HI-SPEED INDUSTRIAL SERVICE

MILLINGTON, TN

June 22, 2021

Arkema

Subject: June week 3 service report

Most of the machines surveyed were found to be in good condition except for the following:

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 0.17"/second velocity peak overall in the axial measurement. Vibration still consists of a few shaft speed harmonics with a dominant 4x RPM component we suspect is pump related. **Rated a Class I Defect.**

Agitator, Hydrogenator C 7001-01
Data shows all vibrations at or under 0.11"/second velocity peak overall. No issues of note.

A/B Concentrator Vacuum Pump 57
The unit vibration overall is 0.28"/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 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. Overall acceleration is 3 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 low 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. **Rated a Class I Defect**.

Air Compressor C-203
Rotor bar vibrations are high for this motor's history and could indicate higher loading 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. **Rated a Class I Defect**.

Instrument Air Compressor
The male and female shaft vibrations still seem to show gear mesh and harmonics as well as a beat vibration occasionally. They continue to vary over time. Both shafts have between 6 and 9 g's RMS overall in the data. The dominant vibration appears to be the second gear mesh harmonic at near 2500 Hz. We are still watching this unit closely and will be going forward. **Rated a Class I Defect.**

Air Compressor NASH A 201-08A
Highest vibration is still in the pump itself at 0.29"/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 II Defect.**

D Hydrogenator Agitator 9002
Highest overall vibration is at 0.22"/sec velocity peak for the gearbox input horizontal. Vibrations are sub-synchronous to motor speed at about 9 Hz and a 14 order peak and harmonic. The 9 Hz peak 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

North Cooling Tower South Fan; South Cooling Tower North and South Fans.
These units have vibrations between 0.3 and 0.4"/second velocity peak. These levels seem to be normal for these fans; however, some of this is caused by a beat vibration from interaction between units. **Rated a Class I Defect.**

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                    Abbreviated Last Measurement Summary
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                Database:  Arkema.rbm
                Station:   PEROXIDE
                Route No.  5:  ARK WK 3
                Report Date:  22-Jun-21   12:40

MEASUREMENT POINT     OVERALL LEVEL       HFD / VHFD      MACHINE SPEED
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2130-1old  - C Concentrator Vacuum Pump     (22-Jun-21)
                       OVERALL LEVEL     1-20 KHz
       11                .064 In/Sec       .384 G-s        1200.0 RPM
       21                .065 In/Sec       .372 G-s
       23                .169 In/Sec       .144 G-s
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71	.101 In/Sec	.653 G-s	
81	.168 In/Sec	.566 G-s	
83	.076 In/Sec	1.098 G-s	

7000-01 - AGITATOR,HYDROGENATOR C (22-Jun-21)

	OVERALL LEVEL	1-20 KHZ	
02	.036 In/Sec	.033 G-s	45.00 RPM
03	.048 In/Sec	.036 G-s	
11	.074 In/Sec	.844 G-s	1400.0 RPM
12	.068 In/Sec	.673 G-s	
13	.090 In/Sec	.233 G-s	
21	.090 In/Sec	.266 G-s	
22	.113 In/Sec	.172 G-s	
23	.095 In/Sec	.587 G-s	
31	.073 In/Sec	.429 G-s	
32	.071 In/Sec	.398 G-s	
33	.045 In/Sec	.173 G-s	
41	.070 In/Sec	.463 G-s	
42	.066 In/Sec	.567 G-s	
51	.071 In/Sec	.284 G-s	375.0 RPM
53	.073 In/Sec	.222 G-s	
61	.039 In/Sec	.263 G-s	
71	.063 In/Sec	.425 G-s	45.00 RPM
81	.020 In/Sec	.150 G-s	
83	.058 In/Sec	.214 G-s	

57 - A/B Concentr Vac Pmp-var RPM (22-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.073 In/Sec	.295 G-s	900.0 RPM
12	.075 In/Sec	.318 G-s	
21	.082 In/Sec	.273 G-s	
23	.050 In/Sec	.204 G-s	
71	.142 In/Sec	.264 G-s	
81	.279 In/Sec	.884 G-s	
83	.050 In/Sec	.887 G-s	

2130-1 - FLASH VAP VAC PUMP-var speed (22-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.044 In/Sec	.127 G-s	1200.0 RPM
12	.038 In/Sec	.279 G-s	
21	.045 In/Sec	.469 G-s	
22	.046 In/Sec	.464 G-s	
23	.050 In/Sec	.247 G-s	
71	.055 In/Sec	.292 G-s	
72	.075 In/Sec	.435 G-s	
81	.083 In/Sec	.296 G-s	
82	.077 In/Sec	.555 G-s	
83	.043 In/Sec	.583 G-s	

C-203 - C-203 Comp (22-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.094 In/Sec	3.660 G-s	3588.0 RPM
12	.179 In/Sec	7.466 G-s	
21	.028 In/Sec	.871 G-s	
22	.047 In/Sec	1.352 G-s	
23	.037 In/Sec	1.292 G-s	
	OVERALL LEVEL	1-20 KHZ	

71M	.054 In/Sec	4.258 G-s	
72M	.036 In/Sec	.827 G-s	
73M	.066 In/Sec	2.766 G-s	
81M	.056 In/Sec	2.755 G-s	
82M	.058 In/Sec	3.123 G-s	
71F	.044 In/Sec	2.952 G-s	
72F	.068 In/Sec	2.492 G-s	
73F	.080 In/Sec	2.253 G-s	
81F	.060 In/Sec	3.665 G-s	
82F	.059 In/Sec	2.027 G-s	

C-202 - C-202 Comp (22-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.042 In/Sec	.342 G-s	3588.0 RPM
12	.119 In/Sec	.916 G-s	
21	.065 In/Sec	1.104 G-s	
22	.086 In/Sec	1.071 G-s	
23	.065 In/Sec	1.737 G-s	
	OVERALL LEVEL	1-20 KHZ	
71M	.030 In/Sec	.920 G-s	
72M	.039 In/Sec	1.151 G-s	
73M	.066 In/Sec	1.686 G-s	
81M	.054 In/Sec	2.192 G-s	
82M	.051 In/Sec	1.583 G-s	
71F	.025 In/Sec	3.127 G-s	
72F	.053 In/Sec	.716 G-s	
73F	.055 In/Sec	4.079 G-s	
81F	.039 In/Sec	2.087 G-s	
82F	.047 In/Sec	.751 G-s	

C-201 - C-201 Comp (22-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.102 In/Sec	2.346 G-s	3588.0 RPM
12	.131 In/Sec	4.362 G-s	
21	.103 In/Sec	.469 G-s	
22	.051 In/Sec	1.094 G-s	
23	.144 In/Sec	5.595 G-s	
	OVERALL LEVEL	1-20 KHZ	
71M	.055 In/Sec	2.634 G-s	
72M	.045 In/Sec	2.418 G-s	
73M	.072 In/Sec	1.779 G-s	
81M	.054 In/Sec	1.431 G-s	
82M	.038 In/Sec	1.038 G-s	
71F	.049 In/Sec	2.560 G-s	
72F	.036 In/Sec	.820 G-s	
73F	.042 In/Sec	1.233 G-s	
81F	.057 In/Sec	1.887 G-s	
82F	.052 In/Sec	1.682 G-s	

new AC - INSTRUMENT AIR COMPRESSOR (22-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.151 In/Sec	.334 G-s	1780.0 RPM
12	.104 In/Sec	.650 G-s	
13	.066 In/Sec	.496 G-s	
21	.107 In/Sec	.674 G-s	
22	.085 In/Sec	.484 G-s	
23	.047 In/Sec	.391 G-s	

	OVERALL LEVEL	1-20 KHZ	
71F	.168 In/Sec	5.195 G-s	
72F	.204 In/Sec	7.893 G-s	
73F	.154 In/Sec	3.090 G-s	
81F	.132 In/Sec	2.703 G-s	
82F	.257 In/Sec	7.122 G-s	
83F	.161 In/Sec	3.274 G-s	
71M	.108 In/Sec	5.095 G-s	
72M	.150 In/Sec	8.860 G-s	
73M	.107 In/Sec	5.072 G-s	
81M	.255 In/Sec	6.329 G-s	
82M	.150 In/Sec	3.130 G-s	
83M	.171 In/Sec	5.732 G-s	

201-08A - COMPRESSOR,NASH A 201-08A (22-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.087 In/Sec	.080 G-s	506.3 RPM
12	.082 In/Sec	.146 G-s	
13	.146 In/Sec	.162 G-s	
21	.089 In/Sec	.117 G-s	
22	.104 In/Sec	.143 G-s	
23	.142 In/Sec	.096 G-s	
71	.147 In/Sec	1.004 G-s	
72	.240 In/Sec	1.329 G-s	
73	.166 In/Sec	.078 G-s	
81	.165 In/Sec	.456 G-s	
82	.287 In/Sec	.307 G-s	
83	.149 In/Sec	.218 G-s	

9002-10 - D-HYDROGENATOR AGITATOR (22-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.108 In/Sec	.044 G-s	1185.0 RPM
21	.072 In/Sec	.151 G-s	
23	.043 In/Sec	.050 G-s	
	OVERALL LEVEL	1-20 KHZ	
31	.163 In/Sec	.671 G-s	
31L	.215 In/Sec	.681 G-s	
	OVERALL LEVEL	1-20 KHz	
51	.186 In/Sec	.620 G-s	
51L	.188 In/Sec	.256 G-s	100.0 RPM
52	.207 In/Sec	.233 G-s	
52L	.211 In/Sec	.258 G-s	
53	.143 In/Sec	.653 G-s	
53L	.032 In/Sec	.707 G-s	
61	.145 In/Sec	.103 G-s	
61L	.117 In/Sec	.119 G-s	
81	.034 In/Sec	.041 G-s	
82	.046 In/Sec	.033 G-s	
83	.025 In/Sec	.148 G-s	

NTC-SF - N CT-SOUTH FAN, N TWR (22-Jun-21)

	OVERALL LEVEL	1-20 KHz	
1	.375 In/Sec	.529 G-s	1780.0 RPM
2	.194 In/Sec	.441 G-s	
3	.206 In/Sec	.481 G-s	
	OVERALL LEVEL	1-20 KHZ	
4	.244 In/Sec	.443 G-s	

5	.0038 In/Sec	.0011 G-s	
6	.268 In/Sec	.415 G-s	
6L	.288 In/Sec	.404 G-s	

NCT - NF - N CT -NORTH FAN, N TWR (22-Jun-21)

	OVERALL LEVEL	1-20 KHz	
7	.212 In/Sec	.433 G-s	1780.0 RPM
8	.150 In/Sec	.401 G-s	
9	.110 In/Sec	.324 G-s	
	OVERALL LEVEL	1-20 KHZ	
10	.108 In/Sec	.339 G-s	
11	.174 In/Sec	.302 G-s	
12	.179 In/Sec	.405 G-s	

530-02 - PUMP,N.COOLING TWR,MIDDLE (22-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.127 In/Sec	.376 G-s	1780.0 RPM
12	.163 In/Sec	.527 G-s	

530-03 - PUMP,N.COOLING TWR,SOUTH (22-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.107 In/Sec	.637 G-s	1780.0 RPM
12	.211 In/Sec	.486 G-s	

548-7 - IRON-FREE H2O BOOSTER PUMP (22-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.020 In/Sec	.603 G-s	1800.0 RPM
21	.021 In/Sec	.616 G-s	
23	.035 In/Sec	.305 G-s	
71	.043 In/Sec	.073 G-s	
72	.033 In/Sec	.121 G-s	

STC-NF - S CT - NORTH FAN, S TWR (22-Jun-21)

	OVERALL LEVEL	1-20 KHz	
1	.382 In/Sec	.507 G-s	1780.0 RPM
2	.313 In/Sec	.362 G-s	
3	.282 In/Sec	.167 G-s	
	OVERALL LEVEL	1-20 KHZ	
4	.191 In/Sec	.348 G-s	
5	.131 In/Sec	.472 G-s	

STC-MF - S CT - MID FAN, S TWR (22-Jun-21)

	OVERALL LEVEL	1-20 KHz	
1	.290 In/Sec	.394 G-s	1780.0 RPM
2	.240 In/Sec	.084 G-s	
3	.129 In/Sec	.095 G-s	
	OVERALL LEVEL	1-20 KHZ	
4	.093 In/Sec	.305 G-s	
5	.133 In/Sec	.452 G-s	
6	.103 In/Sec	.541 G-s	

STC-SF - S CT - SOUTH FAN, S TWR (22-Jun-21)

	OVERALL LEVEL	1-20 KHz	
1	.178 In/Sec	.388 G-s	1780.0 RPM
2	.259 In/Sec	.224 G-s	
3	.276 In/Sec	.106 G-s	
	OVERALL LEVEL	1-20 KHZ	

4	.150 In/Sec	.515 G-s	
5	.084 In/Sec	.544 G-s	
6	.300 In/Sec	.671 G-s	

SCT-1 - SOUTH CT PUMP - EAST (22-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.017 In/Sec	.499 G-s	1800.0 RPM
21	.027 In/Sec	1.598 G-s	
23	.079 In/Sec	.922 G-s	
71	.103 In/Sec	.482 G-s	
72	.058 In/Sec	.586 G-s	

SCT-2 - SOUTH CT PUMP - MID (22-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.029 In/Sec	.428 G-s	1800.0 RPM
21	.043 In/Sec	1.178 G-s	
23	.062 In/Sec	.278 G-s	
71	.067 In/Sec	.446 G-s	
72	.063 In/Sec	.418 G-s	

SCT-3 - SOUTH CT PUMP - WEST (22-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.023 In/Sec	.570 G-s	1800.0 RPM
21	.036 In/Sec	.212 G-s	
23	.049 In/Sec	.191 G-s	
71	.090 In/Sec	.421 G-s	
72	.101 In/Sec	.488 G-s	

Clarification Of Vibration Units:

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