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Archaea Energy North Shelby Plant Millington, TN

The following is a summary of findings from the January 2021 monthly vibration survey at your facility. Please let us know if there are any questions or comments.

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.

451C Vacuum Pump MOTOR

Motor has a high vibration that is non-synchronous to the motor speed and pump speed. This is a harmonic type vibration and may be related to DE bearing cage. These harmonics are very close to bearing cage frequencies which is very concerning. It is highly recommended to remove the belt and inspect the motor bearing. You may be able to turn motor by hand. If this is a bearing cage issue, then you may be able to feel the defect as you roll the shaft over. Because of the peaks being very close to cage frequencies, this is rated as a **CLASS III** defect.

451D Vacuum Pump MOTOR

Motor has had an electrically related vibration since its inception. We are monitoring this closely from month to month. Rated as a **CLASS I** defect.

506 A Product Compressor

Compressor was not in operation during this survey: however, the following likely still applies: Compressor has had higher vibration since rebuilding unit. Spectral data shows high vibration peaks to be multiples of rpm. This may indicate excessive internal clearances. We will monitor this closely. Rated as a **CLASS I** defect.

Abbreviated Last Measurement Summary ************************************		
Database: Clean Energy.rbm Area: millington plant		
MEASUREMENT POINT	OVERALL LEVEL	hfd / vhfd
301 FLARE - 301 FLARE BLOWER	(05-Jan-22)	
	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZ	.146 In/Sec	.344 G-s
MOV - MOTOR OUTBOARD VERT	.116 In/Sec	.268 G-s
MIH - MOTOR INBOARD HORIZ	.126 In/Sec	.560 G-s
MIV - MOTOR INBOARD VERT	.096 In/Sec	.406 G-s
MIA - MOTOR INBOARD AXIAL	.084 In/Sec	.536 G-s
EIH - EQUIPMENT INBOARD HORIZ	.114 In/Sec	.468 G-s
EIV - EQUIPMENT INBOARD VERT	.053 In/Sec	.386 G-s
EIA - EQUIPMENT INBOARD AXIAL	.038 In/Sec	.337 G-s
EOH - EQUIPMENT OUTBOARD HORIZ	.067 In/Sec	.286 G-s
EOV - EQUIPMENT OUTBOARD VERT	.088 In/Sec	.229 G-s
101A COMP - 101A FEED COMPRESSOR	(05-Jan-22)	
	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZ	.044 In/Sec	.350 G-s
MIH - MOTOR INBOARD HORIZ	.054 In/Sec	.306 G-s
MIA - MOTOR INBOARD AXIAL	.037 In/Sec	.356 G-s
IIH - COMP INPUT INBOARD HORIZ	.079 In/Sec	1.168 G-s
IIA - COMP INPUT INBOARD AXIAL	.250 In/Sec	.801 G-s
IOH - COMP INPUT OUTBOARD HORIZ	.081 In/Sec	.702 G-s
OIH - COMP OUTPUT INBOARD HORIZ	.079 In/Sec	1.031 G-s
OIA - COMP OUTPUT INBOARD AXIAL	.108 In/Sec	.863 G-s
OOH - COMP OUTPUT OUTBOARD HORIZ	.065 In/Sec	2.154 G-s
HX132A FAN - HX132A GAS OIL COOLER FAN	(05-Jan-22)	
	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZ CH1	.119 In/Sec	.125 G-s
MIH - MOTOR INBOARD HORIZ CH2	.111 In/Sec	.211 G-s
EIH - EQUIPMENT INBOARD HORIZ CH3	.054 In/Sec	.033 G-s

EOH - EQUIPMENT OUTBOARD HORIZ CH4 .100 In/Sec .038 G-s MOH - MOTOR OUTBOARD HORIZ(05-Jan-22)MOH - MOTOR OUTBOARD HORIZ.088 In/Sec1.257 G-sMOV - MOTOR OUTBOARD VERT.112 In/Sec.718 G-sMIH - MOTOR INBOARD HORIZ.103 In/Sec.571 G-sMIV - MOTOR INBOARD VERT.101 In/Sec.319 G-sMIA - MOTOR INBOARD AXIAL.082 In/Sec.258 G-sEIH - EQUIPMENT INBOARD VERT.167 In/Sec.311 G-sEIV - EQUIPMENT INBOARD VERT.150 In/Sec.428 G-sEIA - EQUIPMENT INBOARD AXIAL.122 In/Sec.447 G-sEOH - EQUIPMENT OUTBOARD HORIZ.193 In/Sec.402 G-sEOV - EQUIPMENT OUTBOARD VERT.195 In/Sec.234 G-s (05-Jan-22) HX453A FAN - HX453A VAC PUMP OIL COOL FAN (05-Jan-22)
 OVERALL LEVEL
 1K-20KHz

 .160 In/Sec
 .102 G-s

 .123 In/Sec
 .131 G-s
MOH - MOTOR OUTBOARD HORIZ MIH - MOTOR INBOARD HORIZ 451B PUMP - 451B VACCUM PUMP (05-Jan-22) 451B PUMP - 451B VACCUM PUMP(05-Jan-22)
OVERALL LEVELMOH - MOTOR OUTBOARD HORIZ.044 In/SecMOV - MOTOR OUTBOARD VERT.044 In/SecMIH - MOTOR INBOARD VERT.086 In/SecMIV - MOTOR INBOARD HORIZ.071 In/SecMIA - MOTOR INBOARD VERT.077 In/SecSILA - MOTOR INBOARD AXIAL.063 In/SecEIH - EQUIPMENT INBOARD HORIZ.152 In/SecEIV - EQUIPMENT INBOARD VERT.144 In/SecSEIA - EQUIPMENT INBOARD AXIAL.123 In/SecEOH - EQUIPMENT OUTBOARD HORIZ.175 In/SecEOV - EQUIPMENT OUTBOARD VERT.235 In/SecCOV - EQUIPMENT OUTBOARD VERT.242 G-s HX453B FAN - HX453B VAC PUMP OIL COOL FAN (05-Jan-22)
 OVERALL LEVEL
 1K-20KHz

 .167 In/Sec
 .209 G-s

 .097 In/Sec
 .105 G-s
MOH - MOTOR OUTBOARD HORIZ .209 G-s MIH - MOTOR INBOARD HORIZ .105 G-s 451C PUMP- 451C VACCUM PUMP(05-Jan-22)
OVERALL LEVEL1K-20KHzMOH - MOTOR OUTBOARD HORIZ.228 In/Sec1.013 G-sMOV - MOTOR OUTBOARD VERT.248 In/Sec.214 G-sMIH - MOTOR INBOARD HORIZ.293 In/Sec.865 G-sMIV - MOTOR INBOARD VERT.232 In/Sec.277 G-sMIA - MOTOR INBOARD AXIAL.154 In/Sec.248 G-sEIH - EQUIPMENT INBOARD HORIZ.220 In/Sec.607 G-sEIV - EQUIPMENT INBOARD VERT.146 In/Sec.383 G-sEIA - EQUIPMENT INBOARD AXIAL.132 In/Sec.296 G-sEOH - EQUIPMENT OUTBOARD HORIZ.236 In/Sec.402 G-sEOV - EQUIPMENT OUTBOARD VERT.275 In/Sec.301 G-s HX453C FAN - HX453C VAC PUMP OIL COOL FAN (05-Jan-22) OVERALL LEVEL 1K-20KHz MOH - MOTOR OUTBOARD HORIZ .221 In/Sec .195 G-s MIH - MOTOR INBOARD HORIZ .119 In/Sec .148 G-s (05-Jan-22) 451D PUMP - 451D VACCUM PUMP 451D PUMP- 451D VACCUM PUMP(05-Jan-22)
OVERALL LEVELMOH - MOTOR OUTBOARD HORIZ.083 In/Sec.640 G-sMOV - MOTOR OUTBOARD VERT.137 In/Sec.343 G-sMIH - MOTOR INBOARD HORIZ.118 In/Sec1.600 G-sMIV - MOTOR INBOARD VERT.108 In/Sec.502 G-sMIA - MOTOR INBOARD VERT.108 In/Sec.502 G-sEIH - EQUIPMENT INBOARD HORIZ.197 In/Sec.575 G-sEIV - EQUIPMENT INBOARD VERT.148 In/Sec.235 G-sEIA - EQUIPMENT INBOARD AXIAL.082 In/Sec.237 G-sEOH - EQUIPMENT OUTBOARD HORIZ.154 In/Sec.545 G-sEOV - EQUIPMENT OUTBOARD VERT.128 In/Sec.265 G-s

HX453D FAN - HX453D VAC PUMP OIL COOL FAN (05-Jan-22)

	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZ	.217 In/Sec	.079 G-s
MIH - MOTOR INBOARD HORIZ	.227 In/Sec	.060 G-s
506C COMP - 506C PRODUCT COMPRESSOR	(05-Jan-22)	
	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZ	.097 In/Sec	.547 G-s
MIH - MOTOR INBOARD HORIZ	.066 In/Sec	.429 G-s
MIA - MOTOR INBOARD AXIAL	.064 In/Sec	.353 G-s
IIH - COMP INPUT INBOARD HORIZ	.168 In/Sec	.697 G-s
IIA - COMP INPUT INBOARD AXIAL	.210 In/Sec	1.203 G-s
IOH - COMP INPUT OUTBOARD HORIZ	.194 In/Sec	2.917 G-s
HX507C FAN - HX507C GAS COOL FAN	(05-Jan-22)	
	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZ	.193 In/Sec	.061 G-s
MIH - MOTOR INBOARD HORIZ	.223 In/Sec	.060 G-s
Clarification Of Vibration Units:		
Acc> G-s RMS		
Vel> In/Sec PK		

As always, it has been a pleasure to serve North Shelby-Archaea Energy. If there are any comments or questions, do not hesitate to contact us.

Sincerely,

Kerin W. Maxuell

ISO Certified Vibration Analyst, Category III



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