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November 3, 2022

South Shelby RNG
Memphis, TN

The following is a summary of findings from the October 2022 monthly vibration survey that was performed on October 25, 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. Vibration has increased from .96 to 1.07 ips at the drive end of the compressor. This may be due to soft foot, coupling issue, or some other issue such as piping strain. Outlet compressor piping has a significant amount of high vibration this survey with amplitude of over 4.0 ips. This is extremely high amplitude. Ensure all fasteners are tight and ensure shims under compressor feet are not loose. Inspect coupling and ensure outlet piping does not have strain. **Inspect unit ASAP**. Rated as a **CLASS III** 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. Ensure motor does not have soft foot condition. We will continue to monitor these issues closely. Rated as a **CLASS II** defect.

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.

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

MEASUREMENT POINT            OVERALL LEVEL       HFD / VHFD
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C-551B     - C-551B VACUUM COMPRESSOR B    (25-Oct-22)
                              OVERALL LEVEL     1K-20KHz
       MOH                     .085 In/Sec      1.381 G-s
       MOV                     .075 In/Sec      1.149 G-s
       MIH                     .099 In/Sec      1.429 G-s
       MIV                     .101 In/Sec       .680 G-s
       MIA                     .068 In/Sec       .652 G-s
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	CIA	.257 In/Sec	3.184 G-s
	CIH	.201 In/Sec	4.561 G-s
	CIV	.207 In/Sec	1.531 G-s
	COH	.276 In/Sec	6.127 G-s
	COV	.303 In/Sec	2.372 G-s
	COA	.195 In/Sec	2.651 G-s

C-551A - C-551A VACUUM COMPRESSOR A (25-Oct-22)

	OVERALL LEVEL	1K-20KHz
MOH	.072 In/Sec	.655 G-s
MOV	.096 In/Sec	.989 G-s
MIH	.109 In/Sec	1.434 G-s
MIV	.082 In/Sec	1.049 G-s
MIA	.054 In/Sec	.468 G-s
CIA	.376 In/Sec	2.678 G-s
CIH	.292 In/Sec	5.194 G-s
CIV	.462 In/Sec	2.316 G-s
COH	.296 In/Sec	6.437 G-s
COV	.438 In/Sec	2.546 G-s
COA	.233 In/Sec	3.090 G-s

C-601B - C-601B N2 RECYCLE COMP B (25-Oct-22)

	OVERALL LEVEL	1K-20KHz
MOH	.113 In/Sec	.281 G-s
MOV	.039 In/Sec	.155 G-s
MIH	.112 In/Sec	.717 G-s
MIV	.059 In/Sec	.218 G-s
MIA	.057 In/Sec	.172 G-s
CIA	.107 In/Sec	1.106 G-s
CIH	.131 In/Sec	2.128 G-s
CIV	.103 In/Sec	2.064 G-s
COH	.140 In/Sec	3.099 G-s
COV	.131 In/Sec	1.424 G-s
COA	.087 In/Sec	1.322 G-s

C-601A - C-601A N2 RECYCLE COMP A (25-Oct-22)

	OVERALL LEVEL	1K-20KHz
MOH	.051 In/Sec	.730 G-s
MOV	.025 In/Sec	.256 G-s
MIH	.092 In/Sec	1.010 G-s
MIV	.039 In/Sec	.446 G-s
MIA	.039 In/Sec	.518 G-s
CIA	.135 In/Sec	1.337 G-s
CIH	.131 In/Sec	2.084 G-s
CIV	.138 In/Sec	.906 G-s
COH	.136 In/Sec	3.676 G-s
COV	.126 In/Sec	1.537 G-s
COA	.140 In/Sec	1.417 G-s

C-0600A - C-0600A FEED GAS COMP A (25-Oct-22)

	OVERALL LEVEL	1K-20KHz
MOH	.235 In/Sec	1.645 G-s
MOV	.235 In/Sec	.324 G-s
MIH	.189 In/Sec	.951 G-s
MIV	.138 In/Sec	.237 G-s
MIA	.105 In/Sec	.258 G-s
CIA	.373 In/Sec	1.373 G-s
CIH	1.065 In/Sec	7.991 G-s
CIV	1.051 In/Sec	1.963 G-s
COH	.765 In/Sec	2.798 G-s
COV	.846 In/Sec	1.726 G-s
COA	.439 In/Sec	2.219 G-s
P1	4.299 In/Sec	2.374 G-s

C-0600B - C-0600B FEED GAS COMP B (25-Oct-22)

	OVERALL LEVEL	1K-20KHz
MOH	.223 In/Sec	.501 G-s
MOV	.104 In/Sec	.199 G-s
MIH	.245 In/Sec	.586 G-s
MIV	.136 In/Sec	.514 G-s

MIA	.103 In/Sec	.321 G-s
CIA	.324 In/Sec	.516 G-s
CIH	.361 In/Sec	3.510 G-s
CIV	.579 In/Sec	.676 G-s
COH	.380 In/Sec	2.958 G-s
COV	.714 In/Sec	.630 G-s
COA	.194 In/Sec	.926 G-s
P1	.780 In/Sec	1.105 G-s

C-0600C - C-0600C FEED GAS COMP C (25-Oct-22)

	OVERALL LEVEL	1K-20KHz
MOH	.503 In/Sec	.338 G-s
MOV	.245 In/Sec	.170 G-s
MIH	.443 In/Sec	.800 G-s
MIV	.189 In/Sec	.309 G-s
MIA	.107 In/Sec	.257 G-s
CIA	.206 In/Sec	.936 G-s
CIH	.328 In/Sec	2.664 G-s
CIV	.626 In/Sec	1.019 G-s
COH	.357 In/Sec	3.174 G-s
COV	.647 In/Sec	.991 G-s
COA	.544 In/Sec	1.135 G-s
P1	.413 In/Sec	1.094 G-s

BLR-0200A - BLR-0200A LFG BLOWER A (25-Oct-22)

	OVERALL LEVEL	1K-20KHz
MOH	.081 In/Sec	.881 G-s
MOV	.062 In/Sec	.389 G-s
MIH	.085 In/Sec	1.180 G-s
MIV	.181 In/Sec	.468 G-s
MIA	.090 In/Sec	.418 G-s
BIA	.270 In/Sec	2.926 G-s
BIH	.459 In/Sec	12.86 G-s
BIV	.421 In/Sec	2.906 G-s
BOH	.506 In/Sec	15.71 G-s
BOV	.326 In/Sec	4.486 G-s
BOA	.194 In/Sec	3.901 G-s

BLR-0200B - BLR-0200B LFG BLOWER B (25-Oct-22)

	OVERALL LEVEL	1K-20KHz
MOH	.199 In/Sec	.717 G-s
MOV	.201 In/Sec	.513 G-s
MIH	.275 In/Sec	1.012 G-s
MIV	.392 In/Sec	.408 G-s
MIA	.084 In/Sec	.491 G-s
BIA	.237 In/Sec	2.530 G-s
BIH	.396 In/Sec	6.269 G-s
BIV	.430 In/Sec	2.159 G-s
BOH	.280 In/Sec	6.851 G-s
BOV	.314 In/Sec	1.952 G-s
BOA	.187 In/Sec	2.504 G-s

C-1300 - C-1300 SALES GAS COMP STG 1 (25-Oct-22)

	OVERALL LEVEL	1K-20KHz
MOH	.089 In/Sec	.652 G-s
MOV	.124 In/Sec	.400 G-s
MIH	.068 In/Sec	.765 G-s
MIV	.243 In/Sec	.323 G-s
MIA	.149 In/Sec	.253 G-s
CIA	.220 In/Sec	.697 G-s
CIH	.141 In/Sec	1.462 G-s
CIV	.384 In/Sec	.708 G-s
COH	.138 In/Sec	2.328 G-s
COV	.321 In/Sec	.682 G-s
COA	.194 In/Sec	1.039 G-s

C-1304 - C-1304 SALES GAS COMP STG 2 (25-Oct-22)

	OVERALL LEVEL	1K-20KHz
MOH	.149 In/Sec	.806 G-s
MOV	.095 In/Sec	.743 G-s

MIH	.138 In/Sec	.968 G-s
MIV	.079 In/Sec	.896 G-s
MIA	.098 In/Sec	.348 G-s
CIA	.139 In/Sec	.216 G-s
CIH	.139 In/Sec	.541 G-s
CIV	.118 In/Sec	.233 G-s
COH	.145 In/Sec	.350 G-s
COV	.130 In/Sec	.246 G-s
COA	.121 In/Sec	.296 G-s

Clarification Of Vibration Units:

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