Water Well Solutions

October 16, 2014

La Crosse Waterworks
400 La Crosse Street
La Crosse, WI 54601
Attn: Mark Johnson

RE: Well No. 17 Pump Report and Recommendations

Mark;

As requested, Water Well Solutions would provide a quotation for the reinstallation of the rehabilitated well pump unit and complete hydraulic testing with collection of data.

The existing line shafts are carbon steel and are pitted. With the shafts being pitted, we cannot flame straighten the shafts back to within 0.003" tolerances to assure a smooth running well pump. Along with that the bearings in the column couplings are obsolete.

I suggest we update the well pump setting to 1800 RPM speed which is standard in the well pump industry. Secondly we will need to replace the column assembly and bowl assembly. The existing electric motor is early 1960's model and probably been reworked at least two times. Each rework of an electric motor decreases the efficiency/performance.

The existing hydraulic conditions of the well are:
2100 GPM
Static water level 31.3'
Pumping level 58.2'
Specific capacity 78 gallons per foot of drawdown

When this well was constructed the flow rate was 3,600 GPM, static water level of 25.6 and a pumping level of 45.6 feet. Specific capacity then was 180 gallons per foot of drawdown. If we calculate on the conservative side, and calculate with an improved well efficiency after Airburst of 25%. Using the existing discharge pressure, design would be the following.

Desired capacity 2,500 GPM
Static level 31.3'
Specific capacity 97.5 gallons per foot of drawdown
New pumping level 57 feet
Discharge pressure 97# psi= 224 feet
New design 2500 GPM at 300 feet total dynamic head

The existing Allen Bradley variable frequency drive unit is rated at 250 HP. The only upgrade necessary for the existing electrical controls would be is to upsize the wire size.

Water Well Solutions

New design components:
New, Aurora, 250 HP, 1800 RPM, premium efficient electric motor. (96.1% eff.), with new motor driveshaft
Sand blast and recoat discharge head
Replace existing stuffing box with new 1-15/16" bronze bearing and packing
80 feet of 1-15/16" X 12" column assembly
New, Goulds, 14RMHC premium construction bowl assembly rated at 2500 GPM at 300' TDH (84.6% efficient.)
5 foot suction pipe
Airline, tape and electrical splice kit and liquid filled gauges
New stilling tube for transducer

Fabrication of existing pump base:

1. Install cap on well casing to deter any debris from entering the well.
2. Demolish existing concrete base 1 to 2 inches below pump house floor level.
3. Drill and install rebar in a vertical position into existing concrete floor.
4. Cut and bevel ends of 20 and 30 inch casing to accept casing extensions.
5. Fill gravel pack to floor level.
6. Provide and fabricate and install 20" X 30" "Donut".
7. Provide and extend 28 inch, 0.500" wall thick casing extension 1 inch above concrete base level.
8. Install necessary gravel fill tubes and well venting.
9. Construct new 48" X 48" X 12" high, concrete pump base.

Upon completion of setting the well pump, the existing riser pipe on the discharge will need to be raised because of the new height of the concrete base. This is included in pricing.

Lump Sum $69,325.00

Water Well Solutions would take care of the requests with Focus on Energy to retain any rebates that are in effect for the new premium efficiency electric motor. The rebates would be sent directly to the Utility.

All components would be warranted for a two year period of startup. Delivery of all components would be within a two week period from acknowledgement of order.

Sincerely,

Mark Thurow
Vice President
Water Well Solutions

Water Well Solutions * N87 W36051 Mapleton St. * Oconomowoc, WI 53066
Toll Free: (888) 769-9009 * Fax: (920) 474-4771 * Web: www.wwssg.com

Pump Data Sheet - Turbine 60 Hz

Company: Water Well Solutions
Name:
Date: 10/16/2014

GOULDS WATER TECHNOLOGY
a xylem brand

Pump:

Size: 14RHMC (4 stage)

Type: Lineshaft
Synch speed: 1800 rpm

Speed: 1770 rpm
Dia: 9.75 in

Curve: E6414RMPC1

Impeller:

Specific Speeds:

Ns: 3100
Nss: ---

Dimensions:

Suction: 12 in
Discharge: 10 in

Vertical Turbine:

Bowl size: 14 in
Max lateral: 0.75 in
Thrust K factor: 16 lb/ft

Pump Limits:

Temperature: ---
Pressure: 327 psi g
Sphere size: ---

Power: ---
Eye area: ---

Search Criteria:

Flow: 2500 US gpm

Head: 300 ft

Fluid:

Water
Density: 62.32 lb/ft³
Viscosity: 0.9946 cP

Temperature: 68 °F
Vapor pressure: 0.3391 psi a
Atm pressure: 14.7 psi a

NPSHa: ---

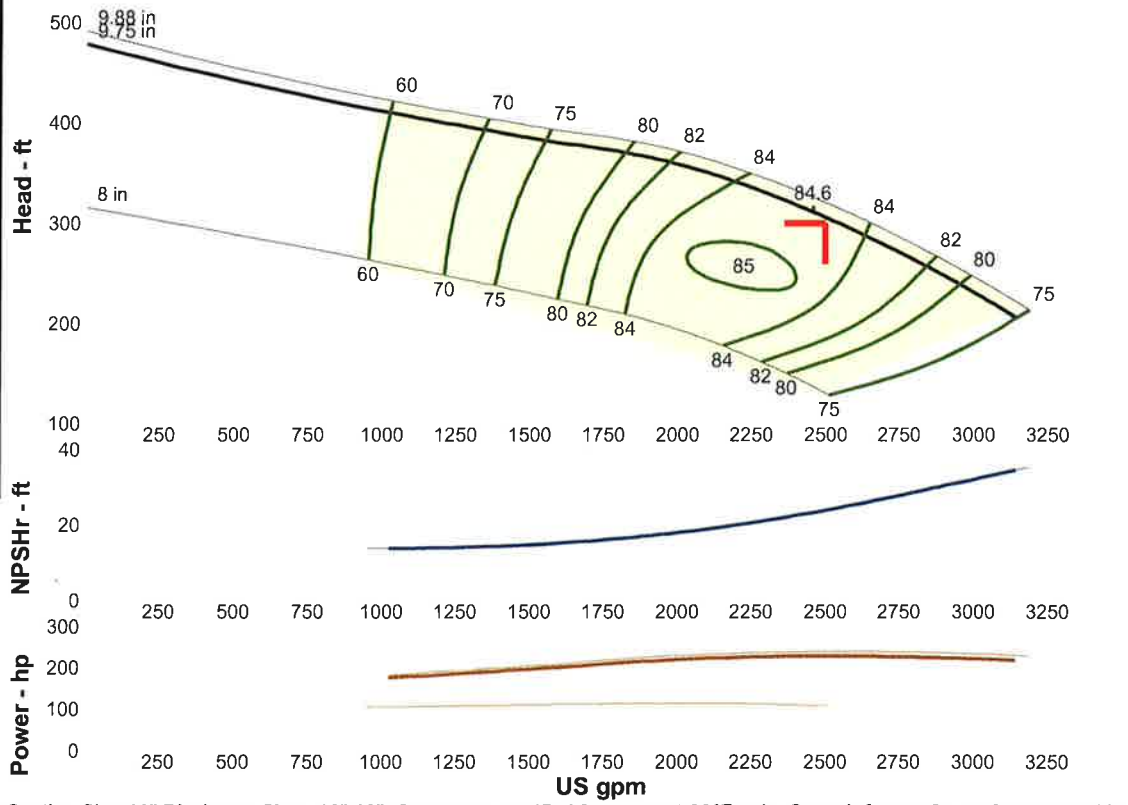
Motor:

Standard: NEMA
Enclosure: WPI

Size: 250 hp
Speed: 1800
Frame: 447

Sizing criteria: Max Power on Design Curve

---- Data Point ----	
Flow:	2500 US gpm
Head:	306 ft
Eff:	84.5%
Power:	228 hp
NPSHr:	24.1 ft
---- Design Curve ----	
Shutoff head:	479 ft
Shutoff dP:	207 psi
Min flow:	---
BEP:	84.6% @ 2458 US gpm
NOL power:	228 hp @ 2458 US gpm
-- Max Curve --	
Max power:	240 hp @ 2650 US gpm



Suction Size-10" Discharge Sizes-10",12". Curves are certified for water at 60°F only. Consult factory for performance with any other fluid.

Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Efficiency %	Power hp	NPSHr ft
3000	1770	232	78.8	222	32.3
2500	1770	306	84.5	228	24.1
2000	1770	359	82.3	220	18.2
1500	1770	386	73.8	198	15
1000	1770	412	59.2	176	14