HI-SPEED INDUSTRIAL SERVICE QualiTest® Diagnostics

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September 2, 2021

Aria Energy
North Shelby Plant
Millington, TN

The following is a summary of findings from the August 2021 monthly 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

101B Feed Compressor

Motor has previously had a high vibration that is likely resonance related. We suspect motor to be resonating with internal cooling fan motor **This month, vibration has increased.** Overall vibration of the motor outboard horizontal increased from .38 ips-pk to .76 ips-pk. Motor appeared to be operating near 1673 rpm during the survey. Highest amplitude of this resonant frequency appears to be around 1650-1700 rpm. We will continue to monitor this closely. Rated as a **CLASS II** defect.

451C Vacuum Pump

Motor has increased 1 x rpm vibration since replacing pump a few days ago. This is likely due to loose or soft motor foot. Visual inspection showed the outboard end of motor to have soft/loose motor foot on inside foot. Inspect all motor fasteners and shim motor soft foot as needed soon. Rated as **CLASS II** defect.

451D Vacuum Pump

Motor on this unit continues to have an electrical related vibration. We will monitor this closely. Rated as a **CLASS I** defect for now.

506 A Product Compressor

Compressor has had higher vibration since rebuilding unit. Spectral data shows high vibration peaks to be multiples of rpm. This may indicate excessive clearances. We will monitor this closely. Rated as a **CLASS I** defect.

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Abbreviated Last Measurement Summary
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             Database:  Clean Energy.rbm
             Area:      millington plant
             Route No.  1:  CLEAN ENERGY

      MEASUREMENT POINT             OVERALL LEVEL       HFD / VHFD
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      303 FLARE  - 303 FLARE BLOWER                (31-Aug-21)
                                   OVERALL LEVEL     1K-20KHz
             MOH                     .061 In/Sec       .575 G-s
             MOV                     .182 In/Sec       .241 G-s
             MIH                     .117 In/Sec       .524 G-s
             MIV                     .138 In/Sec       .221 G-s
             MIA                     .051 In/Sec       .373 G-s
             EIH                     .068 In/Sec       .231 G-s
             EIV                     .047 In/Sec       .145 G-s
             EIA                     .029 In/Sec       .170 G-s
             EOH                     .093 In/Sec       .834 G-s
             EOV                     .273 In/Sec       .306 G-s

       TX301 FAN - TX301 AFTERCOOLER FAN          (31-Aug-21)
                                   OVERALL LEVEL     1K-20KHz
             MOH                     .023 In/Sec       .111 G-s
             MIH                     .019 In/Sec       .424 G-s
             MIA                     .046 In/Sec       .081 G-s
             FIH                     .010 In/Sec       .020 G-s
             FOH                     .013 In/Sec       .024 G-s

      101B COMP  - 101B FEED COMPRESSOR            (31-Aug-21)
                                   OVERALL LEVEL     1K-20KHz
             MOH                     .764 In/Sec       .288 G-s
             MIH                     .539 In/Sec       .300 G-s
             MIA                     .065 In/Sec       .307 G-s
             IIH                     .134 In/Sec      1.666 G-s
             IIA                     .278 In/Sec      1.093 G-s
             IOH                     .080 In/Sec       .966 G-s
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	OIH	.172 In/Sec	1.615 G-s
	OIA	.132 In/Sec	1.395 G-s
	OOH	.124 In/Sec	2.490 G-s

HX132B FAN - HX132B GAS OIL COOLER FAN (31-Aug-21)

	OVERALL LEVEL	1K-20KHz
MOH	.048 In/Sec	.036 G-s
MIH	.165 In/Sec	.121 G-s
EIH	.211 In/Sec	.083 G-s
EOH	.041 In/Sec	.030 G-s

451A PUMP - 451A VACCUM PUMP (31-Aug-21)

	OVERALL LEVEL	1K-20KHz
MOH	.088 In/Sec	1.214 G-s
MOV	.085 In/Sec	.772 G-s
MIH	.108 In/Sec	.815 G-s
MIV	.123 In/Sec	1.494 G-s
MIA	.093 In/Sec	.600 G-s
EIH	.204 In/Sec	.352 G-s
EIV	.117 In/Sec	.236 G-s
EIA	.123 In/Sec	.216 G-s
EOH	.279 In/Sec	.455 G-s
EOV	.232 In/Sec	.374 G-s

HX453A FAN - HX453A VAC PUMP OIL COOL FAN (31-Aug-21)

	OVERALL LEVEL	1K-20KHz
MOH	.251 In/Sec	.157 G-s
MIH	.159 In/Sec	.092 G-s

451B PUMP - 451B VACCUM PUMP (31-Aug-21)

	OVERALL LEVEL	1K-20KHz
MOH	.067 In/Sec	.530 G-s
MOV	.084 In/Sec	.219 G-s
MIH	.083 In/Sec	.602 G-s
MIV	.073 In/Sec	.213 G-s
MIA	.042 In/Sec	.285 G-s
EIH	.146 In/Sec	.536 G-s
EIV	.115 In/Sec	.483 G-s
EIA	.121 In/Sec	.491 G-s
EOH	.134 In/Sec	.439 G-s
EOV	.146 In/Sec	.103 G-s

HX453B FAN - HX453B VAC PUMP OIL COOL FAN (31-Aug-21)

	OVERALL LEVEL	1K-20KHz
MOH	.177 In/Sec	.239 G-s
MIH	.126 In/Sec	.182 G-s

451C PUMP - 451C VACCUM PUMP (31-Aug-21)

	OVERALL LEVEL	1K-20KHz
MOH	.293 In/Sec	.719 G-s
MOV	.178 In/Sec	.103 G-s
MIH	.327 In/Sec	1.545 G-s
MIV	.345 In/Sec	.150 G-s
MIA	.119 In/Sec	.154 G-s
EIH	.191 In/Sec	.588 G-s
EIV	.143 In/Sec	.339 G-s
EIA	.123 In/Sec	.210 G-s
EOH	.200 In/Sec	.402 G-s
EOV	.202 In/Sec	.153 G-s

HX453C FAN - HX453C VAC PUMP OIL COOL FAN (31-Aug-21)

	OVERALL LEVEL	1K-20KHz
MOH	.264 In/Sec	.166 G-s
MIH	.121 In/Sec	.089 G-s

451D PUMP - 451D VACCUM PUMP (31-Aug-21)

	OVERALL LEVEL	1K-20KHz
MOH	.095 In/Sec	.742 G-s
MOV	.116 In/Sec	.236 G-s
MIH	.120 In/Sec	1.117 G-s

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            MIV                      .094 In/Sec       .493 G-s
            MIA                      .069 In/Sec       .785 G-s
            EIH                      .197 In/Sec       .760 G-s
            EIV                      .132 In/Sec       .269 G-s
            EIA                      .089 In/Sec       .326 G-s
            EOH                      .183 In/Sec       .642 G-s
            EOV                      .156 In/Sec       .130 G-s

      HX453D FAN - HX453D VAC PUMP OIL COOL FAN  (31-Aug-21)
                                 OVERALL LEVEL     1K-20KHz
            MOH                    .223 In/Sec       .110 G-s
            MIH                    .243 In/Sec       .091 G-s

      506A COMP  - 506A PRODUCT COMPRESSOR       (31-Aug-21)
                                 OVERALL LEVEL     1K-20KHz
            MOH                    .056 In/Sec       .315 G-s
            MIH                    .057 In/Sec       .523 G-s
            MIA                    .118 In/Sec       .282 G-s
            IIH                    .348 In/Sec       .899 G-s
            IIA                    .355 In/Sec      2.039 G-s
            IOH                    .316 In/Sec      2.529 G-s

      HX507A FAN - HX507A GAS COOL FAN           (31-Aug-21)
                                 OVERALL LEVEL     1K-20KHz
            MOH                    .133 In/Sec       .088 G-s
            MIH                    .147 In/Sec       .067 G-s

      506C COMP  - 506C PRODUCT COMPRESSOR       (31-Aug-21)
                                 OVERALL LEVEL     1K-20KHz
            MOH                    .105 In/Sec       .432 G-s
            MIH                    .070 In/Sec       .514 G-s
            MIA                    .072 In/Sec       .360 G-s
            IIH                    .149 In/Sec      1.981 G-s
            IIA                    .193 In/Sec      1.437 G-s
            IOH                    .183 In/Sec      1.841 G-s

      HX507C FAN - HX507C GAS COOL FAN           (31-Aug-21)
                                 OVERALL LEVEL     1K-20KHz
            MOH                    .180 In/Sec       .060 G-s
            MIH                    .165 In/Sec       .057 G-s

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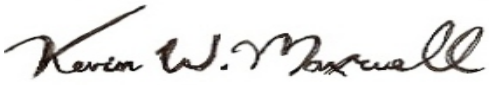
As always, it has been a pleasure to serve North Shelby-Aria Energy. If there are any comments or questions, do not hesitate to contact us.

Sincerely,



ISO Certified Vibration Analyst, Category III

HI-SPEED INDUSTRIAL SERVICE

QualiTest® Diagnostics

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