Layne Christensen Company
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Aurora, IL 60506

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February 20, 2025

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

Re: Aurora Well 29

Mr. Leible:

The Aurora Well 29 Byron Jackson submersible pump has been removed due to a dead short at the Well head. The motor, bowl, pipe, cable and pitless adapter have been inspected. Please find the Aurora Well 29 Pump Inspection Report ("PIR") attached.

After removing the pump from Well 29, the City of Aurora requested we investigate potential interventions to increase Well 29's steadily decreasing Specific Capacity ("SC"). The City of Aurora requested Layne to provide a TV Survey (attached) of Well 29 for any visual indicators that could explain the decrease in SC.

Based upon the recommendations of the PIR, including well rehabilitation to attempt to bring up SC, estimated project cost, including PSA discounts is as follows:

Labor and equipment approval to date including pump removal, transport components to Layne yard, TV Survey, & HyPot Test Charged to P.O. 309301	$ 42,750
1. Component Inspections	$ 16,484
2. Byron Jackson 400 HP, 17", 2300V, Type M exchange motor, 12 weeks lead time	$ 145,700
3. Byron Jackson 17" 2300V Flat Cable Motor Link	$ 12,303
4. Pipe Rehabilitation, estimate	$ 31,780
5. New 126ft of 10", schedule 60, 8RND Pipe @ $119.05/ft	$ 15,000
6. Rehabilitate pitless adapter, estimate	$ 4,000
7. Bowl Assembly Rehabilitation, estimate	$ 18,000
8. BoreBlast Formation up to 2 Days, option	$ 20,000
9. Sand Bail up to 2 Days, option	$ 10,500
10. Miscellaneous consumables (airline, banding, etc.) estimate	$ 2,000
11. Remobilize, set and test pump, estimate	$ 45,000
Total Project Estimate	$ 363,517
Less PSA Labor (est. $84,000) Discount 5%, Estimate	($ 4,200)
Less PSA Specialty (BoreBlast) Discount 10%, Estimate	($ 2,000)
Total Projected Estimate, Including PSA Discount	$ 357,317

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

Layne Christensen Company

Jesse Balluff
Project Manager

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CITY OF AURORA
WELL NO. 29
INSPECTION REPORT

JOB NAME	LN NE AURORA 29	WELL NO.	29	DATE	2/11/2025
JOB NO.	1568152	INSPECTED BY	J. Kopp, J. Iverson, J. Geltz, J. Balluff		
Motor	Byron Jackson 400 HP, 2300V, 17", Type M	BOWL ASSEMBLY	12 Stage 13MQ/12MQH11L1 – All Bronze		
Serial#	17T-1031-5-1RB	COLUMN ASSEMBLY	853' of 10" Sched 60, 8' Stainless Steel Bowl Pup		

MOTOR

Motor on pallet

Unguarded vent screw w/ paint rubbed off

Motor tag

MOTOR OBSERVATIONS

- Motor/cable assembly megged dead at the Well head and megged dead when at the surface.
- When the motor was drained of oil, it was full of water. The vent plug seen above was missing when the crew pulled the motor from the Well.
  - Layne believes the plug could have come unscrewed while pulling due to the evidence of paint being worn off near the vent plug. This also explains the water in the motor and the oil at the top of the Well.
- Once the motor dried out it began megging which was confirmed by Cory Tyner. Layne then inspected the motor for field serviceability. At which point, it was found that the motors thrust bearing was worn out.

MOTOR RECOMMENDATIONS

- Layne recommends utilizing Aurora's spare motor that is in Layne's yard for Well 29
- We recommend sending the current motor back to Flowserve and utilize it as credit towards an exchange motor. Once it is returned, Layne will store it as the new spare motor.

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CITY OF AURORA
WELL NO. 29
INSPECTION REPORT

BOWL ASSEMBLY

Bottom of bowls

Impellers

Top of bowl, bowl seat

Impeller shaft

Stainless-steel bowl pup

Stainless-steel bowl pup, bowl connection

BOWL ASSEMBLY OBSERVATIONS

- 12 Stage 13MQ/12MQH11L1 – All Bronze bowl assembly, with 8’ stainless-steel bowl pup
- 12th stage ring seized to impeller, appears from thrust bearing reduction in motor causing the top impeller to ride at seat location for minimal period and causing a burr at the bottom of the skirt.
- All impellers in good condition.

BOWL ASSEMBLY RECOMMENDATIONS

- Layne recommends the following repairs to the bowl assembly:
  - A new impeller shaft
  - Recondition impellers
  - New wear rings
  - New bushings

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CITY OF AURORA
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INSPECTION REPORT

COLUMN PIPE

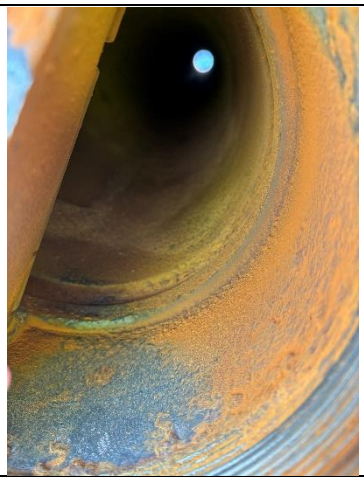
Pipe on rack for inspection

J. Kopp inspecting thread engagement depth

Short thread engagement and thread deterioration

Improper thread engagement and stretched threads

Improper thread engagement depth in coupling



Surge control pitting

COLUMN PIPE OBSERVATIONS

- The total string includes forty, 10”, sched. 60, 8RND thread pipe with one 10”, 8RND pipe nipple welded to the pitless spool assembly, and one 10” stainless steel bowl pup attaching the bowl to the column pipe.
- The length of string, with pitless pipe nipple is 853’.
- The pipe is not epoxy coated as the thicker walled iron of the sched. 60 pipe takes the place of the epoxy coating.
    - The majority of the sched. 60 column appear in good condition.
- Almost all male threads presented evidence of short threading, rolled threads, cross threading, thread stretching, and thread erosion.
- Almost all couplings presented evidence of improper engagement to pipe on both ends, stretching threads, and thread erosion.
- The pitless pipe nipple shows extensive evidence of stretching.
- The stainless-steel bowl pup appears in good condition.

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COLUMN PIPE RECOMMENDATIONS

- Layne recommends cutting and rethreading all 40 pieces and replacing all 38 couplings to provide proper 8RND engagement to couplings per API specifications. The sched. 60 pipe adds additional weight to the string. The 8RND threading provides extra strength to better secure the additional weight, given proper engagement.
    - Most pieces appear in good condition for reusing and putting new threads on. Due to cutting loss, we are estimating 2 new pieces of 20' sched. 60 pipe. Pipe that has lost too much material, we will need to replace with new as well.
- The pitless pipe nipple can be reused, cut and threaded, and welded back to the pitless assembly.
- Replace both 10", 8RND surge control valves per best pump maintenance practice.

CABLE OBSERVATIONS

- All ~910' of cable is in good condition.
- Flat cable presented high levels of leakage when high potential tested.

CABLE RECOMMENDATIONS

- Replace 2300V flat cable with new.

WELL OBSERVATIONS

- Well has a 22" casing to 675', then open hole to an 18" liner from 902' to 1030', back to open hole. The Galesville Sandstone Formation (the targeted producing formation) begins at 1188' and goes to 1398'. The observed total depth from the TV survey was ~1397', indicating that back fill has begun entering the formation.
    - Layne's records indicate the original depth of this well is 1418'.
- Evidence of large scaling above static water level.
- The City has observed a drop in specific capacity ("SPQ") since 2017. Layne has looked into this and checked on rehabilitation options for the City.
- Layne has studied the City's Well 29 log, and it appears that water draw down is the primary symptom affecting the drop in SPQ, indicating the production formation is not back fillings as efficiently as it once use to.

WELL RECOMMENDATIONS

- Layne's recommendation is to scratch the casing to break loose the scale build up, Boreblast the producing formation, and bail the backfill out of the Well.

LAYNE CHRISTENSEN COMPANY

BYRON JACKSON MOTOR INSPECTION REPORT – TYPE: M ☑ H ☐

DATE	01/29/2025				
JOB NAME	Aurora 29			**JOB #**	1568152
HP	400	**SIZE**	17"	**VOLTAGE**	2300V
MOTOR SERIAL #	17T-1031-5-1RB				
MEG	@500V - 2,187/2,327/3,110 (after a day drying out)				
SHAFT PROJECTION SPEC	8 7/8				
SHAFT PROJECTION MEASURED	8 5/8 (!!!) - Bad thrust bearing				
FACE RUNOUT	Not tested (shaft projection issue)				
RABBET ECCENTRICITY	Not tested (shaft projection issue)				
ROTATION	Bad = Will turn but very hard				
FLOAT	N/A				
CONDITION OF STATOR CAN	Good				
CONDITION OF LOWER CAN	Good				
CONDITION OF O-RING JOINT	Good				
COMMENTS:	Balance line almost plugged				
IS MOTOR FIELD SERVICE ELIGIBLE?	**YES**	☐	**NO**	☑	
RECOMMENDATIONS:	Return to flowserve - J. Iverson 01/30/2025				

BOWL ASSEMBLY INSPECTION REPORT

Project	Aurora, IL	**Well No.**	29	**Date**	2/7/2025
Project No.	1568152	**Inspected by**		John Kopp	
Serial No.	Flowserve All Bronze	**Bowl Assembly**		13MQ/12MQH11L1 – 12 Stage (9 full H, 2 trim H @8.250, 1 full L)	

Stage No.	Wear Ring	Impeller Skirt	Clearance	Bearing ID	Impeller Shaft	Clearance
1 (suction) full H	6.565	6.465	.100	1.946/1.948	1.935	.011/.013
2 full H	6.555	6.467	.088	1.960	1.931	.029
3 full H	6.556	6.468	.088	1.961	1.932	.029
4 full H	6.561	6.468	.093	1.958	1.932	.026
5 full H	6.560	6.466	.094	1.961	1.932	.029
6 full H	6.561	6.465	.096	1.962	1.932	.030
7 full H	6.560	6.467	.093	1.961	1.933	.028
8 trim H	6.556	6.466	.090	1.960	1.932	.028
9 trim H	6.562	6.466	.096	1.962	1.933	.029
10 full H	6.564	6.467	.097	1.959	1.933	.026
11 full H	6.556	6.467	.089	1.963	1.932	.031
12 full L	Ring seized	Ring seized	Ring seized	1.960	1.932	.028
			Top Case	1.973	1.929	.044

	Note: Pump contains 8’ SST pipe off bowl (10”) with 8RD coupling, needs to be cleaned
Impeller Shaft	1-15/16” X 178”, mic .002 to .008 under nominal, replace with new
Fasteners	SST, ok for reuse, replace lock washers
Strainer	SST, ok for reuse
Collets	SST, ok for reuse

COMMENTS: All bronze castings are good for reuse with recommended repairs. 12th stage ring seized to impeller (appears from thrust bearing reduction in motor causing the top impeller to ride at seat location for minimal period and causing a burr at the bottom of the skirt. We will need to chuck this casting and check trueness of ring bore and repair as needed. All impellers are ok for reuse, we will true skirts. New wear rings are going to be made as well. New impeller shaft is needed as well. Please see hours estimate for other suggested repairs. Pump is set up for 17” motor and 10” discharge

DOWNHOLE VIDEO SURVEY REPORT

Date: 1/27/2025

Client: City of Aurora

Project Number: 1568152 Well No: 29 S.W.L. 471’

Location: 1374 Deerpath Road

County: Kane City: Aurora State: IL

Was Well Backflushed No

Well Description: 22” casing to 675’, 18” Liner from 902’-1030’. Galesville Sandstone Formation: ~1188’-1398’.

Depth		Description
13’	471’	Heavy scale with large Sheets of scale consistent above static water level
471’		Static water level (decent amount of oil on top) water is very cloudy
532’	616’	Light scale build up (consistent below water)
616’		Water starts to clear up (scale build up getting heavier)
673’		Bottom of casing
902’		Top of 18” liner
915’	1030’	Black scale build up (“Barnacles”)
1030’		Bottom of 18” liner
1042’		Crevices
1052’		Crevices
1266’		Crevices
1390’		Top of broken PVC
1397’		Bottom scale, PVC, banding, soft

It has been noted that Well 29’s specific capacity has been decreasing since repairs were made to the pump in 2017. The Galesville Sandstone Formation (the “Formation”) appears healthy. Scale and sand are also building up into the Formation (total depth of 1397’, formation bottom is 1398’) which could begin to impact specific capacity the more it fills the formation. The scaling on the casing is heavy.

Recommendations:
Boreblast (air blast) the formation to open it up. Bore blasting is easier on the formation to not kick up as much sand as shooting the well causes.
Scratch the casing to break heavy scaling.
Bail the sand and scale out of the bottom to reach original depth again.

Technician	J. Rumple	**Account Manager**	J. Balluff
Project Manager	J. Balluff	**Operations Review**	B. Diehl

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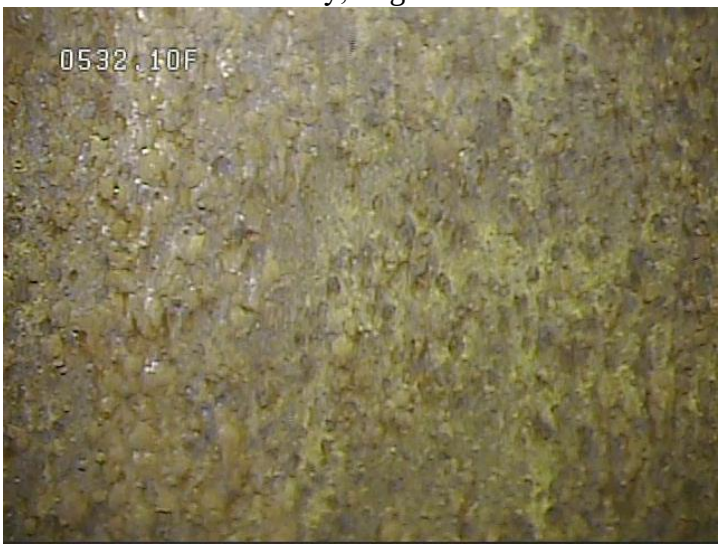
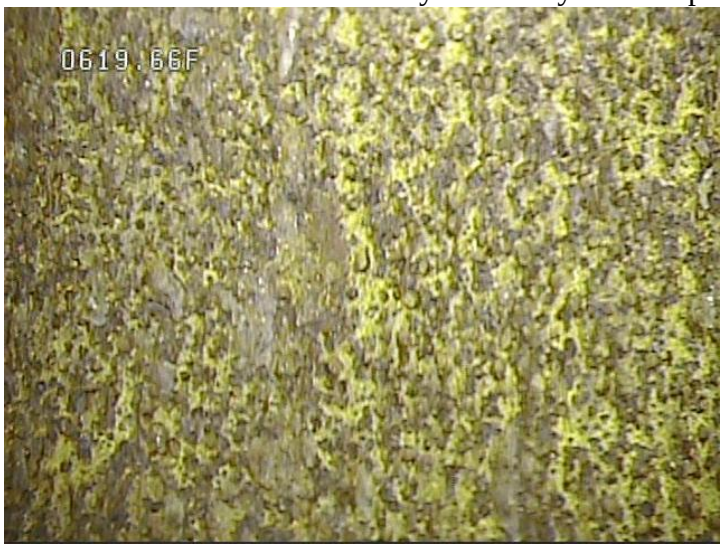
13’ – 471’ Heavy, large sheets of scale

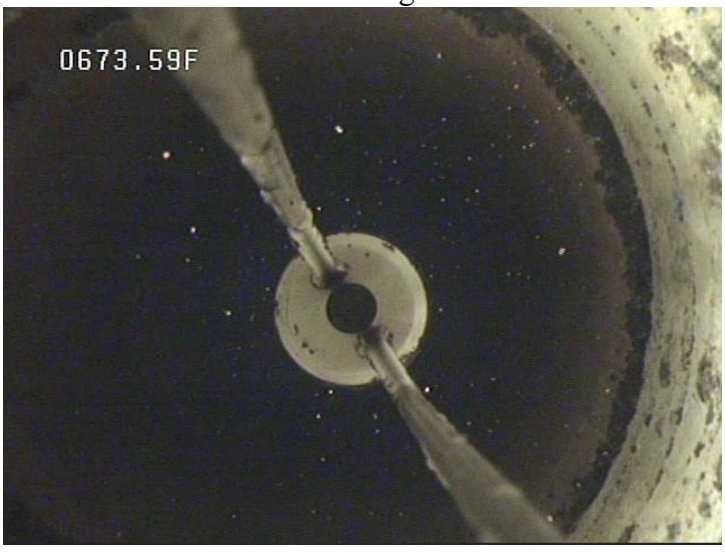
471’ Static water level – Cloudy and heavy oil on top



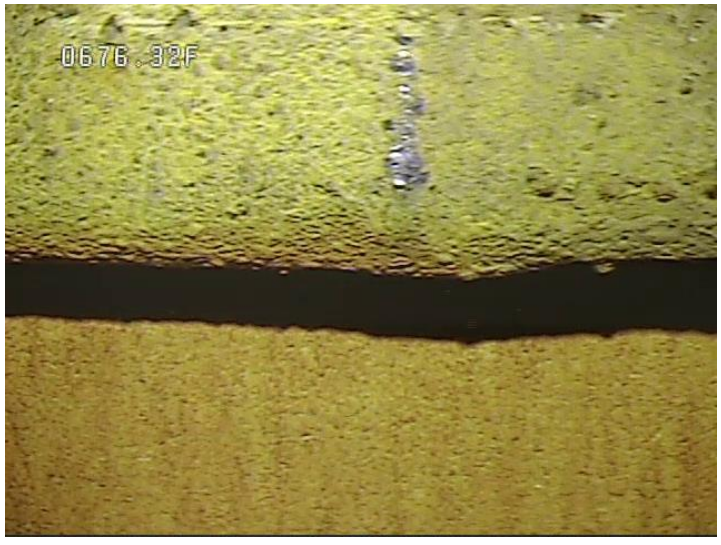
532’ – 616’ Light scale



616’ Scale becomes heavier



673’ Bottom of casing



Cnt. 673’ Bottom of casing

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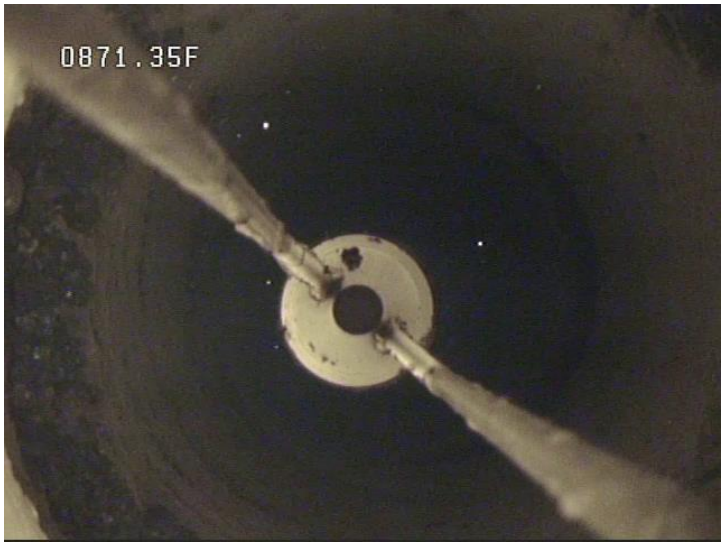
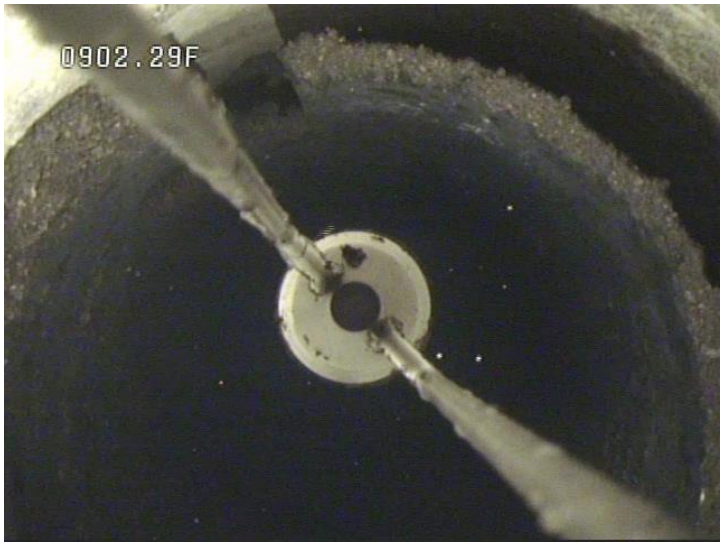


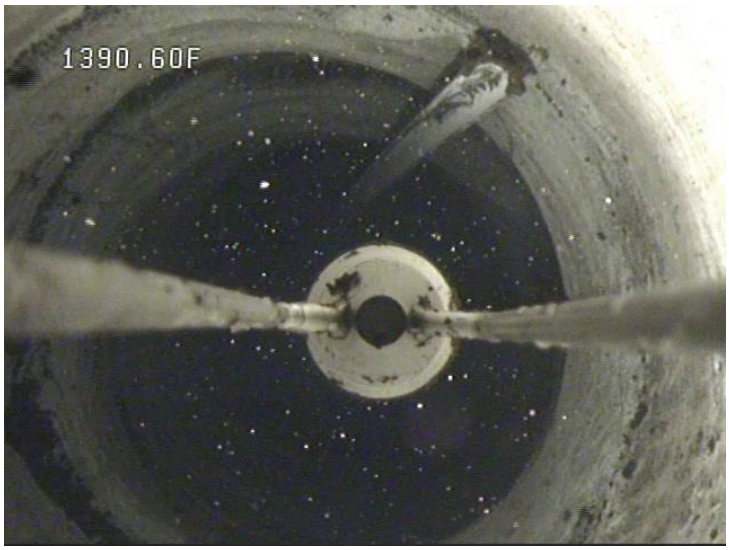
871’ ~Area of pump assembly



902’ Top of 18” liner

1030’ Bottom of 18” liner

~1052’ Large crevice



1390’ Top of broken PVC at bottom

1397’ Bottom settled scale/sand, soft

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