HI-SPEED INDUSTRIAL SERVICE

MILLINGTON, TN

May 1, 2020

ARKEMA

Subject: week 1 vibration service report

Weekly Equipment

C Concentrator Vacuum Pump 2130-1
The pump axial vibration is good; the outboard radial is relatively steady at 0.164"/sec peak velocity this survey. No action is required.

Agitator, Hydrogenator C 7001-01
Vibrations are similar to last week. Motor speed was read to be 1333 RPM during data collection this survey. The highest vibrations were in the motor horizontals and were 0.121 and 0.103"/sec velocity peak, respectively. Motor still shows slight fluting in the bearings. All gearbox vibrations were below 0.1"/second velocity peak except the input horizontal which was just over 0.110". **Motor is rated a Class I Defect.**

A/B Concentrator Vacuum Pump 57
Overall vibrations have increased for the outboard pump bearing and is at 0.313"/sec velocity peak, at what looks to be mostly vane pass. We must note; however, that the vibration changes constantly as the vacuum breaks, so the overall reading and the data could change significantly during a short period of time. No immediate action is required at this time. **Rated a Class I Defect**.

Flash Vacuum Pump 2130-1
Vibrations appear to be normal this survey. No actions required.

Air Compressor C-201
Rotor bar vibrations are at 3.195 g's peak. 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. We will continue to monitor this unit for changes No actions required.

Air Compressor C-202
Rotor bar vibrations are at 4.717 g's peak. The trend clearly shows that the vibrations vary considerably over time. We will watch this unit closely for changes. No immediate actions required at this time. **Defect Rating to a Class II**.

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Air Compressor C-203
Rotor bar vibrations are 2.743 g's peak. 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. No actions required.

Instrument Air Compressor new
The two large vibrations that were close in the frequency spectrum and the subsequent beat vibration have disappeared. We possibly caught the unit in transition last survey. We will still keep a close eye on this unit going forward. **Rated a Class I Defect.**

Air Compressor NASH A 201-08A
We are still recommending a thorough service on this unit. The pump is under 0.3"/sec velocity peak, so the unit is **Rated a Class I Defect this survey.**

D Hydrogenator Agitator 9002-10
Vibration data shows a slight change in vibrations this survey. Highest amplitude is at 0.270"/sec velocity peak for the horizontal input shaft measurement. **Still rated a Class I Defect.**

Route Monthly Equipment

East Oxidizer Feed Pump 9001-1
The pump shaft speed vibration has significantly jumped this survey. We suspect the coupling or fastener issue but cannot rule out an internal pump issue. This needs an inspection as soon as possible since the jump was large. **Rated a Class III Defect.**

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 Specialist
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Hi-Speed **Industrial Service**

Abbreviated Last Measurement Summary

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Database: Arkema.rbm
Station: PEROXIDE
Route No. 3: ARK WK 1
Report Date: 01-May-20 13:37

MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD
2130-1old - C Concentrator Vacuum Pump	(01-May-20)	
	OVERALL LEVEL	1-20 KHz
11 - Motor OB HOR	.061 In/Sec	.199 G-s
21 - Motor IB HOR	.064 In/Sec	.386 G-s
23 - Motor IB AXIAL	.131 In/Sec	.175 G-s
71 - Compressor IB HOR	.145 In/Sec	.872 G-s
81 - Compressor OB Horiz	.164 In/Sec	.591 G-s
83 - Compressor OB Axial	.095 In/Sec	1.417 G-s
7000-01 - AGITATOR,HYDROGENATOR C	(01-May-20)	
	OVERALL LEVEL	1-20 KHZ
01 - DRIVESHAFT BRG-NORTH-SOUTH	.044 In/Sec	.023 G-s
02 - DRIVESHAFT BRG-EAST-WEST	.042 In/Sec	.050 G-s
03 - DRIVESHAFT BRG-VERTICAL	.047 In/Sec	.040 G-s
11 - C Hydro Agitator MOTOR OB HORIZ	.103 In/Sec	.941 G-s
12 - C Hydro Agitator MOTOR OB VERT	.057 In/Sec	.583 G-s
13 - C Hydro Agitator Motor OB Axial	.069 In/Sec	.243 G-s
21 - C Hydro Agitator MOTOR IB HORIZ	.121 In/Sec	1.197 G-s
21P - C Hydro Agitator MOTOR IB HZ PV	.015 In/Sec	
22 - C Hydro Agitator MOTOR IB VERT	.073 In/Sec	.654 G-s
23 - C Hydro Agitator Motor IB Axial	.102 In/Sec	.378 G-s
31 - C Hydro Agitator GrBx In Horizon	.110 In/Sec	.810 G-s
32 - C Hydro Agitator GrBx In VERT	.083 In/Sec	.768 G-s
33 - C Hydro Agitator GrBx In Axial	.053 In/Sec	.392 G-s
41 - C Hydro Agitator GrBx Top HZ E-W	.092 In/Sec	.560 G-s
42 - C Hydro Agitator GrBx TOP HZ N-S	.031 In/Sec	.767 G-s
51 - C Hydro Agitator GrBx BOT HZ E-W	.027 In/Sec	.243 G-s
52 - C Hydro Agitator GrBx BOT HZ N-S	.018 In/Sec	.512 G-s
53 - C Hydro Agitator GrBx Top Axial	.047 In/Sec	.621 G-s
57 - A/B Concentr Vac Pmp-var RPM	(01-May-20)	
	OVERALL LEVEL	1-20 KHz
11 - Motor OB HOR	.048 In/Sec	.342 G-s
12 - Motor OB VERT	.057 In/Sec	.369 G-s
21 - Motor IB HOR	.060 In/Sec	.320 G-s
23 - Motor IB AXIAL	.080 In/Sec	.191 G-s
71 - Compressor IB HOR	.130 In/Sec	.449 G-s
81 - Compressor OB Horiz	.313 In/Sec	.535 G-s
83 - Compressor OB Axial	.068 In/Sec	1.004 G-s
2130-1 - FLASH VAP VAC PUMP-var speed	(01-May-20)	
	OVERALL LEVEL	1-20 KHz
11 - Motor OB HOR	.066 In/Sec	.099 G-s

12	- Motor OB VERT	.034 In/Sec	.187 G-s
21	- Motor IB HOR	.040 In/Sec	.389 G-s
22	- Motor IB VERT	.044 In/Sec	.406 G-s
23	- Motor IB AXIAL	.057 In/Sec	.656 G-s
71	- Compressor IB HOR	.067 In/Sec	.384 G-s
72	- Compressor IB VERT	.076 In/Sec	.558 G-s
81	- Compressor OB Horiz	.079 In/Sec	.233 G-s
82	- Compressor OB VERT	.089 In/Sec	.374 G-s
83	- Compressor OB Axial	.050 In/Sec	.601 G-s

236-06	- HYDRO FD PUMP N 236-06 -2FLR	(01-May-20)	
		OVERALL LEVEL	1-20 KHz
11	- Hydro Fd Pmp B No. Motor Top	.123 In/Sec	.035 G-s
21	- Hydro Fd Pmp B No. Motor Bottom	.096 In/Sec	.206 G-s

2130-6	- ABC SEC FILT FEED PUMP-NORTH	(01-May-20)	
		OVERALL LEVEL	1-20 KHz
11	- MOTOR OUTBOARD HORIZONTAL	.073 In/Sec	.351 G-s
21	- MOTOR INBOARD HORIZONTAL	.080 In/Sec	.370 G-s
23	- MOTOR INBOARD AXIAL	.077 In/Sec	.286 G-s
71	- PUMP HORIZONTAL	.179 In/Sec	1.035 G-s
72	- PUMP VERTICAL	.105 In/Sec	.898 G-s

9001-1	- EAST OXIDIZER FEED PUMP	(01-May-20)	
		OVERALL LEVEL	1-20 KHz
11	- MOTOR OUTBOARD HORIZONTAL	.049 In/Sec	.354 G-s
21	- MOTOR INBOARD HORIZONTAL	.132 In/Sec	.213 G-s
23	- MOTOR INBOARD AXIAL	.122 In/Sec	.229 G-s
71	- PUMP HORIZONTAL	.454 In/Sec	.423 G-s
72	- PUMP VERTICAL	.357 In/Sec	.283 G-s

9001-2	- MIDDLE OXIDIZER FEED PUMP	(01-May-20)	
		OVERALL LEVEL	1-20 KHz
11	- MOTOR OUTBOARD HORIZONTAL	.029 In/Sec	.329 G-s
21	- MOTOR INBOARD HORIZONTAL	.049 In/Sec	.514 G-s
23	- MOTOR INBOARD AXIAL	.084 In/Sec	.189 G-s
71	- PUMP HORIZONTAL	.077 In/Sec	.165 G-s
72	- PUMP VERTICAL	.091 In/Sec	.229 G-s

7016-11	- WEST OXIDIZER FEED PUMP	(01-May-20)	
		OVERALL LEVEL	1-20 KHz
11	- MOTOR OUTBOARD HORIZONTAL	.032 In/Sec	.261 G-s
21	- MOTOR INBOARD HORIZONTAL	.028 In/Sec	.563 G-s
23	- MOTOR INBOARD AXIAL	.019 In/Sec	.195 G-s
71	- PUMP HORIZONTAL	.096 In/Sec	.828 G-s
72	- PUMP VERTICAL	.118 In/Sec	.764 G-s

234-01	- CHILL WATER PUMP 234-01	(01-May-20)	
		OVERALL LEVEL	1-20 KHz
11	- Chilled H2O Pump Motor OB Horizo	.035 In/Sec	.997 G-s
		OVERALL LEVEL	1-20 KHZ
11L	- MOTOR HORZ OUTBOARD - L-FREQ	.034 In/Sec	.944 G-s
		OVERALL LEVEL	1-20 KHz
21	- Chilled H2O Pump Motor IB Horizo	.034 In/Sec	1.095 G-s
23	- MOTOR INBOARD	.036 In/Sec	
		OVERALL LEVEL	1-20 KHZ
23L	- MOTOR AXIAL INBOARD - L-FREQ	.036 In/Sec	1.153 G-s

		OVERALL LEVEL	1-20 KHz
71	- Chilled H2O Pump IB Horizontal	.070 In/Sec	.299 G-s
72	- PUMP VERTICAL	.084 In/Sec	.228 G-s

C-203	- C-203 Comp	(01-May-20)	
		OVERALL LEVEL	1-20 KHz
11	- MOTOR OB HOR	.031 In/Sec	1.002 G-s
12	- MOTOR OB VERT	.025 In/Sec	.303 G-s
21	- MOTOR IB HOR	.069 In/Sec	2.743 G-s
22	- MOTOR IB VERT	.051 In/Sec	1.817 G-s
23	- MOTOR IB AXIAL	.019 In/Sec	.425 G-s
		OVERALL LEVEL	1-20 KHZ
71M	- COMP MALE SHAFT IB HOR	.034 In/Sec	1.378 G-s
72M	- COMP MALE SHAFT IB VERT	.049 In/Sec	2.162 G-s
73M	- COMP MALE SHAFT IB AXIAL	.078 In/Sec	1.385 G-s
81M	- COMP MALE SHAFT OB HOR	.055 In/Sec	2.134 G-s
82M	- COMP MALE SHAFT OB VERT	.053 In/Sec	1.787 G-s
71F	- COMP FEMALE SHAFT IB HOR	.048 In/Sec	2.117 G-s
72F	- COMP FEMALE SHAFT IB VERT	.031 In/Sec	.786 G-s
73F	- COMP FEMALE SHAFT IB AXIAL	.083 In/Sec	2.926 G-s
81F	- COMP FEMALE SHAFT OB HOR	.048 In/Sec	1.468 G-s
82F	- COMP FEMALE SHAFT OB VERT	.039 In/Sec	.450 G-s

9000-01	- D HYDROGENATOR FD PUMP- WEST	(01-May-20)	
		OVERALL LEVEL	1-20 KHz
11	- MOTOR OUTBOARD HORIZONTAL	.044 In/Sec	.368 G-s
21	- MOTOR INBOARD HORIZONTAL	.030 In/Sec	.399 G-s
23	- MOTOR INBOARD AXIAL	.037 In/Sec	.216 G-s
71	- PUMP HORIZONTAL	.075 In/Sec	.623 G-s
72	- PUMP VERTICAL	.060 In/Sec	.665 G-s

236-04A	- HYDROGNTOR PRECOOLER FD PUMP	(01-May-20)	
		OVERALL LEVEL	1-20 KHz
11	- MOTOR OUTBOARD HORIZ	.041 In/Sec	.162 G-s
21	- MOTOR INBOARD HORIZ	.075 In/Sec	.583 G-s
23	- MOTOR INBOARD AXIAL	.041 In/Sec	.301 G-s
71	- PUMP HORIXONTAL	.131 In/Sec	.268 G-s
72	- PUMP VERTICAL	.071 In/Sec	.278 G-s

C-202	- C-202 Comp	(01-May-20)	
		OVERALL LEVEL	1-20 KHz
11	- MOTOR OB HOR	.045 In/Sec	1.128 G-s
12	- MOTOR OB VERT	.121 In/Sec	.735 G-s
21	- MOTOR IB HOR	.056 In/Sec	.506 G-s
22	- MOTOR IB VERT	.155 In/Sec	4.717 G-s
23	- MOTOR IB AXIAL	.055 In/Sec	.830 G-s
		OVERALL LEVEL	1-20 KHZ
71M	- COMP MALE SHAFT IB HOR	.048 In/Sec	2.274 G-s
72M	- COMP MALE SHAFT IB VERT	.059 In/Sec	1.931 G-s
73M	- COMP MALE SHAFT IB AXIAL	.088 In/Sec	1.421 G-s
81M	- COMP MALE SHAFT OB HOR	.047 In/Sec	2.544 G-s
82M	- COMP MALE SHAFT OB VERT	.053 In/Sec	1.639 G-s
71F	- COMP FEMALE SHAFT IB HOR	.040 In/Sec	1.770 G-s
72F	- COMP FEMALE SHAFT IB VERT	.076 In/Sec	1.474 G-s
73F	- COMP FEMALE SHAFT IB AXIAL	.056 In/Sec	1.972 G-s
81F	- COMP FEMALE SHAFT OB HOR	.055 In/Sec	2.720 G-s
82F	- COMP FEMALE SHAFT OB VERT	.045 In/Sec	.626 G-s

C-201	- C-201 Comp	(01-May-20)	
		OVERALL LEVEL	1-20 KHz
11	- MOTOR OB HOR	.095 In/Sec	2.294 G-s
12	- MOTOR OB VERT	.114 In/Sec	3.195 G-s
21	- MOTOR IB HOR	.113 In/Sec	2.437 G-s
22	- MOTOR IB VERT	.059 In/Sec	1.244 G-s
23	- MOTOR IB AXIAL	.127 In/Sec	4.075 G-s
		OVERALL LEVEL	1-20 KHZ
71M	- COMP MALE SHAFT IB HOR	.051 In/Sec	2.196 G-s
72M	- COMP MALE SHAFT IB VERT	.044 In/Sec	1.833 G-s
73M	- COMP MALE SHAFT IB AXIAL	.075 In/Sec	3.078 G-s
81M	- COMP MALE SHAFT OB HOR	.053 In/Sec	3.177 G-s
82M	- COMP MALE SHAFT OB VERT	.048 In/Sec	1.697 G-s
71F	- COMP FEMALE SHAFT IB HOR	.047 In/Sec	1.956 G-s
72F	- COMP FEMALE SHAFT IB VERT	.057 In/Sec	2.005 G-s
73F	- COMP FEMALE SHAFT IB AXIAL	.066 In/Sec	3.753 G-s
81F	- COMP FEMALE SHAFT OB HOR	.078 In/Sec	2.577 G-s
82F	- COMP FEMALE SHAFT OB VERT	.058 In/Sec	2.058 G-s

new AC	- INSTRUMENT AIR COMPRESSOR	(01-May-20)	
		OVERALL LEVEL	1-20 KHz
11	- MOTOR OB HOR	.137 In/Sec	1.273 G-s
12	- MOTOR OB VERT	.103 In/Sec	.575 G-s
13	- MOTOR OB AXIAL	.066 In/Sec	.505 G-s
21	- MOTOR IB HOR	.160 In/Sec	1.422 G-s
22	- MOTOR IB VERT	.076 In/Sec	.772 G-s
23	- MOTOR IB AXIAL	.064 In/Sec	.804 G-s
		OVERALL LEVEL	1-20 KHZ
71F	- COMP FEMALE SHAFT IB HOR	.270 In/Sec	9.140 G-s
72F	- COMP FEMALE SHAFT IB VERT	.184 In/Sec	5.402 G-s
73F	- COMP FEMALE SHAFT IB AXIAL	.166 In/Sec	4.861 G-s
81F	- COMP FEMALE SHAFT OB HOR	.143 In/Sec	2.882 G-s
82F	- COMP FEMALE SHAFT OB VERT	.417 In/Sec	9.815 G-s
83F	- COMP FEMALE SHAFT OB AXIAL	.165 In/Sec	3.041 G-s
71M	- COMP MALE SHAFT IB HOR	.121 In/Sec	4.099 G-s
72M	- COMP MALE SHAFT IB VERT	.180 In/Sec	6.069 G-s
73M	- COMP MALE SHAFT IB AXIAL	.133 In/Sec	2.521 G-s
81M	- COMP MALE SHAFT OB HOR	.179 In/Sec	4.297 G-s
82M	- COMP MALE SHAFT OB VERT	.248 In/Sec	7.732 G-s
83M	- COMP MALE SHAFT OB AXIAL	.249 In/Sec	8.049 G-s

201-08A	- COMPRESSOR,NASH A 201-08A	(01-May-20)	
		OVERALL LEVEL	1-20 KHz
11	- Nash Compr A Motor OB Horiz	.077 In/Sec	.157 G-s
12	- Nash Compr A Motor OB Vertical	.089 In/Sec	.116 G-s
13	- Nash Compr A Motor OB Axial	.170 In/Sec	.148 G-s
21	- Nash Compr A Motor IB Horiz	.081 In/Sec	.119 G-s
22	- Nash Compr A Motor IB VERT	.121 In/Sec	.204 G-s
23	- Nash Compr A Motor IB AXIAL	.180 In/Sec	.091 G-s
71	- Nash Compr A COMP IB HORIZ	.152 In/Sec	.758 G-s
72	- Nash Compr A Compressor IB Verti	.248 In/Sec	1.248 G-s
73	- Nash Compr A COMP IB AXIAL	.172 In/Sec	.278 G-s
81	- Nash Compr A COMP OB HORIZ	.158 In/Sec	.530 G-s
82	- Nash Compr A Compressor OB Verti	.287 In/Sec	.469 G-s
83	- Nash Compr A Compressor OB Axial	.161 In/Sec	.507 G-s

9002-10 - D-HYDROGENATOR AGITATOR	(01-May-20)	
	OVERALL LEVEL	1-20 KHz
11 - MOTOR OUTBOARD HORIZONTAL	.092 In/Sec	.027 G-s
21 - MOTOR INBOARD HORIZONTAL	.075 In/Sec	.071 G-s
23 - MOTOR INBOARD AXIAL	.052 In/Sec	.075 G-s
31 - GEARBOX INPUT SHAFT -HORIZONTAL	.270 In/Sec	.535 G-s
51 - GEARBOX TOP PLATE- E-W	.182 In/Sec	.202 G-s
52 - GEARBOX TOP PLATE- N-S	.248 In/Sec	.269 G-s
53 - GEARBOX OUTPUT TOP -VERTICAL	.155 In/Sec	.537 G-s
61 - GEARBOX BOTTOM E-W-HORIZONTAL	.142 In/Sec	.131 G-s
81 - AGIT INTERMED BRG @ SEAL- N-S	.036 In/Sec	.027 G-s
82 - AGIT INTERMED BRG @ SEAL- E-W	.042 In/Sec	.028 G-s
83 - AGIT INTERMED BRG @ SEAL- VERT	.045 In/Sec	.250 G-s

Clarification Of Vibration Units:

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