

Appendix D-2
**Municipal Well Inspection and
Maintenance Reports**

**Goulais Well 1 and 2 Assessment and Repair Report
(February 2012)**



INTERNATIONAL WATER SUPPLY LTD

Groundwater Development – Drilling Services
Pumps – Water Treatment – Service & Maintenance

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February 28, 2012

Sault Ste. Marie PUC Services Inc.
40 Kresin Engineering Corporation
536 Fourth Line East
Sault Ste. Marie, ON
P6A 5K8

ATTENTION: Orlan Euale, P.Eng.

Reference: Sault Ste. Marie Well Assessment and Repair
Goulais Well No. 1 and No. 2

As authorized we have completed initial inspection and assessment of the well and pumping equipment of the Goulais Wells No. 1 and No. 2 site. The following is a report of our findings and recommendations.

Background

Goulais Wells No. 1 and 2 were reportedly constructed by others in or around 1952. Flowing artesian conditions are present at the site. At both wells, a 16 inch casing was installed through the overburden soils to sandstone bedrock at a depth of approximately 160 ft bgl. Open hole in sandstone and shale was then drilled to approx 180'. The cable tool method of drilling is presumed to have been used.

In 1966 IWS Ltd. was contracted to clean out the soft bedrock portion of the well and install 20 ft of 10 inch diameter stainless steel shutter screen and gravel pack the annular space. IWS Ltd. Well drawings are attached. The wells were subsequently developed and each was step tested at rates of 300, 450, 600 and 750 IGM.

In 1967 the wells were equipped with the existing Layne water lubricated style vertical turbine pumps. Well No. 1 was equipped for 1080 USGM at 320 ft TDH. Well No. 2 was equipped for 660 USGM at 320 ft TDH. The pumps have been serviced in 1978 and 1992. No testing or servicing has been reportedly completed since 1992.

Goulais Well No 1.

A performance test was conducted on 29 Nov 2011. The well was pumped at 3 rates; 3250, 4908, 6200 m³/day (600, 900, 1140 USGM) measured by the pump house flow meter. Pumping levels and above head were also recorded.

Pump performance was observed to be significantly low compared to the factory pump curve attached. It was low by 50 ft (approx 20 psi) @ 1140 USGM. This is likely due to wear and internal friction caused by plugging of water passages.

Due to the flowing artesian conditions, well performance is difficult to accurately determine. However the observed pumping levels appear to be less than that observed in 1966. At 750 IGM (900 USGM) the current pumping level was observed to be approx 16 ft bgl compared to 31 ft in 1966. The 1966 test plots are attached for reference.

The Goulais Well No. 1 pump was not removed at this time as it is required to be in operation to reduce the artesian conditions at the site. It is proposed to remove the pump for well and pump inspection and assessment after Goulais Well No. 2 is placed back into operation.

Goulais Well No. 2.

The Goulais Well No. 2 was not operated to test since a data logger and 10m of cable had been lost down the well and it would likely be damaged or it would damage the pump bowl if it were drawn up into the pump section.

The pump was removed from the well and laid out for inspection. The following was observed:

- The 45 year old pump bowl and column assemblies were found to be in very poor condition.
- The bowl requires a complete rebuild of all bronze bushings and bearings. The impellers are also showing corrosion and thinning of the veins with some fine cracks apparent. They would require replacement.
- The column pipe has a heavy build-up of minerals and beneath the steel pipe is corroded and pitted. The carbon steel line shafts are also heavily coated and corroded. It is not possible to change the stainless steel shaft sleeves or check the shafting for straightness.
- The discharge head appears to be in good condition.
- The PUC Services took the VHS motor to a local service shop for inspection.



A video inspection of Goulais Well No. 2 was conducted on December 6, 2011. A DVD copy of the inspection has been provided for reference. The following observations were made:

- All measurements are recorded in feet with the top of the pump base as the reference measuring point.
- The well was flowing to waste through an overflow fitting near surface during the inspection.
- The 16 inch casing is coated with mineral build-up throughout its length to a depth of 158 ft. No welded joints were visible. The casing had some loose scale in the upper 5 feet. A hard mineral build-up/encrustation begins at approximately 20 ft and becomes slightly heavier with depth. There are no structural concerns with the well apparent.
- At 137 ft the top of the 10 inch screen back off coupling is observed. The 20 ft leader pipe has some mineral build-up as well.
- The data logger and cable were observed at 149 ft. The unit was successfully retrieved.
- The top of the screen was observed at 158 ft. The upper 5 ft section of screen has some minor mineral deposits. The middle sections of screen appeared in excellent condition. The bottom section of screen had some minor mineral deposits and visibility was reduced due to some turbidity, indicating very little flow contribution from this part of the screen.
- The screen bottom plate was not visible since it was covered with approximately 3 ft of accumulated soft mineral debris.

Discussion and Recommendations

Goulais Well No. 1

1. Current Well performance at Goulais No. 1 is good compared to historic data. No well maintenance rehabilitation is required at this time. A performance test should be conducted in the Well every 5 years.
2. Pump performance is significantly low compared to the factory performance curve. Considering the 45 year old age of the components and the found condition of the Goulais No. 2 pump, it is likely that new components below the head are required to maintain the safe, efficient and reliable production of the



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- Well. A new bowl assembly and a complete water lubricated column assembly with stainless steel shafts will be required.
3. When Goulais No. 2 is returned to service, Goulais No. 1 can be removed for inspection and the likely replacement of the components described above. A well video inspection will be conducted at that time.

Goulais Well No. 2

1. The pump was not operated prior to removal so Well performance could not be determined. Since equipped in 1967 with a lower rated capacity pump of 660 USGM, Goulais No. 2 Well performance has not been as good as that compared to Goulais Well No. 1 equipped for 1080 USGM.

At this time it cannot be confirmed if any well maintenance is required. The well video inspection does not suggest that significant deterioration of Well performance would be likely and thus no major well rehabilitation efforts are recommended at this time. The accumulated soft debris at the bottom of the well could be removed at this service interval.

2. A performance test should be conducted when the well is re-equipped with new components.
3. The 45 year old pump was found to be in very poor condition. It is not practical to service the components. The bowl and column assembly below the head should be replaced with new water lubricated style components. Stainless steel shafting should be supplied.

Should you have any questions, please do not hesitate to contact us.

Regards,



John A. Harris, P.Eng

JAH/ww



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Well Material

Outer Casing 16" pipe by others

Inner Casing 21' of 10" Plain End Casing
Screen 20' of Layne S.S. #1 Opening, 10"

Plug S. S. Plate

Gravel 1-1/2 Yards

Pump

No. 56401 Setting BP-MB 130'
No. Stages 5 Length Bowl 5'11"
Bowl 12" RKAH Size & Lgth. Suction 5' x 8"
Head 8 SDH Size Column 8" x 1-1/2"

Materials or setting details other than standard:
Impellers: Trim

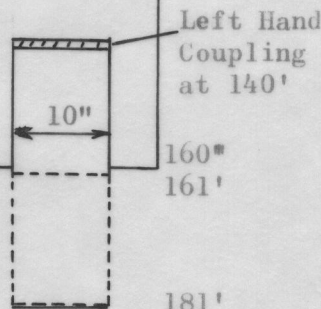
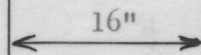
Motor

Make CGE Phase 3
H. P. 125 Cycles 60
R. P. M. 1800 Volts 575
Type K Amps. 116
Frame B405TP16 Serial MBJ 1214 167
Bearing Nos. Upper - 7322.GM/W4
 Lower - 6215-2Z

Special Equipment

Ground Level 0'

Original Hole
Drilled to 160'
By Others



Gray Sandstone

160'
168'

Red and Gray
Shale

183'

160"
161'
181'

Well No. 1

B.P. referred to original ground level.....
Clear depth below B.P.
Started Aug. 19, 1966 Final Test Sept. 1967
Preliminary Test Aug. 29 Static Level +10'
Final Test Sept. 1967 Pumping Level 11' @ 850 IG
Guarantee..... 1 G P M Capacity 850 IG P M
Contract Pressure..... # Pressure Pump 148 #
Length Air Line 130' Main..... #

MD. 1978 1772 1/2"

INTERNATIONAL WATER SUPPLY LTD.

MONTREAL LONDON, CANADA SASKATOON
OAKVILLE WATER SUPPLY CONTRACTORS VANCOUVER

SAULT STE. MARIE, ONTARIO
GOULAIS AVENUE

DRILLED BY T. Kyle
INSTALLED BY J. Hartman

DRAWN BY mc
APPROVED BY *D. Hartman*

No. I.R.

Well Material

Outer Casing 16" pipe
 Inner Casing 21' of 10" plain end casing
 Screen 20' of Layne S.S., #1 Opening, 10"
 Plug S. S. Plate
 Gravel 1 Yard

Pump

No. 56402 Setting BP-MB 130'
 No. Stages 7 Length Bowl 6'1"
 Bowl 10" RKEHC Size & Lgth. Suction 5' x 6"
 Head 8 SDH Size Column 8" x 1-1/2"

Materials or setting details other than standard:
 Impellers: Trim

Motor

Make CGE Phase 3
 H. P. 75 Cycles 60
 R. P. M. 1800 Volts 550
 Type K Amps.
 Frame B365TP16 Serial 1221553 MBJ
 Bearing Nos. Upper - 7219.GM/4
 Lower - 6212-2Z
Special Equipment

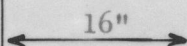
Well No. 2

B.P. referred to original ground level.....
 Clear depth below B.P.
 Started Aug. 4, 1966 Final Test Sept. 1967
 Preliminary Test Aug. 15 Static Level +10'
 Final Test Sept. 1967 Pumping Level 32' @ 600 GPM
 Guarantee..... 1 G P M Capacity 550 1 G P M
 Contract Pressure..... # Pressure Pump 130 #
 Length Air Line 130 Main..... #

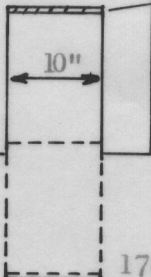
Ground Level

0'

Original Hole to
 160' Drilled By
 Others



Left Hand
 Coupling
 at 137'



160'

158'
 160'

178'

178'

Red and Gray Shale

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SAULT STE. MARIE, ONTARIO
 GOULAIS AVENUE

DRILLED BY T. Kyle DRAWN BY mc
 INSTALLED BY J. Hartman APPROVED BY *D. W. Hartman*

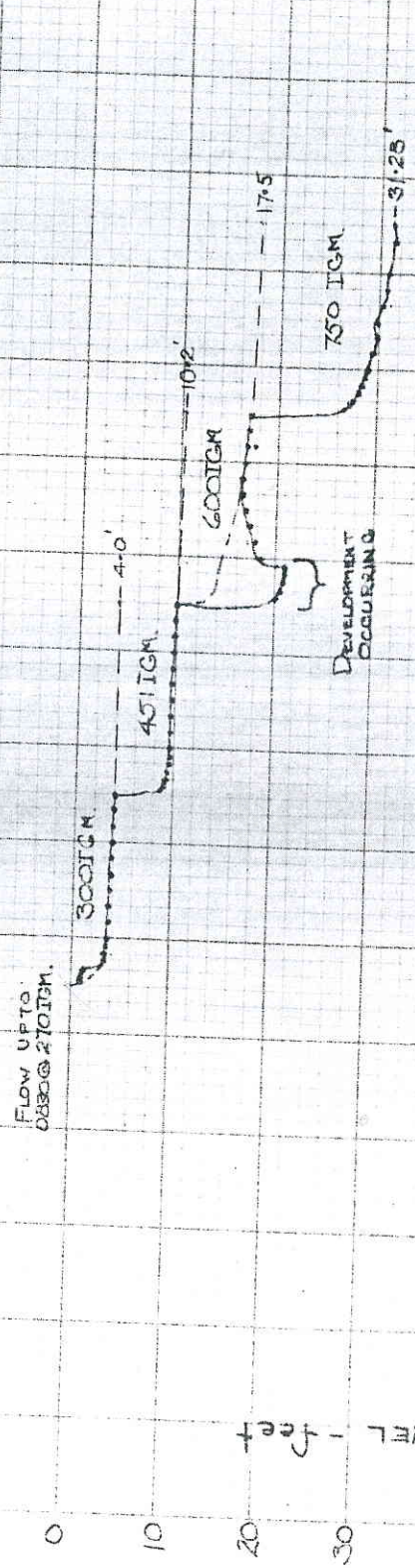
No I.R.



CLOCK TIME - HRS.

0800 1000 1200 1400 1600 1800

PUMPING LEVEL - feet



N.B. - All levels from flange on 16" casing.

SALT STEAMER P.O.C.
 GOULAIS No. 1.
 STEP - TEST.
 AUG 29/66

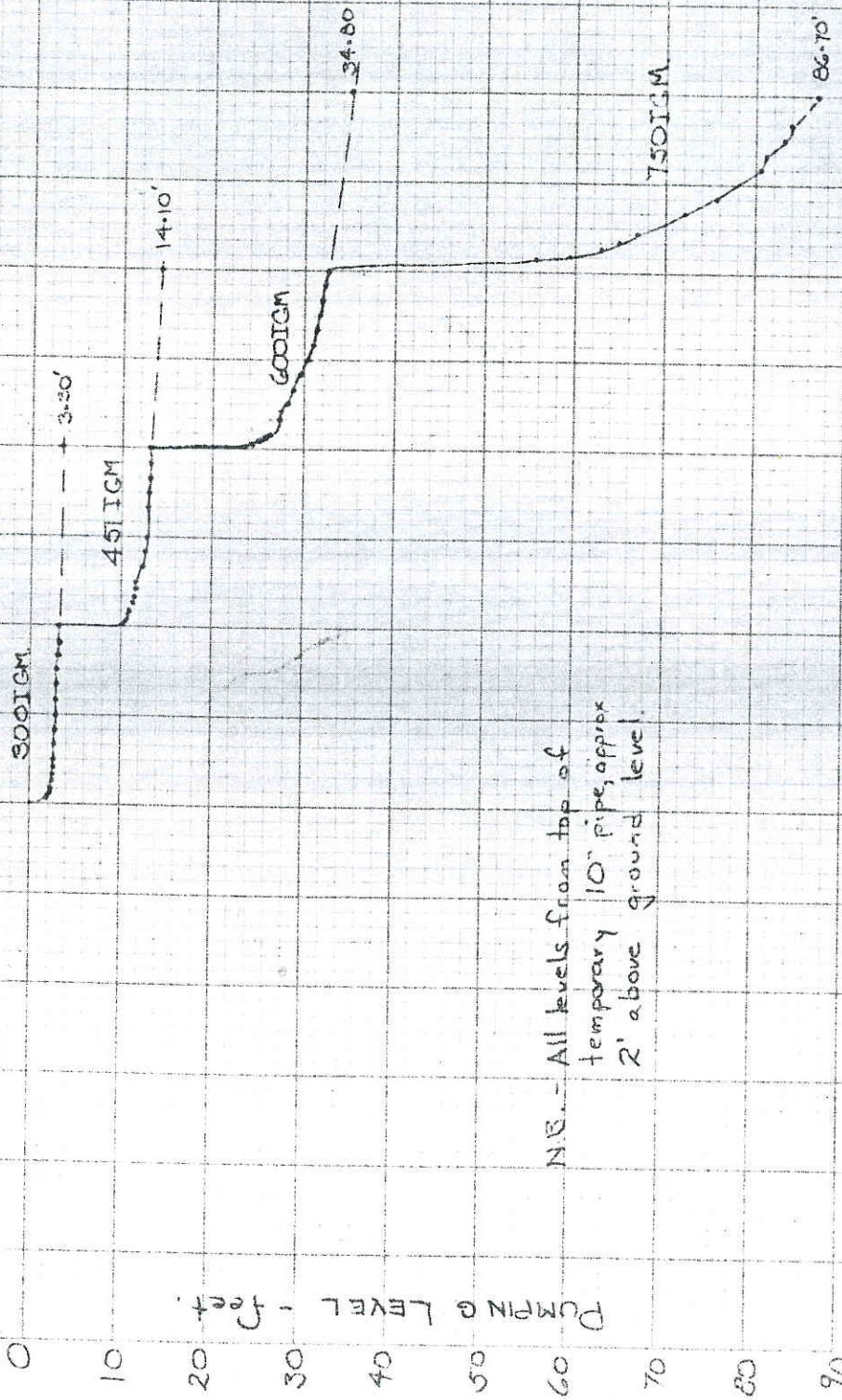
SAULT STE MARIE P.U.C.
 GOULAIS No 2.
 STEP-TEST
 AUG 15/66
 18.



CLOCK TIME - Hrs.

0800 1000 1200 1400 1600 1800

Flow up to
0900 hrs.



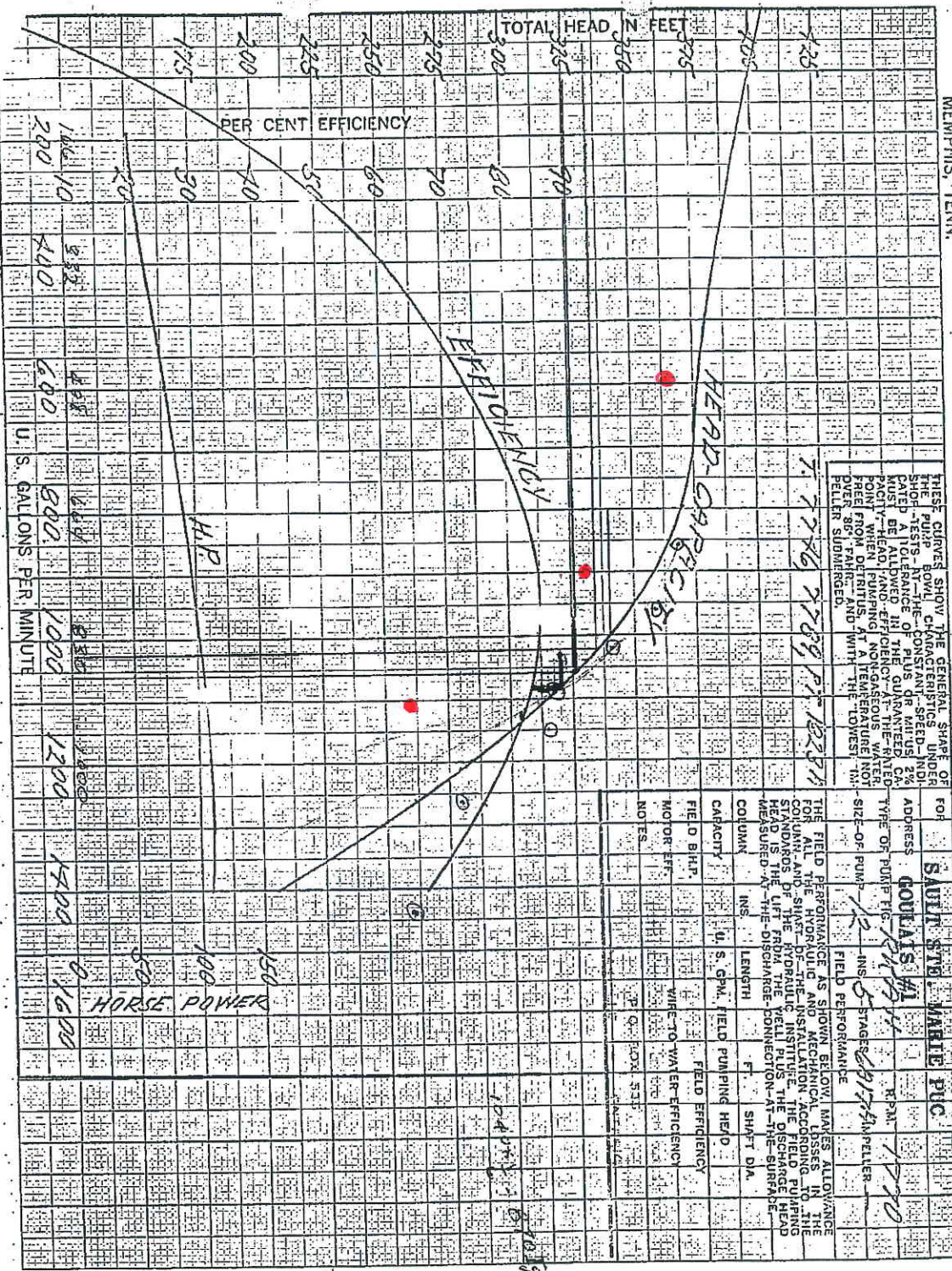
N.B. - All levels from top of temporary 10" pipe, approx 2' above ground level.

PUMPING LEVEL - Feet.

0 10 20 30 40 50 60 70 80 90

DEEP WELL TURBINE PUMP PERFORMANCE CHART

CURVE SHEET NO. 15838
DATE Oct. 4/66



THESE CURVES SHOW THE GENERAL SHAPE OF THE PUMP BOWL AND CONSTANT SPEED UNDER SHOWN TEST RANGE OF PLUS OR MINUS 2% CAPACITY—HEAD, AND EFFICIENCY—ABOUT THE POINT WHEN PUMPING AT TEMPERATURE NOT FEE FROM DESIGN AND MINUTE THE LOWEST BELL IS SUBMERGED.

FOR ADDRESS	SUIT STG	MATERIAL	PUC
17776	12	1770	
17789	12	1770	
17791	12	1770	
17792	12	1770	
17793	12	1770	
17794	12	1770	
17795	12	1770	
17796	12	1770	
17797	12	1770	
17798	12	1770	
17799	12	1770	
17800	12	1770	
17801	12	1770	
17802	12	1770	
17803	12	1770	
17804	12	1770	
17805	12	1770	
17806	12	1770	
17807	12	1770	
17808	12	1770	
17809	12	1770	
17810	12	1770	
17811	12	1770	
17812	12	1770	
17813	12	1770	
17814	12	1770	
17815	12	1770	
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17846	12	1770	
17847	12	1770	
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17884	12	1770	
17885	12	1770	
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17887	12	1770	
17888	12	1770	
17889	12	1770	
17890	12	1770	
17891	12	1770	
17892	12	1770	
17893	12	1770	
17894	12	1770	
17895	12	1770	
17896	12	1770	
17897	12	1770	
17898	12	1770	
17899	12	1770	
17900	12	1770	

Field Observed
• Nov 29/11

Nov 12
Lead 46
122 pwt
326
230
376

**Goulais Well 1 and 2 Assessment and Repair Report
(June 2012)**



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Email: iws@iws.ca www.iws.ca

June 22, 2012

Sault Ste. Marie PUC Services Inc.
C/O Kresin Engineering Corporation
536 Fourth Line East
Sault Ste. Marie, ON
P6A 5K8

Attention: Orlan Euale, P.Eng.

Reference: Sault Ste Marie Well Assessment and Repair
Goulais Well No. 1 and No. 2

COPY

ENTERED
JUN 27 2012

As authorized we have completed inspection and assessment of the well and pumping equipment of the Goulais Wells No. 1 and No. 2 site. The following is a supplemental report to our initial report of Feb 28, 2012.

Goulais Well No. 1

An investigation into the concern of water seepage through floor tiles was undertaken on April 19, 2012. This consisted of a “shut in test” of Goulais Well 2 well head and plugging of water passages in the Goulais Well 1 pump head. The overflow gate valves to waste were also closed. The shut in test was conducted for 65 minutes and during this time no water was observed to leak around the well casing or up through the floor. The test was witnessed by Kresin Engineering staff.

After reinstalling and operating the new pumping equipment in Goulais Well 2, the pump was removed from Goulais Well 1 on May 7, 2012. The following was observed:

- The 45 year old pump bowl and column assemblies were confirmed to be in very poor condition
- The column pipe had a heavy buildup of minerals and beneath the steel pipe is corroded and pitted. The line shafts were carbon steel and also heavily coated and corroded. It would not be possible to change the stainless steel shaft wear sleeves or to check the shafting for straightness.
- The top shaft was severely worn where it passes through the stuffing box. The stainless wear sleeves and rubber bearings were also worn. At 85 ft and 95 ft setting depth the shaft sleeves were severely worn on one side indicating a vibration or alignment problem. The pump had previously operated with severe vibrations in the discharge piping noted.

- The bowl was determined to be in similar condition to that of Goulais 2 and was not serviceable. It was also noted that the bowl showed signs of slight rubbing on the well casing.
- The discharge head appears to be in good condition.
- The PUC Services took the VHS motor to a local shop for inspection.

The bottom of the well screen was then cleaned out to a firm bottom depth of 183 ft below the base plate. The accumulation of red particles of sandstone and some grey silt were removed.

A video inspection of Goulais Well No. 1 was conducted on May 8, 2012. A DVD copy of the inspection is provided for reference. The following observations were made:

- All measurements are recorded in feet with the top of the pump base as the reference measuring point.
- The well was flowing to waste through an overflow fitting near surface during the inspection.
- The 16 inch casing is coated with a red/brown mineral build-up throughout its length to a depth of 160 ft. Only a few welded joints were visible 1, 8, 65 ft bmp. The hard mineral build up/encrustation and some tubercules are observed and become moderately heavier with depth. It is heaviest at around 130 ft near the pump setting. There are no structural concerns with the well apparent.
- At 139 ft the top of the 10 inch screen back off coupling is observed. The 20 ft leader pipe has some mineral build-up as well.
- The top of the screen was observed at 161 ft. The upper 15 ft section of screen appeared in excellent condition. The bottom section had some minor mineral deposits and visibility was reduced due to turbidity, indicating very little flow contribution from this part of the screen.
- The screen bottom plate at 181 ft in the video is not visible since it was covered with a minor amount of accumulated debris.

The new pumping equipment was installed on May 10, 2012. The replacement bowl assembly is a Layne 12EM-4 stage selected for the same duty as the previous obsolete bowl (1080UGSM@323 ft TDH). It was decided to install the pump for 120 ft of 8 x 1 ½ inch column pipe rather than the 130 ft previously. This was to prevent the pump rubbing on the well casing and causing an alignment/vibration problem. Copies of the pump curve and installation plan have been provided.

Due to the flowing conditions the well could not be disinfected however, the pumping equipment was sprayed with a 200 mg/l solution of sodium hypochlorite. The well was flushed to waste on start up and any residual disinfectant neutralized with sodium thiosulphate dechlor. The pump was found to operate quite well.



Goulais Well No. 2

The well pump could not be operated prior to removal of the existing pumping equipment on Nov 29, 2011. Following reinstallation of the new pumping equipment and well performance check was conducted.

Due to flowing conditions a true static water level cannot be easily determined. It is assured to be approximately 8 ft agl. At a flow rate of 3300 m³/day (500 IGM) water was still observed to flow out the overflow at a rate of approximately 30 IGM. This observed drawdown in the well is less than that reported during testing in 1966 when the pumping level at 451 IGM was approximate 10 ft bgl.

Due to the flowing conditions, the well could no be disinfected however, the pumping equipment was spray disinfected with a 200 mg/l solution of sodium hyprochlorite. The well was then flushed to waste on start up and any residual disinfectant neutralized with sodium thiosulphate dechor. The pump was found to operate quite well.

Conclusions and Recommendations

1. Well performance at both Goulais Well No. 1 and No. 2 is considered good compared to historic test data. A performance test should be conducted on the wells every 4 to 5 years.
2. Regular recording of production, water levels, and above ground head should be maintained in order to monitor any changes in well or pump performance
3. The pumps should be pulled for inspection and servicing of wearing parts in 5 years.
4. When the pumps are removed for servicing a well video inspection should be completed.

If you have further questions, please don't hesitate to contact us.

Regards,



John A. Harris, P.Eng.

JAH/ww



Company: International Water Supply
 Name:
 Date: 12/21/2011

SSM Goulais Well 1



Pump:

Size: 12EM (4 stage)
 Type: Vertical Turbine
 Synch speed: 1800 rpm
 Curve:
 Specific Speeds:
 Dimensions:
 Vertical Turbine:
 Speed: 1770 rpm
 Dia: 9.125 in
 Impeller:
 Ns: —
 Nss: —
 Suction: 8 in
 Discharge: 8 in
 Bowl size: 12.26 in
 Max lateral: — in
 Thrust K factor: 6.33 lb/ft

Search Criteria:

Flow: 1080 US gpm Head: 320 ft

Fluid:

Water
 Density: 62.25 lb/ft³
 Viscosity: 1.105 cP
 NPSHa: — ft
 Temperature: 60 °F
 Vapor pressure: 0.2563 psi a
 Atm pressure: 14.7 psi a

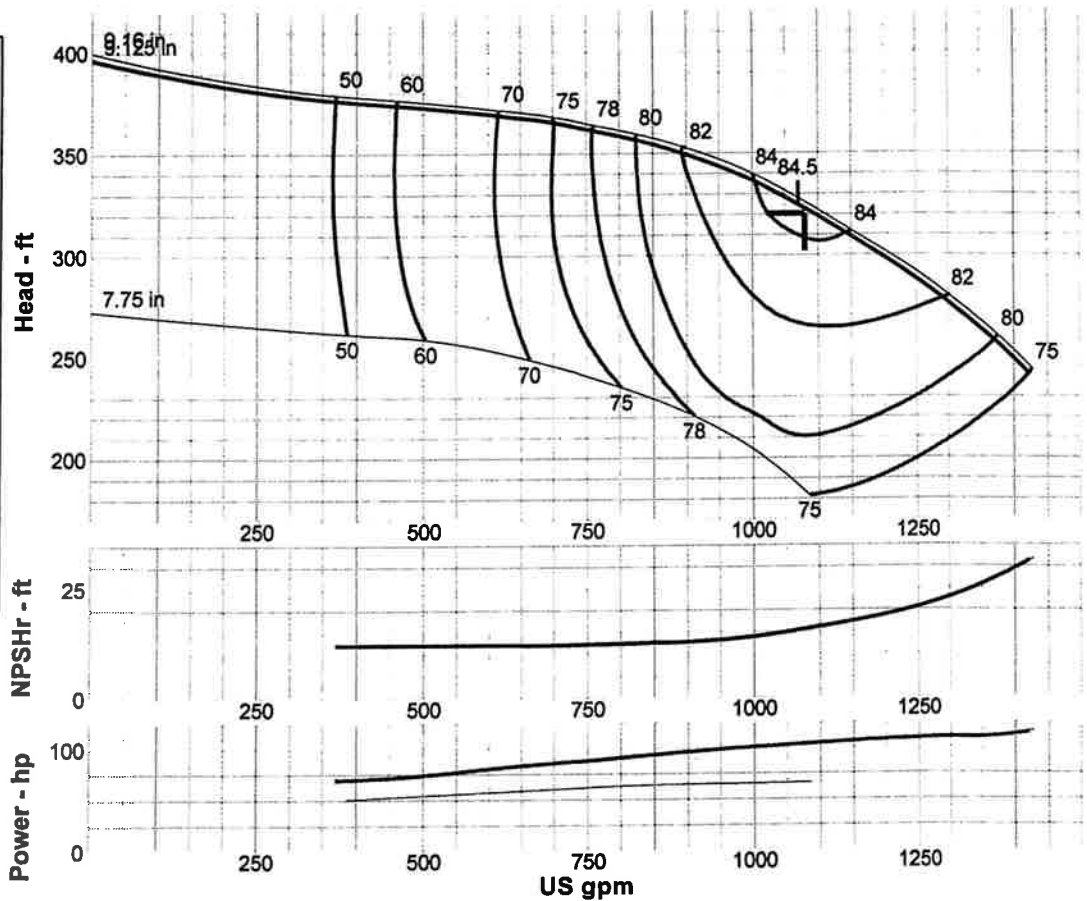
Motor:

Standard: NEMA
 Enclosure: ODP
 Sizing criteria: Max Power on Design Curve
 Size: 125 hp
 Speed: 1800
 Frame: 405T

Pump Limits:

Temperature: 150 °F
 Pressure: 380 psi g
 Sphere size: 0.94 in
 Power: — hp
 Eye area: 19.4 in²

Data Point	
Flow:	1080 US gpm
Head:	323 ft
Eff:	84.4%
Power:	104 hp
NPSHr:	15.7 ft
Design Curve	
Shutoff head:	397 ft
Shutoff dP:	171 psi
Min flow:	— US gpm
BEP:	84.5% @ 1070 US gpm
NOL power:	116 hp @ 1421 US gpm
Max Curve	
Max power:	117 hp @ 1427 US gpm



Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Efficiency %	Power hp	NPSHr ft
1296	1770	277	81.9	111	22.8
1080	1770	323	84.4	104	15.7
864	1770	353	81.1	94.9	12.8
648	1770	368	71.9	83.6	12.2
432	1770	375	57	71.7	12.2

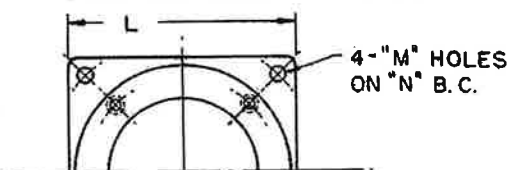
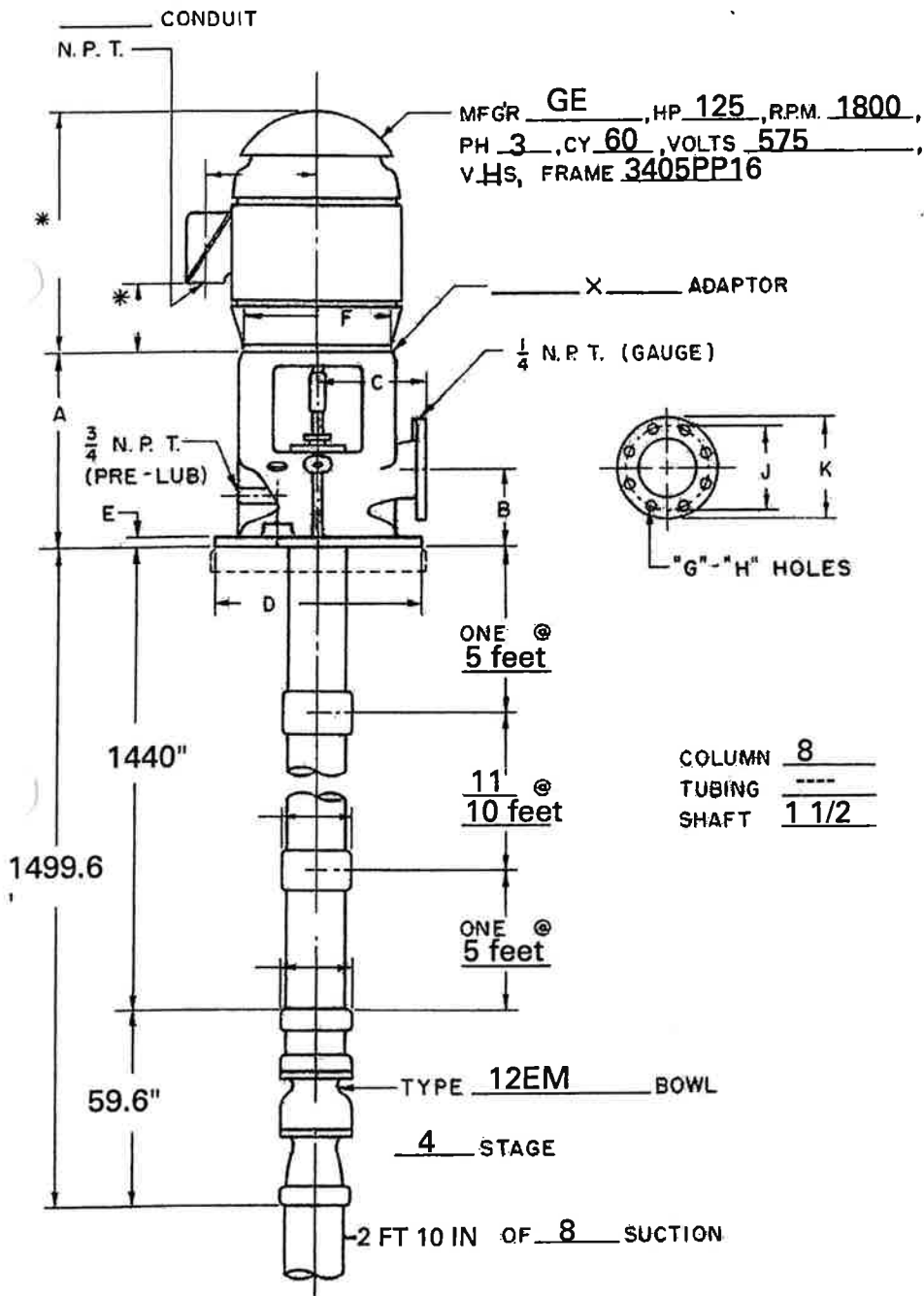
INSTALLATION PLAN

TYPE 8 SDH DISCHARGE HEAD

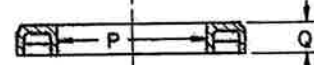
LAYNE & BOWLER, INC. MEMPHIS, TENNESSEE



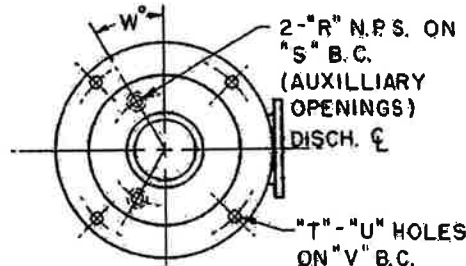
USE THESE DIMENSIONS ONLY
WHEN CERTIFIED BY FACTORY



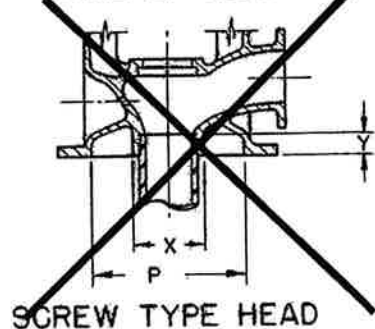
Holes in Base Plate



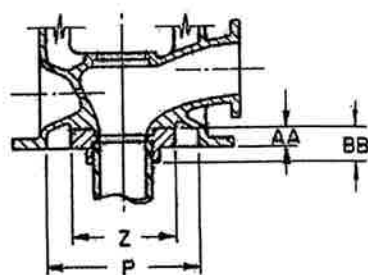
BASE PLATE



BASE OF HEAD



SCREW TYPE HEAD



FLANGE TYPE HEAD

COLUMN 8
TUBING ----
SHAFT 1 1/2

CUSTOMER: SAULT STE. MARIE PUC	YOUR NO: _____	G. P. M: 1080 US
LOCATION: GOULAIS AVE. WELL No. 1	OUR NO: _____	T. D. H: 323 FT
FOR APPROVAL: _____	PUMP NO: 2206686	R. P. M: 1770
CERTIFIED: _____	DATE: MAY 10, 2012	B. H. P: 104

TYPE HEAD	HEAD DISCHARGE FLANGE															HEAD BASE															
	125° ASA FLANGE					1250° ASA FLANGE										STD.				125°											
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	T	U	V	W	X	Y	Z	AA	BB			
SDH 3	14	5 1/2	7 1/2	13 1/2	10	4	6	7 1/2	8	8	6	8	13	15	9 1/2	1 1/2	7 1/2	4	8	11 1/2	24	4	1 1/2	5 1/2	1 1/2	3 1/2					
SDH 4	16 1/2	6	9	16	12	8	7 1/2	9	8	7	7	10	16	18 1/2	11 1/2	8 1/2	4	12	14	18 1/2	5 1/2	1 1/2	7	1	3 1/2						
SDH 6	20	7	11 1/2	21	16 1/2	8	7	9 1/2	11	12	3	10 1/2	21 1/2	24	14 1/2	11 1/2	4	12	19 1/2	20	7 1/2	2 1/2	10 1/2	1	4 1/2						
SDH 8	22	8 1/2	13	23 1/2	16 1/2	8	8	11 1/2	13 1/2	12	7	13	15	23 1/2	1	27 1/2	16 1/2	2	1	14	4	7 1/2	16	1 1/2	21 1/2	20	10	2 1/2	11 1/2	1	4 1/2
SDH 10	25	11	15	27 1/2	20	12	14	16	16 1/2	15	17	22 1/2	31	20	9	17	4	20	25	24	13 1/2	7 1/2	14 1/2	5 1/2	5 1/2						
SDH 12	26	11 1/2	17	32	24 1/2	12	17	19	16 1/2	17 1/2	20 1/2	32 1/2	37	24 1/2	2	19 1/2	4	20	29 1/2	17	14	2 1/2	16 1/2	2 1/2	5 1/4						

* INCLUDES 3" HIGH MOTOR ADAPTOR WHEN USED

Company: International Water Supply
 Name:
 Date: 12/21/2011

SSM Goulais 2



Pump:

Size: 10RKEH (7 stage)
 Type: Vertical Turbine
 Synch speed: 1800 rpm
 Curve:
 Specific Speeds:
 Dimensions:
 Vertical Turbine:

Speed: 1750 rpm
 Dia: 7.625 in
 Impeller:
 Ns: —
 Nss: —
 Suction: 6 in
 Discharge: — in
 Bowl size: 9.75 in
 Max lateral: — in
 Thrust K factor: 4 lb/ft

Search Criteria:

Flow: 660 US gpm Head: 320 ft

Fluid:

Water
 Density: 62.25 lb/ft³
 Viscosity: 1.105 cP
 NPSHa: — ft

Temperature: 60 °F
 Vapor pressure: 0.2563 psi a
 Atm pressure: 14.7 psi a

Motor:

Standard: NEMA
 Enclosure: ODP
 Sizing criteria: Max Power on Design Curve

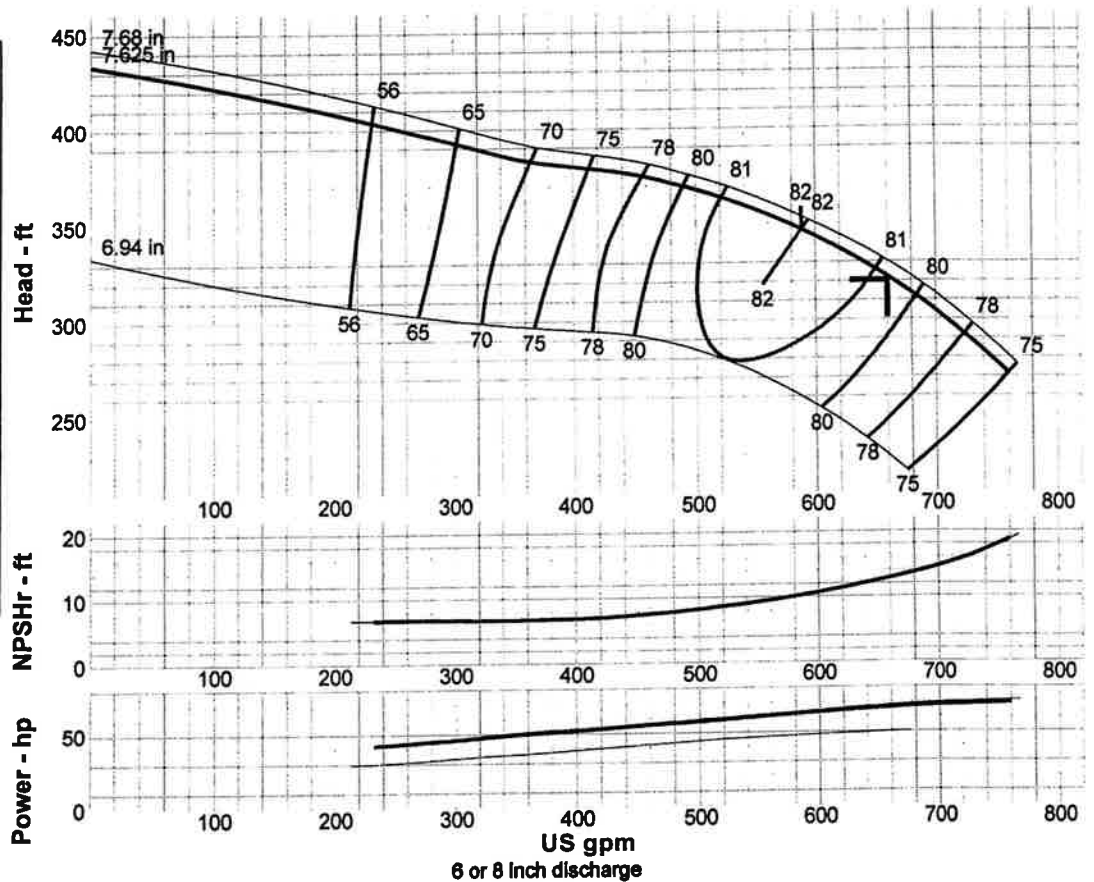
Size: 75 hp
 Speed: 1800
 Frame: 365T

Pump Limits:

Temperature: 150 °F
 Pressure: 700 psi g
 Sphere size: 0.84 in

Power: — hp
 Eye area: 11.63 in²

— Data Point —	
Flow:	660 US gpm
Head:	322 ft
Eff:	80.7%
Power:	66.4 hp
NPSHr:	12.9 ft
— Design Curve —	
Shutoff head:	434 ft
Shutoff dP:	187 psi
Min flow:	— US gpm
BEP:	82% @ 588 US gpm
NOL power:	69.5 hp @ 760 US gpm
— Max Curve —	
Max power:	71.4 hp @ 767 US gpm



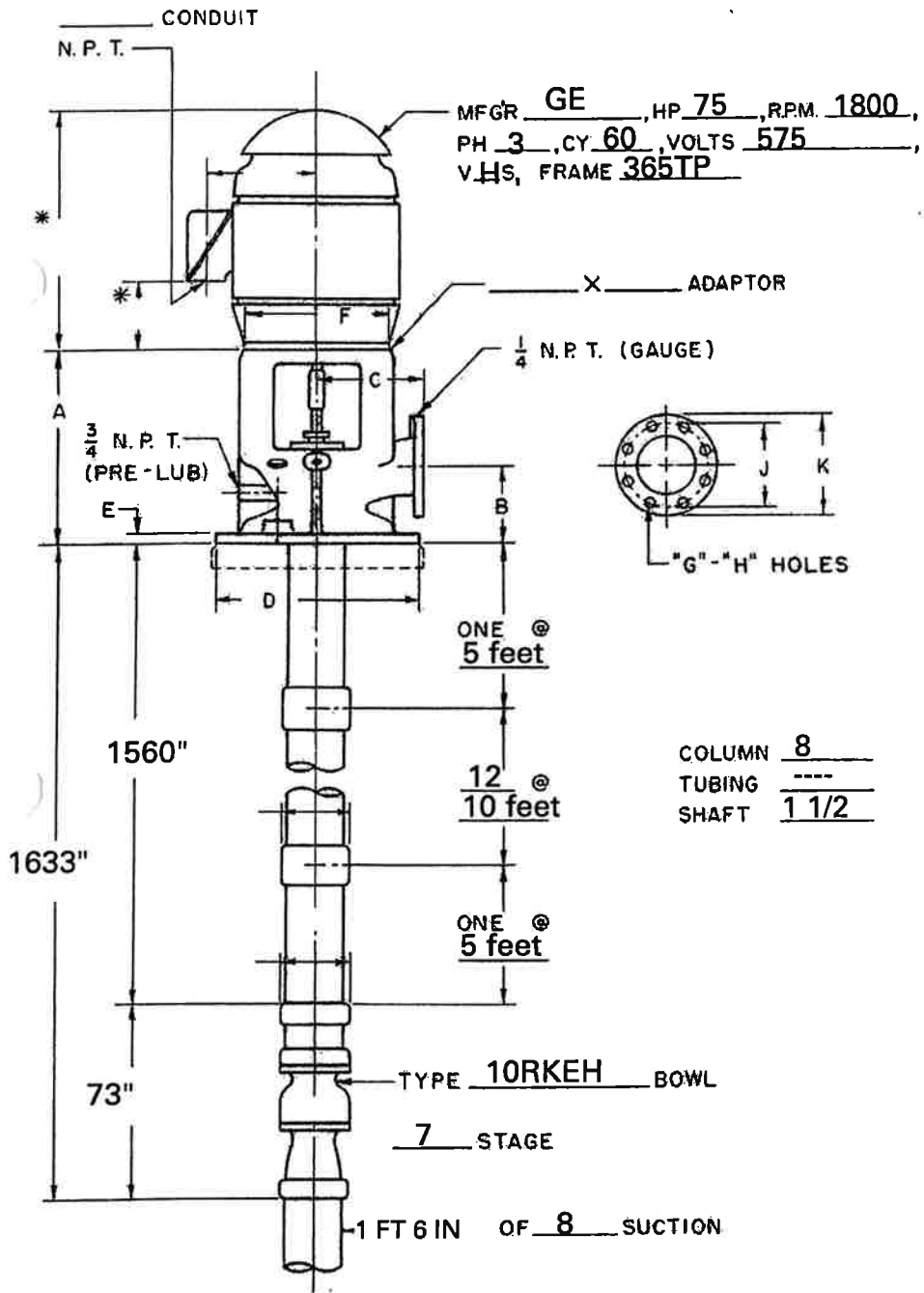
Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Efficiency %	Power hp	NPSHr ft
792	1750	—	—	—	—
660	1750	322	80.7	66.4	12.9
528	1750	362	81.1	59.5	8.86
396	1750	381	73.3	51.9	6.95
264	1750	399	60.1	44	6.81

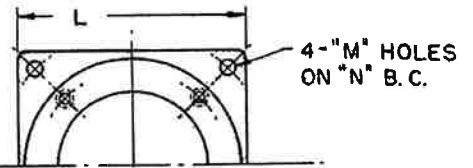
INSTALLATION PLAN

TYPE 8 SDH DISCHARGE HEAD

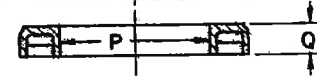
LAYNE & BOWLER, INC. MEMPHIS, TENNESSEE



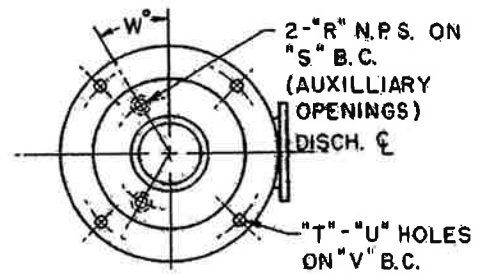
USE THESE DIMENSIONS ONLY WHEN CERTIFIED BY FACTORY



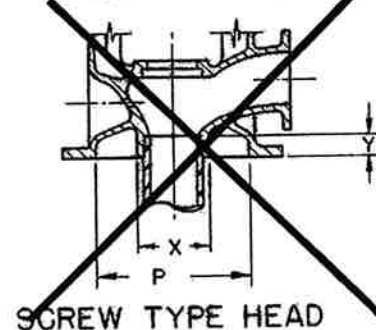
HOLES IN BASE PLATE



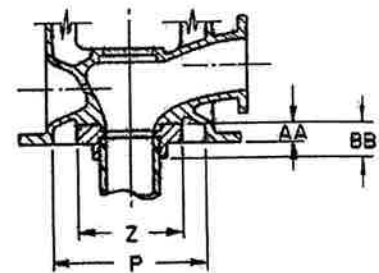
BASE PLATE



BASE OF HEAD



SCREW TYPE HEAD



FLANGE TYPE HEAD

COLUMN 8
TUBING ----
SHAFT 1 1/2

CUSTOMER: SAULT STE. MARIE PUC	YOUR NO: _____	G. P. M.: 600 US
LOCATION: GOULAIS AVE. WELL No. 2	OUR NO: _____	T. D. H.: 320 FT
FOR APPROVAL: _____	PUMP NO: 2206718	R. P. M.: 1750
CERTIFIED: _____	DATE: APRIL 28, 2012	B. H. P.: 66.4

TYPE HEAD	HEAD DISCHARGE FLANGE																HEAD BASE													
	125° ASA FLANGE								250° ASA FLANGE								STD.					125°								
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB				
SDH 3	14	5 1/2	7 1/2	13	10	4	6	7 1/2	8	6	8 1/2	13 1/2	15 3/4	9 1/2	1 1/2	7 3/8	4	8	11 1/2	24	4 1/2	1 1/2	5 1/2	1 1/2	3 1/2					
SDH 4	16 1/2	6	9	16	12	8	7 1/2	9	8	7 1/2	10	16 1/2	18 1/2	11 1/2	1 1/2	8 1/2	4	12	14 1/2	18 1/2	5 1/2	1 1/2	7	1	3 1/2					
SDH 6	20	7	11 1/2	21	16 1/2	10	9 1/2	11	12	10 1/2	12 1/2	21 1/2	24 1/2	1 1/2	11 1/2	4	12	16 1/2	20	7 1/2	2 1/2	10 1/2	1 1/2	4 1/2						
SDH 8	22	8 1/2	13	23 1/2	16 1/2	8	11 1/2	13 1/2	12	1	13	15	23 1/2	1	27 1/2	16 1/2	2	1	14	4	7 1/2	16	1 1/2	21 1/2	20	10	2 1/2	11 1/2	1	4 1/2
SDH 10	25	11	15	27 1/2	20	12	14 1/2	16 1/2	15 1/2	15 1/2	17 1/2	27 1/2	31 1/2	20 1/2	2	1	17 1/2	4	7 1/2	20 1/2	25	24	12 1/2	15 1/2	14 1/2	1	5 1/2			
SDH 12	26	11 1/2	17	32 1/2	24 1/2	12	1	17	19	16 1/2	17 1/2	20 1/2	32 1/2	1 1/2	37	24 1/2	2	1	19 1/2	4	8	20 1/2	29 1/2	17	14	2 1/2	16 1/2	2	5 1/2	

* INCLUDES 3" HIGH MOTOR ADAPTOR WHEN USED