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July 26, 2021

South Shelby RNG
Memphis, TN

The following is a summary of findings from the monthly vibration survey that was performed on July 13, 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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## *Defects*

**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**

Acceleration amplitudes seemed to have leveled out some. 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 have high amplitudes of acceleration (high frequency vibrations). Amplitudes are around the same as last survey. 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**

There is a slight increase in 1 x motor rpm vibration. We would like to inspect the coupling, coupling orientation, perform motor soft foot check, and recheck alignment during the next down time. Rated as a **CLASS I** defect for now.

**C-1300 Sales Gas Compressor Stage 2**

Overall vibration increased this survey. The high 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

      MEASUREMENT POINT            OVERALL LEVEL       HFD / VHFD
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      C-551B     - C-551B VACUUM COMPRESSOR B    (13-Jul-21)
                                   OVERALL LEVEL     1K-20KHz
             MOH                     .087 In/Sec       .688 G-s
             MOV                     .088 In/Sec       .662 G-s
             MIH                     .114 In/Sec      1.205 G-s
             MIV                     .087 In/Sec       .296 G-s
             MIA                     .088 In/Sec       .261 G-s
             CIA                     .171 In/Sec       .943 G-s
             CIH                     .194 In/Sec      3.171 G-s
             CIV                     .221 In/Sec      1.194 G-s
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| | | | |
|---|---|---|---|
| | COH | .193 In/Sec | 4.246 G-s |
| | COV | .220 In/Sec | 1.801 G-s |
| | COA | .210 In/Sec | 2.425 G-s |

C-551A - C-551A VACUUM COMPRESSOR A (13-Jul-21)

| | OVERALL LEVEL | 1K-20KHz |
|---|---|---|
| MOH | .068 In/Sec | .678 G-s |
| MOV | .053 In/Sec | .634 G-s |
| MIH | .099 In/Sec | .686 G-s |
| MIV | .070 In/Sec | .407 G-s |
| MIA | .079 In/Sec | .985 G-s |
| CIA | .231 In/Sec | 2.722 G-s |
| CIH | .189 In/Sec | 2.886 G-s |
| CIV | .273 In/Sec | 3.555 G-s |
| COH | .121 In/Sec | 3.895 G-s |
| COV | .213 In/Sec | 2.433 G-s |
| COA | .158 In/Sec | 2.476 G-s |

C-601B - C-601B N2 RECYCLE COMP B (13-Jul-21)

| | OVERALL LEVEL | 1K-20KHz |
|---|---|---|
| MOH | .129 In/Sec | 1.769 G-s |
| MOV | .033 In/Sec | .406 G-s |
| MIH | .114 In/Sec | 2.111 G-s |
| MIV | .051 In/Sec | .218 G-s |
| MIA | .072 In/Sec | .261 G-s |
| CIA | .143 In/Sec | .797 G-s |
| CIH | .127 In/Sec | 1.697 G-s |
| CIV | .302 In/Sec | 1.654 G-s |
| COH | .307 In/Sec | 2.041 G-s |
| COV | .235 In/Sec | 2.342 G-s |
| COA | .277 In/Sec | .743 G-s |

C-601A - C-601A N2 RECYCLE COMP A (13-Jul-21)

| | OVERALL LEVEL | 1K-20KHz |
|---|---|---|
| MOH | .044 In/Sec | .920 G-s |
| MOV | .024 In/Sec | .096 G-s |
| MIH | .093 In/Sec | 1.327 G-s |
| MIV | .033 In/Sec | .245 G-s |
| MIA | .040 In/Sec | .239 G-s |
| CIA | .093 In/Sec | .717 G-s |
| CIH | .112 In/Sec | 1.552 G-s |
| CIV | .109 In/Sec | .774 G-s |
| COH | .169 In/Sec | 1.705 G-s |
| COV | .152 In/Sec | 1.299 G-s |
| COA | .151 In/Sec | 1.161 G-s |

C-0600A - C-0600A FEED GAS COMP A (13-Jul-21)

| | OVERALL LEVEL | 1K-20KHz |
|---|---|---|
| MOH | .189 In/Sec | .352 G-s |
| MOV | .143 In/Sec | .149 G-s |
| MIH | .102 In/Sec | .712 G-s |
| MIV | .132 In/Sec | .228 G-s |
| MIA | .073 In/Sec | .241 G-s |
| CIA | .205 In/Sec | .498 G-s |
| CIH | .213 In/Sec | 1.796 G-s |
| CIV | .341 In/Sec | .330 G-s |
| COH | .131 In/Sec | 2.237 G-s |
| COV | .299 In/Sec | .809 G-s |
| COA | .259 In/Sec | .721 G-s |

C-0600B - C-0600B FEED GAS COMP B (13-Jul-21)

| | OVERALL LEVEL | 1K-20KHz |
|---|---|---|
| MOH | .221 In/Sec | .477 G-s |
| MOV | .138 In/Sec | .205 G-s |
| MIH | .189 In/Sec | .386 G-s |
| MIV | .181 In/Sec | .136 G-s |
| MIA | .087 In/Sec | .161 G-s |
| CIA | .388 In/Sec | .715 G-s |
| CIH | .362 In/Sec | 3.449 G-s |
| CIV | .489 In/Sec | .678 G-s |

| | | | |
|---|---|---|---|
| | COH | .359 In/Sec | 2.313 G-s |
| | COV | .596 In/Sec | .770 G-s |
| | COA | .342 In/Sec | .753 G-s |

C-0600C - C-0600C FEED GAS COMP C (13-Jul-21)

| | OVERALL LEVEL | 1K-20KHz |
|---|---|---|
| MOH | .351 In/Sec | .392 G-s |
| MOV | .060 In/Sec | .263 G-s |
| MIH | .294 In/Sec | .563 G-s |
| MIV | .082 In/Sec | .215 G-s |
| MIA | .095 In/Sec | .238 G-s |
| CIA | .417 In/Sec | 1.169 G-s |
| CIH | .386 In/Sec | 3.294 G-s |
| CIV | .507 In/Sec | 2.000 G-s |
| COH | .359 In/Sec | 2.577 G-s |
| COV | .609 In/Sec | 1.490 G-s |
| COA | .466 In/Sec | 1.358 G-s |

BLR-0200B - BLR-0200B LFG BLOWER B (13-Jul-21)

| | OVERALL LEVEL | 1K-20KHz |
|---|---|---|
| MOH | .121 In/Sec | 1.102 G-s |
| MOV | .092 In/Sec | .412 G-s |
| MIH | .102 In/Sec | 1.456 G-s |
| MIV | .118 In/Sec | .224 G-s |
| MIA | .076 In/Sec | .422 G-s |
| BIA | .583 In/Sec | 6.624 G-s |
| BIH | .676 In/Sec | 10.64 G-s |
| BIV | .567 In/Sec | 3.351 G-s |
| BOH | .702 In/Sec | 13.15 G-s |
| BOV | .481 In/Sec | 4.767 G-s |
| BOA | .443 In/Sec | 5.226 G-s |

BLR-0200C - BLR-0200C LFG BLOWER C (13-Jul-21)

| | OVERALL LEVEL | 1K-20KHz |
|---|---|---|
| MOH | .080 In/Sec | .737 G-s |
| MOV | .095 In/Sec | .410 G-s |
| MIH | .080 In/Sec | 2.045 G-s |
| MIV | .095 In/Sec | .390 G-s |
| MIA | .088 In/Sec | .263 G-s |
| BIA | .348 In/Sec | 5.616 G-s |
| BIH | .647 In/Sec | 17.75 G-s |
| BIV | .554 In/Sec | 4.776 G-s |
| BOH | .502 In/Sec | 18.17 G-s |
| BOV | .332 In/Sec | 4.156 G-s |
| BOA | .289 In/Sec | 6.872 G-s |

BLR-0200D - BLR-0200D LFG BLOWER D (13-Jul-21)

| | OVERALL LEVEL | 1K-20KHz |
|---|---|---|
| MOH | .122 In/Sec | 1.607 G-s |
| MOV | .095 In/Sec | .718 G-s |
| MIH | .194 In/Sec | 2.923 G-s |
| MIV | .193 In/Sec | .503 G-s |
| MIA | .082 In/Sec | 1.200 G-s |
| BIA | .303 In/Sec | 4.799 G-s |
| BIH | .474 In/Sec | 13.78 G-s |
| BIV | .379 In/Sec | 4.647 G-s |
| BOH | .364 In/Sec | 11.74 G-s |
| BOV | .420 In/Sec | 5.394 G-s |
| BOA | .304 In/Sec | 5.466 G-s |

C-1300 - C-1300 SALES GAS COMP STG 1 (13-Jul-21)

| | OVERALL LEVEL | 1K-20KHz |
|---|---|---|
| MOH | .101 In/Sec | .603 G-s |
| MOV | .180 In/Sec | .100 G-s |
| MIH | .096 In/Sec | .421 G-s |
| MIV | .175 In/Sec | .131 G-s |
| MIA | .203 In/Sec | .186 G-s |
| CIA | .308 In/Sec | .286 G-s |
| CIH | .288 In/Sec | 1.247 G-s |
| CIV | .491 In/Sec | .489 G-s |

| | | | |
|---|---|---|---|
| COH | .232 In/Sec | 1.380 G-s |
| COV | .422 In/Sec | .426 G-s |
| COA | .369 In/Sec | .535 G-s |

C-1304 - C-1304 SALES GAS COMP STG 2 (13-Jul-21)

| | OVERALL LEVEL | 1K-20KHz |
|---|---|---|
| MOH | .405 In/Sec | .820 G-s |
| MOV | .250 In/Sec | .864 G-s |
| MIH | .357 In/Sec | 1.446 G-s |
| MIV | .227 In/Sec | .490 G-s |
| MIA | .178 In/Sec | .227 G-s |
| CIA | .193 In/Sec | .495 G-s |
| CIH | .499 In/Sec | .577 G-s |
| CIV | .171 In/Sec | .633 G-s |
| COH | .332 In/Sec | .745 G-s |
| COV | .165 In/Sec | .372 G-s |
| COA | .190 In/Sec | .197 G-s |

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Clarification Of Vibration Units:

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