HI-SPEED INDUSTRIAL SERVICE

MILLINGTON, TN

October 1, 2021

Arkema

Subject: September week 4 service report

Critical equipment and monthly equipment with issues are discussed in this 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.

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,

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H2O2 Weekly Route Critical Equipment Observations

C Concentrator Vacuum Pump 2130-1
The motor has the highest vibration amplitude of about 0.18"/second velocity peak overall in the outboard axial measurement. Vibration still consists of multiple low amplitude shaft speed harmonics with a dominant 4x RPM peak. **Rated a Class I Defect.**

Agitator, Hydrogenator C 7001-01
Data shows all vibrations are below 0.1"/second velocity peak overall. No immediate concern.

A/B Concentrator Vacuum Pump 57
The unit vibration overall is 0.36"/sec peak velocity for the outboard pump bearing and is dominated by a 16 order vibration which we believe to be vane pass. We will continue to watch for changes. **Rated a Class I Defect.**

Flash Vacuum Pump 2130-1
Data shows all vibrations are under 0.1"/second velocity peak overall. No issues of note.

Air Compressor C-201
Rotor bar vibrations are normal for this motor's history. The trend clearly shows that the vibrations vary considerably over time. We still believe these motors have possible weak rotor bar end connections that cause the vibrations to fluctuate higher due to loading. There are still blower case vibrations around 2.5-3 KHz with a wide noise floor. We suspect this is impeller pass related. Overall acceleration is 6.6 g's RMS at 1 point. Synchronous and non-synchronous harmonic vibration peaks are evident in the data. All 3 compressors have the same non-synchronous peaks but vary in amplitude. We will continue to monitor this unit closely for changes. **Rated a Class I Defect.**

Air Compressor C-202
Rotor bar vibrations are normal for this motor's history. The trend clearly shows that the vibrations vary considerably over time. We still believe these motors have possible weak rotor bar end connections that cause the vibrations to fluctuate higher due to loading. There are still blower case vibrations around 2.5-3 KHz with a wide noise floor. We suspect this is impeller pass related. Overall acceleration is 4.7 g's RMS at 1 point. Synchronous and non-synchronous harmonic vibration peaks are evident in the data. All 3 compressors have the same non-synchronous peaks but vary in amplitude. We will continue to monitor this unit closely for changes. **Rated a Class I Defect.**

Air Compressor C-203
Rotor bar vibrations are above normal for this motor's history. The trend clearly shows that the vibrations vary considerably over time. We still believe these motors have possible weak rotor bar end connections that cause the vibrations to fluctuate higher due to loading. There are still blower case vibrations around 2.5-3 KHz with a wide noise floor. We suspect this is impeller pass related. Overall acceleration is 6.7 g's RMS at 1 point. Synchronous and non-synchronous harmonic vibration peaks are evident in the data. All 3 compressors have the same non-synchronous peaks but vary in amplitude. We will continue to monitor this unit closely for changes. **Rated a Class I Defect.**

Instrument Air Compressor
The unit pad was still covered with an extremely slippery oily slimy mixture that prevented safe data collection.

Air Compressor NASH A 201-08A
Vibrations are still lower at 0.18"/sec velocity peak for the outboard vertical. The vibration spectrum is still dominated by a 20-order vibration, which is thought to be vane pass. **Rated a Class I Defect.**

D Hydrogenator Agitator 9002
Highest overall vibration is at 0.2"/sec velocity peak for the gearbox output top horizontal. 2 dominant vibrations are sub-synchronous to motor speed at about 9 Hz and a 10.5 orders. There appears to be a resonance, and the amplitude changes over time, but does not seem to be periodic. The others are most likely the number of pinion teeth (14 teeth and the input gear mesh) and the first harmonic of gear mesh. Ensure all fasteners are at proper torque values and inspect support structures for any signs of stress cracks, broken welds, or metal fatigue. **Rated a Class I Defect now.**

H2O2 Monthly Route Equipment

South Cooling Tower South Fan
Overall vibrations have been slowly climbing over time. The highest vibration is the motor axial and dominant at 4.5 Hz. This is most likely the speed of the fan shaft (270 RPM). There could be imbalance in the fan, or loose fasteners. Inspect as time allows. Trim balancing could possibly reduce the vibration. **Rated a Class I Defect.**

North Cooling Tower South Fan
The motor outboard vibration is highest and appears to be a beat vibration possibly between the motor shaft speed and fan blade pass. Check all the fasteners and motor to gearbox shaft alignment as time allows. **Rated a Class I Defect.**

Abbreviated Last Measurement Summary

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Database: Arkema.rbm
Station: PEROXIDE
Route No. 6: ARKEMA WK4
Report Date: 01-Oct-21 12:24

MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD	MACHINE SPEED
2130-1old - C Concentrator Vacuum Pump (01-Oct-21)			
	OVERALL LEVEL	1-20 KHz	
11	.072 In/Sec	.264 G-s	1200.0 RPM
21	.075 In/Sec	.452 G-s	
23	.178 In/Sec	.215 G-s	
71	.138 In/Sec	.802 G-s	
81	.175 In/Sec	.554 G-s	
83	.077 In/Sec	1.279 G-s	
7000-01 - AGITATOR,HYDROGENATOR C (01-Oct-21)			
	OVERALL LEVEL	1-20 KHZ	
02	.043 In/Sec	.022 G-s	45.00 RPM
03	.049 In/Sec	.0061 G-s	
11	.072 In/Sec	.656 G-s	1400.0 RPM
12	.069 In/Sec	.807 G-s	
13	.088 In/Sec	.189 G-s	
21	.084 In/Sec	.409 G-s	
22	.094 In/Sec	.179 G-s	
23	.095 In/Sec	.757 G-s	
31	.078 In/Sec	.403 G-s	
32	.077 In/Sec	.444 G-s	
33	.046 In/Sec	.175 G-s	
41	.073 In/Sec	.608 G-s	
42	.075 In/Sec	.507 G-s	
51	.071 In/Sec	.361 G-s	375.0 RPM
53	.081 In/Sec	.185 G-s	
61	.028 In/Sec	.215 G-s	
71	.059 In/Sec	.226 G-s	45.00 RPM
81	.024 In/Sec	.168 G-s	
83	.059 In/Sec	.233 G-s	
57 - A/B Concentr Vac Pmp-var RPM (01-Oct-21)			
	OVERALL LEVEL	1-20 KHz	
11	.077 In/Sec	.375 G-s	900.0 RPM
12	.077 In/Sec	.338 G-s	
21	.091 In/Sec	.240 G-s	
23	.076 In/Sec	.205 G-s	
71	.138 In/Sec	.787 G-s	
81	.363 In/Sec	.705 G-s	
83	.084 In/Sec	.679 G-s	
2130-1 - FLASH VAP VAC PUMP-var speed (01-Oct-21)			
	OVERALL LEVEL	1-20 KHz	
11	.037 In/Sec	.135 G-s	1200.0 RPM
12	.035 In/Sec	.739 G-s	
21	.040 In/Sec	.724 G-s	

	22	.045 In/Sec	.401 G-s	
	23	.063 In/Sec	1.098 G-s	
	71	.072 In/Sec	.514 G-s	
	72	.068 In/Sec	.468 G-s	
	81	.078 In/Sec	.735 G-s	
	82	.084 In/Sec	1.049 G-s	
	83	.046 In/Sec	.678 G-s	
C-203	- C-203 Comp		(01-Oct-21)	
		OVERALL LEVEL	1-20 KHz	
	11	.025 In/Sec	.776 G-s	3588.0 RPM
	12	.178 In/Sec	6.849 G-s	
	21	.034 In/Sec	1.046 G-s	
	22	.088 In/Sec	2.963 G-s	
	23	.020 In/Sec	1.004 G-s	
		OVERALL LEVEL	1-20 KHZ	
	71M	.031 In/Sec	1.226 G-s	
	72M	.046 In/Sec	1.650 G-s	
	73M	.064 In/Sec	3.988 G-s	
	81M	.056 In/Sec	2.752 G-s	
	82M	.045 In/Sec	6.766 G-s	
	71F	.052 In/Sec	1.934 G-s	
	72F	.063 In/Sec	2.390 G-s	
	73F	.067 In/Sec	2.898 G-s	
	81F	.036 In/Sec	1.141 G-s	
	82F	.039 In/Sec	1.188 G-s	
C-202	- C-202 Comp		(01-Oct-21)	
		OVERALL LEVEL	1-20 KHz	
	11	.057 In/Sec	.824 G-s	3588.0 RPM
	12	.127 In/Sec	2.313 G-s	
	21	.069 In/Sec	.352 G-s	
	22	.109 In/Sec	2.654 G-s	
	23	.038 In/Sec	.327 G-s	
		OVERALL LEVEL	1-20 KHZ	
	71M	.035 In/Sec	1.365 G-s	
	72M	.046 In/Sec	1.172 G-s	
	73M	.068 In/Sec	4.555 G-s	
	81M	.049 In/Sec	3.640 G-s	
	82M	.058 In/Sec	2.906 G-s	
	71F	.029 In/Sec	2.533 G-s	
	72F	.057 In/Sec	1.086 G-s	
	73F	.075 In/Sec	4.708 G-s	
	81F	.030 In/Sec	1.931 G-s	
	82F	.050 In/Sec	1.257 G-s	
C-201	- C-201 Comp		(01-Oct-21)	
		OVERALL LEVEL	1-20 KHz	
	11	.093 In/Sec	1.893 G-s	3588.0 RPM
	12	.080 In/Sec	1.232 G-s	
	21	.099 In/Sec	2.289 G-s	
	22	.053 In/Sec	1.573 G-s	
	23	.099 In/Sec	2.636 G-s	
		OVERALL LEVEL	1-20 KHZ	
	71M	.039 In/Sec	1.511 G-s	
	72M	.031 In/Sec	.736 G-s	
	73M	.067 In/Sec	1.772 G-s	

81M	.084 In/Sec	4.158 G-s	
82M	.055 In/Sec	6.648 G-s	
71F	.057 In/Sec	2.233 G-s	
72F	.034 In/Sec	.727 G-s	
73F	.035 In/Sec	1.122 G-s	
81F	.042 In/Sec	2.446 G-s	
82F	.060 In/Sec	2.036 G-s	

201-08A - COMPRESSOR,NASH A 201-08A (01-Oct-21)

	OVERALL LEVEL	1-20 KHz	
11	.056 In/Sec	.079 G-s	506.3 RPM
12	.062 In/Sec	.132 G-s	
13	.098 In/Sec	.062 G-s	
21	.049 In/Sec	.072 G-s	
22	.058 In/Sec	.123 G-s	
23	.081 In/Sec	.061 G-s	
71	.120 In/Sec	.820 G-s	
72	.171 In/Sec	.906 G-s	
73	.086 In/Sec	.359 G-s	
81	.122 In/Sec	.257 G-s	
82	.181 In/Sec	.280 G-s	
83	.107 In/Sec	.261 G-s	

202-05 - NASH SEAL LIQUID PUMP-A (01-Oct-21)

	OVERALL LEVEL	1-20 KHz	
11	.027 In/Sec	.064 G-s	1800.0 RPM
21	.011 In/Sec	.215 G-s	
23	.014 In/Sec	.106 G-s	
71	.019 In/Sec	.052 G-s	
72	.016 In/Sec	.046 G-s	

9002-10 - D-HYDROGENATOR AGITATOR (01-Oct-21)

	OVERALL LEVEL	1-20 KHz	
11	.091 In/Sec	.041 G-s	1185.0 RPM
21	.068 In/Sec	.148 G-s	
23	.059 In/Sec	.051 G-s	
	OVERALL LEVEL	1-20 KHZ	
31	.156 In/Sec	.758 G-s	
31L	.142 In/Sec	.781 G-s	
	OVERALL LEVEL	1-20 KHz	
51	.185 In/Sec	.226 G-s	
51L	.182 In/Sec	.227 G-s	100.0 RPM
52	.197 In/Sec	.274 G-s	
52L	.202 In/Sec	.258 G-s	
53	.044 In/Sec	.234 G-s	
53L	.022 In/Sec	.217 G-s	
61	.117 In/Sec	.111 G-s	
61L	.154 In/Sec	.105 G-s	
81	.038 In/Sec	.023 G-s	
82	.033 In/Sec	.033 G-s	
83	.024 In/Sec	.139 G-s	

Clarification Of Vibration Units:
Acc --> G-s PK
Vel --> In/Sec PK

Abbreviated Last Measurement Summary

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Database: Arkema.rbm
Station: PEROXIDE
Route No. 5: ARK WK 3
Report Date: 01-Oct-21 12:25

MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD	MACHINE SPEED
NTC-SF - N CT-SOUTH FAN, N TWR	(01-Oct-21)		
	OVERALL LEVEL	1-20 KHz	
1	.325 In/Sec	.549 G-s	1780.0 RPM
2	.174 In/Sec	.417 G-s	
3	.156 In/Sec	.454 G-s	
	OVERALL LEVEL	1-20 KHZ	
4	.247 In/Sec	.423 G-s	
5	.0050 In/Sec	.0011 G-s	
6	.280 In/Sec	.388 G-s	
6L	.264 In/Sec	.400 G-s	
NCT - NF - N CT -NORTH FAN, N TWR	(01-Oct-21)		
	OVERALL LEVEL	1-20 KHz	
7	.223 In/Sec	.417 G-s	1780.0 RPM
8	.157 In/Sec	.391 G-s	
9	.118 In/Sec	.321 G-s	
	OVERALL LEVEL	1-20 KHZ	
10	.113 In/Sec	.325 G-s	
11	.143 In/Sec	.294 G-s	
12	.159 In/Sec	.382 G-s	
STC-NF - S CT - NORTH FAN, S TWR	(01-Oct-21)		
	OVERALL LEVEL	1-20 KHz	
1	.317 In/Sec	.782 G-s	1780.0 RPM
2	.251 In/Sec	.260 G-s	
3	.246 In/Sec	.182 G-s	
	OVERALL LEVEL	1-20 KHZ	
4	.129 In/Sec	.368 G-s	
5	.140 In/Sec	.490 G-s	
STC-MF - S CT - MID FAN, S TWR	(01-Oct-21)		
	OVERALL LEVEL	1-20 KHz	
1	.251 In/Sec	.391 G-s	1780.0 RPM
3	.124 In/Sec	.107 G-s	
	OVERALL LEVEL	1-20 KHZ	
4	.083 In/Sec	.258 G-s	
5	.126 In/Sec	.443 G-s	
6	.078 In/Sec	.507 G-s	
STC-SF - S CT - SOUTH FAN, S TWR	(01-Oct-21)		
	OVERALL LEVEL	1-20 KHz	
1	.189 In/Sec	.349 G-s	1780.0 RPM
2	.252 In/Sec	.203 G-s	
3	.377 In/Sec	.099 G-s	
	OVERALL LEVEL	1-20 KHZ	

4	.171 In/Sec	.494 G-s
5	.102 In/Sec	.529 G-s
6	.301 In/Sec	.625 G-s

Clarification Of Vibration Units:

Acc	-->	G-s	PK
Vel	-->	In/Sec	PK