March 11, 2021

DuPont Solae

Memphis, TN

Subject: March 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**

There is quite a bit of vibration in the main drive motor at what appears to be related to the belt frequency fundamental. Motor at the back of the unit is also showing signs of looseness. For now, inspect the belts for wear and proper tension, inspect outboard smaller motor and coupling assemblies for looseness and wear. Rated as a **CLASS II** defect for now.

**1st Extraction NX438 0714**

Vibration at the back drive motor has decreased considerably since Feb survey. Main drive motor data is showing some high vibration peaks that are not exactly multiples of motor rpm. This may be a severe rotor issue. MIV waveform data shows a significant increase in pk-pk amplitude from 2 G’s to 11 G’s. We highly recommend replacing this motor at the earliest opportunity. 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**

Overall vibration has decreased some this survey. Unit was likely cleaned out between surveys. Centrifuge bearing data 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. Even though overall vibration has decreased, this is still rated as a **CLASS III** defect.

**Concentrator #1 4500**

Centrifuge verticals have increased this survey. Vibration is mainly at 1 x rpm. Unit needs to be cleaned out at earliest opportunity. 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**

Overall 1 x rpm vibration of the centrifuge has increased some this month. Bowl likely has build-up. 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**

Unit has increased 1 x rpm vibration from .4 ips to 1.0 ips at the centrifuge inboard horizontal and needs to be cleaned out as soon as possible. Outboard bearing has a high 2 x rpm vibration which indicates possible bent shaft, misaligned or cocked bearing. Smaller back bearings are also showing signs of defects/wear. Unit should be scheduled for repair soon. Rated as a **CLASS III** defect.

**Extraction Tank Discharge Pump 4170**

Unit has a 1x 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.

**Curd Pot Wet Grinder 4557**

Unit has increased 2 x rpm vibration. Inspect all fasteners and couplings. Rated as a **CLASS II** defect.

**5400 Discharge Pump North 4351**

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**

Geardrive has a high vibration. Spectral data shows the vibration to be at multiple of input rpm. This could be alignment/ coupling issue. Inspect couplings and alignment soon. Rated as a **CLASS III** defect.

**P1 DRYER**

**Cooling Ring Fan 1138**

**OVERALL VIBRATION AT THE OUTBOARD FAN BEARING HAS INCREASED TO OVER 1. IPS.** Dominant vibration appears to be sub-synchronous and may be belt related. 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 belt need inspection ASAP**. Rated as a **CLASS III** defect.

**Northwest Blowback Fan 1041**

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**

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**

Fan vibration has increased especially at the verticals. Fan may have build up on the blades which could be causing a high 1 x rpm vibration. **Fan should be cleaned as soon as practical.** 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**

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 remains high. Vibration is dominant at 59 Hz. in the motor. If rpm is correct in the data base this would be at 2 x rpm. Motor fasteners and coupling should be checked ASAP. Ensure motor is aligned properly. Rated as a **CLASS III** 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. Fan bearing data shows some signs of bearing defects. Bearings should be scheduled for replacement during next down time. Rated as a **CLASS III** defect.

**P3 DRYER**

**P1 Blender 6650**

Motor and gearbox continue to have 1 x input rpm vibration. This may be caused by the coupling becoming out of balance or some other mechanical issue in the coupling. Inspect coupling assembly ASAP. Ensure all fasteners are tight on motor and coupling assembly. 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 Exhaust Fan 2531**

Overall amplitude was highest at 1 x rpm at FOH with an amplitude .5 ips-pk. 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 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**

This fan was repaired recently; however, vibration data does not look good. 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**

**115 Batch Tank Discharge Pump 6326**

Motor and pump 2 x rpm vibration has increased this survey, especially in the vertical direction. Motor spectra also shows defects are present in the bearings while pump data is showing signs of internal wear. Check all fasteners and couplings/alignment immediately and schedule the motor, pump, and impeller to be replaced as soon as scheduling allows. Rated as a **CLASS III** defect.

**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 Discharge Pump 6266**

Motor and pump are showing signs of defects with the pump having the higher amplitudes. This unit will need replacement as soon as scheduling allows. Rated as a **CLASS II** defect.

**P3 Packaging**

**P3 Blender**

Gearbox seems noisier than normal. Data of the gearbox indicates a very high noise floor in the spectral data with some gear mesh vibration peaks present. We will continue to monitor this closely. We recommend collecting data once per week on this unit. Rated as a **CLASS II** defect.

**P3 CURD**

**C-30 #1 0085**

Motor has some high electrical related vibrations that may indicate a connection issue internally in the motor. Online and offline PdMA testing may clarify this issue. Motor will likely need attention in the coming months. We will monitor the electrical vibration closely. Rated as a **CLASS II** defect.

**Concentrator #1 0279**

Centrifuge has lower 1 x rpm vibration this month; however, rpm harmonics remain in spectra. This indicates fit looseness of the bearing. We will monitor this closely. Rated as a **CLASS II** defect.

**Concentrator #3 0281**

**MIV has increased from .5 to 1.0 ips pk.** Motor has high 1 x motor rpm vibration with some harmonics and also 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. Online and offline PdMA testing may clarify this issue. Centrifuge has some 1 x rpm vibration still with 2, 3, 4, x rpm smaller peaks. Bearings likely have some fit looseness. Rated as a **CLASS II** defect.

**Concentrator #5 0283**

Amplitudes have decreased this month, but high acceleration remains in the motor. This appears to be electrically related. Online and offline PdMA testing may help clarify this issue. We will monito this closely. Rated as a **CLASS II** defect.

**Concentrator #6 0610**

Centrifuge bearings show signs of looseness. Smaller bearings in the back of the unit are defective. Because of the high acceleration and raised noise floor in the data of the smaller bearings, this is rated as a **CLASS III** 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. 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 .55 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 increased 1 x rpm vibration in the grinder. **Amplitude is over 1 ips pk. at the GIH.** Grinder bearings are also showing some signs of looseness. 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**

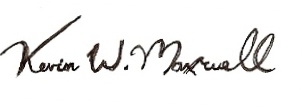
After further analysis, the peaks that are close to BSF of this motor are likely the second shaft of the air end. The calculated speed of this shaft is 1964 rpm. Harmonics of this shaft mimic BSF harmonics of the motor operating at 1795 rpm. This unit does have some higher amplitudes than the other compressors; 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.

**90˚ Water HP Pump 2499**

Pump has high axial 2 x rpm vibration. This may be caused by excessive shaft run-out of the pump shaft, misalignment, or coupling issue. 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](mailto:kwilliam@gohispeed.com)