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July 29, 2022

South Shelby RNG
Memphis, TN

The following is a summary of findings from the July 2022 monthly vibration survey that was performed on July 27, 2022.

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.

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

Sincerely,

ISO Certified Vibration Analyst, Category III

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Defects

C-0600 A Feed Gas Compressor
Higher than average 1 x rpm vibration is still present in the compressor section. This may be due to soft foot or some other base issue. For now, ensure all fasteners are tight and ensure shims under compressor feet are not loose. Perform a hot alignment check as well. Rated as a **CLASS II** defect.

C-0600 B Feed Gas Compressor
Compressor vertical data is still showing some dominant 4-x male rotor rpm vibration. Internal clearance issue or some other process or loading issue may be causing the 4-x rpm vibration and harmonics of 4 x that also seen in the compressor data. We will continue to monitor closely. Rated as a **CLASS I** defect.

C-0600 C Feed Gas Compressor
Motor has had an increase in 1 x rpm vibration. Compressor continues to have high vibrations that are related to 4 x the speed of the male rotor. For now, we recommend performing a hot alignment on the unit. We will continue to monitor these issues closely. Rated as a **CLASS I** defect for now.

BLR-0200 A, B, C, and D LFG Blowers
These blowers still have high amplitudes of acceleration (high frequency vibrations). Blower outboard axials are typically the highest amplitudes and may be process load related. Multiple harmonics at what appears to be 8 x blower rpm are present and is dominant in blower data. Amplitudes are as high as 60 g's peak to peak which is very high; however, this is likely a characteristic of this blowers' sliding vanes. We will continue to monitor closely. Rated as **CLASS I** defects for now.

BLR-0200 D LFG Blower
Unit was down but the following still applies: Motor data shows signs of bearing defects in the DE motor bearing. Amplitudes have increased to alarm levels. Motor should be replaced soon. Rated as a **CLASS III** defect.

C-1300 Sales Gas Compressor Stage 2
Overall vibration continues to be lower than past data shows. In the past there has been an up and down vibration that was likely due to a natural frequency coinciding with a forcing frequency from the compressor causing resonance. For now, we still recommend on performing some other vibration testing with the VFD in local control so we can determine what frequencies may be causing the higher vibrations. Rated as a **CLASS I** defect for now.

Abbreviated Last Measurement Summary
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Database: South Shelby RNG.rbm
Area: SOUTH SHELBY PLANT

MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD
C-551B - C-551B VACUUM COMPRESSOR B	(27-Jul-22)	
	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL	.057 In/Sec	1.209 G-s
MOV - MOTOR OUTBOARD VERTICAL	.055 In/Sec	.636 G-s
MIH - MOTOR INBOARD HORIZONTAL	.107 In/Sec	1.324 G-s
MIV - MOTOR INBOARD VERTICAL	.099 In/Sec	1.027 G-s
MIA - MOTOR INBOARD AXIAL	.076 In/Sec	1.097 G-s
CIA - COMPRESSOR INBOARD AXIAL	.134 In/Sec	1.814 G-s

CIH - COMPRESSOR INBOARD HORIZONTAL	.161 In/Sec	2.916 G-s
CIV - COMPRESSOR INBOARD VERTICAL	.214 In/Sec	1.341 G-s
COH - COMPRESSOR OUTBOARD HORIZONTAL	.273 In/Sec	6.039 G-s
COV - COMPRESSOR OUTBOARD VERTICAL	.183 In/Sec	1.912 G-s
COA - COMPRESSOR OUTBOARD AXIAL	.204 In/Sec	2.146 G-s

C-551A - C-551A VACUUM COMPRESSOR A (27-Jul-22)

	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL	.069 In/Sec	.666 G-s
MOV - MOTOR OUTBOARD VERTICAL	.075 In/Sec	.755 G-s
MIH - MOTOR INBOARD HORIZONTAL	.108 In/Sec	1.114 G-s
MIV - MOTOR INBOARD VERTICAL	.097 In/Sec	.311 G-s
MIA - MOTOR INBOARD AXIAL	.077 In/Sec	.342 G-s
CIA - COMPRESSOR INBOARD AXIAL	.474 In/Sec	1.773 G-s
CIH - COMPRESSOR INBOARD HORIZONTAL	.297 In/Sec	4.062 G-s
CIV - COMPRESSOR INBOARD VERTICAL	.421 In/Sec	1.809 G-s
COH - COMPRESSOR OUTBOARD HORIZONTAL	.356 In/Sec	5.328 G-s
COV - COMPRESSOR OUTBOARD VERTICAL	.275 In/Sec	1.610 G-s
COA - COMPRESSOR OUTBOARD AXIAL	.303 In/Sec	3.249 G-s

C-601B - C-601B N2 RECYCLE COMP B (27-Jul-22)

	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL	.091 In/Sec	.675 G-s
MOV - MOTOR OUTBOARD VERTICAL	.040 In/Sec	.510 G-s
MIH - MOTOR INBOARD HORIZONTAL	.130 In/Sec	1.082 G-s
MIV - MOTOR INBOARD VERTICAL	.040 In/Sec	.437 G-s
MIA - MOTOR INBOARD AXIAL	.052 In/Sec	.237 G-s
CIA - COMPRESSOR INBOARD AXIAL	.163 In/Sec	1.427 G-s
CIH - COMPRESSOR INBOARD HORIZONTAL	.121 In/Sec	1.447 G-s
CIV - COMPRESSOR INBOARD VERTICAL	.072 In/Sec	3.968 G-s
COH - COMPRESSOR OUTBOARD HORIZONTAL	.152 In/Sec	2.219 G-s
COV - COMPRESSOR OUTBOARD VERTICAL	.110 In/Sec	1.336 G-s
COA - COMPRESSOR OUTBOARD AXIAL	.097 In/Sec	1.445 G-s

C-601A - C-601A N2 RECYCLE COMP A (27-Jul-22)

	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL	.046 In/Sec	.572 G-s
MOV - MOTOR OUTBOARD VERTICAL	.027 In/Sec	.187 G-s
MIH - MOTOR INBOARD HORIZONTAL	.089 In/Sec	1.051 G-s
MIV - MOTOR INBOARD VERTICAL	.036 In/Sec	.261 G-s
MIA - MOTOR INBOARD AXIAL	.034 In/Sec	.428 G-s
CIA - COMPRESSOR INBOARD AXIAL	.140 In/Sec	.918 G-s
CIH - COMPRESSOR INBOARD HORIZONTAL	.107 In/Sec	.849 G-s
CIV - COMPRESSOR INBOARD VERTICAL	.111 In/Sec	.505 G-s
COH - COMPRESSOR OUTBOARD HORIZONTAL	.125 In/Sec	2.892 G-s
COV - COMPRESSOR OUTBOARD VERTICAL	.099 In/Sec	1.213 G-s
COA - COMPRESSOR OUTBOARD AXIAL	.134 In/Sec	1.569 G-s

C-0600A - C-0600A FEED GAS COMP A (27-Jul-22)

	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL	.083 In/Sec	.610 G-s
MOV - MOTOR OUTBOARD VERTICAL	.106 In/Sec	.193 G-s
MIH - MOTOR INBOARD HORIZONTAL	.189 In/Sec	.584 G-s
MIV - MOTOR INBOARD VERTICAL	.130 In/Sec	.194 G-s
MIA - MOTOR INBOARD AXIAL	.043 In/Sec	.214 G-s
CIA - COMPRESSOR INBOARD AXIAL	.457 In/Sec	.567 G-s
CIH - COMPRESSOR INBOARD HORIZONTAL	.597 In/Sec	1.887 G-s
CIV - COMPRESSOR INBOARD VERTICAL	.765 In/Sec	.595 G-s
COH - COMPRESSOR OUTBOARD HORIZONTAL	.463 In/Sec	3.785 G-s
COV - COMPRESSOR OUTBOARD VERTICAL	.598 In/Sec	.591 G-s
COA - COMPRESSOR OUTBOARD AXIAL	.341 In/Sec	.932 G-s

C-0600B - C-0600B FEED GAS COMP B (27-Jul-22)

	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL	.207 In/Sec	.418 G-s
MOV - MOTOR OUTBOARD VERTICAL	.116 In/Sec	.260 G-s
MIH - MOTOR INBOARD HORIZONTAL	.215 In/Sec	.750 G-s
MIV - MOTOR INBOARD VERTICAL	.195 In/Sec	.313 G-s
MIA - MOTOR INBOARD AXIAL	.127 In/Sec	.231 G-s
CIA - COMPRESSOR INBOARD AXIAL	.490 In/Sec	.582 G-s

CIH - COMPRESSOR INBOARD HORIZONTAL	.469 In/Sec	1.871 G-s
CIV - COMPRESSOR INBOARD VERTICAL	.828 In/Sec	.697 G-s
COH - COMPRESSOR OUTBOARD HORIZONTAL	.393 In/Sec	2.929 G-s
COV - COMPRESSOR OUTBOARD VERTICAL	.898 In/Sec	.673 G-s
COA - COMPRESSOR OUTBOARD AXIAL	.317 In/Sec	.804 G-s

C-0600C - C-0600C FEED GAS COMP C (27-Jul-22)

	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL	.392 In/Sec	.333 G-s
MOV - MOTOR OUTBOARD VERTICAL	.280 In/Sec	.314 G-s
MIH - MOTOR INBOARD HORIZONTAL	.418 In/Sec	.587 G-s
MIV - MOTOR INBOARD VERTICAL	.142 In/Sec	.523 G-s
MIA - MOTOR INBOARD AXIAL	.115 In/Sec	.324 G-s
CIA - COMPRESSOR INBOARD AXIAL	.278 In/Sec	.714 G-s
CIH - COMPRESSOR INBOARD HORIZONTAL	.275 In/Sec	4.051 G-s
CIV - COMPRESSOR INBOARD VERTICAL	.605 In/Sec	1.118 G-s
COH - COMPRESSOR OUTBOARD HORIZONTAL	.393 In/Sec	3.125 G-s
COV - COMPRESSOR OUTBOARD VERTICAL	.658 In/Sec	1.308 G-s
COA - COMPRESSOR OUTBOARD AXIAL	.629 In/Sec	1.367 G-s

BLR-0200A - BLR-0200A LFG BLOWER A (27-Jul-22)

	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL	.176 In/Sec	.887 G-s
MOV - MOTOR OUTBOARD VERTICAL	.169 In/Sec	.390 G-s
MIH - MOTOR INBOARD HORIZONTAL	.193 In/Sec	1.245 G-s
MIV - MOTOR INBOARD VERTICAL	.434 In/Sec	.282 G-s
MIA - MOTOR INBOARD AXIAL	.156 In/Sec	.440 G-s
BIA - BLOWER INBOARD AXIAL	.319 In/Sec	3.329 G-s
BIH - BLOWER INBOARD HORIZONTAL	.727 In/Sec	13.55 G-s
BIV - BLOWER INBOARD VERTICAL	.469 In/Sec	3.112 G-s
BOH - BLOWER OUTBOARD HORIZONTAL	.668 In/Sec	15.02 G-s
BOV - BLOWER OUTBOARD VERTICAL	.448 In/Sec	3.661 G-s
BOA - BLOWER OUTBOARD AXIAL	.365 In/Sec	3.527 G-s

BLR-0200B - BLR-0200B LFG BLOWER B (27-Jul-22)

	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL	.424 In/Sec	.712 G-s
MOV - MOTOR OUTBOARD VERTICAL	.267 In/Sec	.328 G-s
MIH - MOTOR INBOARD HORIZONTAL	.314 In/Sec	1.037 G-s
MIV - MOTOR INBOARD VERTICAL	.438 In/Sec	.314 G-s
MIA - MOTOR INBOARD AXIAL	.118 In/Sec	.366 G-s
BIA - BLOWER INBOARD AXIAL	.306 In/Sec	4.464 G-s
BIH - BLOWER INBOARD HORIZONTAL	.438 In/Sec	9.251 G-s
BIV - BLOWER INBOARD VERTICAL	.421 In/Sec	3.702 G-s
BOH - BLOWER OUTBOARD HORIZONTAL	.433 In/Sec	10.47 G-s
BOV - BLOWER OUTBOARD VERTICAL	.407 In/Sec	2.773 G-s
BOA - BLOWER OUTBOARD AXIAL	.232 In/Sec	3.528 G-s

BLR-0200C - BLR-0200C LFG BLOWER C (27-Jul-22)

	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL	.177 In/Sec	1.090 G-s
MOV - MOTOR OUTBOARD VERTICAL	.173 In/Sec	.341 G-s
MIH - MOTOR INBOARD HORIZONTAL	.205 In/Sec	1.192 G-s
MIV - MOTOR INBOARD VERTICAL	.262 In/Sec	.281 G-s
MIA - MOTOR INBOARD AXIAL	.056 In/Sec	.353 G-s
BIA - BLOWER INBOARD AXIAL	.228 In/Sec	2.968 G-s
BIH - BLOWER INBOARD HORIZONTAL	.575 In/Sec	13.60 G-s
BIV - BLOWER INBOARD VERTICAL	.426 In/Sec	3.255 G-s
BOH - BLOWER OUTBOARD HORIZONTAL	.535 In/Sec	11.78 G-s
BOV - BLOWER OUTBOARD VERTICAL	.408 In/Sec	4.277 G-s
BOA - BLOWER OUTBOARD AXIAL	.267 In/Sec	2.798 G-s

C-1300 - C-1300 SALES GAS COMP STG 1 (27-Jul-22)

	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL	.068 In/Sec	.447 G-s
MOV - MOTOR OUTBOARD VERTICAL	.113 In/Sec	.110 G-s
MIH - MOTOR INBOARD HORIZONTAL	.058 In/Sec	.456 G-s
MIV - MOTOR INBOARD VERTICAL	.277 In/Sec	.098 G-s
MIA - MOTOR INBOARD AXIAL	.154 In/Sec	.318 G-s
CIA - COMPRESSOR INBOARD AXIAL	.273 In/Sec	.617 G-s

CIH - COMPRESSOR INBOARD HORIZONTAL	.243 In/Sec	2.526 G-s
CIV - COMPRESSOR INBOARD VERTICAL	.372 In/Sec	.665 G-s
COH - COMPRESSOR OUTBOARD HORIZONTAL	.203 In/Sec	3.003 G-s
COV - COMPRESSOR OUTBOARD VERTICAL	.289 In/Sec	1.014 G-s
COA - COMPRESSOR OUTBOARD AXIAL	.224 In/Sec	1.195 G-s

C-1304 - C-1304 SALES GAS COMP STG 2 (27-Jul-22)

	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL	.114 In/Sec	.733 G-s
MOV - MOTOR OUTBOARD VERTICAL	.081 In/Sec	.725 G-s
MIH - MOTOR INBOARD HORIZONTAL	.131 In/Sec	.788 G-s
MIV - MOTOR INBOARD VERTICAL	.085 In/Sec	.793 G-s
MIA - MOTOR INBOARD AXIAL	.069 In/Sec	.301 G-s
CIA - COMPRESSOR INBOARD AXIAL	.080 In/Sec	.351 G-s
CIH - COMPRESSOR INBOARD HORIZONTAL	.121 In/Sec	.408 G-s
CIV - COMPRESSOR INBOARD VERTICAL	.075 In/Sec	.299 G-s
COH - COMPRESSOR OUTBOARD HORIZONTAL	.189 In/Sec	.395 G-s
COV - COMPRESSOR OUTBOARD VERTICAL	.118 In/Sec	.211 G-s
COA - COMPRESSOR OUTBOARD AXIAL	.118 In/Sec	.260 G-s

Clarification Of Vibration Units:

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