April 19, 2021

Victor Foster

IFF

Memphis, TN

Subject: April 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.

**Observations**

**P1 CURD**

**3rd Extraction NX438 0715**

Main drive motor has a high inboard vertical 1 x rpm vibration. Motor at the back of the unit is also showing signs of looseness. For now, inspect the belts for wear and proper tension, ensure all motor and motor base fasteners are tight, and inspect outboard smaller motor and coupling assemblies for looseness and wear. Rated as a **CLASS II** defect for now.

**1st Extraction NX438 0714**

Motor appears to be missing the rubber isolators on the from the motor feet. This is likely the cause of the high 1 x rpm vibration. There is still a high vibration the back drive motor. Data of this motor shows looseness either in the motor or coupling. Inspect for these issues ASAP. Rated as a **CLASS III** defect.

**5400 Discharge Pump South 4352**

Pump data is showing signs of impacting and rpm harmonics which indicate issues in the pump. The feet bolts on the pump for this unit are loose and the pump loose to the base. It is recommended to replace pump, install new bolts with hardened washers and realign unit as soon as practical. Ensure coupling does not have excessive wear and gear drive is not defective. Rated as a **CLASS III** defect.

**Concentrator #2 4495**

1 x rpm vibration is higher this month in the Centrifuge. Centrifuge bearing data also shows fit looseness is still present. Peakvue data also still indicates non-synchronous vibration with a fundamental of 7.97 orders of the DE bearing indicating a bearing issue in the DE. Rated as a **CLASS III** defect.

**Concentrator #1 4500**

Centrifuge vibration has increased this survey. Vibration is mainly at 1 x rpm and is over 1 ips at CIH. Unit needs to be cleaned out at earliest opportunity. Rated as a **CLASS III** defect.

**Isolate Wet-in Pump 4140**

Pump has high 4 x rpm vibration with some harmonics thereof. It is unlikely that this is vane pass. 4 x vibration usually indicates coupling issue. Inspect coupling and alignment as scheduling allows. Rated as a **CLASS II** defect.

**C30 #1 4380**

Motor data continues to show signs of electrical issues. This appears to have started back in September 2020. Motor was likely replaced around this time. This could be internal connection issue in the stator, rotor issues, or connection issue at the motor junction box. An online and offline PdMA test could help clarify this issue. We will continue to monitor this closely. Rated as a **CLASS II** defect.

**C30 #2 4381**

Motor data is still showing vibrations at 120 HZ. which is 2 x line frequency and increased harmonics of 120 Hz. This could be an air gap issue, internal connection issue in the stator, rotor issues, or connection issue at the motor junction box. An online and offline PdMA test could help clarify this issue. We will continue to monitor this closely. Rated as a **CLASS II** defect.

**2nd Extraction P5000 4340**

Overall vibration is much better in the back bearings. 1 x rpm is also lower in the centrifuge. Data still shows some 2 and 3 x rpm in the axial direction. This may indicate some shaft run-out or misaligned/cocked bearings. Rated as a **CLASS II** defect.

**1st Extraction 5400 4341**

Motor DE bearing data is showing a non-synchronous peak at 5.2 orders which is likely ball spin frequency. Peakvue and 1-20 kHz. are also showing increases in amplitude which are more indications of a bearing issue. It is recommended to replace the main drive motor at the earliest opportunity. Rated as a **CLASS III** defect.

**Curd Pot Wet Grinder 4557**

Unit remains to have 2 x rpm vibration. Inspect all fasteners and couplings. Rated as a **CLASS II** defect.

**Extraction Tank Discharge Pump 4170**

Unit has a 1 x vibration in the motor. This is likely due to the fact that the motor is flange mounted and has no foot support. There is a base under the motor, but it appears to be for a previous design. There could also be a coupling issue. Motor needs support and inspect coupling as soon as practical. Rated as a **CLASS III** defect.

**5400 Discharge Pump North 4351**

**Pump has loose feet bolts.** Motor and pump both have increased vibration this survey. Pump shows signs of wear while the motor may have coupling issue along with base issues. Ensure all bolts are tight, coupling is in good shape and unit has good alignment. Pump and gear drive need attention soon. Rated as a **CLASS III** defect.

**East Extraction NX Pump 9321**

Gear drive still has a high vibration. Gear drive appears to be defective. Replace gear drive as scheduling allows. Rated as a **CLASS II** defect.

**P1 DRYER**

**Northwest Blowback Fan 1041**

***Equipment was down this survey however, the following likely still applies*:** This unit looks much better after shop balancing the wheel. There is still some vertical vibration which is likely due to the base not being anchored properly to the concrete. New anchors should be inserted and epoxied into the concrete and fastened properly. Rated as a **CLASS II** defect.

**Northeast Blowback Fan 1021**

***Equipment was down this survey however, the following likely still applies*:** Motor has elevated 1 x rpm vibration at 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.

**South Exhaust Fan 1075**

Motor inboard bearing data is showing some early to mid-stage bearing failure on the DE motor bearing. Given the high ambient temperature in this area, these types of defects tend to progress quickly; therefore, we recommend scheduling this motor for replacement at the next scheduled downtime. We will monitor this closely. Rated as a **CLASS II** defect.

**Southwest Blow-Back Fan 1081**

***Equipment was down this survey however, the following likely still applies*:** Motor is starting to show some ½ harmonics which indicate mechanical looseness either in the motor fits or fan hub fit. Base bolts being loose can also cause this type of vibration. Inspect unit for looseness as scheduling allows. Rated as a **CLASS II** defect.

**P1 IDN**

**Bogey Discharge Pump 4845**

Motor vibration is lower; however, there is still 2 x rpm vibration in the motor. Motor fasteners and coupling should be checked as scheduling allows. Ensure base is properly secured and motor is aligned properly. Rated as a **CLASS II** defect.

**P3 FEED DRYER**

**Collector Aspiration Fan 3026**

Outboard fan bearing is showing a high 1 x rpm vibration that appears to fluctuate some each survey. Outboard fan bearing data shows some signs of bearing defects/wear. Bearings should be scheduled for replacement during next down time. Sheaves and belts may also be worn. Fan wheel also needs to be dynamically balanced. Rated as a **CLASS III** defect.

**Aljet Exhaust Fan 3418**

Motor data is starting to show bearing defects in the drive end bearing. We will monitor this closely; however, motor may need to be scheduled for replacement during the upcoming TAR. Rated as a **CLASS II** defect.

**P3 DRYER**

**P1 Blender 6650**

Data shows some high 1 x rpm in the motor while MIV shows a high 1 x and 2 x rpm vibration**. MIV has also increased from .4 to .9 ips-pk over the last month.** This could be coupling related or flexible base/loose fasteners. Gearbox shows some input rpm harmonics which indicates some looseness may be present internally in the gearbox. It is recommended to inspect all fasteners and replace gearbox and coupling unit during upcoming TAR. Rated as a **CLASS III** defect.

**Cooling Ring Fan 2448**

Motor verticals are still showing high vertical vibration. Dominant 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.

**North Baghouse Heater Fan 2680**

Fan outboard data shows an increase in overall amplitude from .09 to .37 ips this month. Spectral data shows a dominant peak at what appears to be 18 x fan rpm. This may be a multiple of blade pass if the fan wheel has 9 blades which may indicate an issue with the fan wheel. Fan wheel and inner cone needs to be inspected as soon as scheduling allows. Because of the increased amplitude over one month, this is rated as a **CLASS III** defect.

**North Exhaust Fan 2531**

Overall vibration was much lower this month likely because fan was operating at a slightly lower speed. This fan is suspected to be operating near a resonant frequency that coincides with the 1 x rpm of the unit. The peakvue data is still showing some early outboard fan bearing defect frequencies. Efforts may need to be made to keep this fan from operating at the speed of 1450-1550 rpm to help keep amplitudes down. Rated as a **CLASS II** defect.

**Product Collector Fan 2558**

Spectral data of the fan bearings shows several rpm harmonics present which is indicative of mechanical looseness. Bearings and shaft need to be inspected ASAP. Shaft may have excessive wear. Rated as a **CLASS III** defect.

**P1 Blender Asp. Fan 6660**

Blower unit appears to have some internal issues. Blower likely needs replacing as soon as scheduling allows. Rated as a **CLASS III** defect.

**P3 IDN**

**IDN Tank Discharge Pump 6124**

Motor data shows an increase acceleration. Motor bearings are likely defective. Replace as soon as scheduling allows. Rated as a **CLASS II** defect.

**600 Bogey Vacuum Pump 6293**

Vibration is high in the vertical direction of the motor and pump. Base is loose to the concrete which is likely the cause of the high vibration. Repair base as soon as practical and realign unit. Rated as a **CLASS III** defect.

**600 Bogey Discharge Pump 6266**

Motor and pump are showing signs of bearing defects and motor also has 2 x rpm vibration. Motor, pump, and couplings should be replaced during TAR. Rated as a **CLASS III** defect.

**P3 Packaging**

**P3 Blender 2181**

Data from 4/14/21 shows some electrically related vibrations in the motor. This appears to be 1 x rotor bar pass frequency with 120 Hz. sidebands. This could be caused by internal rotor defects such as loose bars. We are watching this issue closely. Motor also has a 1 x rpm axial vibration that may be coupling related. As far as the gearbox goes, data still shows a high noise floor while amplitudes remain steady. We still suspect a possible gear issue and recommend pulling an oil sample from the gearbox .Inspect coupling and all fasteners as time allows. Rated as a **CLASS II** defect.

**P3 CURD**

**C-30 #1 0085**

Bowl is likely out of balance. C1V data shows 1 x bowl rpm peak amplitude to be .97 ips. Motor data is now starting to show some bearing defect frequencies present in the acceleration spectra of the motor inboard bearing. Motor has had some high electrical related vibrations that may indicate a connection issue internally in the motor. Motor will likely need to be replaced in the upcoming months. Rated as a **CLASS II** defect.

**Concentrator #1 0279**

Centrifuge has rpm harmonics in spectra. This indicates fit looseness of the centrifuge bearings particularly the drive end. We will monitor this closely. Rated as a **CLASS II** defect.

**Concentrator #3 0281**

**MIV remains near 1 ips-pk.** Motor has high 1 x motor rpm vibration with some harmonics and electrical related vibrations (rotor bar pass) which may indicate rotor issue. Data also shows a high sub-harmonic vibration which is very concerning this survey. Online and offline PdMA testing may clarify this issue; however, we recommend that motor be swapped out at earliest opportunity. Rated as a **CLASS III** defect.

**Concentrator #4 0282**

New motor has higher acceleration than a newly rebuilt motor should have. Peaks are mainly electrically related. Appears to be rotor bar issue and an online and offline PdMA testing may clarify this issue. Centrifuge also has some 1 x rpm vibration still with 2, 3, 4, x rpm smaller peaks. Centrifuge bearings likely have some fit looseness. Rated as a **CLASS II** defect.

**Concentrator #5 0283**

High acceleration remains in the motor especially at the drive end. This appears to be electrically related. Online and offline PdMA testing may help clarify this issue. We will monitor this closely. Rated as a **CLASS II** defect.

**3rd Extraction 5400 0299**

Motor inboard horizontal peakvue data and normal acceleration spectra are showing some harmonics of what appears to be .43 orders of motor rpm. This may be cage frequency and may indicate cage defects of the DE bearing. Amplitudes are not very high but the presence of these peaks are concerning. We will monitor this closely. Rated as a **CLASS II** defect for now.

**5000 Desludger Discharge Pump 0291**

Motor data indicates defects are present in the motor. Replace motor soon. Rated as a **CLASS III** defect.

**Wet-In Pump 0030**

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 #1 9302**

Main motor has increased vibration at motor outboard horizontal. Amplitude has increased from .3 to .7 ips since last month. **M3V has amplitude increase from .5 to 1 ips-pk**. Vibration appears to be 1 x decanter speed. This may be sheave or belt related. Inspect sheaves and belts for wear, alignment, and ensure all fasteners are tight. Rated as a **CLASS III** defect.

**Flottweg Decanter #2 9301**

Outboard Decanter Bearing vibration has increased 1 x rpm vibration this month. Amplitude increased from .19 to .85 ips-pk. Unit likely needs to be cleaned and flushed. Rated as a **CLASS III** defect.

**Flottweg Decanter #3 9300**

Outboard Decanter Bearing vibration has increased 1 x rpm vibration this month. Amplitude increased from .18 to .94 ips-pk. Unit likely needs to be cleaned and flushed. Rated as a **CLASS III** defect.

**Lime Slurry Pump 4714**

Spectral data of the motor shows defects are present in the motor bearings. Pump also has a significant increase in vibration at the PIH. Vibration is mainly at 2 x rpm with amplitude increase of .06 to .6 ips-pk. Replace motor and coupling and ensure good alignment. Rated as a **CLASS III** defect.

**300T MONTHLY**

**300T South Grinder 6421**

Motor has increased inboard axial vibration. High 1 x rpm vibration increased from .5 to .8 ips-pk. This may be sheave related. Ensure sheaves are not worn, aligned properly with minimal face run-out on the sheave and ensure belts are not worn and properly tensioned. Motor also has some electrical vibration Rated as a **CLASS III** defect.

**300T North Grinder 6417**

1 x grinder rpm vibration in the grinder bearings has decreased some but remains high at .7 ips-pk. This is likely caused by a material buildup/ loss of material due to a defect in the grinder. Inspect for defects and buildup. It is also recommended to go through this unit inspecting all fasteners, sheaves/belts for issues. Rated as a **CLASS III** defect.

**MAIN PLANT UTILITIES**

**Air Compressor #3 0820**

Motor data shows harmonics of the driven shaft of the air end. This motor does have some higher amplitudes than the other compressors; therefore, it is recommended to collect trend able vibration data on the compressor and inspect the compressor as time allows. Rated as a **CLASS II** 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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Cell: 901-486-4565

Email: kwilliam@gohispeed.com