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March 23, 2021

South Shelby RNG
Memphis, TN

The following is a summary of findings from the monthly vibration survey that was performed on March 12, 2021. Please let us know if there are any questions or comments.

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

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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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.

Defects

C-551B and C-551A Vacuum Compressors
Compressor vibration has increased quite a bit this survey in the inboard end of the compressor. This may process and/or load related; however, we will monitor this closely in the upcoming surveys. Rated as **CLASS I** defects for now.

C-601B N2 Recycle Compressor B
Compressor inboard has increased rotor harmonics in relation to 3 x rpm which is likely rotor mesh frequency. Other compressors had elevated vibration this survey, so this may be load or process related. We will monitor this closely. Rated as a **CLASS I** defect for now.

C-0600A Feed Gas Compressor
Motor still has a slightly higher than normal 1 x rpm vibration in the horizontal direction DE and ODE. Compressor also has high vibrations that are related to 4 x the speed of the male rotor. Compressor vibrations were higher this month. Rated as a **CLASS I** defect for now.

C-0600 B Feed Gas Compressor
Compressor is showing 1/3 harmonics of the higher rpm rotor fundamental (1 x rpm). This indicates some type of internal fit looseness. Unit is also still experiencing some 1 x motor horizontal vibration. Internal clearance issue or some other loading issue may be causing the 4 x rpm and harmonics thereof 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 still has a slightly higher than normal 1 x rpm vibration in the horizontal direction DE and ODE. Compressor also has high vibrations that are related to 4 x the speed of the male rotor. Compressor vibrations were higher this month. 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 also have very high amplitudes of velocity and high frequency vibrations this survey and it is even higher than the survey last month. 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 range from 3 to nearly 40 g's peak to peak which seems very high for newer equipment; however, this is possibly a characteristic of this blowers' sliding vanes. Rated as **CLASS I** defects for now.

C-1300 Sales Gas Compressor Stage 1
This compressor has elevated 1 x rpm vibration but not as high as the Feed Gas Compressors. This is an indication of a structural base issue. Compressor base directly under compressor is weak and likely needs to be stiffened or re-designed. Rated as a **CLASS I** defect for now.

C-1300 Sales Gas Compressor Stage 2
Overall vibration continues to remain low The high 2 x rpm vibration seen previously was possibly due to a resonant frequency coinciding with a forcing frequency from the compressor. We are possibly planning on performing some other vibration testing with the VFD in local control so we can determine what frequencies may be causing the vibrations seen recently. Rated as a **CLASS I** defect for now.

Abbreviated Last Measurement Summary

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Area: SOUTH SHELBY PLANT

MEASUREMENT POINT		OVERALL LEVEL	HFD / VHFD
C-551B	- C-551B VACUUM COMPRESSOR B	(12-Mar-21)	
		OVERALL LEVEL	1K-20KHz
	MOH	.064 In/Sec	.588 G-s
	MOV	.059 In/Sec	.737 G-s
	MIH	.093 In/Sec	.460 G-s
	MIV	.087 In/Sec	.794 G-s
	MIA	.070 In/Sec	.635 G-s
	CIA	.291 In/Sec	4.228 G-s
	CIH	.423 In/Sec	7.433 G-s
	CIV	.281 In/Sec	3.786 G-s
	COH	.284 In/Sec	4.463 G-s
	COV	.290 In/Sec	4.325 G-s
	COA	.273 In/Sec	3.815 G-s
C-551A	- C-551A VACUUM COMPRESSOR A	(12-Mar-21)	
		OVERALL LEVEL	1K-20KHz
	MOH	.075 In/Sec	.952 G-s
	MOV	.048 In/Sec	.545 G-s
	MIH	.090 In/Sec	.263 G-s
	MIV	.084 In/Sec	.635 G-s
	MIA	.072 In/Sec	.613 G-s
	CIA	.319 In/Sec	4.005 G-s
	CIH	.485 In/Sec	7.872 G-s
	CIV	.222 In/Sec	2.972 G-s
	COH	.207 In/Sec	3.455 G-s
	COV	.332 In/Sec	4.926 G-s
	COA	.325 In/Sec	4.968 G-s
C-601B	- C-601B N2 RECYCLE COMP B	(12-Mar-21)	
		OVERALL LEVEL	1K-20KHz
	MOH	.114 In/Sec	.698 G-s
	MOV	.047 In/Sec	.943 G-s
	MIH	.114 In/Sec	.498 G-s
	MIV	.041 In/Sec	.449 G-s
	MIA	.087 In/Sec	.470 G-s
	CIA	.292 In/Sec	2.879 G-s
	CIH	.310 In/Sec	3.621 G-s
	CIV	.167 In/Sec	1.925 G-s
	COH	.132 In/Sec	1.598 G-s
	COV	.125 In/Sec	1.381 G-s
	COA	.118 In/Sec	1.356 G-s
C-601A	- C-601A N2 RECYCLE COMP A	(12-Mar-21)	
		OVERALL LEVEL	1K-20KHz
	MOH	.081 In/Sec	.429 G-s
	MOV	.052 In/Sec	.770 G-s
	MIH	.079 In/Sec	.358 G-s
	MIV	.059 In/Sec	.692 G-s
	MIA	.047 In/Sec	.658 G-s
	CIA	.128 In/Sec	1.259 G-s
	CIH	.164 In/Sec	1.736 G-s
	CIV	.143 In/Sec	1.831 G-s
	COH	.147 In/Sec	1.270 G-s
	COV	.113 In/Sec	1.629 G-s
	COA	.198 In/Sec	1.806 G-s
C-0600A	- C-0600A FEED GAS COMP A	(12-Mar-21)	
		OVERALL LEVEL	1K-20KHz
	MOH	.364 In/Sec	1.396 G-s
	MOV	.215 In/Sec	1.608 G-s
	MIH	.143 In/Sec	.469 G-s
	MIV	.086 In/Sec	.854 G-s

MIA	.163	In/Sec	1.772 G-s
CIA	.333	In/Sec	3.245 G-s
CIH	.323	In/Sec	2.723 G-s
CIV	.456	In/Sec	5.112 G-s
COH	.362	In/Sec	4.239 G-s
COV	.340	In/Sec	2.724 G-s
COA	.315	In/Sec	2.741 G-s
P1	.234	In/Sec	1.003 G-s
P2	.151	In/Sec	.815 G-s
P3	.211	In/Sec	1.718 G-s
P4	.091	In/Sec	.282 G-s
P5	.143	In/Sec	.495 G-s
P6	.380	In/Sec	2.782 G-s
P7	.151	In/Sec	1.280 G-s
P8	.308	In/Sec	1.885 G-s
P9	.385	In/Sec	.684 G-s
P10	.182	In/Sec	1.566 G-s
P11	.113	In/Sec	.761 G-s
P12	.206	In/Sec	.333 G-s
P13	.320	In/Sec	.828 G-s
P14	.302	In/Sec	2.570 G-s
VSI	.717	In/Sec	.293 G-s
VLW	.276	In/Sec	.413 G-s
VSL	.206	In/Sec	.250 G-s
VRW	.513	In/Sec	.395 G-s
2SL	1.130	In/Sec	.898 G-s
2SW	.655	In/Sec	1.031 G-s
2SR	.276	In/Sec	.958 G-s
2RW	.450	In/Sec	.736 G-s

C-0600B - C-0600B FEED GAS COMP B (12-Mar-21)

	OVERALL LEVEL		1K-20KHz
MOH	.273	In/Sec	1.057 G-s
MOV	.193	In/Sec	1.700 G-s
MIH	.168	In/Sec	.526 G-s
MIV	.173	In/Sec	.683 G-s
MIA	.158	In/Sec	1.143 G-s
CIA	.408	In/Sec	3.229 G-s
CIH	.370	In/Sec	3.613 G-s
CIV	.468	In/Sec	5.698 G-s
COH	.383	In/Sec	2.306 G-s
COV	.369	In/Sec	2.461 G-s
COA	.386	In/Sec	4.261 G-s
P1	.469	In/Sec	.835 G-s
P2	.369	In/Sec	1.358 G-s
P3	.641	In/Sec	2.840 G-s
P4	.410	In/Sec	3.328 G-s
P5	.736	In/Sec	1.536 G-s
P6	.809	In/Sec	2.444 G-s
P7	.725	In/Sec	2.209 G-s
P8	.302	In/Sec	2.040 G-s
P9	.613	In/Sec	1.398 G-s
P10	.368	In/Sec	1.751 G-s
P11	.175	In/Sec	.752 G-s
P12	.441	In/Sec	.810 G-s
P13	1.037	In/Sec	1.680 G-s
P14	.612	In/Sec	1.823 G-s
VLL	1.457	In/Sec	.974 G-s
VLW	.520	In/Sec	1.330 G-s
VRL	1.243	In/Sec	.653 G-s
VRW	.745	In/Sec	1.173 G-s

C-0600C - C-0600C FEED GAS COMP C (12-Mar-21)

	OVERALL LEVEL		1K-20KHz
MOH	.361	In/Sec	.980 G-s
MOV	.167	In/Sec	1.267 G-s
MIH	.222	In/Sec	.805 G-s
MIV	.123	In/Sec	.606 G-s
MIA	.140	In/Sec	1.393 G-s
CIA	.308	In/Sec	1.802 G-s

CIH	.291	In/Sec	2.001 G-s
CIV	.293	In/Sec	4.085 G-s
COH	.259	In/Sec	2.627 G-s
COV	.209	In/Sec	2.462 G-s
COA	.233	In/Sec	2.302 G-s
P1	.247	In/Sec	.578 G-s
P2	.207	In/Sec	.706 G-s
P3	.188	In/Sec	.994 G-s
P4	.208	In/Sec	1.261 G-s
P5	.485	In/Sec	.787 G-s
P6	.306	In/Sec	1.723 G-s
P7	.304	In/Sec	1.517 G-s
P8	.475	In/Sec	1.476 G-s
P9	.179	In/Sec	.836 G-s
P10	.076	In/Sec	.570 G-s
P11	.234	In/Sec	.395 G-s
P12	.208	In/Sec	.623 G-s
P13	.313	In/Sec	.784 G-s
P14	.218	In/Sec	1.853 G-s
VSL	.540	In/Sec	1.025 G-s
SLW	.697	In/Sec	.855 G-s
SRL	.242	In/Sec	1.017 G-s
RSW	.979	In/Sec	.901 G-s

BLR-0200A - BLR-0200A LFG BLOWER A (12-Mar-21)

	OVERALL LEVEL		1K-20KHz
MOH	.171	In/Sec	1.227 G-s
MOV	.072	In/Sec	.900 G-s
MIH	.238	In/Sec	3.492 G-s
MIV	.171	In/Sec	1.345 G-s
MIA	.134	In/Sec	1.850 G-s
BIA	.621	In/Sec	9.218 G-s
BIH	1.073	In/Sec	15.29 G-s
BIV	.810	In/Sec	10.78 G-s
BOH	.821	In/Sec	13.13 G-s
BOV	1.176	In/Sec	20.32 G-s
BOA	1.061	In/Sec	14.58 G-s

BLR-0200B - BLR-0200B LFG BLOWER B (12-Mar-21)

	OVERALL LEVEL		1K-20KHz
MOH	.181	In/Sec	1.256 G-s
MOV	.126	In/Sec	.767 G-s
MIH	.268	In/Sec	3.772 G-s
MIV	.225	In/Sec	.842 G-s
MIA	.171	In/Sec	1.115 G-s
BIA	1.208	In/Sec	17.36 G-s
BIH	.617	In/Sec	7.166 G-s
BIV	.750	In/Sec	6.014 G-s
BOH	.875	In/Sec	11.70 G-s
BOV	1.019	In/Sec	15.71 G-s
BOA	1.259	In/Sec	18.83 G-s

BLR-0200D - BLR-0200D LFG BLOWER D (12-Mar-21)

	OVERALL LEVEL		1K-20KHz
MOH	.117	In/Sec	1.456 G-s
MOV	.156	In/Sec	.826 G-s
MIH	.185	In/Sec	2.904 G-s
MIV	.168	In/Sec	1.085 G-s
MIA	.076	In/Sec	.948 G-s
BIA	1.006	In/Sec	14.61 G-s
BIH	.791	In/Sec	12.19 G-s
BIV	.586	In/Sec	6.926 G-s
BOH	.817	In/Sec	12.99 G-s
BOV	1.156	In/Sec	17.15 G-s
BOA	1.318	In/Sec	19.82 G-s

C-1300 - C-1300 SALES GAS COMP STG 1 (12-Mar-21)

	OVERALL LEVEL		1K-20KHz
MOH	.109	In/Sec	1.416 G-s
MOV	.179	In/Sec	2.157 G-s

MIH	.058 In/Sec	.550 G-s
MIV	.058 In/Sec	.516 G-s
MIA	.081 In/Sec	1.046 G-s
CIA	.242 In/Sec	2.464 G-s
CIH	.145 In/Sec	1.656 G-s
CIV	.281 In/Sec	2.478 G-s
COH	.160 In/Sec	1.329 G-s
COV	.315 In/Sec	2.019 G-s
COA	.146 In/Sec	1.388 G-s
VSL	.568 In/Sec	.586 G-s
VSR	.935 In/Sec	.537 G-s

C-1304 - C-1304 SALES GAS COMP STG 2 (12-Mar-21)

	OVERALL LEVEL	1K-20KHz
MOH	.080 In/Sec	.582 G-s
MOV	.086 In/Sec	.348 G-s
MIH	.139 In/Sec	.607 G-s
MIV	.087 In/Sec	.299 G-s
MIA	.093 In/Sec	.239 G-s
CIA	.115 In/Sec	.551 G-s
CIH	.166 In/Sec	.448 G-s
CIV	.105 In/Sec	.635 G-s
COH	.198 In/Sec	.215 G-s
COV	.121 In/Sec	.401 G-s
COA	.120 In/Sec	.567 G-s

Clarification Of Vibration Units:

Acc --> G-s RMS

Vel --> In/Sec PK