HI-SPEED INDUSTRIAL SERVICE QualiTest® Diagnostics

7030 Ryburn Dr. Millington, TN Phone: (901) 873-5300 Fax: (901) 873-5301 www.gohispeed.com

February 16, 2021

South Shelby RNG
Memphis, TN

The following is a summary of findings from the monthly vibration survey that was performed on February 10, 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

Defects

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 male 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 male rotor looseness 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 were also very high this month and may be process 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 new equipment; however, this is likely a characteristic of this blower and we need to continue to establish a trend. 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 was much lower in the compressor this month. Motor vibration was also lower. The high 2 x rpm vibration seen last month 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
                    ***********************************

              Database:  South Shelby RNG.rbm
              Area:      SOUTH SHELBY PLANT

      MEASUREMENT POINT            OVERALL LEVEL       HFD / VHFD
      -----------------            -------------       ----------

      C-551B     - C-551B VACUUM COMPRESSOR B    (10-Feb-21)
                                   OVERALL LEVEL     1K-20KHz
             MOH                     .079 In/Sec       .615 G-s
             MOV                     .052 In/Sec       .425 G-s
             MIH                     .089 In/Sec       .544 G-s
             MIV                     .078 In/Sec       .614 G-s
             MIA                     .075 In/Sec       .818 G-s
```

	CIA	.205 In/Sec	3.018 G-s
	CIH	.165 In/Sec	2.343 G-s
	CIV	.171 In/Sec	2.192 G-s
	COH	.340 In/Sec	5.424 G-s
	COV	.276 In/Sec	4.397 G-s
	COA	.199 In/Sec	3.774 G-s

C-551A - C-551A VACUUM COMPRESSOR A (10-Feb-21)

	OVERALL LEVEL	1K-20KHz
MOH	.120 In/Sec	1.778 G-s
MOV	.056 In/Sec	.664 G-s
MIH	.092 In/Sec	.762 G-s
MIV	.092 In/Sec	.808 G-s
MIA	.062 In/Sec	.445 G-s
CIA	.313 In/Sec	4.751 G-s
CIH	.283 In/Sec	2.898 G-s
CIV	.246 In/Sec	3.042 G-s
COH	.271 In/Sec	4.126 G-s
COV	.406 In/Sec	5.166 G-s
COA	.318 In/Sec	4.694 G-s

C-601B - C-601B N2 RECYCLE COMP B (10-Feb-21)

	OVERALL LEVEL	1K-20KHz
MOH	.120 In/Sec	.754 G-s
MOV	.037 In/Sec	.609 G-s
MIH	.113 In/Sec	.693 G-s
MIV	.034 In/Sec	.515 G-s
MIA	.058 In/Sec	.557 G-s
CIA	.210 In/Sec	1.756 G-s
CIH	.123 In/Sec	.972 G-s
CIV	.141 In/Sec	2.141 G-s
COH	.141 In/Sec	1.489 G-s
COV	.095 In/Sec	1.169 G-s
COA	.100 In/Sec	2.231 G-s

C-601A - C-601A N2 RECYCLE COMP A (10-Feb-21)

	OVERALL LEVEL	1K-20KHz
MOH	.038 In/Sec	.379 G-s
MOV	.039 In/Sec	.704 G-s
MIH	.076 In/Sec	.582 G-s
MIV	.036 In/Sec	.520 G-s
MIA	.043 In/Sec	.758 G-s
CIA	.129 In/Sec	1.354 G-s
CIH	.133 In/Sec	1.417 G-s
CIV	.122 In/Sec	1.434 G-s
COH	.131 In/Sec	1.993 G-s
COV	.132 In/Sec	1.600 G-s
COA	.126 In/Sec	3.104 G-s

C-0600A - C-0600A FEED GAS COMP A (10-Feb-21)

	OVERALL LEVEL	1K-20KHz
MOH	.412 In/Sec	5.132 G-s
MOV	.274 In/Sec	3.957 G-s
MIH	.239 In/Sec	.827 G-s
MIV	.146 In/Sec	1.897 G-s
MIA	.195 In/Sec	2.962 G-s
CIA	.473 In/Sec	6.049 G-s
CIH	.337 In/Sec	3.123 G-s
CIV	.481 In/Sec	6.164 G-s
COH	.441 In/Sec	4.285 G-s
COV	.465 In/Sec	3.134 G-s
COA	.423 In/Sec	3.584 G-s
P1	.337 In/Sec	1.680 G-s
P2	.213 In/Sec	.985 G-s
P3	.840 In/Sec	1.931 G-s
P4	.127 In/Sec	.886 G-s
P5	.258 In/Sec	.962 G-s
P6	.466 In/Sec	4.176 G-s
P7	.359 In/Sec	2.712 G-s
P8	.402 In/Sec	1.966 G-s

P9	.758	In/Sec	.919 G-s
P10	.118	In/Sec	1.251 G-s
P11	.120	In/Sec	.445 G-s
P12	.190	In/Sec	.603 G-s
P13	.384	In/Sec	.842 G-s
P14	.312	In/Sec	2.512 G-s
VSI	.490	In/Sec	.232 G-s
VLW	.371	In/Sec	.425 G-s
VSL	.190	In/Sec	.344 G-s
VRW	.430	In/Sec	.403 G-s
2SL	.572	In/Sec	.824 G-s
2SW	.427	In/Sec	.792 G-s
2SR	.226	In/Sec	.932 G-s
2RW	.196	In/Sec	.622 G-s

C-0600B - C-0600B FEED GAS COMP B (10-Feb-21)

	OVERALL LEVEL		1K-20KHz
MOH	.334	In/Sec	1.383 G-s
MOV	.234	In/Sec	1.994 G-s
MIH	.270	In/Sec	.466 G-s
MIV	.121	In/Sec	.650 G-s
MIA	.121	In/Sec	1.320 G-s
CIA	.398	In/Sec	3.782 G-s
CIH	.381	In/Sec	3.785 G-s
CIV	.518	In/Sec	6.039 G-s
COH	.382	In/Sec	2.365 G-s
COV	.369	In/Sec	2.802 G-s
COA	.377	In/Sec	3.952 G-s
P1	.561	In/Sec	.855 G-s
P2	.496	In/Sec	1.099 G-s
P3	.499	In/Sec	2.439 G-s
P4	.336	In/Sec	1.298 G-s
P5	.703	In/Sec	.964 G-s
P6	.943	In/Sec	2.011 G-s
P7	.310	In/Sec	1.476 G-s
P8	.334	In/Sec	2.067 G-s
P9	.493	In/Sec	.868 G-s
P10	.669	In/Sec	1.787 G-s
P11	.376	In/Sec	.690 G-s
P12	.401	In/Sec	.521 G-s
P13	.547	In/Sec	.688 G-s
P14	.838	In/Sec	1.415 G-s
VLL	1.586	In/Sec	.915 G-s
VLW	.804	In/Sec	1.146 G-s
VRL	1.210	In/Sec	.641 G-s
VRW	.682	In/Sec	.939 G-s

C-0600C - C-0600C FEED GAS COMP C (10-Feb-21)

	OVERALL LEVEL		1K-20KHz
MOH	.401	In/Sec	1.133 G-s
MOV	.138	In/Sec	1.068 G-s
MIH	.347	In/Sec	1.832 G-s
MIV	.136	In/Sec	.687 G-s
MIA	.202	In/Sec	2.858 G-s
CIA	.304	In/Sec	1.616 G-s
CIH	.277	In/Sec	2.379 G-s
CIV	.242	In/Sec	3.315 G-s
COH	.245	In/Sec	2.452 G-s
COV	.201	In/Sec	1.847 G-s
COA	.210	In/Sec	2.677 G-s
P1	.200	In/Sec	.443 G-s
P2	.291	In/Sec	.479 G-s
P3	.153	In/Sec	.980 G-s
P4	.151	In/Sec	.626 G-s
P5	.473	In/Sec	.622 G-s
P6	.331	In/Sec	1.337 G-s
P7	.225	In/Sec	.883 G-s
P8	.439	In/Sec	1.124 G-s
P9	.187	In/Sec	1.017 G-s
P10	.087	In/Sec	.596 G-s

P11	.232 In/Sec	.291 G-s
P12	.192 In/Sec	.406 G-s
P13	.274 In/Sec	.607 G-s
P14	.207 In/Sec	1.780 G-s
VSL	.638 In/Sec	.838 G-s
SLW	.719 In/Sec	.877 G-s
SRL	.227 In/Sec	.891 G-s
RSW	.877 In/Sec	1.583 G-s

BLR-0200A - BLR-0200A LFG BLOWER A (10-Feb-21)

	OVERALL LEVEL	1K-20KHz
MOH	.123 In/Sec	1.049 G-s
MOV	.070 In/Sec	.826 G-s
MIH	.193 In/Sec	2.925 G-s
MIV	.135 In/Sec	1.340 G-s
MIA	.117 In/Sec	1.522 G-s
BIA	.784 In/Sec	13.76 G-s
BIH	.709 In/Sec	10.23 G-s
BIV	.745 In/Sec	8.964 G-s
BOH	.898 In/Sec	12.55 G-s
BOV	.546 In/Sec	8.888 G-s
BOA	1.046 In/Sec	18.20 G-s

BLR-0200B - BLR-0200B LFG BLOWER B (10-Feb-21)

	OVERALL LEVEL	1K-20KHz
MOH	.162 In/Sec	2.180 G-s
MOV	.082 In/Sec	.976 G-s
MIH	.190 In/Sec	2.965 G-s
MIV	.194 In/Sec	2.643 G-s
MIA	.092 In/Sec	1.038 G-s
BIA	.533 In/Sec	8.992 G-s
BIH	.726 In/Sec	10.92 G-s
BIV	.491 In/Sec	6.660 G-s
BOH	.431 In/Sec	6.694 G-s
BOV	.506 In/Sec	8.469 G-s
BOA	1.204 In/Sec	15.65 G-s

BLR-0200D - BLR-0200D LFG BLOWER D (10-Feb-21)

	OVERALL LEVEL	1K-20KHz
MOH	.181 In/Sec	2.142 G-s
MOV	.149 In/Sec	1.102 G-s
MIH	.282 In/Sec	4.396 G-s
MIV	.225 In/Sec	2.089 G-s
MIA	.169 In/Sec	2.431 G-s
BIA	.940 In/Sec	14.26 G-s
BIH	.889 In/Sec	12.93 G-s
BIV	.712 In/Sec	10.27 G-s
BOH	.850 In/Sec	13.06 G-s
BOV	.546 In/Sec	8.760 G-s
BOA	.976 In/Sec	17.79 G-s

C-1300 - C-1300 SALES GAS COMP STG 1 (10-Feb-21)

	OVERALL LEVEL	1K-20KHz
MOH	.114 In/Sec	1.536 G-s
MOV	.212 In/Sec	2.973 G-s
MIH	.085 In/Sec	1.106 G-s
MIV	.079 In/Sec	.670 G-s
MIA	.247 In/Sec	3.843 G-s
CIA	.206 In/Sec	1.408 G-s
CIH	.182 In/Sec	1.852 G-s
CIV	.306 In/Sec	2.620 G-s
COH	.169 In/Sec	1.197 G-s
COV	.329 In/Sec	1.970 G-s
COA	.157 In/Sec	1.496 G-s
P1	.074 In/Sec	.199 G-s
P2	.140 In/Sec	.853 G-s
P3	.277 In/Sec	.756 G-s
P4	.063 In/Sec	.198 G-s
P5	.236 In/Sec	.425 G-s
P6	.306 In/Sec	.630 G-s

P7	.272 In/Sec	.675 G-s
P8	.250 In/Sec	.728 G-s
P9	.187 In/Sec	.326 G-s
P10	.181 In/Sec	.459 G-s
P11	.067 In/Sec	.485 G-s
P12	.068 In/Sec	.565 G-s
P13	.096 In/Sec	.521 G-s
P14	.134 In/Sec	1.418 G-s
VSL	.466 In/Sec	.589 G-s
VSR	.901 In/Sec	.554 G-s

C-1304 - C-1304 SALES GAS COMP STG 2 (10-Feb-21)

	OVERALL LEVEL	1K-20KHz
MOH	.136 In/Sec	.660 G-s
MOV	.130 In/Sec	.644 G-s
MIH	.186 In/Sec	.822 G-s
MIV	.142 In/Sec	.344 G-s
MIA	.155 In/Sec	.425 G-s
CIA	.216 In/Sec	.684 G-s
CIH	.244 In/Sec	.577 G-s
CIV	.110 In/Sec	.686 G-s
COH	.243 In/Sec	.210 G-s
COV	.095 In/Sec	.383 G-s
COA	.152 In/Sec	.706 G-s

Clarification Of Vibration Units:
Acc --> G-s RMS
Vel --> In/Sec PK

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

HI-SPEED INDUSTRIAL SERVICE

QualiTest® Diagnostics

Cell: 901-486-4565
Email: kwilliam@gohispeed.com