Layne Christensen Company
721 W. Illinois Avenue
Aurora, IL 60506

630/897-6941
graniteconstruction.com

January 15, 2020

Mr. Robert Leible
City of Aurora
44 E. Downer Place
Aurora, IL 60507

Re: Well 28

Mr. Leible:

The Aurora Well 28 Byron Jackson submersible pump has been removed; 10" Line Pipe racked on site; and the bowl and motor have been inspected. Please find the Aurora Well 28 Pump Inspection Report (PIR) attached. The reason for the pump's low capacity is apparent via a large hole in the Line Pipe just below the lower surge control valve.

Based upon the recommendations of the PIR, estimated project cost is as follows:

1.	Labor and equipment to remove pump, inspect bowl and motor, HyPot test cable	$ 39,227
2.	Transport Line Pipe and material handling, estimate	$ 15,000
3.	Sandblast Line Pipe for inspection, estimate	$ 5,000
4.	Service motor, estimate	$ 10,000
5.	Televise Well	$ 1,350
6.	Rebuild bowl assembly, estimate	$ 25,000
7.	Rehabilitate (30) lengths 10", schedule 60, 8RND, estimate	$ 15,000
8.	Replace 17 lengths 10", schedule 60, 8RND, SRL (contingency)	$ 30,872
9.	150' #2/2.4kV submersible cable	$ 3,750
10.	Sand Bail 5 Days (contingency)	$ 17,500
11.	Dynotek transducer assembly, furnish and install to well head	$ 6,950
12.	Miscellaneous consumables (airline, banding, etc.) estimate	$ 3,000
13.	Remobilize, set and test pump, estimate	$ 35,000
	Total Project Estimate	$207,649

These estimates include the Professional Service Agreement discounts.

The City is encouraged to visit our yard to inspect the bowl and motor components at any convenient time and to inspect the Line Pipe components once they have been sand blasted for examination.

If you have any questions or comments, please do not hesitate to contact me.

Layne Christensen Company

William Balluff, P.E.
Area Manager

721 WEST ILLINOIS AVE.
AURORA, IL 60506
630.897.6941 PHONE
630.897.6976 FAX

CITY OF AURORA
WELL #28 PUMP INSPECTION REPORT

JOB NAME	Aurora		WELL	28	DATE	01/13/2020
JOB NO.	982278	INSPECTED BY	J. Poppen, J. Kopp, M. Poppen, B. Balluff, J. Iverson			
		BOWL ASSEMBLY	Byron Jackson13 stage 13MQ/12MQH all bronze construction			
		COLUMN ASSEMBLY	10" T&C schedule 60, 8RND thread, SRL			
		MOTOR	Byron Jackson 400 HP, 17", 2300V, type H			

MOTOR

Motor Observations

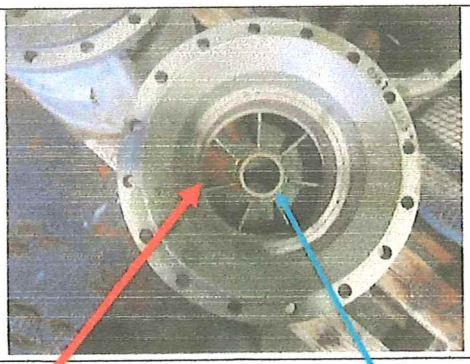
Motor S/N 17-1010-4-1RB. Resistance megs OL at motor terminals. Shaft projection and rotation meet specifications. The stator can, lower can, O-Ring joint, and balance tube are in good condition. The motor is field service eligible. Reference attached Motor Inspection Report.

Motor Recommendations

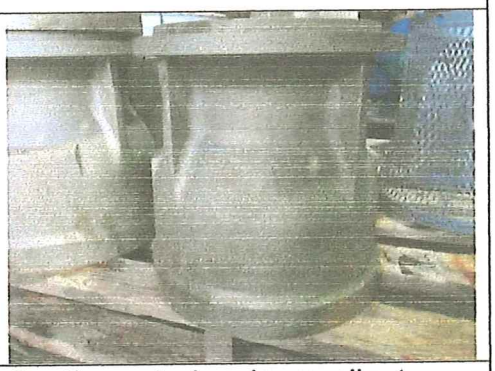
Perform standard field motor service and reinstall.

BOWL ASSEMBLY

Byron Jackson 13MQ/12MQH all bronze bowl assembly components after disassembly and clean up



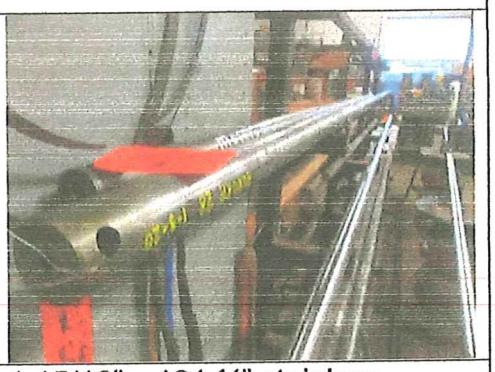
Wear ring clearances exceed acceptable tolerance. Bushing clearances on high end, or exceed acceptable tolerance. (Photo typical of all castings)



Casting exteriors in excellent shape. (Photo typical of all castings)

Stainless strainer symmetrically deformed.

Heavy iron build up in stainless nipple off of bowl. Similar to heavy iron build up in interior of bowl assembly prior to sandblast.



1 15/16" x 191 ¼" stainless impeller shaft.

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WELL #28 PUMP INSPECTION REPORT

Bowl Assembly Observations

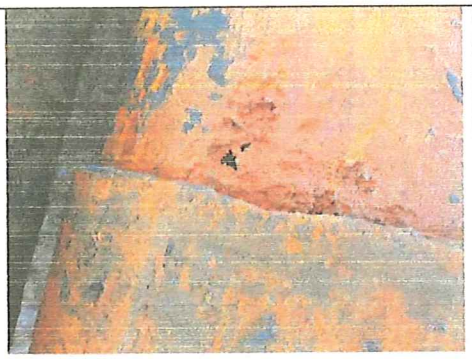
The bowl assembly is all bronze construction. All wear ring clearances exceed acceptable tolerance. Bowl bushing clearances either are on the high side of tolerance or exceed tolerance. The impeller shaft has light wear but is acceptable for reuse. The stainless fasteners and collets are in good condition. The bronze castings and impellers are in excellent condition. The stainless strainer was symetrically "sucked in" on four sides. Reference attached Bowl Inspection report.

Bowl Assembly Recommendations

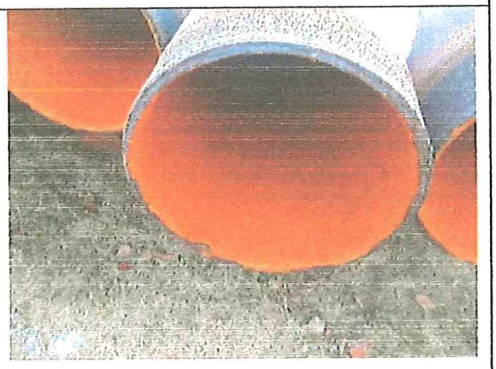
Rebuild bowl with custom wear rings and bushings. Replace strainer with stainless that has more inlet area.

COLUMN PIPE

10" pipe racked on site.

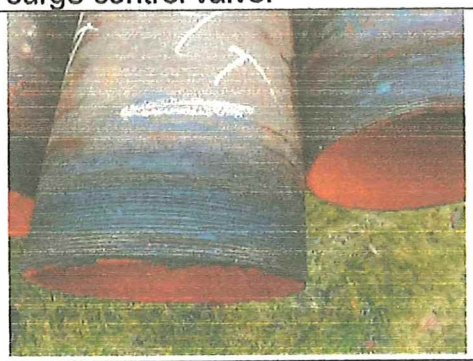


Hole in pipe just below lower surge control valve.



Heavy build up on pipe interior (typical of all).

The seventeen lowest pipe joint, on right, were submerged under static water level. Build up is too heavy to determine pipe integrity prior to sand blast.



Damaged male threads above static water level. Typical of seven pipe joints.

Eroded coupling above static water level. Typical of eleven couplings.

Pipe Observations

The 10" column pipe remains racked on the well site. All pipe have a heavy interior buildup of deposition. The lowest seventeen joints, which were submerged below static water level, have a moderate to heavy buildup of deposition on their exteriors. Final inspection and repair determination on these seventeen joints cannot be accomplished until they are sandblasted for inspection. A hole was

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WELL #28 PUMP INSPECTION REPORT

WELL
Well Observations
The well has not been televised
Well Recommendations
Budget 5 days of sand bailing as a contingency pending televising of well.

BYRON JACKSON MOTOR INSPECTION - TYPE H

Inspected By J. Iverson Date 12/18/19

Job Name Aurora 28 Job # 982278

HP 400 Size 17 Voltage 2300

Motor Serial # 17-1010-4-1RB

Meg Overload

Shaft Projection Spec 8 13/16

Shaft Projection Measured 8 13/16

Rotation Good

Condition of Stator Can Good

Condition of Lower Can Good

Condition of O-Ring Joint Good

Condition of Balance Tube Good

Balance Tube Clear? Yes

Comments

Is Motor Field Service Eligible? Yes

Recommendations: Standard field service.

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BOWL ASSEMBLY INSPECTION REPORT

Project	Aurora, IL	**Well No.**	28	**Date**	1/15/2020
Project No.	982278	**Inspected by**		Jeff	
Serial No.	can't read	**Bowl Assembly**		13/12MQH – All Bronze	

Stage No.	Wear Ring	Impeller Skirt	Clearance	Bearing ID	Impeller Shaft	Clearance
1 (suction)	6.504	6.448	.056"	1.950	1.936	.014"
2	6.524	6.448	.076"	1.948	1.936	.012"
3	6.527	6.448	.079"	1.948	1.936	.012"
4	6.527	6.448	.079"	1.948	1.936	.012"
5	6.528	6.447	.081"	1.949	1.936	.013"
6	6.530	6.447	.083"	1.949	1.936	.013"
7	6.531	6.446	.085"	1.949	1.936	.013"
8	6.547	6.445	.102"	1.950	1.936	.014"
9	6.540	6.446	.094"	1.950	1.936	.014"
10	6.545	6.443	.102"	1.949	1.936	.013"
11	6.536	6.447	.089"	1.948	1.936	.012"
12	6.534	6.447	.087"	1.948	1.936	.012"
13	6.533	6.447	.086"	1.948	1.936	.012"
14			***Top Bowl →***	1.950	1.936	.014"
15						
16						
17						
18						

Impeller Shaft	1-15/16" x 191-1/4" – Light wear. Okay to reuse.
Fasteners	SST – Okay to reuse.
Strainer	SST – Appears the iron build up caused it to distort.
Collets	SST – Okay

COMMENTS:

- ***Bronze castings and impellers are in excellent condition.***
- ***Interior of bowl was packed with thick iron deposition prior to clean up.***

WATER RESOURCES

721 W. Illinois Avenue; Aurora, IL 60506 | Office: 630-897-6941 | Fax: 630-897-6976 | layne.com

CABLE HIGH POTENTIAL TEST

Layne
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Customer: Aurora, IL Date 1/15/2020 Job No 982278

Well No.: 28 Location: Aurora, IL – Layne Yard

Cable Description 5kV #2 w/ground Length 900' (approx.) Installed By

Type of Test Proof Max. Test Voltage 5,000 Duration 5 min. Motor Voltage 2,300

Weather Indoors Temperature 65°F Humidity

Test Equipment 6 kV Test Set Test Engineer J. Geltz Time

READINGS ON VOLTAGE RISE

Test Voltage	Leakage I in Micro - Amps			
	AØ Blue	BØ Red	CØ Yellow	
1000	4.9	3.7	3.8	
2000	5.4	4.5	4.3	
3000	5.5	5.1	4.9	
4000	5.7	4.6	5.2	
5000	4.9	5.0	4.8	

READINGS WITH VOLTAGE CONSTANT

Time in Min.	Leakage I in Micro - Amps			
	AØ Blue	BØ Red	CØ Yellow	
0	4.9	5.0	4.8	
1	.7	.7	.6	
2	.6	.7	.6	
3	.7	.6	.6	
4	.6	.6	.5	
5	.7	.5	.5	

DISCHARGE TIME

Comments:

Cable tested without flat cable. Leakage values are quite low and cable appears suitable for reuse. However, note that reinstallation means cable as tested on spool above ground will be flexed over cable sheaves, squeezed against pipe by stainless steel banding and will be subject to possible down-hole damage, as well as significant hydrostatic pressure. Hypot testing may not detect leakage to atmosphere (i.e. external holes in cable insulation).

Witness: Signature:

John Geltz

CABLE HIGH POTENTIAL TEST

Customer: Aurora, IL Date 1/15/2020 Job No 982278

Well No.: 28 Location: Aurora, IL – Layne Yard

Cable Description #4 Flat Cable Length _____ Installed By _____

Type of Test Proof Max. Test Voltage 5,000 Duration 5 min. Motor Voltage 2,300

Weather Indoors Temperature 65°F Humidity _____

Test Equipment 6 kV Test Set Test Engineer J. Geltz Time _____

READINGS ON VOLTAGE RISE

Test Voltage	Leakage I in Micro - Amps			
	AØ	BØ	CØ	
	Orange	Yellow	Green	
1000	2.1	1.9	2.0	
2000	2.4	2.1	2.3	
3000	2.3	2.2	1.9	
4000	1.9	1.8	1.9	
5000	2.2	2.1	1.8	

READINGS WITH VOLTAGE CONSTANT

Time in Min.	Leakage I in Micro - Amps			
	AØ	BØ	CØ	
	Orange	Yellow	Green	
0	2.2	2.1	1.8	
1	.3	.3	.2	
2	.3	.2	.2	
3	.3	.3	.3	
4	.2	.3	.3	
5	.2	.3	.3	

DISCHARGE TIME

Comments:

BJ flat cable only. Leakage values are quite low and cable appears suitable for reuse. However, note that reinstallation means cable as tested on spool above ground will be flexed over cable sheaves, squeezed against pipe by stainless steel banding and will be subject to possible down-hole damage, as well as significant hydrostatic pressure. Hypot testing may not detect leakage to atmosphere (i.e. external holes in cable insulation).

Witness: Signature: John Geltz