HI-SPEED INDUSTRIAL SERVICE

MILLINGTON, TN

February 3, 2021

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Subject: January North Plant Vibration Report

QualiTest® uses a four step rating system for defects.

Class I: Defect is present, but effect on reliability is not clear; no immediate action is required. Continue to normally monitor.

Class II: Defect (s) present that may cause problem in long term (2-6 months.). Repair during normal maintenance scheduling. Continue to monitor.

Class III; Defect (s) present that may cause failure in short term (less than 2 months.). This should be addressed as soon as practical, with a high maintenance priority. Increase monitoring frequency.

Class IV; Defect (s) present that makes continued reliability unpredictable, and possibility of secondary damage is high. Repairs should be made ASAP. An unscheduled shutdown should be considered for repairs

Hi-Speed **Industrial Service** tests and inspects industrial machinery and equipment and makes recommendations concerning maintenance and repairs based on its experience in the field of industrial repair and maintenance. The information contained herein is provided as an opinion only, not as a guaranty or warranty of the matters discussed herein.

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Observations

P1 CURD

Extraction Tank Discharge Pump 4170
Motor outboard has a 1x vibration of .73 in/sec peak which is slightly lower than last month. Inspect the foot bolts and ensure that they are properly torqued. There may be a loose/broken foot bolt. Inspect the coupling for wear/loose hardware. Consider checking for soft foot and checking alignment. Rated as a **CLASS II** Defect.

C30 #2 4381
Motor data is showing a large increase in high frequency vibration. For example, in September of 2020 the overall 1-20 KHz. Amplitude was .3 g's RMS. This month the overall at MIH was 3.36 g's RMS. Motor peakvue data is also showing an increase in amplitude at 120 HZ. which is 2 x line frequency and increased harmonics of 120 Hz. This indicates an electrical issue within the motor or motor connections. Because of the increase of high frequency amplitude, this is rated as a **CLASS III** defect.

C30 #1 4380
Motor data is showing some possible bearing issues in the DE of the motor. Electrical vibrations are also present, but not near the severity of C-30 #2. We will monitor this issue closely. Rated as a **CLASS II** defect.

3rd Extraction NX Pump 9322
Motor has a high axial vibration. Spectral data shows the vibration to be at 2 x rpm. This could be alignment/ coupling issue. There is also an increase in acceleration of the pump. High frequency rpm harmonics are present in the pump which may indicate internal looseness. Inspect unit for these issues as scheduling allows. Rated as a **CLASS II** defect.

3rd Extraction NX438 0715
This unit seems to be running with an imbalance, more than likely material has built up in the centrifuge. Also the motors has a high 1x vibration as well at motor run speed. Ensure that all foot bolts are torqued, belts are in good shape, and belt tension is appropriate for this unit. Rated as **CLASS II** defect.

Concentrator #1 4500
The back end bearing has had an increase in 1 x rpm vibration. The smaller bearings on the back side of the centrifuge also have high vibration. Data of these smaller bearings also show a high 1 x rpm vibration with rpm harmonics. It is recommended to inspect the bearings and couplings for looseness/wear soon. Rated as a **CLASS II** defect.

Concentrator #2 4495
Outboard end centrifuge bearing is showing strong signs of mechanical looseness. Unit also has some imbalance. Unit will likely need attention soon. Rated as a **CLASS II** defect.

1st Extraction NX438 0714
This unit has an extreme amount of vibration throughout the drive train. The dominant vibration is mainly at 1 x centrifuge rpm. This is likely due to imbalance of the bowl. There is also a lot of vibration at the back end of the unit. Motor and couplings appear to have some looseness/wear. It is recommended to replace this unit and also check back end motor and couplings for wear and likely replace these components as well. **Rated as a CLASS IV defect.**

2nd Extraction P5000 4340
Centrifuge bearings have a 1x and 2 x vibration this seems to indicate misalignment/excessive shaft run-out issue. Outboard centrifuge bearing (ODE) also has signs of bearing defects. Unit will likely need to be replaced as scheduling allows. Rated as a **CLASS II** defect.

Extraction Tank Discharge Pump 4170
Unit has a 1x vibration in the motor with a peak of .92 in/sec peak. Ensure all foot bolts are torqued, inspect coupling for loose bolts and wear. Preform an alignment at next available opportunity. Rated as a **CLASS III** defect.

5400 Discharge Pump South 4352
The foot bolts on the pump for this unit are loose and the pump is basically free floating. Install washers and new foot bolts. This unit also appears to have a misalignment causing a 1x vibration. We recommend after ensuring all foot bolts are tight, if vibrations persist, preforming an alignment as time allows. Rated as a **CLASS II** defect.

P1 DRYER

Cooling Ring Fan 1138
Motor has a high 1 x motor rpm axial vibration. Fan bearings appear to have fan rpm harmonics. This indicates severe looseness of the fan bearings. Fan bearings, sheaves, and belts need inspection ASAP. Rated as a **CLASS III** defect.

Northwest Blowback Fan 1041
Motor has a high vibration at 1 x rpm. This is the fan that was repaired during an emergency on the weekend. Fan wheel needs to be replaced with a new dynamically balanced wheel and motor base needs to be re-anchored to the concrete floor. Fasteners appear to be loose in the ground. Unit needs attention very soon. Rated as a **CLASS IV** defect.

Northeast Blowback Fan 1021
Motor has elevated 1 x rpm vibration I the motor verticals. This is likely due to imbalance. It is difficult to field balance these units due to flexible base and inadequate fasteners to the concrete. It is recommended to replace fan wheel with newly dynamically balance wheel or remove this wheel and dynamically balance the wheel in shop during a downtime. Rated as a **CLASS II** defect.

P1 IDN

Vacuum Pump 4890
Pump has cavitation that is causing high acceleration. Ensure pump flow is not restricted and is operating at optimal flow. Rated as a **CLASS I** defect.

P3 DRYER

P1 Blender 6650
Motor has an increased 1 x rpm vibration at MOV and MIA. It is recommended to inspect all motor fasteners ensuring they are tight. Ensure coupling bolts are tight as well. Rated as a **CLASS II** defect.

North Exhaust Fan 2531
Vibration data of the fan bearings indicate some signs of bearing defects beginning to occur in the outboard fan bearing. Peakvue trend of the FOH is trending upward at 1.6 g's compared to .2 g's last month. This appears to be early stage; however, given the history of failure of this unit, we are recommending an inspection of the bearing as soon as scheduling allows. Ensure grease is clean and adequate. Rated as a **CLASS II** defect.

Cooling Ring Fan 2448
Motor verticals are up this month quite a bit to .8 ips-pk. Vibration is at 1 x rpm of the fan or motor. It is difficult to determine which it is because the speeds are very close. For now, it is recommended to inspect the motor/base fasteners, sheaves for looseness, misalignment, and belts for proper tension and wear. Rated as a **CLASS II** defect.

P3 IDN

IDN Tank Discharge Pump 6124
Motor data shows an increase acceleration. There is also an unknown non-synchronous peak that may be bearing, or gear related. Motor/gear unit needs to be inspected as time allows. Rated as a **CLASS II** defect.

P3 CURD

Concentrator #5 0283

Motor inboard bearing data indicates defects within the bearing. Non-synchronous peaks are present with harmonics of 5.66 orders. Motor will need to be replaced SOON. Centrifuge is also out of balance with the inboard bearing have rpm harmonics in the spectral data indicating some internal looseness. Unit needs attention soon. Rated as a **CLASS III** defect.

South Reitz Grinder 0165

Grinder has visible shaft movement. Overall vibration in the grinder outboard bearing has increased from .01 to .8 ips-pk. Grinder bearing is wiped and grinder needs replacing ASAP. Rated as a **CLASS IV** defect.

Concentrator #1 0279

This unit has had a strong 1 x rpm vibration for some time now. This high vibration has caused mechanical looseness of the inboard centrifuge bearing. Because of the inboard bearing looseness, this unit will need to replaced soon. Rated as a **CLASS III** defect.

Concentrator #2 0280

Inboard centrifuge bearing shows a high axial vibration with 3 x rpm being dominant. Overall amplitude at CIA is 1.18 ips-pk. This may indicate excessive shaft run-out or cocked bearing. There is some high 1 x rpm vibration present in the verticals which is likely due to imbalance of the centrifuge. Inspect shaft run-out, check inboard bearing for looseness and make sure bearing isn't cocked. Build-up may be the cause of the high 1 x rpm vibration. Rated as a **CLASS II** defect.

Concentrator #3 0281

Overall vibration at the centrifuge outboard axial has **increased from .28 to 1.1 ips-pk**. Increase in vibration at the outboard centrifuge bearing is at 2 x rpm. This may indicate loose pillow block bolts but may be cracked frame/structure. Inspect unit for these issues ASAP. Rated as a **CLASS III** defect.

Concentrator #4 0282

Centrifuge has high 1 x rpm vibration with 2, 3, 4, x rpm smaller peaks. This is a combo of imbalance and some looseness of the bearings. Motor is also showing some early signs of bearing wear in the inboard bearing. Unit needs to be cleaned out soon to hopefully lower the high 1 x rpm vibration. Rated as a **CLASS II** defect.

C-30 #1 0085

Motor has some high electrical related vibrations that may indicate a connection issue internally in the motor. WE will monitor the electrical vibration closely. Centrifuge also shows some imbalance with amplitude of .7 ips-pk at the inboard horizontal. Rated as a **CLASS II** defect.

5000 Desludger 0300

Motor is showing some electrical vibrations related to possible winding issue. We will monitor this closely. Centrifuge has a high 1 x rpm vibration with the outboard centrifuge bearing showing some signs of internal looseness/wear. Overall vibration is beginning to increase to over 1 ips pk at the CIV. Unit needs to be cleaned and check outboard bearing as scheduling allows. Rated as a **CLASS II** defect.

3rd Extraction 5400

Motor is showing some signs of air gap issue and or internal electrical issue; however, the main issue in this unit is the extremely high 1 x rpm vibration in the centrifuge. **Over 2 ips at the inboard vertical**. **Centrifuge needs attention ASAP**. **Rated as a CLASS IV Defect.**

Wet-In Pump

Data of the motor and pump suggests coupling/alignment issue. Motor may also have a rotor bar issue. For now ensure all bolts are tight and check coupling for wear and unit for proper alignment. Rated as a **CLASS II** defect.

Flottweg Decanter #2 9301

Motor data shows sub-synchronous vibration that is likely 1 and 2 x belt frequency. This likely indicates a belt issue. Inspect belts and sheaves for defects, wear, misalignment as scheduling allows. Outboard centrifuge bearing is also showing signs of looseness. Rated as a **CLASS II** defect.

East Concentrator Feed Pump 0120

The pump has a high 1x vibration with 2x and 3x harmonics. Most likely an impeller imbalance. The pump internals probably are worn and the pump will need to be replaced in the near future. Ensure all foot bolts are tight and consider having the alignment checked to try and delay further wear. Rated as a **CLASS II** defect.

300T MONTHLY

300T South Grinder 6421

Motor has a high inboard axial vibration. High 1 x rpm vibration at .6 ips-pk. This may be sheave related. Ensure sheaves are aligned properly with minimal face run-out on the sheave. Rated as a **CLASS II** defect.

300T North Grinder 6417
Unit has a high 1 x rpm vibration in the motor and grinder. Grinder bearings are also showing some signs of looseness. It is recommended to go through this unit inspecting all fasteners, sheaves/belts for issues, check grinder of build-up, and check grinder bearings for looseness. This could also be caused by a material buildup/ loss of material due to a defect in the grinder. Inspect for defects and buildup. Have alignment checked if necessary. Rated as a **CLASS II** defect.

MAIN PLANT UTILITIES

90˚ Water HP Pump 2499
Unit has vibrations associated with misalignment. Ensure all foot bolts are secure, couplings are in good shape, and have an alignment performed as time allows. Rated as a **CLASS II** defect.

Air Compressor #3 0820
There are non-synchronous peaks present in the motor inboard bearing data that may be bearing defect frequencies. They are harmonics of 2.197 orders which may be BSF, but this could also be a harmonic of the compressor. More info is needed to make this call on the bearing. Because of the increased acceleration, this is rated as a **CLASS III** defect.

This completes our assessment of your equipment for this survey. Thank you for your business and do not hesitate to call if you have any comments or questions.

Sincerely,

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