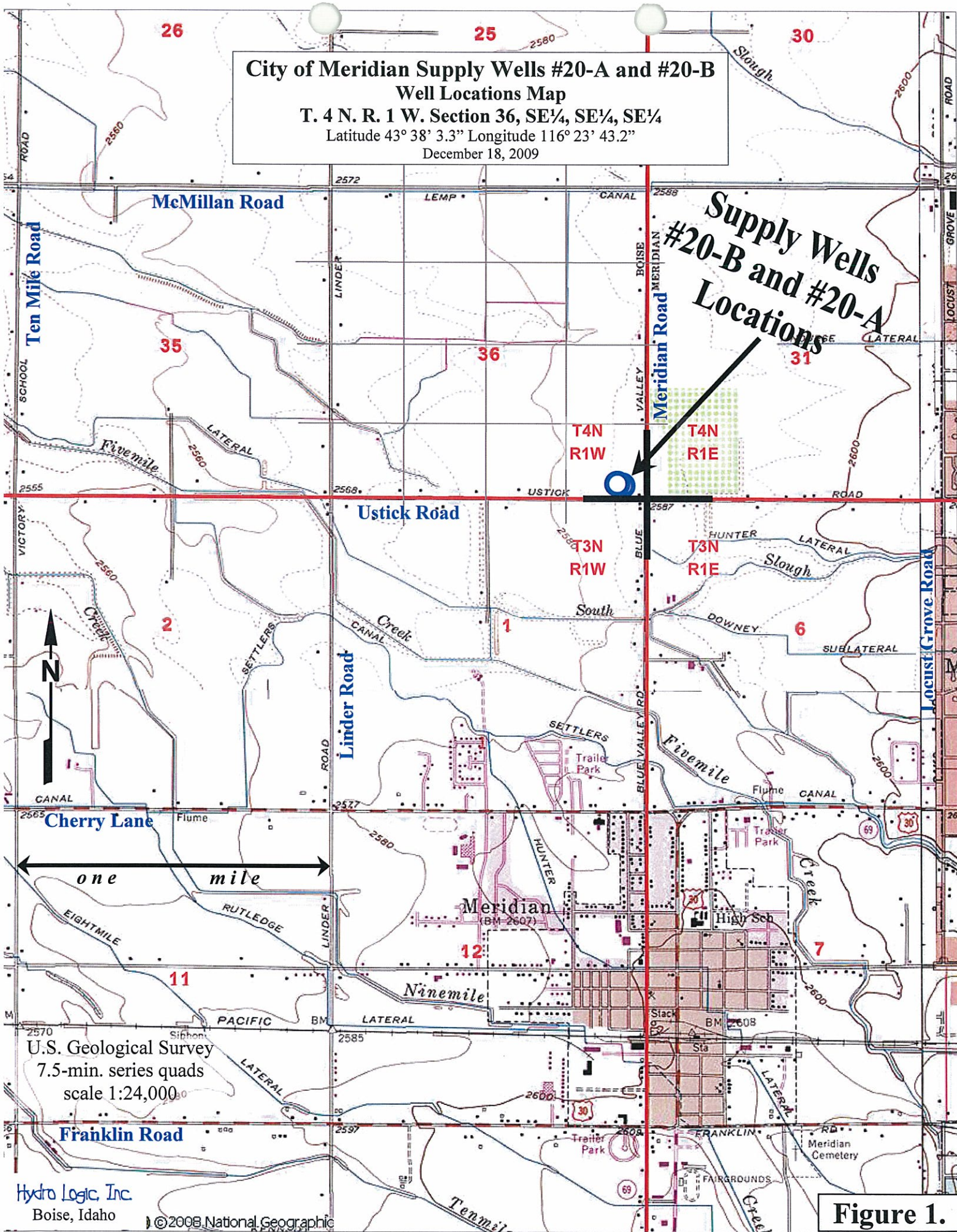
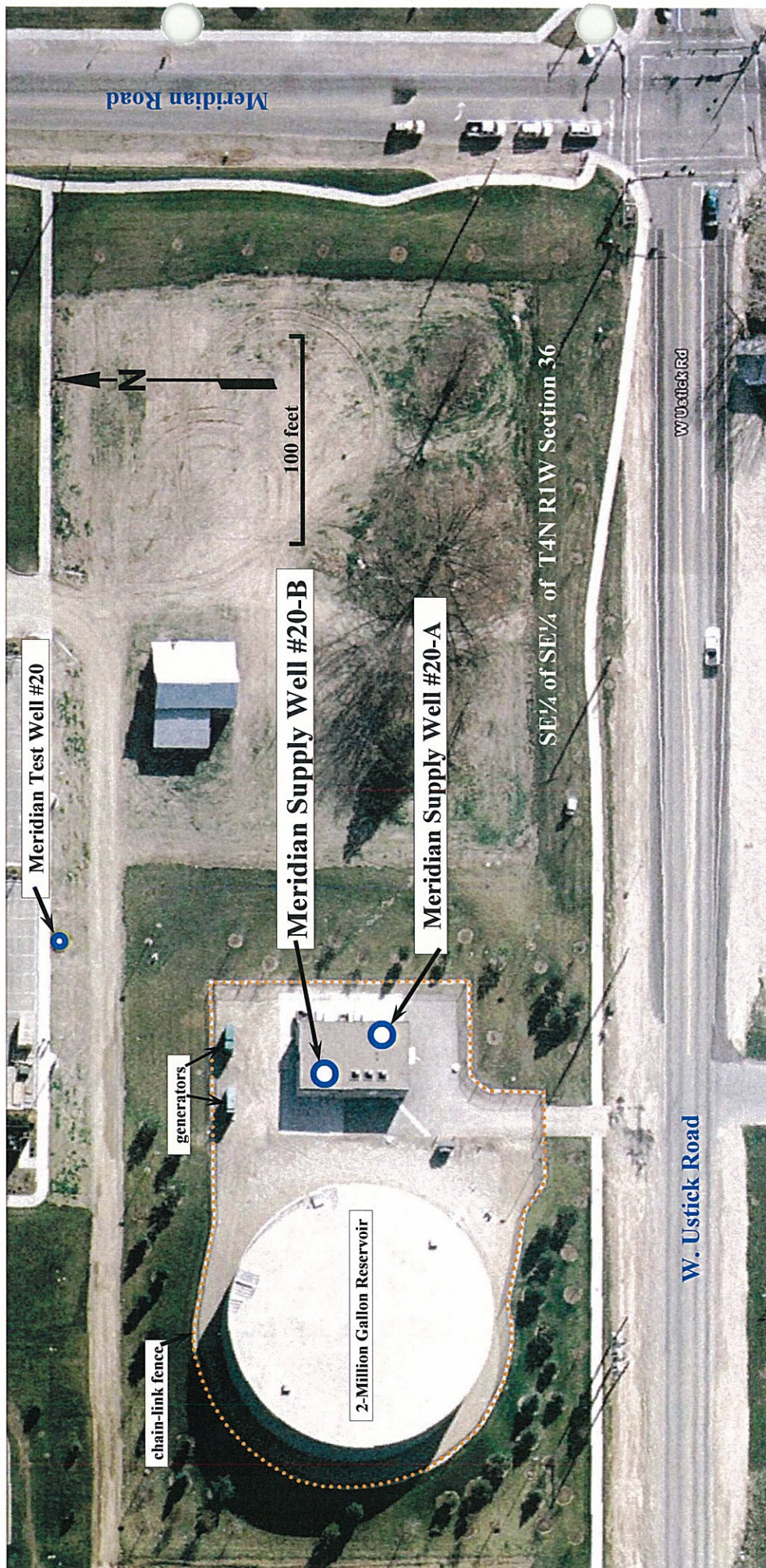


Figure 1.



Map from Google Earth Pro
 Image from USGS aerial photo
 acquired 9-30-2006

Figure 2. Annotated aerial photograph of the Meridian #20 well and reservoir site showing the location of the Meridian Supply Well #20-B with respect to other site facilities.

Figure 3. Photos of the 12-inch flow meter and line-pressure gauge for Meridian Supply Well #20-B



Figure 3. November 16, 2009 photographs of the McCrometer 12-inch impeller flow-meter and Asscroft line pressure guage in the City of Meridian Well #20-B discharge piping. Photos show conditions at the site when we arrived for the field licensing examination and after 7 days of non-pumping at our request.

Figure 4. Photos of the Well Head and Discharge Piping for Meridian Supply Well #20-B

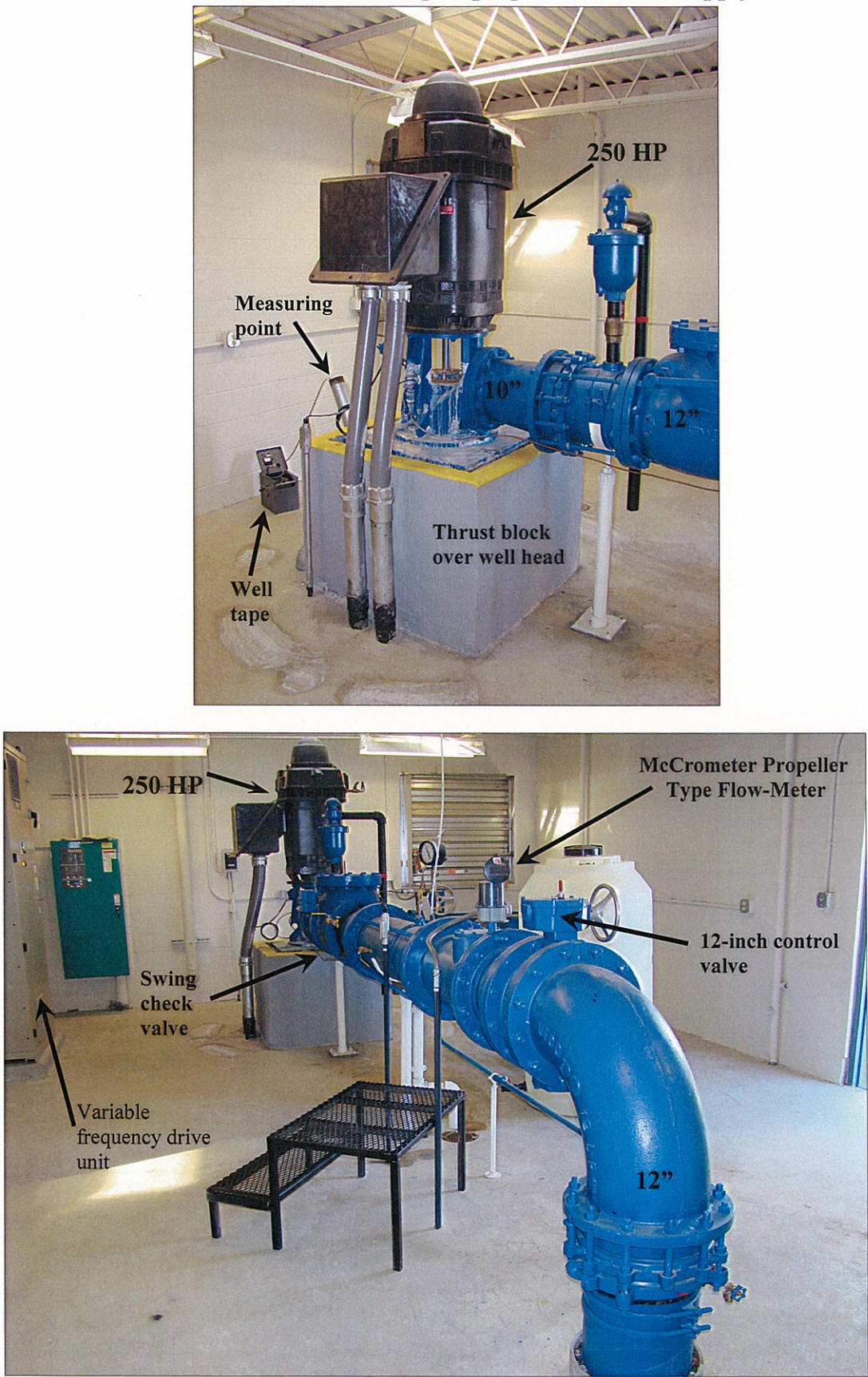


Figure 4.

Figure 5. Photos of the Flow Rate and Pressure During Beneficial Use Exam of Meridian Well #20-B



Figure 6. November 16, 2009 Photographs of Meridian #20-B Pump/Control House



a) Views looking at Well #20-A side of pump house. (looking NW on the left and NE on the right)

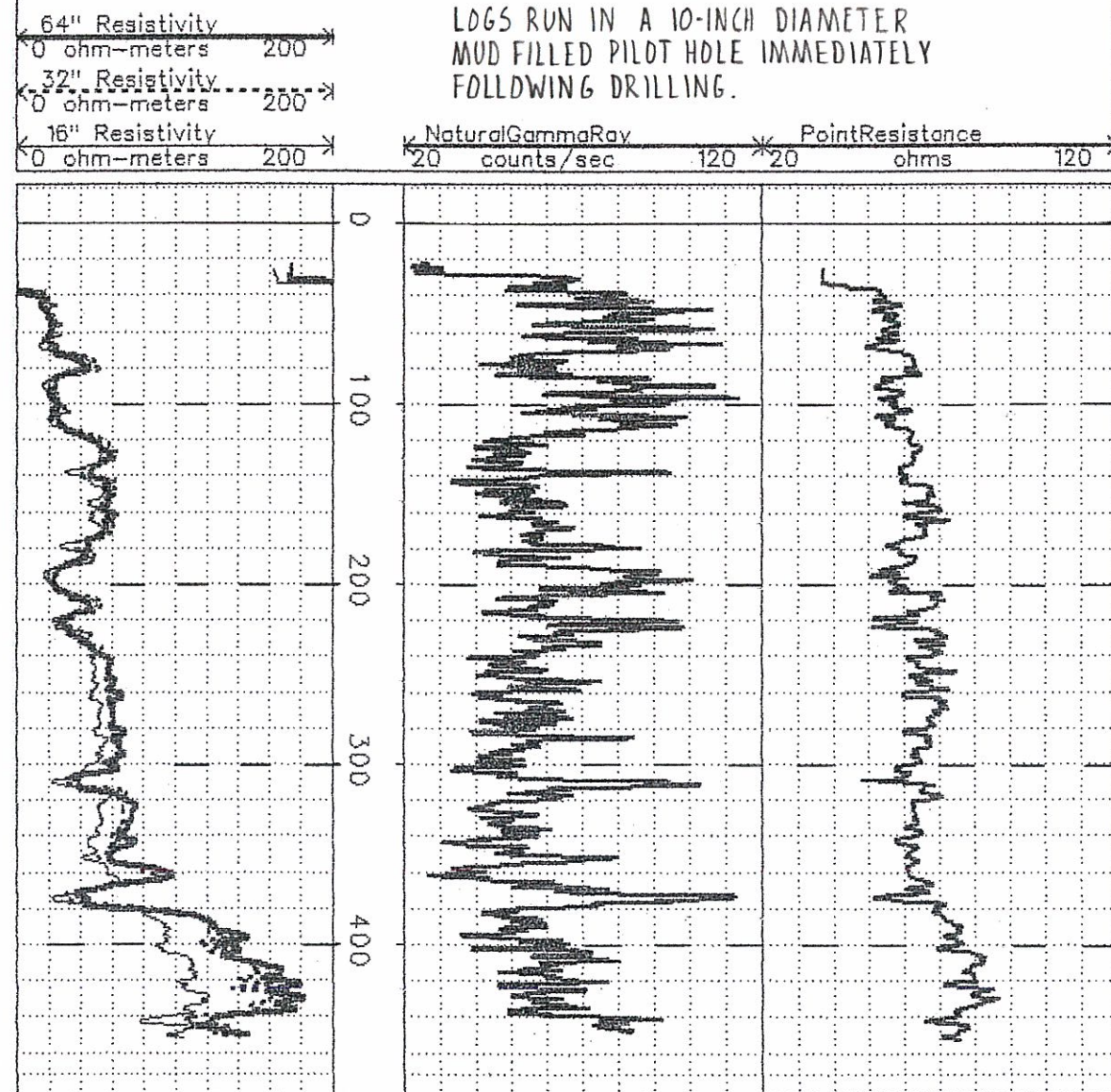


b) Photo looking southwest at Well #20-B side of pump house with 2 million gallon tank in background.

BOREHOLE GEOPHYSICS

Meridian #20-B September 10, 2004

LOGS RUN IN A 10-INCH DIAMETER
MUD FILLED PILOT HOLE IMMEDIATELY
FOLLOWING DRILLING.

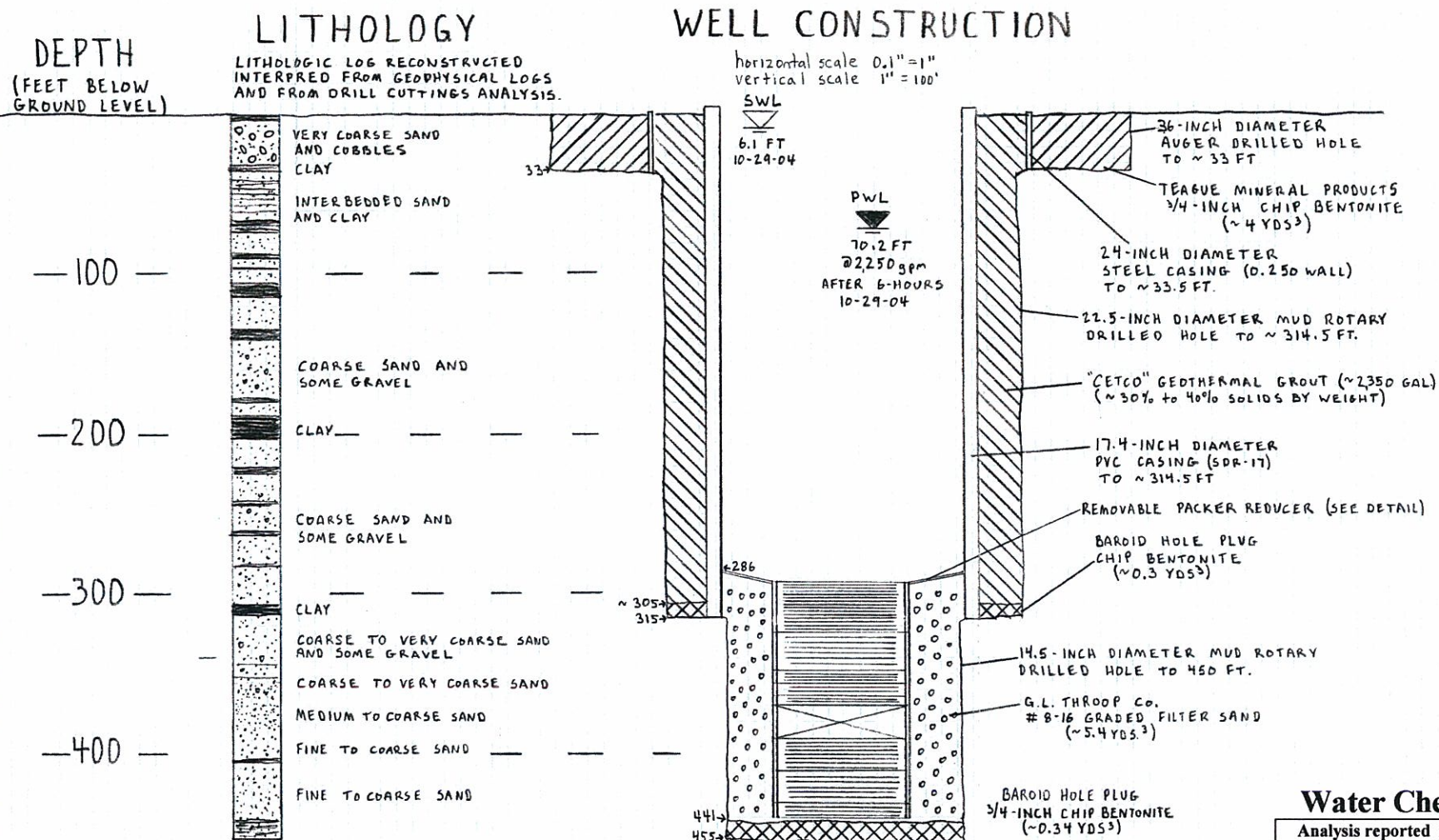


ONSITE SUPERVISION BOREHOLE GEOPHYSICS PUMP TEST DESIGN
AND WATER QUALITY SAMPLING BY HYDRO LOGIC INC. BOISE, IDAHO.
MUD ROTARY DRILLING AND WELL CONSTRUCTION BY TREASURE
VALLEY DRILLING, Nampa, IDAHO. AUGER DRILLING BY ANDERSON
AND WOOD CONSTRUCTION, MERIDIAN, IDAHO. PUMP TESTING BY
LAYNE OF IDAHO, Nampa, IDAHO.

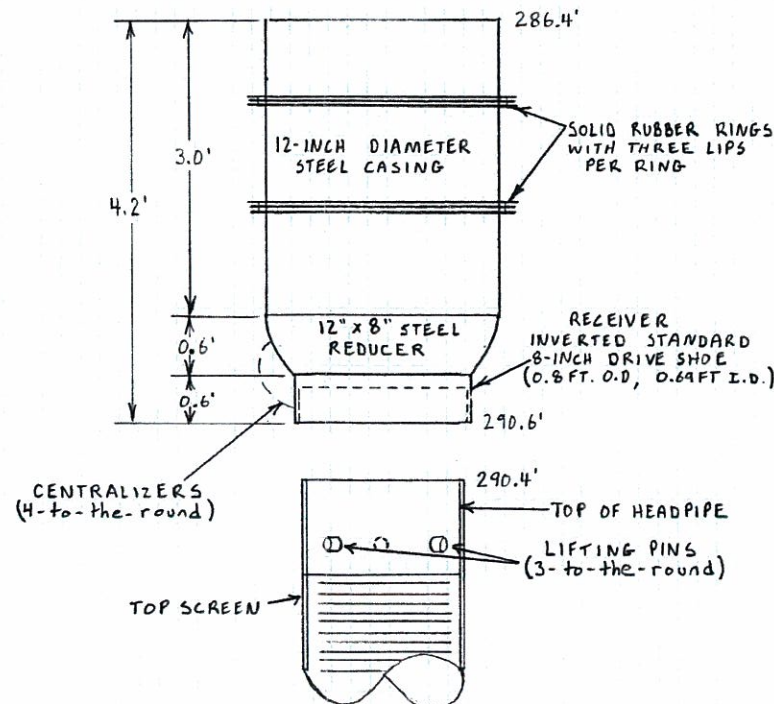
City of Meridian #20-B Well

T. 4 N., R. 1 W, Sec. 36, SE¼, SE¼

October, 2004

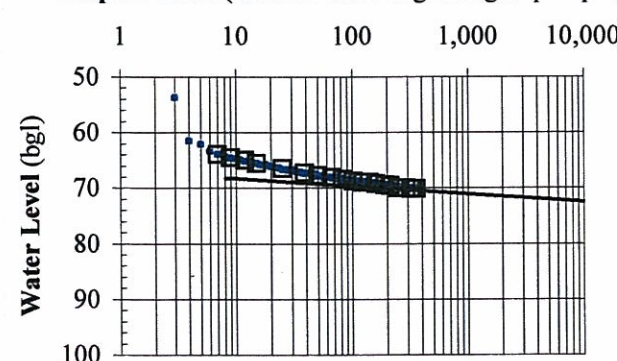


PACKER/REDUCER DETAIL



8-INCH DIAMETER	STAINLESS STEEL SCREEN
TIGHTWRAP	~291 FT. - 323 FT.
0.030 SLOT	~323 FT. - 348 FT.
TIGHTWRAP	~348 FT. - 356 FT.
0.030 SLOT	~356 FT. - 364 FT.
0.025 SLOT	~364 FT. - 369 FT.
BLANK	~369 FT. - 390 FT.
0.015 SLOT	~390 FT. - 410 FT.
0.018 SLOT	~410 FT. - 430 FT.
0.022 SLOT	~430 FT. - 440 FT.

Hydraulic Testing



October 29, 2004
Discharge Rate = 2,250 gpm
SWL = 6.12 ft. bgl at 09:15 hrs.

Water Chemistry

Analysis reported in mg/l (unless noted)	Result
Alkalinity	133.0
Ammonia as N	<0.01
Arsenic	<0.003
Calcium as CaCO ₃	111.0
Chloride	9.91
Conductivity (µS/cm)	395.0
Corrosivity	-0.56
Fluoride	0.18
Hardness	140.0
Iron (diss.)	0.04
Magnesium	7.04
Manganese (diss.)	<0.01
Nitrate as N	1.41
Potassium	1.44
Silica	28.1
Sodium	21.3
Sulfate	39.6
Sulfide	<0.05
Total Dissolved Solids	213.0
Field Temperature (°F)	58.8
Field Conductivity (µS)	377
Field pH (S.U.)	7.25

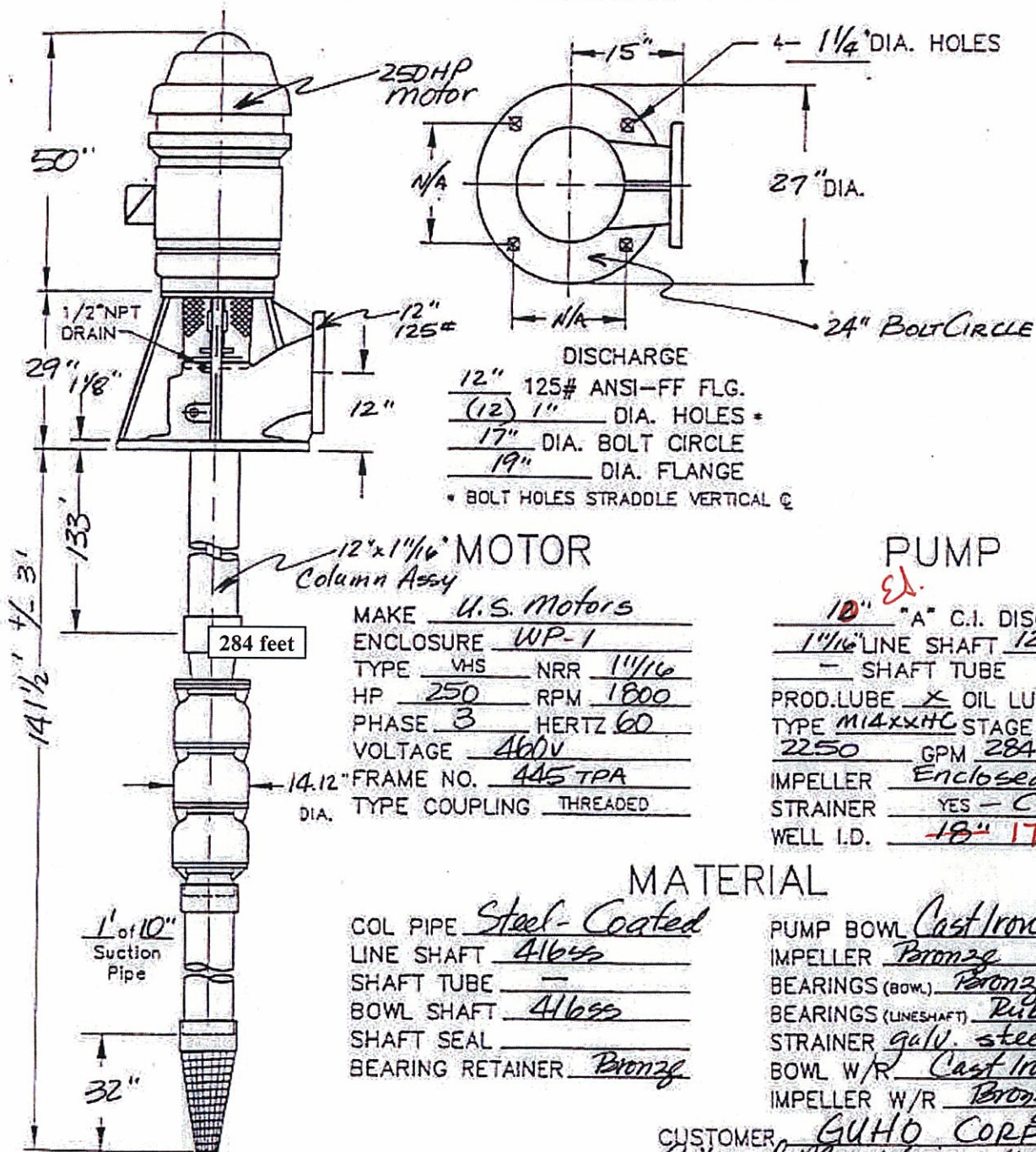
Analyses by Alchem Laboratories, Boise, Idaho
(samples collected on 11/1/04)



Figure 7.

Figure 8. Diagram of Installed Pumping Plant at Meridian Supply Well #20-B

VERTICAL TURBINE PUMP



REMARKS
NO. UNITS REQ'D. 1
~~1" PVC Water Monitor~~
~~pipe to top of bowl~~
None
installed 21

FLUID WATER
SPEC. GRAVITY 1.0
VISCOSITY -
TEMPERATURE 60°F
PH 7

CUSTOMER GUHO CORP-
City of Meridian Well 20

ORDER NO. 2,250 gpm
SUPPLIER Pump Tech Co. Inc
National Pump Co.

DWG. NO.
SERIAL NO.

Figure 9. Pumping Plant Performance Curve at Design Point for Meridian Supply Well #20-B

Pump Data Sheet - National Pump Company

Company: Hydro Logic, Inc.
Name: Meridian Supply Well #20-B
Date: 12/19/2009



Pump:

Size: M14XXHC (3 stage)
Type: VERT.TURBINE
Synch speed: 1800 rpm
Curve: CVM14XXH4P6C
Specific Speeds:
Dimensions:
Speed: 1770 rpm
Dia: 11.325 in
Impeller:
Ns: 2315
Nss: 5172
Suction: 10 in
Discharge: 12 in

Pump Limits:

Temperature: 180 °F
Pressure: 321 psi g
Sphere size: 0.64 in
Power: —
Eye area: 25.4 in²

Search Criteria:

Flow: 2250 US gpm
Head: 284 ft

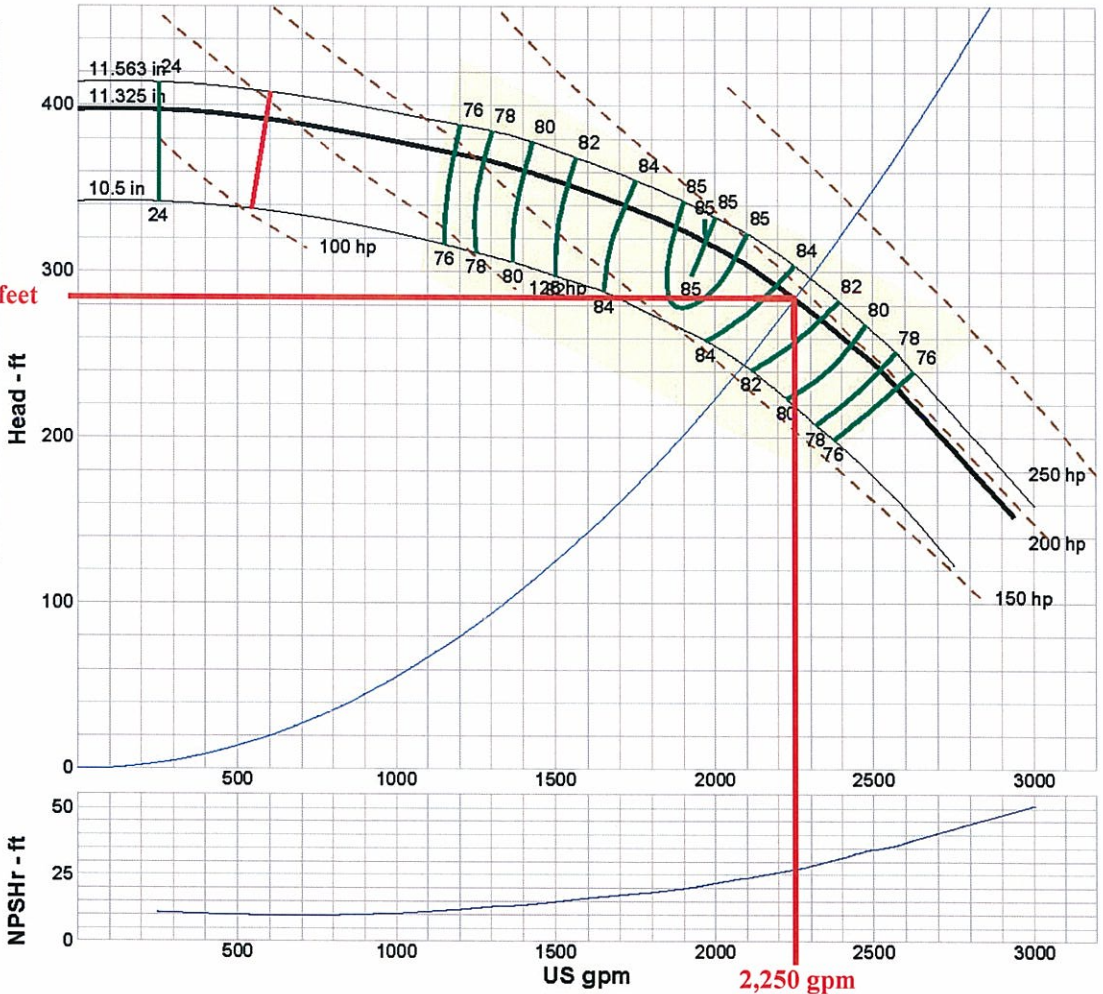
Fluid:

Water
SG: 1
Viscosity: 1.105 cP
NPSHa: —
Temperature: 60 °F
Vapor pressure: 0.2563 psi a
Atm pressure: 14.7 psi a

Motor:

Standard: NEMA
Enclosure: WP-1
Sizing criteria: Max Power on Design Curve
Size: 200 hp
Speed: 1800
Frame: 447

— Data Point —	
Flow:	2250 US gpm
Head:	284 ft
Eff:	83%
Power:	194 hp
NPSHr:	27.1 ft
— Design Curve —	
Shutoff head:	398 ft
Shutoff dP:	172 psi
Min flow:	590 US gpm
BEP:	85% @ 1968 US gpm
NOL power:	197 hp @ 2521 US gpm
— Max Curve —	
Max power:	210 hp @ 2475 US gpm



Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Efficiency %	Power hp	NPSHr ft
2700	1770	203	70	196	40.7
2250	1770	284	83	194	27.1
1800	1770	333	85	179	18.7
	1770	364	79	157	13.4
	1770	379	60	133	11.7

Hydro Logic, Inc.
Boise, Idaho

Figure 9.

Figure 10. Multispeed Pump Performance Curve for Meridian Supply Well #20-B

Pump Data Sheet - National Pump Company

Company: Hydro Logic, Inc.
Name: Meridian Supply Well #20-B
Date: 12/19/2009



Pump:

Size: M14XXHC (3 stage)
Type: VERT. TURBINE
Synch speed: 1800 rpm
Curve: CVM14XXH4P6C
Specific Speeds:
Dimensions:
Speed: 1770 rpm
Dia: 11.325 in
Impeller:
Ns: 2315
Nss: 5172
Suction: 10 in
Discharge: 12 in

Search Criteria:

Flow: 2250 US gpm Head: 284 ft

Fluid:

Water
SG: 1
Viscosity: 1.105 cP
NPSHa: —
Temperature: 60 °F
Vapor pressure: 0.2563 psi a
Atm pressure: 14.7 psi a

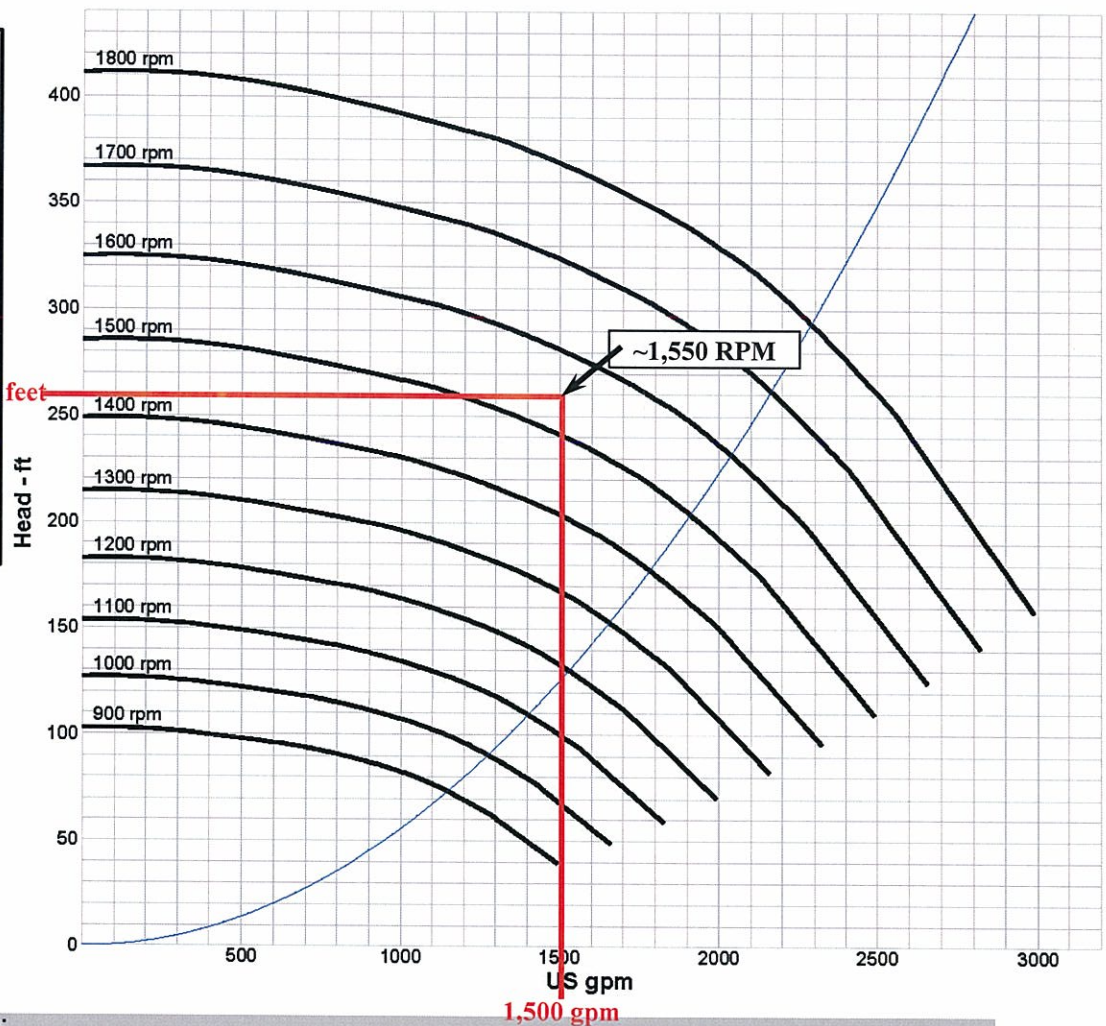
Motor:

Standard: NEMA
Enclosure: WP-1
Sizing criteria: Max Power on Design Curve
Size: 200 hp
Speed: 1800
Frame: 447

Pump Limits:

Temperature: 180 °F
Pressure: 321 psi g
Sphere size: 0.64 in
Power: —
Eye area: 25.4 in²

— Data Point —	
Flow:	2250 US gpm
Head:	284 ft
Eff:	83%
Power:	194 hp
NPSHr:	27.1 ft
— Design Curve —	
Shutoff head:	398 ft
Shutoff dP:	172 psi
Min flow:	590 US gpm
BEP:	85% @ 1968 US gpm
NOL power:	197 hp @ 2521 US gpm
— Max Curve —	
Max power:	210 hp @ 2475 US gpm



Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Efficiency %	Power hp	NPSHr ft
2700	1770	203	70	196	40.7
2250	1770	284	83	194	27.1
1800	1770	333	85	179	18.7
1350	1770	364	79	157	13.4
	1770	379	60	133	11.7

Meridian Supply Well #20-B Stepped-Discharge Test - 1,250 to 2,000 gallons / minute November 1, 2004

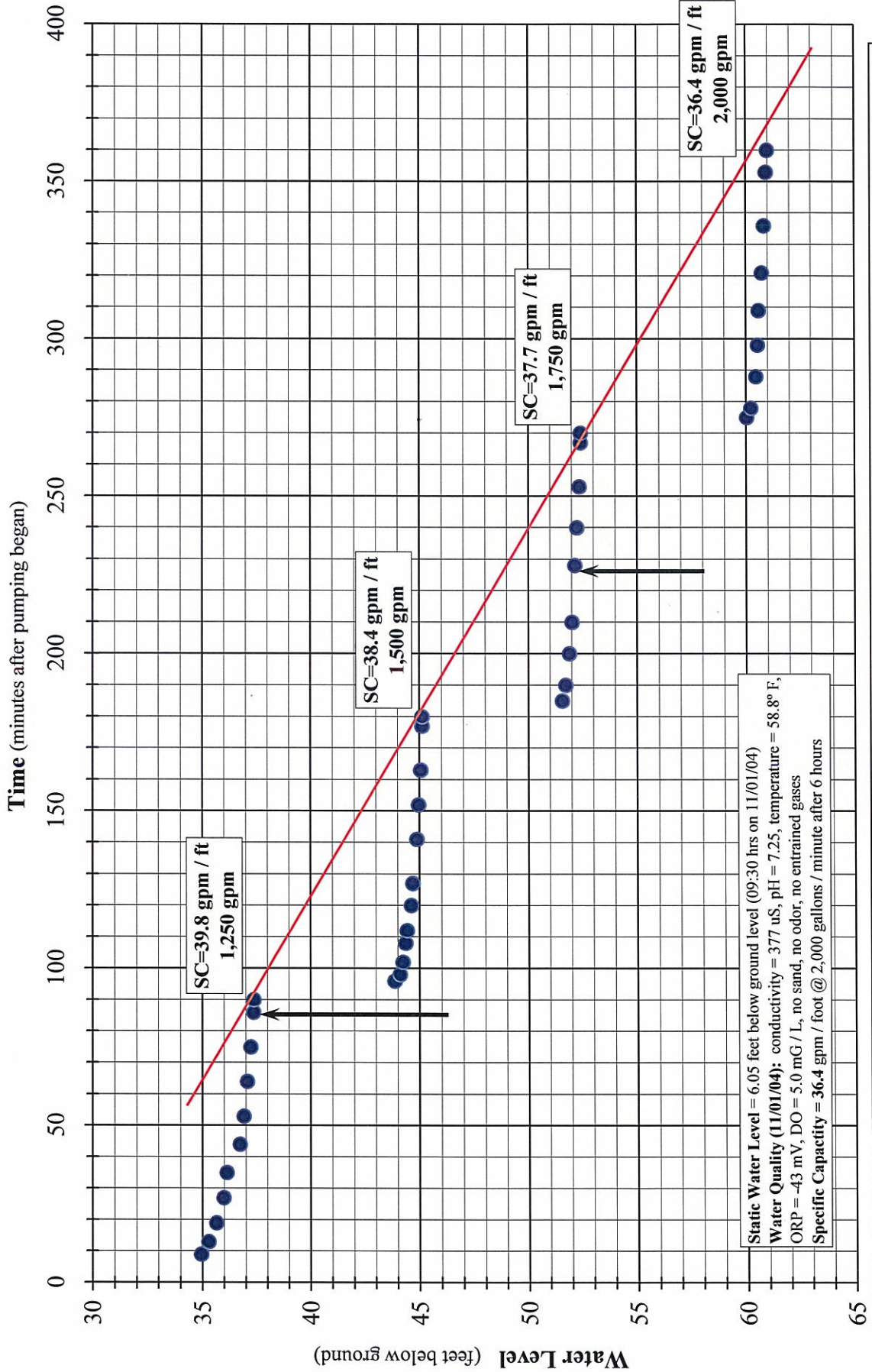


Figure 11.

Figure 11. Stepped-discharge test at 1,250, 1,500, 1,750, and 2,000 gallons/minute of Meridian Supply Well #20-B.
 ↑ = times during constant rate discharge test when hydraulic boundaries affected drawdown (and, hence, this test as well.)

Meridian Supply Well #20-B

Stepped-Discharge Test - 1,250 to 2,000 gallons / minute
November 1, 2004

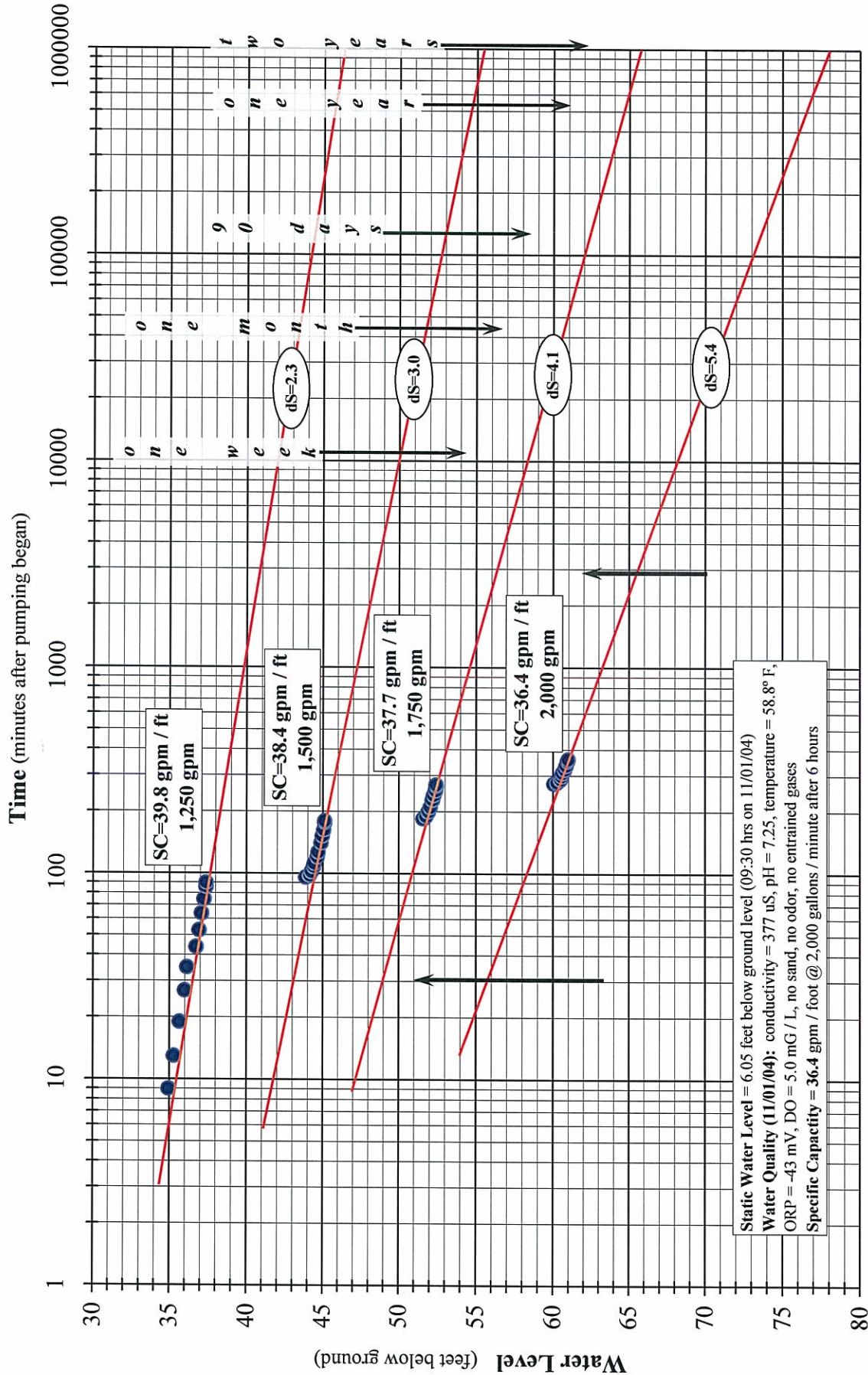


Figure 12. . Stepped-discharge test at 1,250, 1,500, 1,750, and 2,000 gallons/minute of Meridian Supply Well #20-B.
 ↑ = times during constant rate discharge test when hydraulic boundaries affected drawdown (and, hence, this test as well.)

Meridian Supply Well #20-B

Constant Discharge Test - 2,250 gallons / minute
October 29, 2004

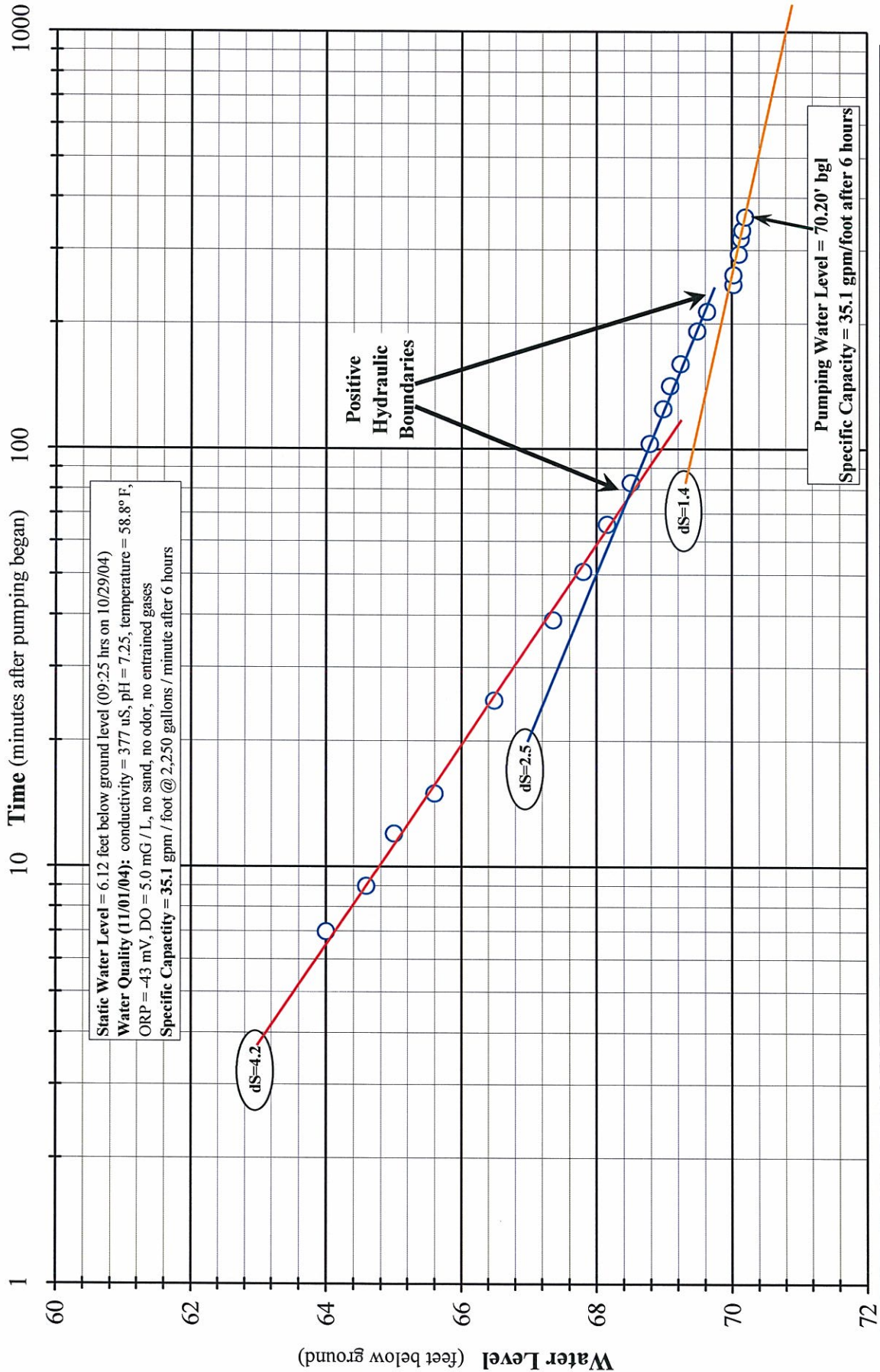
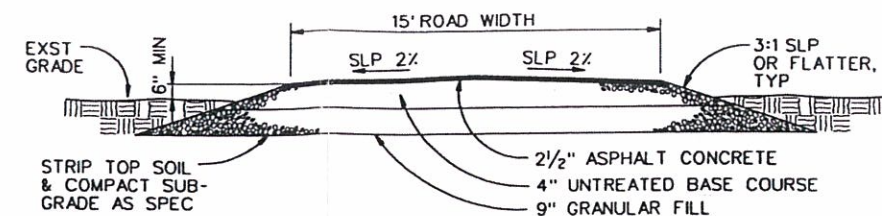
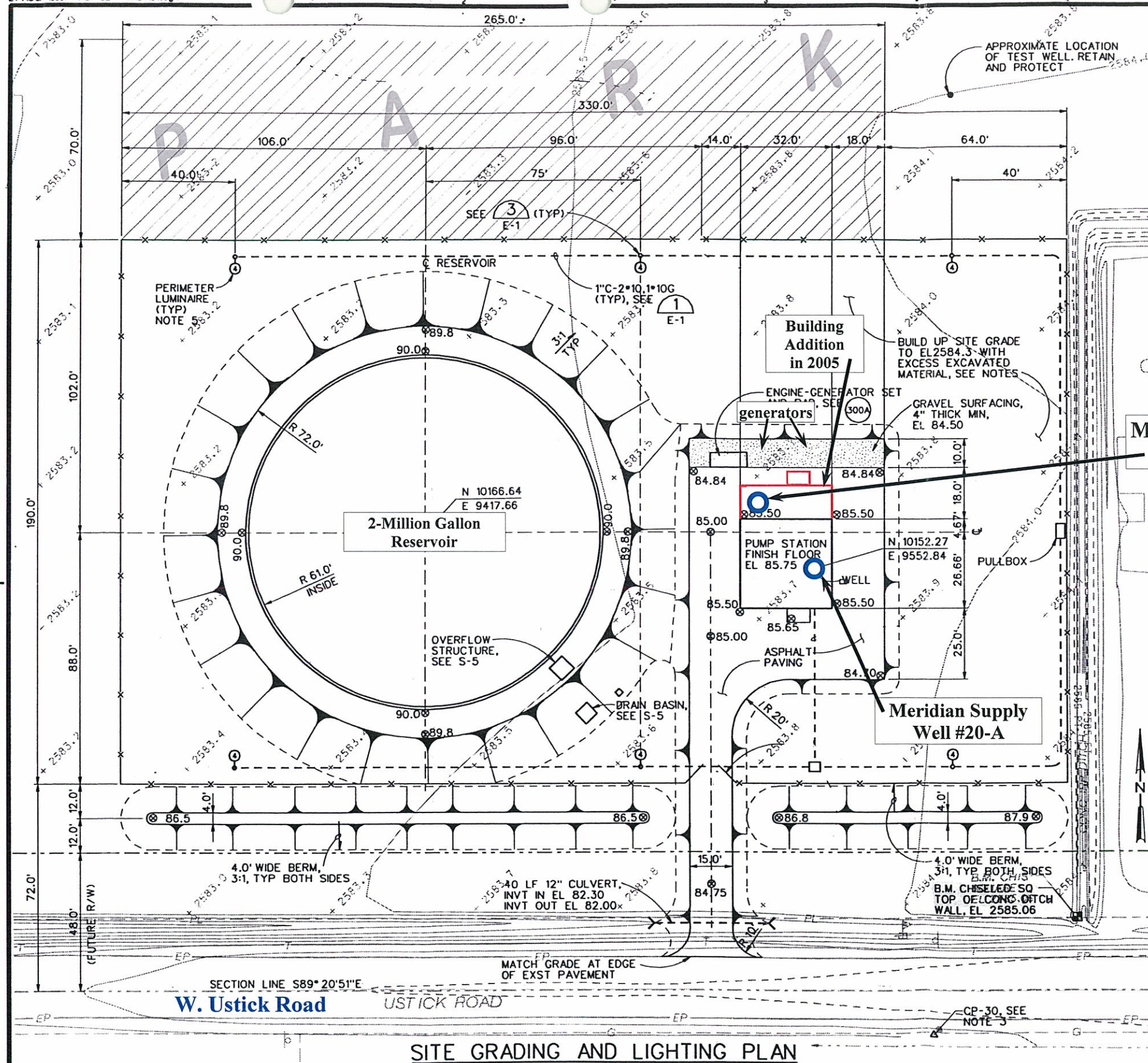
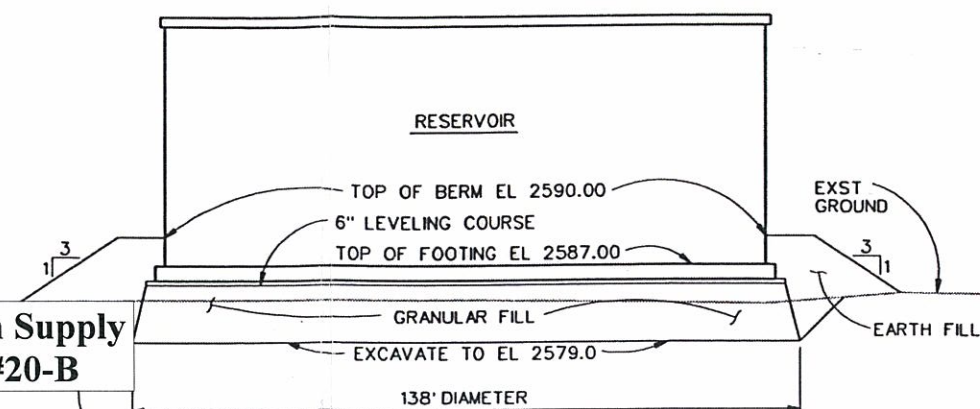


Figure 13. Semi-logarithmic plot of constant-rate discharge test at 2,250 gallons/minute of the City of Meridian's municipal supply Well #20-B during completion hydraulic testing on October 29th, 2004 by Hydro Logic, Inc.

Figure 13.



ASPHALT ACCESS ROAD AND PARKING NTS



NOTES:

1. BACKFILL UNDER STRUCTURE AND WITHIN MINIMUM LIMITS WITH GRANULAR, PLACED AND COMPACTED AS DESCRIBED SPECIFICATIONS, SECTION 02200, EARTHWORK.
2. EXTEND GRANULAR FILL AND LEVELING COURSE MINIMUM OF 2- FEET BEYOND THE EDGE OF FOUNDATION AND SLAB ON GRADE.

RESERVOIR EXCAVATION AND BACKFILL CROSS SECTION

1\"/>

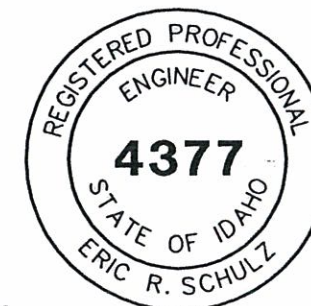
NOTES:

1. WASTE EXCAVATED MATERIAL MAY BE DEPOSITED ON SITE (WITHIN THE FENCED AREA) UP TO A MAXIMUM ELEVATION OF 2584.3. GRADE MATERIAL BACK AWAY FROM FENCE AT A 4:1 OR FLATTER SLOPE.
2. THE CONTRACTOR SHALL MAKE HIS OWN DETERMINATION OF THE CUT AND/OR FILL QUANTITIES REQUIRED TO DO THE WORK AS SHOWN.
3. CONTROL POINT (CP-30) IS AT N 9,990.88, E 9,594.60. SECTION CORNER AT INTERSECTION OF USTICK AND MERIDIAN ROADS IS AT N 10,000, E 10,000.
4. FOR CONTINUATION, SEE PUMP STATION ELECTRICAL SITE PLAN.
5. SEE LUMINAIRE PLAN.



LEGEND

EP	EDGE OF PAVEMENT
PL	PROPERTY LINE
⊕	POWER POLE
⚡	U/G GAS MARKER
▽	TELEPHONE PEDESTAL
Δ	SURVEY CONTROL POINT



SITE GRADING AND LIGHTING PLAN

Figure X. Annotated site diagram of the Meridian #20 well and reservoir site showing the location of the newly completed Meridian Supply Well #20-B with respect to other site facilities.

USTICK RESERVOIR AND
BOOSTER PUMP STATION
CITY OF MERIDIAN, IDAHO

RESERVOIR AND PUMP STATION
SITE GRADING PLAN

SHEET 2
DWG NO. C-1
DATE AUG 1998

Figure 14.

APPENDICES

Appendix A.

**Manufacturer's installation specifications for the 12-inch McCrometer
impeller flow-meter installed on the City of Meridian's #20-B Supply Well**



MODEL MW500 / MZ500

CONFIGURATION SHEET MAIN LINE FLOWMETER

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.

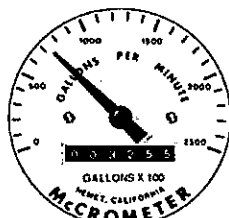
Impellers are manufactured of high-impact plastic, capable of retaining their shape and accuracy over the life of the meter. Each impeller is individually calibrated at the factory to accommodate the use of any standard McCrometer

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.



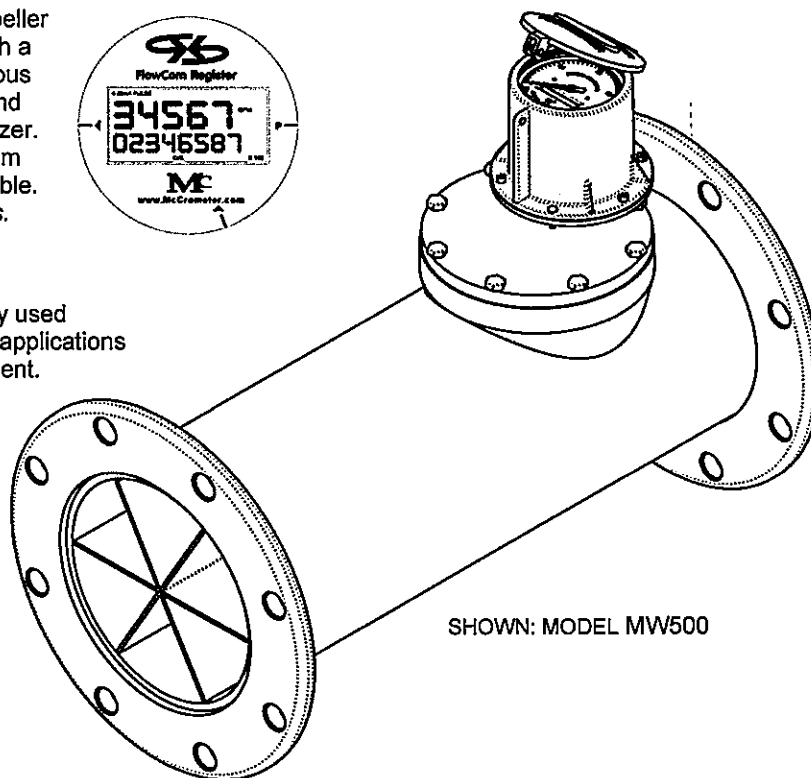
The McCrometer Propeller flowmeter comes with a standard instantaneous flowrate indicator and straight-reading totalizer. An optional FlowCom register is also available. Typical face plates.



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

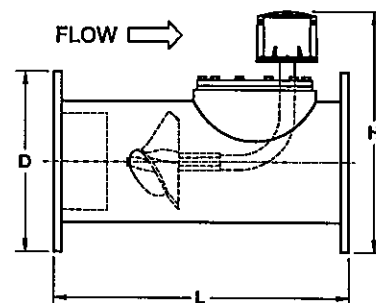
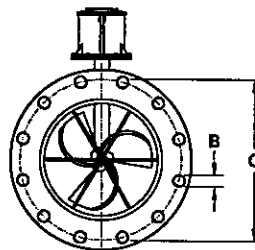
BEARING HOUSING: Brass; Stainless Steel optional

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.

Field notes of Ed Squires and Loren Pearson from the November 16th, 2009 Proof of Beneficial Use Field Licensing Examination of the City of Meridian #20-B Supply Well

11-16-2009

(1)

Proof of Beneficial Use Licensing Examination For the City of Meridian Municipal Well #20-B

9:21
AM

Ed Squires and Loren Pearson meet Jamie Allen and Chip Hudson on site at Well 20 facility.

- Wells had been off for ~ 7 days at our request.

- Flowmeter

- McCrometer MW500 propeller meter (w/vanes)
- Model # E7000-000
- Meter Ser. # = 05-07841
- Full scale = 4,000 gpm
- 8-5-2005 = calibration (new)
- Electronics Ser. # = E05-00942
- Meter No. = 05-07841-12
- Totalizer reading = 032318.75 X 1000 gal

- 10" discharge head but 12" discharge piping and, apparently, 12" pump column.

- Motor

- Emerson Motor Co. - St Louis, MO
- U.S. Motors Inverter Duty
- 250 HP 460 V 292 amps
- J10-20033922-GT-01
- Cat. # H0250V2SLH-C

(2)

- Ashcroft line pressure gage "Duragauge"
0-200 psi - reads 80psi prior to turn on.

Well head plumbing

- 21 feet of piping
from well to discharge
through floor
- discharge head (10")
 - 10"-12" reducer
 - Dresser coupler
 - AWWA Kennedy 12" swing-check valve
 - 12" Tee w/ 8" flush line take off
 - tee has sample tap + Pratt control valve
 - 2nd Dresser Coupler
 - has pre-lube line, gage, + Cl₂-feed
 - 12" flow-meter
 - spool
 - 12" gate valve
 - 90° ell down through floor w/eyewash str

- Toshiba VFD
- Power bldg. vent
- Floor drains
- Aux power gen-set out side

Well head needs a screen on vent or filter

CALCULATIONS AND DESIGN DATA

PREPARED BY E. Squires/L. Pearson

SUBJECT

Meridian #20-B BUE.

DATE

11/16/09

Flow Testing of Pumping Plant

SHEET

1

OF 1

mop = 38 1/4" aghf phf = 1' agl

43 38 3.5" ±16'
116 23 43.4" well is 20' S of point

time	w.l.	Flow
9:55	11' 6 1/4"	0
11:10	11' 6 1/2"	0
11:35	11' 6 5/8"	0
11:40	—	—
11:41.26	—	—
11:42	24' 11 1/4"	—
11:43.30	30' 0"	1,050
11:44.30	33' 6 7/8"	1,150
11:45.5	37' 8 1/4"	1,300
11:46.8	37' 11 1/4"	1,300
11:48	38' 3 5/8"	"
11:50	38' 11 1/2"	"
11:51.8	42' 3 5/8"	1,500
11:52	44' 0"	1,500
11:53.5	47' 3 7/8"	1,700
11:55	47' 1 5/8"	1,600
11:57	46' 5 3/4"	1,550
11:58	46' 3 1/8"	1,550

NPWL; Totalizer 032319000

Pump On 79 PSI

Flowing

44 HZ

50 HZ @ 88 PSI

53.0 HZ @ 93 PSI

55.1 HZ @ 90

" @ 98

" @ 100

" "