

January 14, 2021

Solae

Subject: January14 vibration report

Most of the machines surveyed were found to be in good condition with the exception of the following:

QualiTest® uses a four step rating system for defects.

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

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

<u>Class III</u>: 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.

<u>Class IV;</u> 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.

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

Sincerely,

David W. Shook Senior Reliability Specialists *Hi-Speed* Industrial Service dshook@gohispeed.com

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MS2P WET/ 2P CURD

2P 3304 SHARPLES #2

The highest vibration in the unit is over 1.2"/sec velocity peak at shaft speed of 2999 RPM for the centrifuge inboard horizontal. We suspect internal imbalance due to build up. Flush clean and inspect at the very next opportunity. It is always a good idea to check the drivetrain when performing service. **Rated a Class III Defect.**

2P 3320 SHARPLES #3

The appears to be a dominant vibration in the centrifuge inboard bearing axial. Date shows 1/3 harmonics with the 5/3rd one being the highest in the spectrum at 1.5"/sec velocity peak and the point overall at 2.29"/sec velocity peak. Fractional harmonics are usually indicative of excessive looseness, which is what we suspect. Inspect the unit ASAP. Look for loose fasteners, a worn bearing, or possibly a drive train issue such as a bad coupling or loose hub. **Rated a Class IV Defect.**

2P 3296 SHARPLES #4

Data seems high in both the motor and in the centrifuge, but their trends have not changed much recently. We see high acceleration in the motor bearings at what appears to be harmonics of possible bearing defect frequencies with overalls above 5g's RMS. The inboard centrifuge bearing has a shaft speed vibration at near 1.3"/sec velocity peak overall. Inspect, flush, and clean the centrifuge. We will watch the motor carefully moving forward. **Rated a Class III Defect.**

2P 3171 SHARPLES #5

Motor data shows a gradual increase in rotor bar defect vibration peaks. Overall acceleration is above 3 g's peak. We suspect weak end connections since there is little 1x RPM issues present. No immediate action is required at this time. **Rated a Class I Defect.**

2P 3149 SHARPLES #6

Vibration data shows a strong shaft speed vibration for the centrifuge inboard horizontal bearing measurement. There are also about 4 low harmonic peaks. We suspect some imbalance and maybe a little looseness or misalignment. Inspect and check unit as time allows. **Rated a Class I Defect.**

2P 3151 SHARPLES #8

Motor has an increase in rotor bar frequency peaks over time at near 5 g's RMS. Motor and centrifuge both have inboard vertical measurements at around 0.7"/sec velocity peak. Inspect the coupling and alignment, and fasteners as time allows. We will watch the motor rotor vibration. **Rated a Class II Defect.**

2P 3141 SHARPLES #9

Overall data for the last year or so shows high acceleration in the centrifuge input bearing that didn't reveal itself in the normal spectrum; vibrations must be above the f max. This overall is historically lower at this time but is still considered high by us. The acceleration and velocity data below 4KHz shows harmonics and near harmonics of a strong 1xRPM peak at neat 0.7"/sec velocity peak and 3.9 g's RMS. There is an issue in the drive end of the centrifuge that will require investigation soon. **Rated a Class II Defect.**

2P 3137 WESTFALIA PUMP #8

The motor inboard bearing data indicates an inner race defect with sideband modulation. Possible outer race too. Overall acceleration is near 4 g's RMS. The motor bearing is in distress and should be changed out in soon. Soon to be a **Class III**. **Rated a Class II Defect**.

2P 3224 CLARIFIED TANK PUMP

Data shows a 1xRPMvibration in the outboard motor vertical. Inspect the fasteners and structure, as well as the motor fan and the coupling and alignment as time allows. **Rated a Class I Defect.**

29 3727 EAST RESLURRY PUMP

Data shows a strong 1xRPM vibration throughout the motor. These vibrations have been high for a long time. Inspect for the same issues as 3224 above but this is **Rated a Class II Defect.**

2P 3276 C-30 #4

Overall velocity for several motor points is close to 2"/sec velocity peak. We suspect bad data, but it would not hurt to have it re-checked soon. Rated a Class IV Defect based upon the numbers.

MS2P WET/ 2P BATCH

2P 3562 EAST HYDROLISIS TANK PUMP

Data shows a high shaft speed vibration near 1"/sec velocity peak measured at the motor inboard vertical. Inspect the fasteners and structure, as well as the motor fan, and the coupling and alignment as time allows. **Rated a Class II Defect.**

2P 9241 WEST BOGEY PUMP

Data for the pump suggests wear and looseness. Harmonic peaks have increased substantially during the last year. Overall velocity is over 0.9"/sec peak. Suggest inspect/replace the pump soon. **Rated a Class III Defect.**

2P 3539 WEST BOEGY VACUUM PUMP

Data for the pump suggests looseness. Harmonic peaks dominate the spectrum Overall velocity is over 0.6"/sec peak. Suggest inspect/replace the pump soon. **Rated a Class III Defect.**

2P 3352 South Chill Tank Pump

The motor still suffers from bearing defects. The pump seems to show bearing defects also. Harmonics of 57.8 Hz seem to dominate the data. Is this unit on a variable speed drive since this is below the normal shaft speed on a 3600 RPM motor? Change the motor and pump as time allows. **Rated a Class II Defect.**

MS2P FEED DRYER/ 2P FEED DRYER

2P 3844 DRYER EXHAUST FAN

The fan has seen an increase in a 13 Hz vibration that seems to be fan speed of 785 RPM. The velocity is just shy of 1"/sec peak. Recommend cleaning the fan wheel and inspecting all drive train components. **Rated a Class III Defect.**

MS2P FEED DRYER/ 2P DRYER

2P 8068 AND 8088 1&2 EXHAUST FANS

The fan bearings seem to have elevated acceleration overall values near 4 g's RMS. Ensure the bearings are receiving proper lubrication. **Rated a Class I Defect.**

2P 8069 and 8089 HEAT FANS

Both motors have an increasing vibration at 42.5 Hz to near 0.7"/sec velocity peak overall. Inspect the drive system and all fasteners and structures. Clean and inspect the fan also. **Rated a Class II Defect.**

2P 3710 BLENDER

The motor data shows significand velocity in multiple measurements over time. Many vibration measurements are over 1"/sec velocity peak at near 20 Hz (1200 RPM). High vibrations like these will shorten the life of the motor. Inspect the unit base structure, fasteners coupling and alignment as time allows. **Rated a Class II Defect.**

2P 3727 #1 AZO

The inboard motor vibration has increased with multiple peaks possibly associated with drive train components and harmonics. Overall velocity is almost 0.5"/sec peak. Inspect as time allows. **Rated a Class I Defect.**

2P 8074 #4 CMC BLOWER

Blower bearings still show defects at near 5g's RMS, but little changed. Inspect as time allows. Rated a Class II Defect.

2P 8054 #2 CMC BLOWER

Blower bearings still show what looks to be a shaft speed vibration with multiple low harmonics, but little changed. Inspect the unit drive train components for wear as time allows. **Rated a Class II Defect.**

2P 8064 #1 CMC BLOWER

Blower bearings still show what looks to be a shaft speed vibration with multiple low harmonics, but little changed. Inspect the unit drive train components for wear as time allows. **Rated a Class II Defect.**

MSP WET/ MSP CURD

3141 SHARPLE #1

The centrifuge measurement C2A has jumped to about 2"/sec velocity peak overall and is dominated by what looks to be a 2x RPM vibration. We suspect a severe drive train issue such as misalignment or eccentricity as soon as possible. **Rated a Class IV Defect.**

3151, 3161, 3149 SHARPLES 2, 3 &4

These unit have 1xRPM vibrations that could indicate some balance issues. Clean and/or flush the unit to help reduce the vibration. **Rated a Class I Defect.**

3171, 3304, 3320, 3298 SHARPLES 5, 6, 7, &8

These unit have 1xRPM vibrations that could indicate some balance issues. Clean and/or flush the unit to help reduce the vibration. **Rated a Class II Defect.**

4085 SHARPLE #9

The centrifuge measurement C2A has jumped to about 1.5"/sec velocity peak overall and is dominated by a 1x RPM vibration with multiple harmonics. We suspect imbalance and possible looseness. Clean and/or flush the unit to help reduce the vibration. Inspect the bearings fasteners, drive train and alignment soon. **Rated a Class III Defect.**

3289 WEST RESLURRY PUMP

The outboard pump axial data shows a strong 3xRPM vibration at near 0.5"/sec velocity peak in the spectrum. We suspect a process flow issue is causing the increase in vibration amplitude. Ensure the pump is running in the correct part of the performance curve. **Rated a Class I Defect.**

3256 C-30 #2

Data shows a gradual increase in the motor vibration at about 51.5 Hz or near a possible 3087 RPM. Inspect the drive train. Clean and/or flush the centrifuge. **Rated a Class I Defect.**

3276 C-30 #4

Data shows an increase of what looks to be high frequency rotor bar defect signatures. Generally, we do not report these unless they are high or increasing for several consecutive surveys. Ensure the motor is operating no higher than rated amps and that the voltage and current are balanced. **Rated a Class I Defect.**

4095 CURD GRINDER #4

The motor is vibrating at just over 32 Hz at near 0.7:/sec velocity peak overall. Inspect the motor fasteners and drive train components for defects. **Rated a Class II Defect.**

3137 SHARPLES DEFOAMER PUMP #2

Motor data indicates some misalignment due to a dominant 2x motor RPM vibration at near 0.4"/sec velocity peak. Check unit for alignment issues. **Rated a Class I Defect.**

3151-08 OIL PUMP MOTOR #2

Motor shows a large shaft speed vibration and lesser 2x RPM peak at the inboard vertical at over 0.7"/sec velocity peak overall. Inspect fasteners and structures as well as possible run out or imbalance. **Rated a Class II Defect.**

3320-08 OIL PUMP MOTOR #7

Overall velocity is just over 0.44"/sec peak for the motor with multiple low frequency peaks. Inspect the unit fasteners. **Rated a Class I Defect.**

MSP WET/ MSP BATCH

3475 SOUTH BOGEY PUMP

Pump shows high axial vibration at near 1"/sec velocity overall at 1x and 2x RPM. Have the alignment checked as well as the coupling, hubs, and shafts for run out. Pump impeller could be worn causing imbalance. **Rated a Class III Defect.**

MSP FEED DRYER/ MSP FEED DRYER

3843 SOUTH INLET FAN

Motor outboard vertical has a dominant fan speed vibration over 0.4"/sec velocity peak in the spectrum. Inspect the unit fasteners and structure for defects as well as all drivetrain components for run out and wear. **Rated a Class I Defect.**

3863 EXHAUST FAN

Fan or possible belt related vibration in the unit. Inspect as time allows. Rated a Class I Defect.

3828 RECYCLE BLOWER

Fan data shows a single large vibration peak at near 86 Hz for the outboard fan bearing vertical that has been increasing steadily. We suspect an issue in the bearing, fasteners, or adjacent structure. We assume the fan is not running at 5,000 RPM. **Rated a Class III Defect.**

3800 MIXING CONVEYOR

Overall motor vibration is over 1"/sec velocity peak and consists of multiple low frequency peaks. Inspect the unit for defects such as loose or missing fasteners, structural defects, or worn drive train components. **Rated a Class II Defect.**

800 T GRINGING/ 800 T MONTHLY

2P 3043 2P NORTH MILL RECEIVING FAN

Inboard fan bearing shows an increase in harmonic peaks. We suspect shaft or housing looseness. Inspect/ repair/ replace the bearings. **Rated a Class II Defect.**

3016 NORTH GRINDER

Data shows an increase of what looks to be high frequency rotor bar defect signatures. Generally, we do not report these unless they are high or increasing for several consecutive surveys. Ensure the motor is operating no higher than rated amps and that the voltage and current are balanced. **Rated a Class I Defect.**

3029 SOUTH GRINDER

Data shows an increase of what looks to be high frequency rotor bar defect signatures. Generally, we do not report these unless they are high or increasing for several consecutive surveys. Ensure the motor is operating no higher than rated amps and that the voltage and current are balanced. **Rated a Class I Defect.**

2P100AC ATLAS COPCO COMPRESSOR

Vibration data id dominated by a peak in the motor at 286 Hz near 2"/sec velocity. The overall has increased by a magnitude of over 10. We suspect data might not be accurate and should be retaken, otherwise there is a major issue here. **Rated a Class IV Defect**

2040 TRACK 5 BLOWER

Data for the inboard bearing shows an increase in high frequency vibrations as well as the overall acceleration since September. We will watch for changes carefully. Make sure the bearings are receiving adequate lubrication. **Rated a Class II Defect.**

687 TRACK 1 RECEIVER ASP BLOWER

Data for the motor inboard vertical shows a substantial increase in vibration at just below the first harmonic at near 1.5"/sec velocity peak. We believe this to possibly be a drive train issue. Motor bearings also show an increase in floor noise in the spectrum. Inspect the unit as soon as possible to Confirm vibration increase. Look for loose fasteners and worn drive train components. **Rated a Class III Defect.**

5031 TRACK 1 NORTH BLOWER

Data for the motor outboard horizontal shows an increase in harmonics of both the motor fundamental and a vibration above the first motor harmonic. Overall velocity is just above 1"/sec peak. Inspect the unit for loose fasteners and drive train issues. **Rated a Class II Defect for now.**

MS2P GROUND FLAKE/ 2P WET IN

No issues of note

MSP GROUND FLAKE/ MSP GROUND FLAKE

3050 SOUTH ASPIRATION FAN

Vibration increase is mostly due to a sub-synchronous peak at near 5 Hz. This could be a resonance or possibly a belt issue if so equipped. Perform a visual inspection of the unit and drive train. **Rated a Class I Defect.**

3090 MSP WET-IN PUMP

Vibration data for the unit shows a large increase at shaft speed. Check all fasteners, shaft hubs and coupling for run out, and have the unit shaft alignment checked and adjusted as necessary. **Rated a Class II Defect.**