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December 3, 2021

South Shelby RNG
Memphis, TN

The following is a summary of findings from the monthly vibration survey that was performed on December 2, 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

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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Email: kwilliam@gohispeed.com

Defects

C-0600 A Feed Gas Compressor

Compressor has elevated 1 x input rpm vibration. Compressor has highest vibration on record in compressor inboard horizontal (CIH). Overall amplitude at the CIH is .57 ips. On average CIH has been around .38 ips. 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. Grout may be separating due to high vibration. And could also be contributing to this vibration. Rated as a **CLASS II** defect.

C-0600 B Feed Gas Compressor

1/3 rpm harmonics appear to have subsided this survey. Compressor data still shows some 4 x male rotor rpm 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 has slightly high 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. 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

Overall velocity vibration has decreased some this survey on all 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 70to 80 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

Equipment was not in service this survey; however, 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 II** defect.

C-1300 Sales Gas Compressor Stage 2

Overall vibration was lower this survey. The up and down vibration is likely due to a natural frequency coinciding with a forcing frequency from the compressor causing resonance. We recommend 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.

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Abbreviated Last Measurement Summary
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                Database:  South Shelby RNG.rbm
                Area:      SOUTH SHELBY PLANT
                Route No.  1:  SOUTH SHELBY
                Report Date:  03-Dec-21   08:48

          MEASUREMENT POINT                    OVERALL LEVEL       HFD / VHFD
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   C-551B     - C-551B VACUUM COMPRESSOR B    (02-Dec-21)
                                               OVERALL LEVEL     1K-20KHz
   MOH - MOTOR OUTBOARD HORIZONTAL               .082 In/Sec       .834 G-s
   MOV - MOTOR OUTBOARD VERTICAL                 .071 In/Sec       .457 G-s
   MIH - MOTOR INBOARD HORIZONTAL                .102 In/Sec      1.693 G-s
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MIV - MOTOR INBOARD VERTICAL	.095 In/Sec	.710 G-s
MIA - MOTOR INBOARD AXIAL	.068 In/Sec	.620 G-s
CIA - COMPRESSOR INBOARD AXIAL	.200 In/Sec	.954 G-s
CIH - COMPRESSOR INBOARD HORIZONTAL	.208 In/Sec	5.160 G-s
CIV - COMPRESSOR INBOARD VERTICAL	.250 In/Sec	1.359 G-s
COH - COMPRESSOR OUTBOARD HORIZONTAL	.236 In/Sec	6.164 G-s
COV - COMPRESSOR OUTBOARD VERTICAL	.228 In/Sec	1.739 G-s
COA - COMPRESSOR OUTBOARD AXIAL	.212 In/Sec	3.050 G-s

C-551A - C-551A VACUUM COMPRESSOR A (02-Dec-21)

	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL	.076 In/Sec	.580 G-s
MOV - MOTOR OUTBOARD VERTICAL	.079 In/Sec	.606 G-s
MIH - MOTOR INBOARD HORIZONTAL	.113 In/Sec	.894 G-s
MIV - MOTOR INBOARD VERTICAL	.071 In/Sec	.646 G-s
MIA - MOTOR INBOARD AXIAL	.067 In/Sec	.915 G-s
CIA - COMPRESSOR INBOARD AXIAL	.370 In/Sec	2.390 G-s
CIH - COMPRESSOR INBOARD HORIZONTAL	.208 In/Sec	3.190 G-s
CIV - COMPRESSOR INBOARD VERTICAL	.333 In/Sec	1.358 G-s
COH - COMPRESSOR OUTBOARD HORIZONTAL	.305 In/Sec	4.655 G-s
COV - COMPRESSOR OUTBOARD VERTICAL	.348 In/Sec	1.450 G-s
COA - COMPRESSOR OUTBOARD AXIAL	.162 In/Sec	1.941 G-s

C-601B - C-601B N2 RECYCLE COMP B (02-Dec-21)

	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL	.127 In/Sec	1.090 G-s
MOV - MOTOR OUTBOARD VERTICAL	.055 In/Sec	.197 G-s
MIH - MOTOR INBOARD HORIZONTAL	.120 In/Sec	1.173 G-s
MIV - MOTOR INBOARD VERTICAL	.027 In/Sec	.204 G-s
MIA - MOTOR INBOARD AXIAL	.035 In/Sec	.209 G-s
CIA - COMPRESSOR INBOARD AXIAL	.169 In/Sec	1.280 G-s
CIH - COMPRESSOR INBOARD HORIZONTAL	.147 In/Sec	2.107 G-s
CIV - COMPRESSOR INBOARD VERTICAL	.245 In/Sec	2.756 G-s
COH - COMPRESSOR OUTBOARD HORIZONTAL	.169 In/Sec	2.292 G-s
COV - COMPRESSOR OUTBOARD VERTICAL	.133 In/Sec	1.157 G-s
COA - COMPRESSOR OUTBOARD AXIAL	.094 In/Sec	1.226 G-s

C-601A - C-601A N2 RECYCLE COMP A (02-Dec-21)

	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL	.081 In/Sec	1.348 G-s
MOV - MOTOR OUTBOARD VERTICAL	.029 In/Sec	.313 G-s
MIH - MOTOR INBOARD HORIZONTAL	.089 In/Sec	.782 G-s
MIV - MOTOR INBOARD VERTICAL	.044 In/Sec	.333 G-s
MIA - MOTOR INBOARD AXIAL	.035 In/Sec	.301 G-s
CIA - COMPRESSOR INBOARD AXIAL	.112 In/Sec	1.138 G-s
CIH - COMPRESSOR INBOARD HORIZONTAL	.110 In/Sec	2.986 G-s
CIV - COMPRESSOR INBOARD VERTICAL	.123 In/Sec	.903 G-s
COH - COMPRESSOR OUTBOARD HORIZONTAL	.121 In/Sec	2.895 G-s
COV - COMPRESSOR OUTBOARD VERTICAL	.094 In/Sec	1.046 G-s
COA - COMPRESSOR OUTBOARD AXIAL	.093 In/Sec	1.321 G-s

C-0600A - C-0600A FEED GAS COMP A (02-Dec-21)

	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL	.081 In/Sec	.628 G-s
MOV - MOTOR OUTBOARD VERTICAL	.136 In/Sec	.241 G-s
MIH - MOTOR INBOARD HORIZONTAL	.148 In/Sec	.407 G-s
MIV - MOTOR INBOARD VERTICAL	.132 In/Sec	.170 G-s
MIA - MOTOR INBOARD AXIAL	.065 In/Sec	.383 G-s
CIA - COMPRESSOR INBOARD AXIAL	.323 In/Sec	.609 G-s
CIH - COMPRESSOR INBOARD HORIZONTAL	.577 In/Sec	3.644 G-s
CIV - COMPRESSOR INBOARD VERTICAL	.659 In/Sec	.590 G-s
COH - COMPRESSOR OUTBOARD HORIZONTAL	.411 In/Sec	4.148 G-s
COV - COMPRESSOR OUTBOARD VERTICAL	.596 In/Sec	.758 G-s
COA - COMPRESSOR OUTBOARD AXIAL	.370 In/Sec	1.022 G-s

C-0600B - C-0600B FEED GAS COMP B (02-Dec-21)

	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL	.251 In/Sec	.496 G-s
MOV - MOTOR OUTBOARD VERTICAL	.162 In/Sec	.347 G-s
MIH - MOTOR INBOARD HORIZONTAL	.207 In/Sec	.993 G-s

MIV - MOTOR INBOARD VERTICAL	.160 In/Sec	.369 G-s
MIA - MOTOR INBOARD AXIAL	.142 In/Sec	.390 G-s
CIA - COMPRESSOR INBOARD AXIAL	.342 In/Sec	.662 G-s
CIH - COMPRESSOR INBOARD HORIZONTAL	.364 In/Sec	2.222 G-s
CIV - COMPRESSOR INBOARD VERTICAL	.482 In/Sec	.603 G-s
COH - COMPRESSOR OUTBOARD HORIZONTAL	.408 In/Sec	2.847 G-s
COV - COMPRESSOR OUTBOARD VERTICAL	.469 In/Sec	.927 G-s
COA - COMPRESSOR OUTBOARD AXIAL	.260 In/Sec	.824 G-s

C-0600C - C-0600C FEED GAS COMP C (02-Dec-21)

	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL	.299 In/Sec	.453 G-s
MOV - MOTOR OUTBOARD VERTICAL	.083 In/Sec	.471 G-s
MIH - MOTOR INBOARD HORIZONTAL	.261 In/Sec	.820 G-s
MIV - MOTOR INBOARD VERTICAL	.078 In/Sec	.395 G-s
MIA - MOTOR INBOARD AXIAL	.078 In/Sec	.609 G-s
CIA - COMPRESSOR INBOARD AXIAL	.530 In/Sec	1.280 G-s
CIH - COMPRESSOR INBOARD HORIZONTAL	.370 In/Sec	1.976 G-s
CIV - COMPRESSOR INBOARD VERTICAL	.308 In/Sec	1.091 G-s
COH - COMPRESSOR OUTBOARD HORIZONTAL	.536 In/Sec	2.723 G-s
COV - COMPRESSOR OUTBOARD VERTICAL	.557 In/Sec	1.206 G-s
COA - COMPRESSOR OUTBOARD AXIAL	.918 In/Sec	1.005 G-s

BLR-0200A - BLR-0200A LFG BLOWER A (02-Dec-21)

	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL	.097 In/Sec	.936 G-s
MOV - MOTOR OUTBOARD VERTICAL	.090 In/Sec	.504 G-s
MIH - MOTOR INBOARD HORIZONTAL	.104 In/Sec	1.752 G-s
MIV - MOTOR INBOARD VERTICAL	.162 In/Sec	.299 G-s
MIA - MOTOR INBOARD AXIAL	.065 In/Sec	.470 G-s
BIA - BLOWER INBOARD AXIAL	.211 In/Sec	3.904 G-s
BIH - BLOWER INBOARD HORIZONTAL	.502 In/Sec	16.95 G-s
BIV - BLOWER INBOARD VERTICAL	.450 In/Sec	3.857 G-s
BOH - BLOWER OUTBOARD HORIZONTAL	.501 In/Sec	12.52 G-s
BOV - BLOWER OUTBOARD VERTICAL	.428 In/Sec	3.368 G-s
BOA - BLOWER OUTBOARD AXIAL	.338 In/Sec	3.453 G-s

BLR-0200B - BLR-0200B LFG BLOWER B (02-Dec-21)

	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL	.136 In/Sec	.858 G-s
MOV - MOTOR OUTBOARD VERTICAL	.124 In/Sec	.490 G-s
MIH - MOTOR INBOARD HORIZONTAL	.161 In/Sec	1.213 G-s
MIV - MOTOR INBOARD VERTICAL	.227 In/Sec	.324 G-s
MIA - MOTOR INBOARD AXIAL	.093 In/Sec	.375 G-s
BIA - BLOWER INBOARD AXIAL	.295 In/Sec	3.851 G-s
BIH - BLOWER INBOARD HORIZONTAL	.353 In/Sec	7.204 G-s
BIV - BLOWER INBOARD VERTICAL	.417 In/Sec	2.774 G-s
BOH - BLOWER OUTBOARD HORIZONTAL	.541 In/Sec	13.54 G-s
BOV - BLOWER OUTBOARD VERTICAL	.406 In/Sec	3.193 G-s
BOA - BLOWER OUTBOARD AXIAL	.295 In/Sec	4.014 G-s

BLR-0200C - BLR-0200C LFG BLOWER C (02-Dec-21)

	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL	.126 In/Sec	.903 G-s
MOV - MOTOR OUTBOARD VERTICAL	.123 In/Sec	.342 G-s
MIH - MOTOR INBOARD HORIZONTAL	.129 In/Sec	1.263 G-s
MIV - MOTOR INBOARD VERTICAL	.194 In/Sec	.263 G-s
MIA - MOTOR INBOARD AXIAL	.125 In/Sec	.395 G-s
BIA - BLOWER INBOARD AXIAL	.381 In/Sec	5.151 G-s
BIH - BLOWER INBOARD HORIZONTAL	.640 In/Sec	14.25 G-s
BIV - BLOWER INBOARD VERTICAL	.576 In/Sec	4.606 G-s
BOH - BLOWER OUTBOARD HORIZONTAL	.744 In/Sec	15.87 G-s
BOV - BLOWER OUTBOARD VERTICAL	.404 In/Sec	2.299 G-s
BOA - BLOWER OUTBOARD AXIAL	.290 In/Sec	4.320 G-s

C-1300 - C-1300 SALES GAS COMP STG 1 (02-Dec-21)

	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL	.059 In/Sec	.696 G-s
MOV - MOTOR OUTBOARD VERTICAL	.177 In/Sec	.333 G-s
MIH - MOTOR INBOARD HORIZONTAL	.046 In/Sec	.965 G-s

MIV - MOTOR INBOARD VERTICAL	.141 In/Sec	.402 G-s
MIA - MOTOR INBOARD AXIAL	.108 In/Sec	.227 G-s
CIA - COMPRESSOR INBOARD AXIAL	.312 In/Sec	.353 G-s
CIH - COMPRESSOR INBOARD HORIZONTAL	.174 In/Sec	1.553 G-s
CIV - COMPRESSOR INBOARD VERTICAL	.398 In/Sec	.279 G-s
COH - COMPRESSOR OUTBOARD HORIZONTAL	.250 In/Sec	2.100 G-s
COV - COMPRESSOR OUTBOARD VERTICAL	.410 In/Sec	.637 G-s
COA - COMPRESSOR OUTBOARD AXIAL	.165 In/Sec	.637 G-s

C-1304 - C-1304 SALES GAS COMP STG 2 (02-Dec-21)

	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL	.190 In/Sec	.659 G-s
MOV - MOTOR OUTBOARD VERTICAL	.100 In/Sec	.616 G-s
MIH - MOTOR INBOARD HORIZONTAL	.189 In/Sec	.793 G-s
MIV - MOTOR INBOARD VERTICAL	.081 In/Sec	.582 G-s
MIA - MOTOR INBOARD AXIAL	.170 In/Sec	.262 G-s
CIA - COMPRESSOR INBOARD AXIAL	.193 In/Sec	.503 G-s
CIH - COMPRESSOR INBOARD HORIZONTAL	.343 In/Sec	.585 G-s
CIV - COMPRESSOR INBOARD VERTICAL	.144 In/Sec	.220 G-s
COH - COMPRESSOR OUTBOARD HORIZONTAL	.153 In/Sec	.251 G-s
COV - COMPRESSOR OUTBOARD VERTICAL	.170 In/Sec	.130 G-s
COA - COMPRESSOR OUTBOARD AXIAL	.211 In/Sec	.201 G-s

Clarification Of Vibration Units:

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