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

630/897-6941
graniteconstruction.com

October 20, 2018

Mr. Robert Leible
Assistant Superintendent of Water Production
City of Aurora
44 E. Downer Place
Aurora, IL 60507

Re: Well 127

Mr. Leible:

The Byron Jackson submersible pump was removed from Well 127 due to low cable/motor assembly electrical resistance. The flat cable motor link was found to be the problem. During this pump's last repair in 2010, the entire string of Line Pipe was replaced due to heavy corrosion. At that time, sacrificial anodes were installed on the pipe. The anodes were effective in that the pipe can be reused but it will require rethreading.

Please find Layne's Well 127 Pump Inspection Report attached. Total project estimate per the report's recommendations are as follows:

1.	Labor and equipment to date to remove pump; transport; disassemble, clean, and inspect components; televise well; Hi-Pot test cable	$12,000
2.	Service Byron Jackson motor, estimate	$ 5,000
3.	Rebuild bowl assembly, estimate	$ 4,000
4.	Rehabilitate Line Pipe including new zinc anodes, estimate	$ 3,500
5.	New flat cable motor link	$ 6,000
6.	Handle, transport, and install pump, test to waste, estimate	$ 9,000
	Total Project Estimate	$39,500

I am attaching a new Schedule B. Our labor contract called for a 1 ½% increase on October 1.

As always, we welcome and encourage the City to visit our yard and inspect the pump components with us. Layne will proceed with the repairs and reinstallation upon the City's written notice to proceed. If you have any questions or comments, please do not hesitate to contact me.

Layne, a Granite Company

William Balluff, P.E.
Senior Project Manager

WORK ORDER

Layne, a Granite Company
721 W. Illinois Avenue, Aurora, IL 60506; Phone (630) 897-6941
229 W. Indiana Ave., P.O. Box 489, Beecher, IL 60401; Phone (708) 946-2244

PROFESSIONAL SERVICES AGREEMENT
SCHEDULE B

Purchaser: CITY OF AURORA, IL
Job Location: WELL 127

SERVICE RATES - EFFECTIVE OCTOBER 1, 2018

	Straight Time		Overtime	Doubletime
	Per Hr.	8 Hr. Day	Per Hr.	Per Hr.
Serviceman w/hand tools	193.00	1544.00	289.50	386.00
Serviceman w/service truck and hand tools, or welder	222.00	1776.00	318.50	415.00
Helper	157.00	1256.00	235.50	314.00
Serviceman and 1 Helper	350.00	2800.00	525.00	700.00
Small Rig or Winch Truck ($48.00)				
1 Man Crew	241.00	1928.00	337.50	434.00
2 Man Crew	398.00	3184.00	573.00	748.00
3 Man Crew	555.00	4440.00	808.50	1062.00
Middle Rig, Large Hoist or Flatbed Crane ($64.00)				
1 Man Crew	257.00	2056.00	353.50	450.00
2 Man Crew	414.00	3312.00	589.00	764.00
3 Man Crew	571.00	4568.00	824.50	1078.00
Big Rig, Large Hoist and Poles, or Large Crane ($105.00)				
1 Man Crew	298.00	2384.00	394.50	491.00
2 Man Crew	455.00	3640.00	630.00	805.00
3 Man Crew	612.00	4896.00	865.50	1119.00
4 Man Crew	769.00	6152.00	1101.00	1433.00
Power Tong Usage, per 8 hour shift		460.00		
Machine Shop/Yard Labor and Equipment				
Machinist and Equipment	187.00	1496.00	272.00	357.00
12" Threading Machine and Operator	213.00	1704.00	298.00	383.00
Serviceman w/hand tools	170.00	1360.00	255.00	340.00
Helper	155.00	1240.00	232.50	310.00
Sandblast Equipment and 2 man crew	373.00	2984.00	535.50	698.00

Mileage: Auto: $0.55 Pickup: $0.70 1-Ton:$1.00 2-1/2 Ton Flatbed: $2.10 Semi-Tractor: $2.75

Subsistence-Per Man
Over 55 miles radius from home office.....$65.00 + Hotel

REMARKS:
SUBMITTED WITH REPAIR ESTIMATE OF 10/20/2018

Work Authorized on Behalf of Purchaser By: _____

Date: _____ Title: _____

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

CITY OF AURORA
WELL NO. 127 PUMP
INSPECTION REPORT

JOB NAME	Aurora		WELL NO.	127	DATE	10/16/2018
JOB NO.	51161	INSPECTED BY	J. Poppen, J. Kopp, J. Gilchrist, B. Balluff			
		BOWL ASSEMBLY	Byron Jackson 3 stage 10MQH, all bronze			
		COLUMN ASSEMBLY	95' of 6" T&C Line Pipe, SRL			
		MOTOR	Byron Jackson 40 HP, 10", 460V, Type H			

MOTOR

Motor Observations

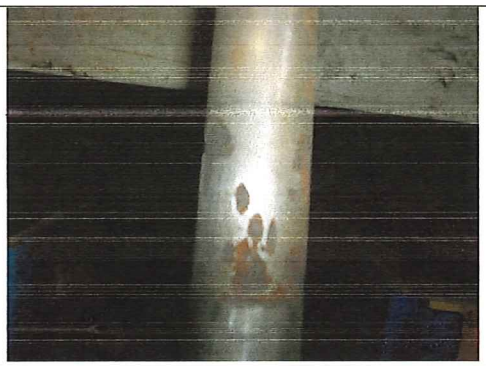
The motor megged 2700+ in the field and overload in the shop. Shaft projection, shaft rotation, and seal float meet specification. The exterior of the cans and the o-ring joint are in good condition. The balance tube is plugged with deposition. Reference attached Byron Jackson Motor Inspection – Type H

Motor Recommendations

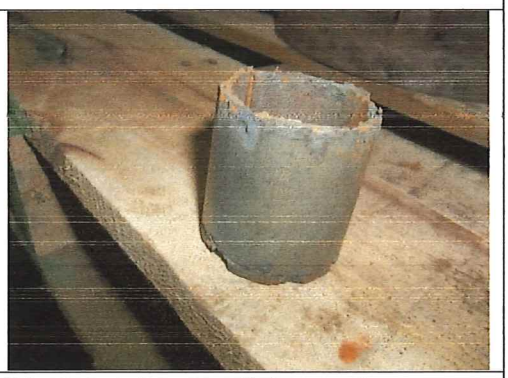
Perform standard field motor service with balance line replacement and epoxy coat exterior.

BOWL ASSEMBLY

Bowl castings are in excellent condition with very little wear to internal clearances.



The stainless impeller shaft is heavily pitted.



The stainless collets are in very poor condition.

Bowl Assembly Observations

The wear ring clearances are well within new specification. Bushing clearances exceed tolerance. The stainless impeller shaft and collets exhibit heavy pitting and are in poor condition. It is an unusual circumstance that these stainless components are so heavily decayed. Stainless fasteners and suction strainer are in good condition. Reference attached Bowl Assembly Inspection Report.

Bowl Assembly Recommendations

Rebuild bowl assembly with new bushings, collets, and impeller shaft.

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CITY OF AURORA
WELL NO. 127 PUMP
INSPECTION REPORT

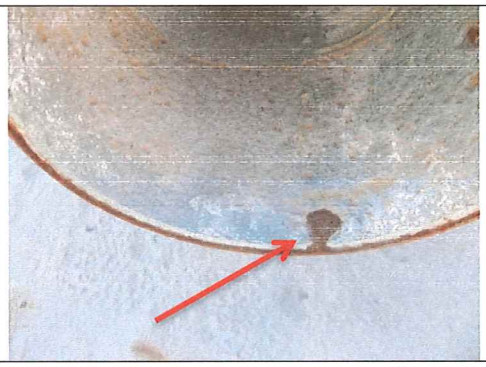
COLUMN PIPE

6" Line Pipe on Layne blast rack.

Heavy iron deposition on pipe interior prior to sand blas (typ.)

Zinc sleeve sacrificial anodes appear to have abosorbed the brunt of corrossion.

However, the pipe still has some random pitting.



Interior pipe pit above sacrificial zinc anode.

Eroded thread on coupling.

Pipe Observations

After the entire string of 6" Line Pipe required replacement in 2010, sacrificial zinc anodes were installed on the new pipe. The anodes appear to be a good investment as they have taken the brunt of the corrosion in the last eight years of operation. However, all four single random joints do require thread removal and rethread (cut & thread). Three couplings and the surge control require replacement. The pitless guts and the pitless' threaded nipple are in good condition. The 6" x 5' stainless pup off the bowl is in good condition but its associated 6" Line Pipe coupling is in poor condition. The pipe string also includes 5' of 6" black steel with surge control valve.

Pipe Recommendations

Cut and thread four male ends. Replace three couplings and surge control. Plan a contingency to cut and thread two ends after removing the coupling/surge control – pending thread inspection at that time. Pending lost pipe length due to cut and thread, consider replacing 5" black steel nipple with new that compensates for the lost length. Install sacrificial zinc anodes.

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CITY OF AURORA
WELL NO. 127 PUMP
INSPECTION REPORT

CABLE – There is 6' of spare cable at the well head. The cable/motor assembly megged 0.4 at the well head and 0.3 with bowl/motor removed from well. The motor, without cable, megged 2700+.
The cable and flat cable failed high potential testing. The #2 cable, without the flat cable motor link, passed high potential testing.

Cable Recommendation: Replace the flat cable motor link.

WELL – The well was televised on 10/08/2018. The formation has one area of fracturing and crevicing from 108' to 118'. The total depth was logged at 226'. This is the same TD televised in 2010. Bailing was attempted at that time with no return. Reference attached Downhole Video Survey Report.

BYRON JACKSON MOTOR INSPECTION - TYPE H

Inspected By J. Gilchrist Date 10/10/18

Job Name Aurora 127 Job # 51161W

HP 100 Size 10 Voltage 460

Motor Serial # No Tag

Meg OL-OL-OL

Shaft Projection Spec 6 5/8

Shaft Projection Measured 6 5/8

Rotation great

Float great

Condition of Stator Can good

Condition of Lower Can good

Condition of O-Ring Joint good

Condition of Balance Tube plugged

Balance Tube Clear? No

Comments Motor is in excellent condition with the exception of heavy deposition in the balance tube.

Is Motor Field Service Eligible? Yes

Recommendations: Perform standard field motor service with balance line replacement. Sandblast exterior and epoxy coat.

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BOWL ASSEMBLY INSPECTION REPORT

Project	Aurora, IL	**Well No.**	127	**Date**	**10/09/2018**
Project No.	51161	**Inspected by**		Jeff	
Serial No.		**Bowl Assembly**		10 MQH	

Stage No.	Wear Ring	Impeller Skirt	Clearance	Bearing ID	Impeller Shaft	Clearance
1 (suction)	5.314	5.293	.021"	1.450	1.936	.014"
2	5.315	5.293	.022"	1.450	1.936	.014"
3	5.315	5.293	.022"	1.448	1.936	.012"
4				1.454	1.936	.018"
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

Impeller Shaft	1 7/16 X 47 1/16 – Heavy pitting. Poor Condition
Fasteners	SST. - OK to reuse.
Strainer	SST. - OK to reuse.
Collets	Poor condition – should NOT be reused.

COMMENTS: Impellers and pump casting in very good condition.

WATER RESOURCES

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

CABLE HIGH POTENTIAL TEST

Customer: Aurora, IL Date 10/03/2018 Job No 51161

Well No.: 127 Location: Aurora, IL –Layne Yard

Cable Description 600 Volt, #2 w/grnd.. Length Installed By

Type of Test Proof Max. Test Voltage 2,000 Duration 5 min. Motor Voltage 460

Weather Indoors Temperature 80°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		CØ	
	Red			
1st.				
400	269.7	UA		
800	.603	MA		
1200	.979	MA		
1600	1.396	Ma		
2000	1.794	MA		
2nd				
400	198.6	UA		
800	.426	MA		
1200	.607	MA		
1600	.759	MA		
2000	.916	MA		

READINGS WITH VOLTAGE CONSTANT

Time in Min.	Leakage I in Micro - Amps			
	AØ		CØ	
	Red			
0	1.974	MA		
1	1.299	MA		
2	1.006	MA		
3	.820	MA		
4	.698	MA		
5	.600	MA		
0	.916	MA		
1	.610	MA		
2	.496	MA		
3	.424	MA		
4	.371	MA		
5	.333	MA		

DISCHARGE TIME

Comments:

Cable tested with Byron Jackson flat cable attached. FAIL

Witness: Signature:

John Geltz

WATER RESOURCES

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CABLE HIGH POTENTIAL TEST

Customer: Aurora, IL Date 10/03/2018 Job No 501161

Well No.: 127 Location: Aurora, IL – Layne Yard

Cable Description 600 Volt, #2 w/grnd. Length 100' + or - Installed By

Type of Test Proof Max. Test Voltage 2,000 Duration 5 min. Motor Voltage 460

Weather Indoors Temperature 80°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	
	Red	Brown	Yellow	
400	1.6	1.3	1.2	
800	1.5	1.4	1.3	
1200	.9	1.6	1.4	
1600	1.3	1.4	1.6	
2000	1.5	1.5	1.6	

READINGS WITH VOLTAGE CONSTANT

Time in Min.	Leakage I in Micro - Amps			
	AØ	BØ	CØ	
	Red	Brown	Yellow	
0	1.5	1.5	1.6	
1	.5	.2	.5	
2	.4	.4	.2	
3	.4	.4	.4	
4	.3	.3	.3	
5	.5	.4	.4	

DISCHARGE TIME

Comments:

Hypot test Power Cable only w/NO B.J. flat cable attached. B.J. Flat-cable = 15' long. Leakage values are low.
Cable appears suitable for reuse.
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

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DOWNHOLE VIDEO SURVEY REPORT

Layne A GRANITE COMPANY

Date 10/08/2018

Client: City of Aurora, IL

Project Number: 51161 Well No: 127 S.W.L. 18' 6"

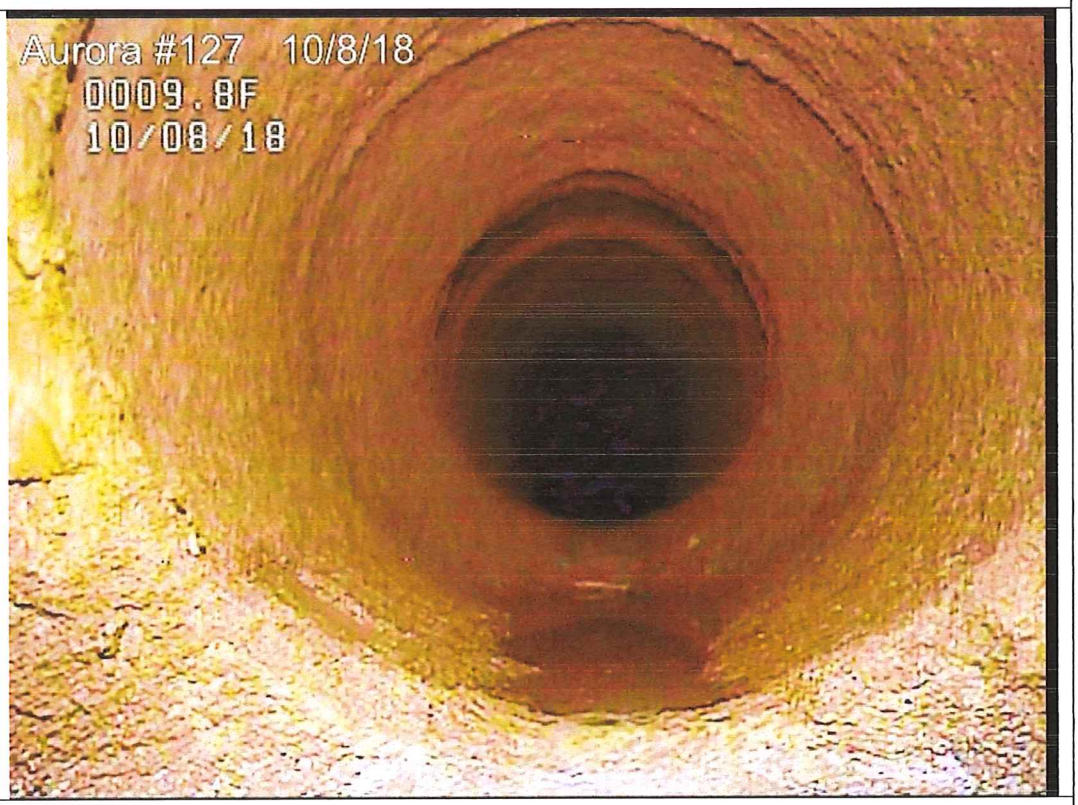
Location: 1048 Almond Drive

County: Kane City: Aurora State: IL

Sec: 8 Twp: 38N Range: 8E

Flash Drive Made: Yes x No ____ Well Back flushed no

Driller's Report: 24" cemented casing to 47', 19" open lime hole to 240' TD

Depth		Description
		All measurements from top of pitless at 26" above grade.
	Pitless discharge	
	18' 6"	Static water level

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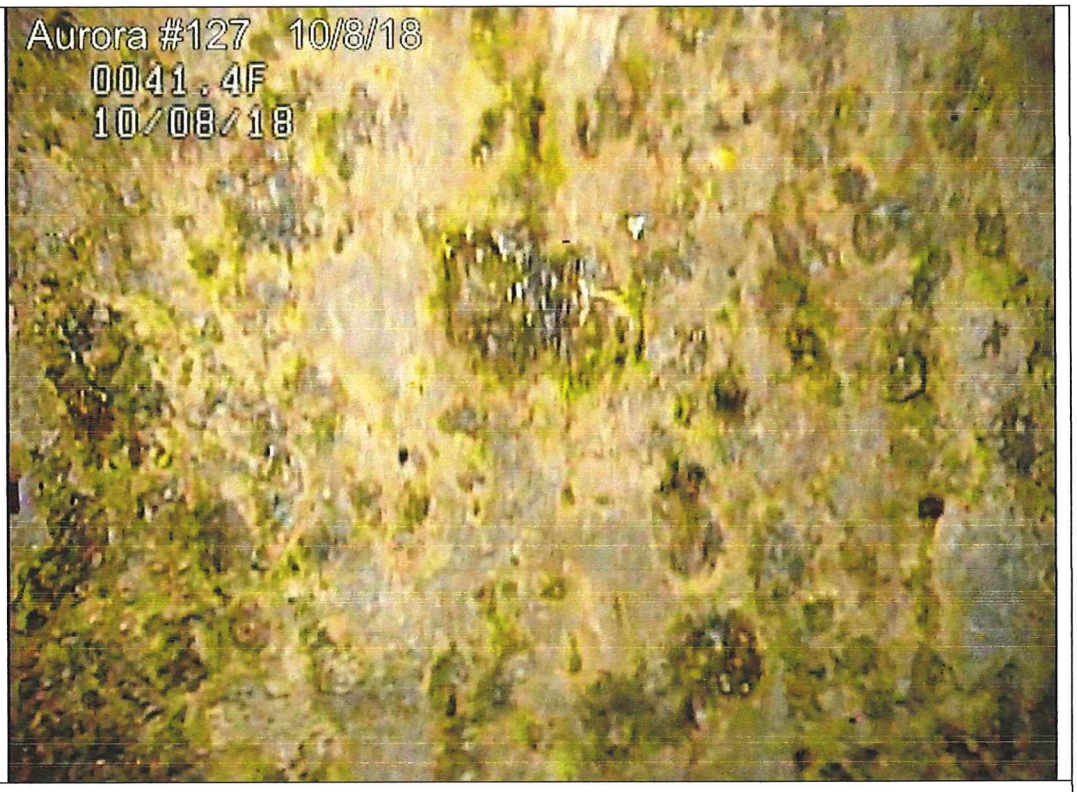
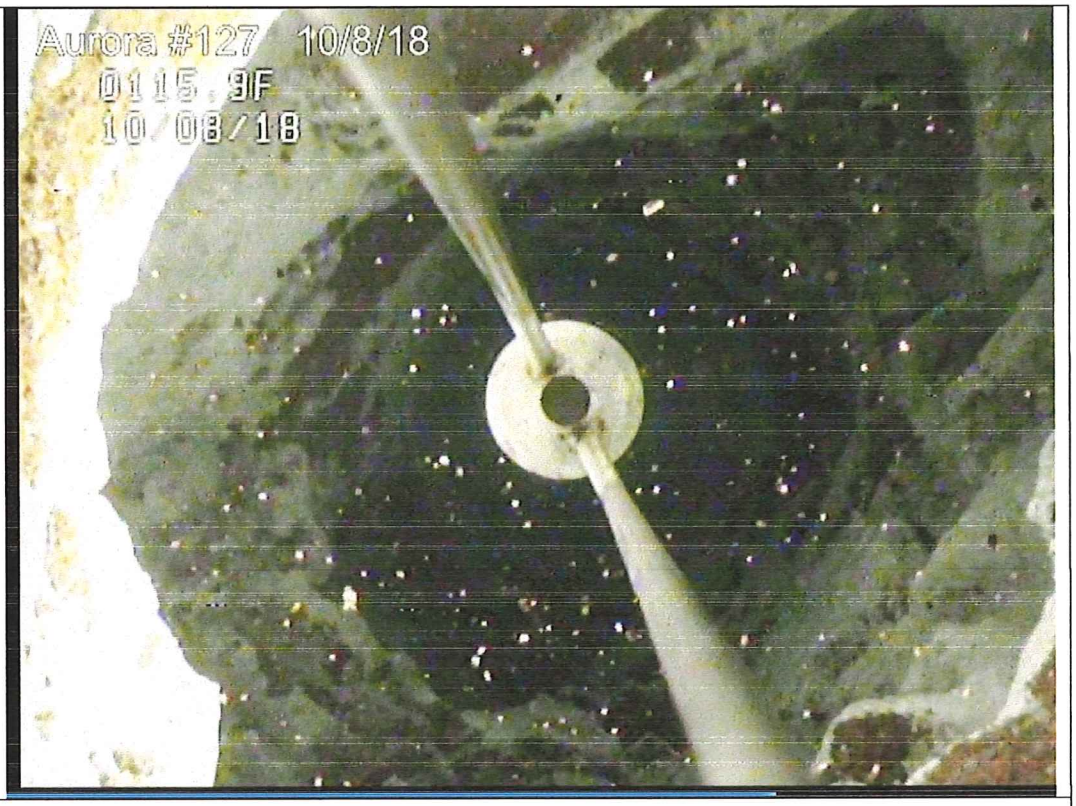
DOWNHOLE VIDEO SURVEY REPORT

18' 6"	46' Moderate scale on well casing.	

	46' Bottom of casing.	

	"Stalactites" hanging from bottom of casing	

108	118 The only significant fractures and crevicing in well's open limestone formation	

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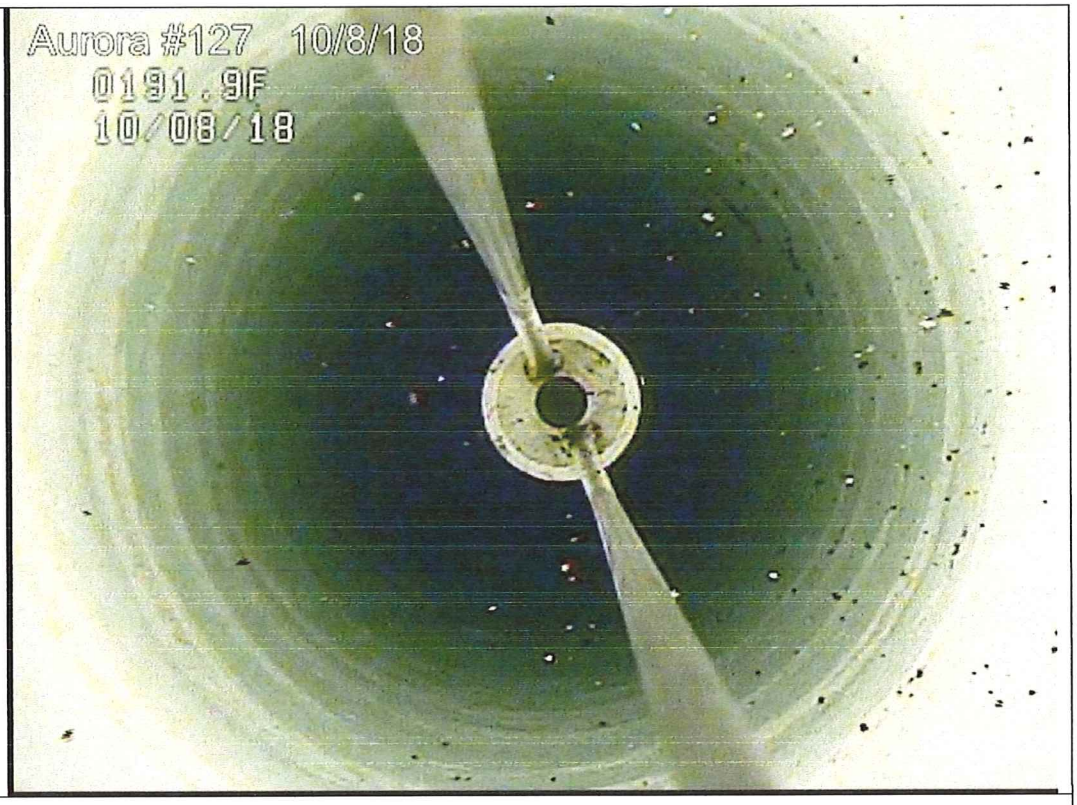
DOWNHOLE VIDEO SURVEY REPORT

118	226 Smooth bore hole.	
	226'	Total depth – the same total depth logged during 2010 pump repair.
		At that time, attempts were made to bail material with no return and no increase
		in total depth.

Technician	John Geltz	**Account Manager**	Michael McDonald
Project Manager	William Balluff, P.E.	**Operations Review**	William Balluff, P.E.