HI-SPEED INDUSTRIAL SERVICE QualiTest® Diagnostics

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

August 19, 2019

Aria Energy
Millington, TN

The following is a summary of findings from the August 2019 vibration survey at your facility. 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

HX453C Vac Pump Oil Cool Fan

Vibration data is showing signs of bearing defects. Motor bearings may need to be replaced as time allows. We will monitor this issue closely. Rated as a **CLASS II** defect.

HX453D Vac Pump Oil Cool Fan

Vibration data is showing signs of bearing defects. Motor bearings may need to be replaced as time allows. We will monitor this issue closely. Rated as a **CLASS II** defect.

101B Feed Compressor

Data of the compressor does vary some month to month due to load; with acceleration being highest in the compressor second stage axial. We will continue to monitor this closely. Rated as a **CLASS I** defect.

HX507B Gas Cool Fan

Drive end motor bearing is now showing signs of bearing defects. We will monitor this issue closely. Rated as a **CLASS II** defect.

HX507C Gas Cool Fan

Data of the top (DE) motor bearing is showing some increased vibration associated with bearing defects/wear. Motor will need to be swapped out SOON. We will monitor this closely. Rated as a **CLASS III** defect.

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Abbreviated Last Measurement Summary
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              Database:  Clean Energy.rbm
              Area:      millington plant
              Report Date:  19-Aug-19   15:34

    MEASUREMENT POINT             OVERALL LEVEL       HFD / VHFD
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    301 FLARE  - 301 FLARE BLOWER               (19-Aug-19)
                                  OVERALL LEVEL     1K-20KHz
           MOH                     .057 In/Sec       .281 G-s
           MIH                     .098 In/Sec       .435 G-s
           MIA                     .045 In/Sec       .548 G-s
           EIH                     .149 In/Sec       .367 G-s
           EIA                     .061 In/Sec       .848 G-s
           EOH                     .097 In/Sec       .114 G-s

     TX301 FAN - TX301 AFTERCOOLER FAN          (19-Aug-19)
                                  OVERALL LEVEL     1K-20KHz
           MOH                     .062 In/Sec       .287 G-s
           MIH                     .038 In/Sec       .379 G-s
           MIA                     .077 In/Sec       .162 G-s
           FIH                     .027 In/Sec       .033 G-s

    101A COMP  - 101A FEED COMPRESSOR           (19-Aug-19)
                                  OVERALL LEVEL     1K-20KHz
           MOH                     .037 In/Sec       .139 G-s
           MIH                     .055 In/Sec       .133 G-s
           MIA                     .048 In/Sec       .120 G-s
           IIH                     .085 In/Sec       .564 G-s
           IIA                     .250 In/Sec       .847 G-s
           IOH                     .115 In/Sec       .745 G-s
           OIH                     .093 In/Sec       .569 G-s
           OIA                     .088 In/Sec      1.009 G-s
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	OOH	.082 In/Sec	.285 G-s

101B COMP - 101B FEED COMPRESSOR (19-Aug-19)

	OVERALL LEVEL	1K-20KHz
MOH	.060 In/Sec	.197 G-s
MIH	.077 In/Sec	.125 G-s
MIA	.026 In/Sec	.227 G-s
IIH	.064 In/Sec	.379 G-s
IIA	.175 In/Sec	1.036 G-s
IOH	.083 In/Sec	.870 G-s
OIH	.076 In/Sec	1.137 G-s
OIA	.078 In/Sec	1.604 G-s
OOH	.071 In/Sec	.447 G-s

HX132A FAN - HX132A GAS OIL COOLER FAN (19-Aug-19)

	OVERALL LEVEL	1K-20KHz
MOH	.112 In/Sec	.123 G-s
MIH	.112 In/Sec	.115 G-s
EIH	.048 In/Sec	.047 G-s
EOH	.060 In/Sec	.067 G-s

HX132B FAN - HX132B GAS OIL COOLER FAN (19-Aug-19)

	OVERALL LEVEL	1K-20KHz
MOH	.063 In/Sec	.059 G-s
MIH	.193 In/Sec	.108 G-s
EIH	.257 In/Sec	.078 G-s
EOH	.062 In/Sec	.042 G-s

451A PUMP - 451A VACCUM PUMP (19-Aug-19)

	OVERALL LEVEL	1K-20KHz
MOH	.048 In/Sec	.231 G-s
MIH	.067 In/Sec	.080 G-s
MIA	.048 In/Sec	.364 G-s
EIH	.144 In/Sec	.390 G-s
EIA	.092 In/Sec	.238 G-s
EOH	.123 In/Sec	.246 G-s

HX453A FAN - HX453A VAC PUMP OIL COOL FAN (19-Aug-19)

	OVERALL LEVEL	1K-20KHz
MOH	.213 In/Sec	.074 G-s
MIH	.137 In/Sec	.043 G-s

451B PUMP - 451B VACCUM PUMP (19-Aug-19)

	OVERALL LEVEL	1K-20KHz
MOH	.033 In/Sec	.178 G-s
MIH	.052 In/Sec	.491 G-s
MIA	.031 In/Sec	.448 G-s
EIH	.167 In/Sec	.369 G-s
EIA	.094 In/Sec	.330 G-s
EOH	.173 In/Sec	.237 G-s

HX453B FAN - HX453B VAC PUMP OIL COOL FAN (19-Aug-19)

	OVERALL LEVEL	1K-20KHz
MOH	.193 In/Sec	.232 G-s
MIH	.103 In/Sec	.050 G-s

451C PUMP - 451C VACCUM PUMP (19-Aug-19)

	OVERALL LEVEL	1K-20KHz
MOH	.042 In/Sec	.209 G-s
MIH	.055 In/Sec	.352 G-s
MIA	.049 In/Sec	.540 G-s
EIH	.142 In/Sec	.337 G-s
EIA	.060 In/Sec	.704 G-s
EOH	.124 In/Sec	.508 G-s

HX453C FAN - HX453C VAC PUMP OIL COOL FAN (19-Aug-19)

	OVERALL LEVEL	1K-20KHz
MOH	.429 In/Sec	.566 G-s
MIH	.244 In/Sec	.213 G-s

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451D PUMP  - 451D VACCUM PUMP              (19-Aug-19)
                                OVERALL LEVEL     1K-20KHz
       MOH                       .065 In/Sec       .580 G-s
       MIH                       .112 In/Sec       .915 G-s
       MIA                       .062 In/Sec      1.061 G-s
       EIH                       .214 In/Sec      1.441 G-s
       EIA                       .071 In/Sec       .549 G-s
       EOH                       .122 In/Sec       .564 G-s

HX453D FAN - HX453D VAC PUMP OIL COOL FAN  (19-Aug-19)
                                OVERALL LEVEL     1K-20KHz
       MOH                       .283 In/Sec       .673 G-s
       MIH                       .097 In/Sec       .152 G-s

506B COMP  - 506B PRODUCT COMPRESSOR       (19-Aug-19)
                                OVERALL LEVEL     1K-20KHz
       MOH                       .119 In/Sec       .238 G-s
       MIH                       .076 In/Sec       .136 G-s
       MIA                       .084 In/Sec       .240 G-s
       IIH                       .126 In/Sec       .932 G-s
       IIA                       .408 In/Sec       .671 G-s
       IOH                       .198 In/Sec      2.599 G-s

HX507B FAN - HX507B GAS COOL FAN           (19-Aug-19)
                                OVERALL LEVEL     1K-20KHz
       MOH                       .114 In/Sec       .432 G-s
       MIH                       .243 In/Sec       .830 G-s

506C COMP  - 506C PRODUCT COMPRESSOR       (19-Aug-19)
                                OVERALL LEVEL     1K-20KHz
       MOH                       .063 In/Sec       .235 G-s
       MIH                       .060 In/Sec       .261 G-s
       MIA                       .036 In/Sec       .222 G-s
       IIH                       .108 In/Sec       .544 G-s
       IIA                       .110 In/Sec       .587 G-s
       IOH                       .201 In/Sec      2.074 G-s

HX507C FAN - HX507C GAS COOL FAN           (19-Aug-19)
                                OVERALL LEVEL     1K-20KHz
       MOH                       .568 In/Sec       .827 G-s
       MIH                       .675 In/Sec      2.544 G-s

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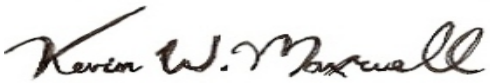
As always, it has been a pleasure to serve Aria Energy. If there are any comments or questions, do not hesitate to contact us.

Sincerely,



ISO Certified Vibration Analyst, Category III

HI-SPEED INDUSTRIAL SERVICE

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