HI-SPEED INDUSTRIAL SERVICE QualiTest® Diagnostics

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

July 19, 2024

North Shelby Plant
Millington, TN

The following is a summary of findings from the July 2024 monthly vibration survey at the North Shelby site.

***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*

**Rinse Compressor**
Drive motor data still shows some high frequency vibration. The last reading showed amplitude to be 2.0 g's. Spectral data shows a noise floor starting around the 1500 hz range. This may be a lube issue or early stage bearing wear. We are monitoring this closely. Rated as a **CLASS I** defect for now.

**Cooling Fan 2 (new belt driven cooling fan)**
The 37 hz vibration was present this survey. This appears to be 4 x fan rpm. May be blade pass if fan has 4 blades. Could also be resonance. There are also some signs of bearing wear beginning to show in fan spectra. May be due to style of bearing not allowing for axial load due to configuration of the fan wheel/shaft. We are monitoring this closely. Rated as a **CLASS II** defect.

**101-B Feed Compressor**
***Equipment was not in service during this survey; however, the following still applies:*** Compressor data shows some high frequency acceleration amplitude with noise floor. Peaks in spectral data suggest possible wear of internal compressor components. We are watching this closely. Rated as a **CLASS I** defect.

**506 C Product Compressor**
Motor data shows indications of bearing defects in DE motor bearing. Motor needs to be inspected as time allows. Rated as a **CLASS II** defect.

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                  Abbreviated Last Measurement Summary
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          Database:  Clean Energy.rbm
          Area:      millington plant

MEASUREMENT POINT             OVERALL LEVEL       HFD / VHFD
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303 FLARE  - 303 FLARE BLOWER               (15-Jul-24)
                              OVERALL LEVEL     1K-20KHz
       MOH                     .058 In/Sec      1.035 G-s
       MOV                     .115 In/Sec       .270 G-s
       MIH                     .049 In/Sec       .979 G-s
       MIV                     .118 In/Sec       .148 G-s
       MIA                     .029 In/Sec       .271 G-s
       EIH                     .080 In/Sec       .246 G-s
       EIV                     .057 In/Sec       .092 G-s
       EIA                     .054 In/Sec       .150 G-s
       EOH                     .047 In/Sec       .464 G-s
       EOV                     .183 In/Sec       .402 G-s

 TX301 FAN - TX301 AFTERCOOLER FAN          (15-Jul-24)
                              OVERALL LEVEL     1K-20KHz
       MOH                     .245 In/Sec       .497 G-s
       MIH                     .193 In/Sec      1.146 G-s
       MIA                     .294 In/Sec       .506 G-s
       FIH                     .096 In/Sec       .064 G-s
       FOH                     .088 In/Sec       .105 G-s
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RINSE COMP - RINSE COMPRESSOR (15-Jul-24)

| | OVERALL LEVEL | 1K-20KHz |
|---|---|---|
| MOH | .087 In/Sec | 1.859 G-s |
| MIH | .083 In/Sec | 2.109 G-s |
| MIA | .085 In/Sec | .267 G-s |
| IIH | .070 In/Sec | .952 G-s |
| IIA | .122 In/Sec | .192 G-s |
| IOH | .101 In/Sec | .516 G-s |
| OIH | .068 In/Sec | .658 G-s |
| OIA | .103 In/Sec | .139 G-s |
| OOH | .094 In/Sec | .674 G-s |

VAC COMP - VACUUM COMPRESSOR (15-Jul-24)

| | OVERALL LEVEL | 1K-20KHz |
|---|---|---|
| MOH | .103 In/Sec | 1.488 G-s |
| MIH | .115 In/Sec | 1.181 G-s |
| MIA | .052 In/Sec | .313 G-s |
| IIH | .092 In/Sec | .502 G-s |
| IIA | .060 In/Sec | .112 G-s |
| IOH | .096 In/Sec | .654 G-s |
| OIH | .090 In/Sec | .791 G-s |
| OIA | .052 In/Sec | .106 G-s |
| OOH | .095 In/Sec | 1.064 G-s |

COOLFAN1 - COOLING FAN 1 (15-Jul-24)

| | OVERALL LEVEL | 1K-20KHz |
|---|---|---|
| MOH | .020 In/Sec | .655 G-s |
| MOV | .370 In/Sec | .249 G-s |
| MIH | .052 In/Sec | .498 G-s |
| MIV | .050 In/Sec | .190 G-s |
| MIA | .030 In/Sec | .165 G-s |

COOLFAN2 - COOLING FAN 2 (15-Jul-24)

| | OVERALL LEVEL | 1K-20KHz |
|---|---|---|
| MOH | .362 In/Sec | 1.194 G-s |
| MOV | .167 In/Sec | .178 G-s |
| MIH | .292 In/Sec | .595 G-s |
| MIV | .211 In/Sec | .190 G-s |
| MIA | .258 In/Sec | .128 G-s |
| EIH | .425 In/Sec | .699 G-s |
| EIV | .130 In/Sec | .336 G-s |
| EIA | .170 In/Sec | .207 G-s |
| EOH | .573 In/Sec | .283 G-s |
| EOV | .127 In/Sec | .189 G-s |

101A COMP - 101A FEED COMPRESSOR (15-Jul-24)

| | OVERALL LEVEL | 1K-20KHz |
|---|---|---|
| MOH | .211 In/Sec | .274 G-s |
| MIH | .169 In/Sec | .289 G-s |
| MIA | .074 In/Sec | .278 G-s |
| IIH | .187 In/Sec | 1.191 G-s |
| IIA | .402 In/Sec | 1.719 G-s |
| OIH | .194 In/Sec | 1.538 G-s |
| OIA | .222 In/Sec | .946 G-s |
| OOH | .115 In/Sec | 2.865 G-s |

HX132A FAN - HX132A GAS OIL COOLER FAN (15-Jul-24)

| | OVERALL LEVEL | 1K-20KHz |
|---|---|---|
| EIH | .045 In/Sec | .065 G-s |
| EOH | .070 In/Sec | .092 G-s |

451A PUMP - 451A VACCUM PUMP (15-Jul-24)

| | OVERALL LEVEL | 1K-20KHz |
|---|---|---|
| MOH | .083 In/Sec | .695 G-s |
| MOV | .081 In/Sec | .267 G-s |
| MIH | .100 In/Sec | .947 G-s |
| MIV | .120 In/Sec | .193 G-s |
| MIA | .055 In/Sec | .217 G-s |
| EIH | .235 In/Sec | .697 G-s |

| | | | |
|---|---|---|---|
| EIV | .168 In/Sec | .111 G-s |
| EIA | .118 In/Sec | .105 G-s |
| EOH | .168 In/Sec | .334 G-s |
| EOV | .102 In/Sec | .195 G-s |

HX453A FAN - HX453A VAC PUMP OIL COOL FAN (15-Jul-24)

| | OVERALL LEVEL | 1K-20KHz |
|---|---|---|
| MOH | .231 In/Sec | .132 G-s |
| MIH | .131 In/Sec | .105 G-s |

451B PUMP - 451B VACCUM PUMP (15-Jul-24)

| | OVERALL LEVEL | 1K-20KHz |
|---|---|---|
| MOH | .060 In/Sec | .501 G-s |
| MOV | .075 In/Sec | .125 G-s |
| MIH | .074 In/Sec | .738 G-s |
| MIV | .072 In/Sec | .191 G-s |
| MIA | .049 In/Sec | .127 G-s |
| EIH | .221 In/Sec | .181 G-s |
| EIV | .204 In/Sec | .214 G-s |
| EIA | .148 In/Sec | .200 G-s |
| EOH | .194 In/Sec | .478 G-s |
| EOV | .183 In/Sec | .206 G-s |

HX453B FAN - HX453B VAC PUMP OIL COOL FAN (15-Jul-24)

| | OVERALL LEVEL | 1K-20KHz |
|---|---|---|
| MOH | .138 In/Sec | .267 G-s |
| MIH | .101 In/Sec | .123 G-s |

451C PUMP - 451C VACCUM PUMP (15-Jul-24)

| | OVERALL LEVEL | 1K-20KHz |
|---|---|---|
| MOH | .104 In/Sec | .424 G-s |
| MOV | .112 In/Sec | .104 G-s |
| MIH | .131 In/Sec | .408 G-s |
| MIV | .193 In/Sec | .116 G-s |
| MIA | .067 In/Sec | .102 G-s |
| EIH | .141 In/Sec | .989 G-s |
| EIV | .116 In/Sec | .202 G-s |
| EIA | .088 In/Sec | .085 G-s |
| EOH | .137 In/Sec | .827 G-s |
| EOV | .114 In/Sec | .141 G-s |

HX453C FAN - HX453C VAC PUMP OIL COOL FAN (15-Jul-24)

| | OVERALL LEVEL | 1K-20KHz |
|---|---|---|
| MOH | .157 In/Sec | .424 G-s |
| MIH | .125 In/Sec | .194 G-s |

451D PUMP - 451D VACCUM PUMP (15-Jul-24)

| | OVERALL LEVEL | 1K-20KHz |
|---|---|---|
| MOH | .075 In/Sec | .722 G-s |
| MOV | .080 In/Sec | .207 G-s |
| MIH | .097 In/Sec | 1.178 G-s |
| MIV | .070 In/Sec | .205 G-s |
| MIA | .035 In/Sec | .234 G-s |
| EIH | .178 In/Sec | .439 G-s |
| EIV | .149 In/Sec | .123 G-s |
| EIA | .142 In/Sec | .139 G-s |
| EOH | .155 In/Sec | .482 G-s |
| EOV | .179 In/Sec | .142 G-s |

HX453D FAN - HX453D VAC PUMP OIL COOL FAN (15-Jul-24)

| | OVERALL LEVEL | 1K-20KHz |
|---|---|---|
| MOH | .213 In/Sec | .103 G-s |
| MIH | .201 In/Sec | .108 G-s |

506C COMP - 506C PRODUCT COMPRESSOR (15-Jul-24)

| | OVERALL LEVEL | 1K-20KHz |
|---|---|---|
| MOH | .126 In/Sec | 1.205 G-s |
| MIH | .136 In/Sec | 4.737 G-s |
| MIA | .078 In/Sec | 2.647 G-s |
| IIH | .205 In/Sec | .852 G-s |

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            IIA                      .211 In/Sec      1.100 G-s
            IOH                      .239 In/Sec      1.625 G-s
            OIH                      .218 In/Sec      1.107 G-s
            OOH                      .248 In/Sec       .847 G-s

      HX507C FAN - HX507C GAS COOL FAN           (15-Jul-24)
                                 OVERALL LEVEL     1K-20KHz
            MOH                      .262 In/Sec       .057 G-s
            MIH                      .375 In/Sec       .039 G-s

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   Clarification Of Vibration Units:
      Acc       -->  G-s      RMS
      Vel       -->  In/Sec   PK
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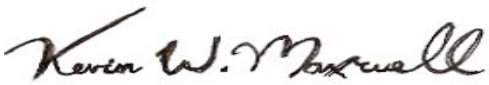
As always, it has been a pleasure to serve North Shelby-Archaea Energy. If there are any comments or questions, do not hesitate to contact us.

Sincerely,



**ISO Certified Vibration Analyst, Category III**

HI-SPEED INDUSTRIAL SERVICE

QualiTest® Diagnostics

Cell: 901-486-4565

Email: kwilliam@gohispeed.com