HI-SPEED INDUSTRIAL SERVICE QualiTest® Diagnostics

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September 9, 2022

Essex Power Plant
Essex, MO

The following is a summary of findings from vibration survey that was performed on 9/2/22. Please note that this report only contains the defects found. All other equipment was found to be in satisfactory condition during the survey.

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.

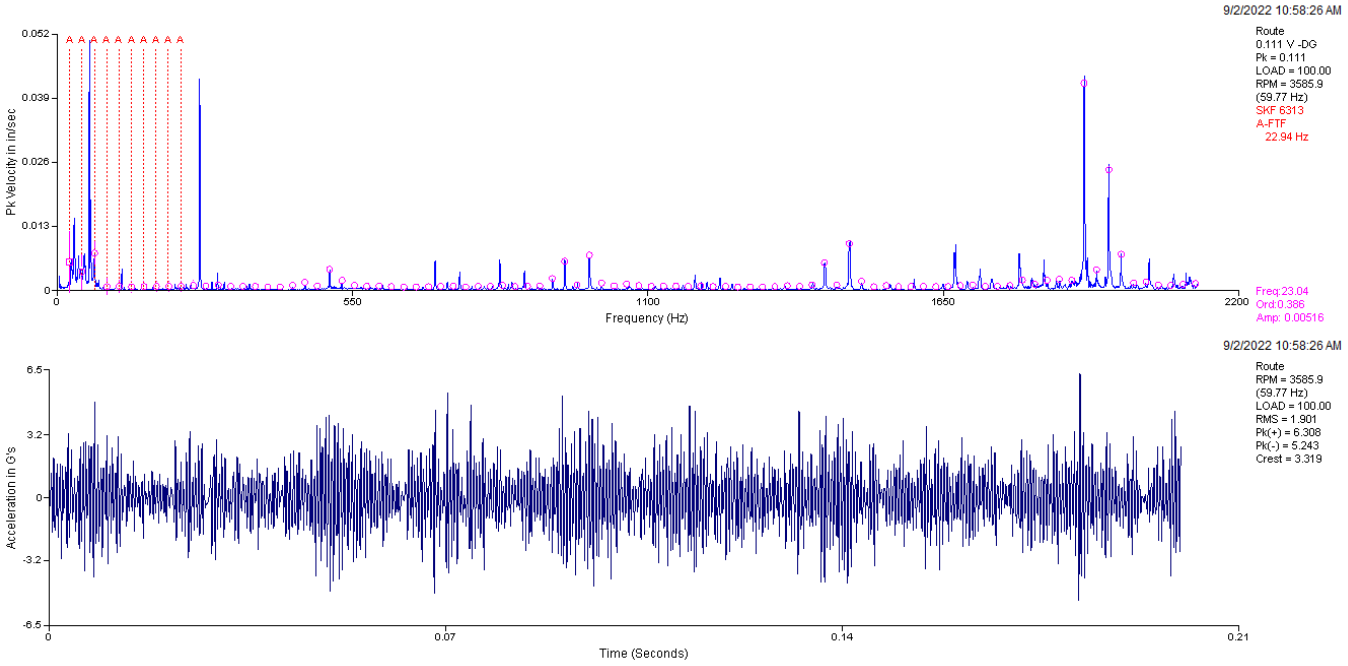
CLASS II: Defect (s) present that may cause problem in long term (2-6 months). Repair during normal maintenance scheduling. Continue to monitor.

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

Defect Summary

Lube Oil Pump 1 CLASS II



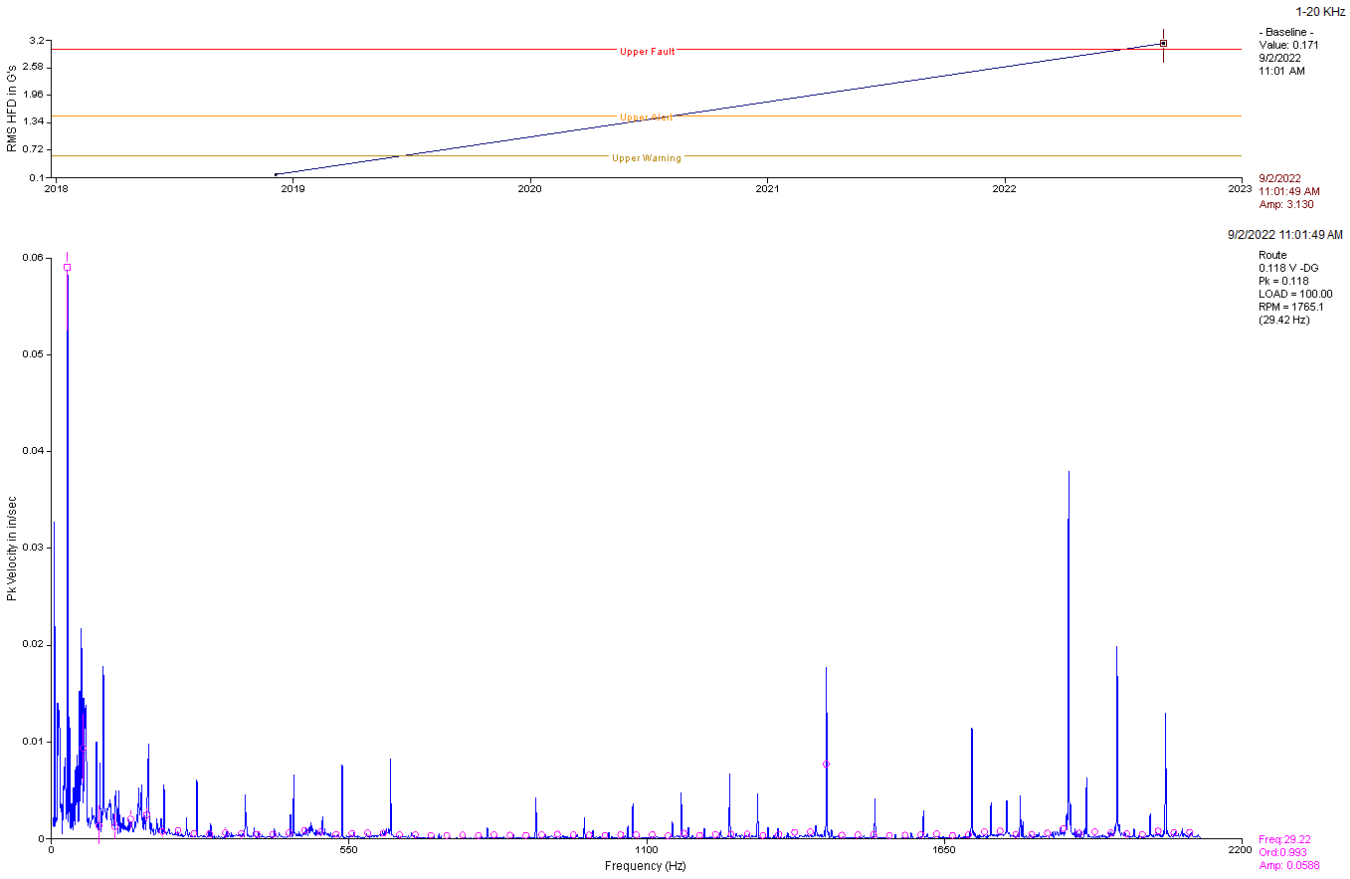
Observation:

Data above is the motor outboard (top) horizontal. Spectral data shows non-synchronous peaks present that appear to be harmonics of FTF (bearing cage frequency). Waveform data shows amplitude of 11 g's peak to peak which is considered to be high amplitude for this motor.

Recommendation:

Data suggests possible bearing issue in motor. Ensure motor bearings are properly lubricated. Because of the presence of cage frequencies, this motor will likely need attention as scheduling allows.

Rotor Air Cooler Fan **CLASS II**



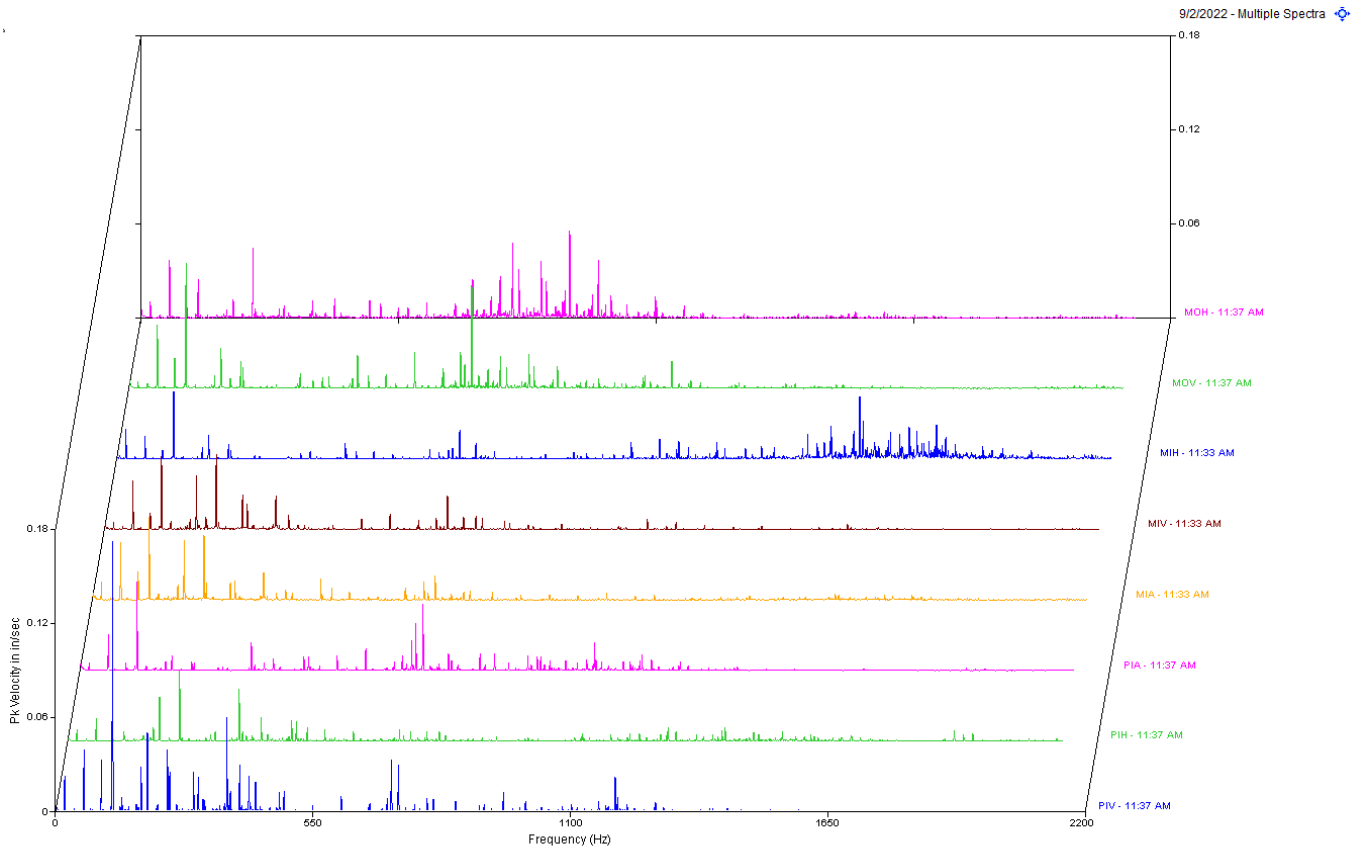
Observation:

Spectral data is motor inboard (DE) horizontal. Data shows several peaks that are non-synchronous with motor rpm modulation.

Recommendation:

Data suggest electrical fluting of the bearing races. This is a common issue with AC motors that are operated by a VFD. Motor needs to be replaced with a motor that has grounding protection such as an insulated bearing and an AEGIS grounding brush ring installed in the motor. Replace as scheduling allows.

Jacking Oil Pump 1 CLASS II



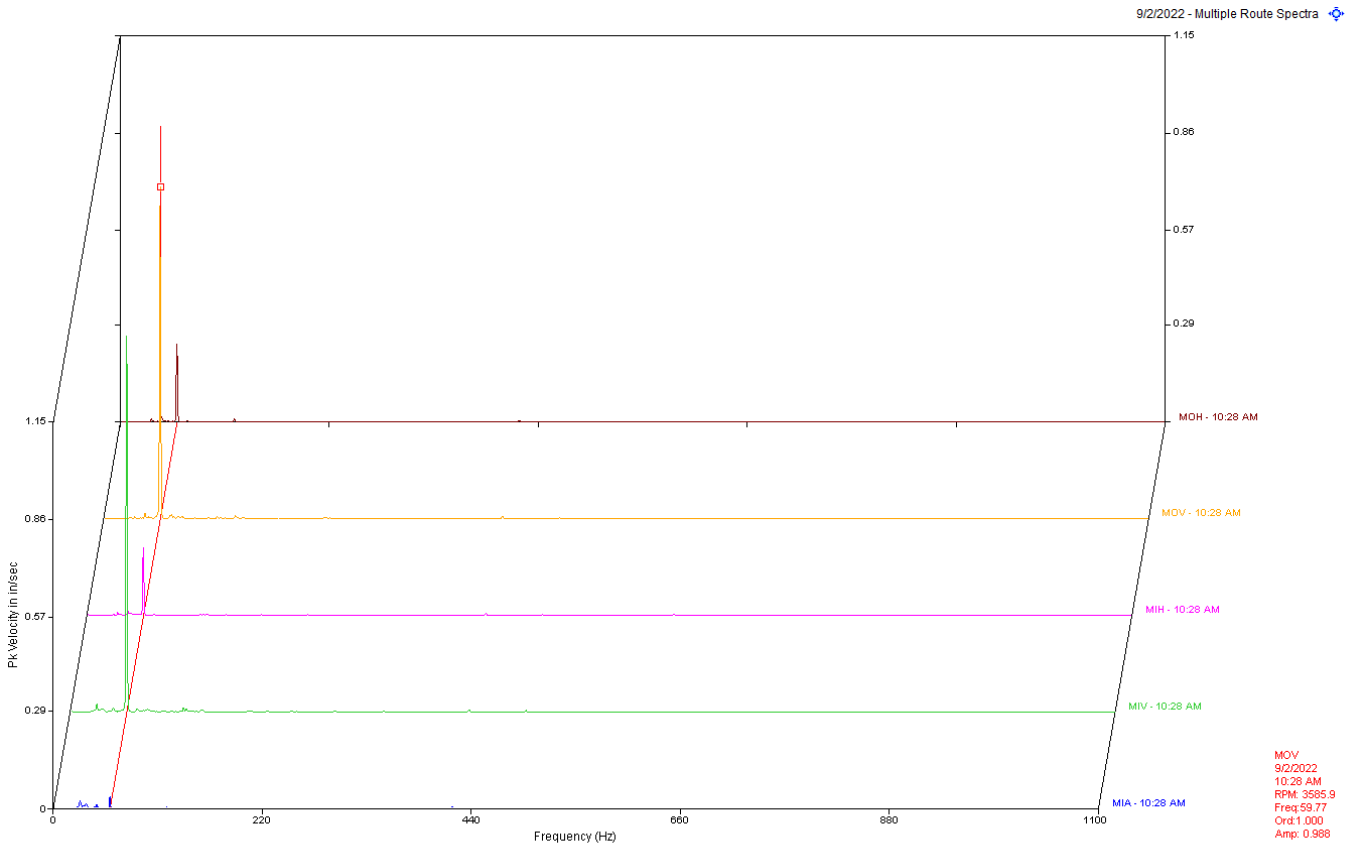
Observation:

Motor/Pump spectral waterfall shows quite a bit of non-synchronous high frequency vibration. Pump also some vibrations but in the low to mid frequency range.

Recommendation:

Data of the motor indicates some likely bearing issues. Pump may also have some internal wear. Inspect motor and pump as scheduling allows.

Lube Oil Vapor Extractor 2 CLASS II



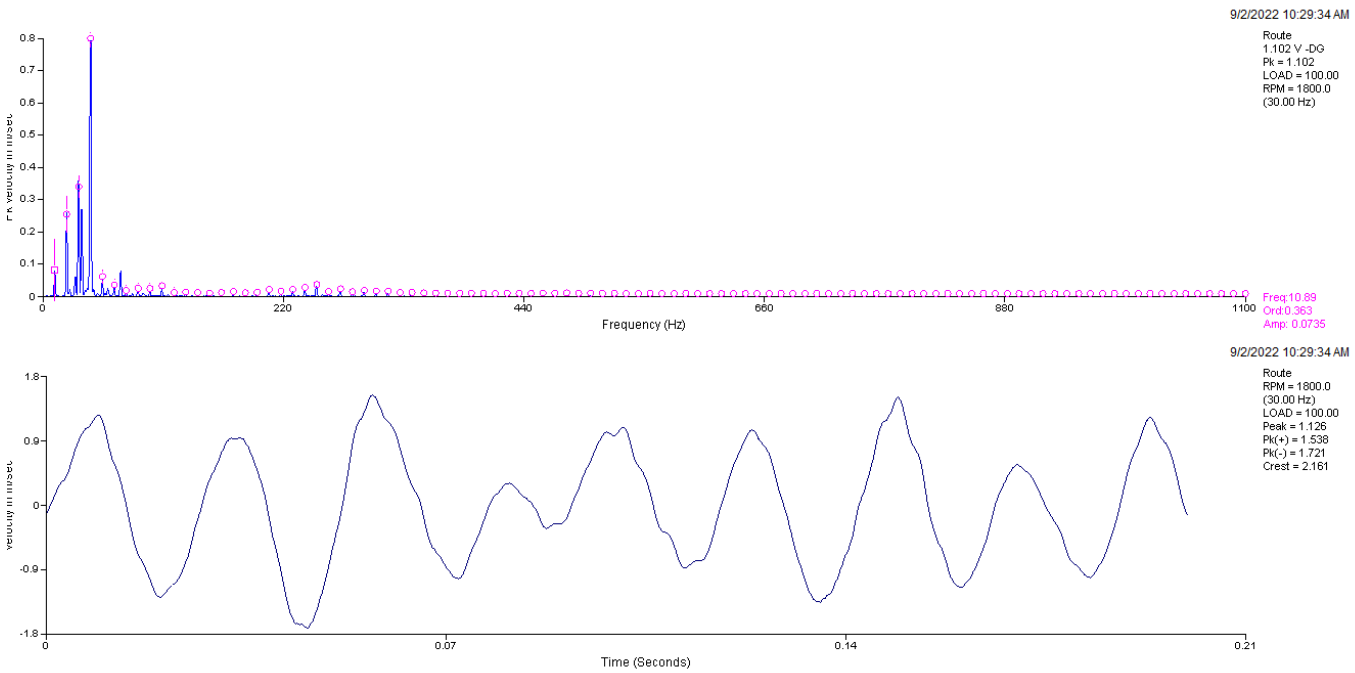
Observation:

Motor multi-point waterfall shows high 1 x rpm vibration in the vertical direction.

Recommendation:

Fan likely has some imbalance; however, this vibration appears to be highly directional and may be caused by some resonance or other structural issue. Inspect fan wheel for build-up or damage. If wheel looks good, then a trim balance will be needed.

Reciprocating Air Compressor CLASS II



Observation:

Motor has high vertical vibration. All vibrations appears to be related to compressor rpm.

Recommendation:

Unit has directional vibration that is related to compressor rpm. This is likely inherent of the reciprocating forces of the compressor, however vibration seems excessive. It is recommended to inspect all fasteners of the motor base and compressor. Also ensure sheaves and belts are in good order.

Abbreviated Last Measurement Summary

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Database: ESSEX.rbm
Area: POWER PLANT

MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD
2H - LUBE OIL PUMP 1	(02-Sep-22)	
	OVERALL LEVEL	1-20 KHz
MOH	.111 In/Sec	1.996 G-s
MIH	.079 In/Sec	1.128 G-s
MIA	.073 In/Sec	.545 G-s
MOV	.152 In/Sec	.553 G-s
MIV	.061 In/Sec	.660 G-s
2M - LUBE OIL PUMP 2	(02-Sep-22)	
	OVERALL LEVEL	1-20 KHz
MOH	.058 In/Sec	.630 G-s
MIH	.032 In/Sec	.589 G-s
MIA	.055 In/Sec	.264 G-s
MOV	.126 In/Sec	.111 G-s
MIV	.078 In/Sec	.229 G-s
3M - ROTOR AIR COOLER FAN	(02-Sep-22)	
	OVERALL LEVEL	1-20 KHz
MOH	.077 In/Sec	1.340 G-s
MIH	.118 In/Sec	3.130 G-s
MIA	.163 In/Sec	.905 G-s
MOV	.134 In/Sec	.268 G-s
MIV	.176 In/Sec	.857 G-s
7J - JACKING OIL PUMP 1	(02-Sep-22)	
	OVERALL LEVEL	1-20 KHz
MOH	.148 In/Sec	.532 G-s
MIH	.148 In/Sec	1.521 G-s
MIA	.077 In/Sec	.326 G-s
PIA	.106 In/Sec	.537 G-s
PIH	.085 In/Sec	1.072 G-s
MOV	.150 In/Sec	.538 G-s
MIV	.106 In/Sec	.157 G-s
PIV	.228 In/Sec	.627 G-s
7M - JACKING OIL PUMP 2	(02-Sep-22)	
	OVERALL LEVEL	1-20 KHz
MIH	.116 In/Sec	1.178 G-s
MIA	.067 In/Sec	.287 G-s
PIA	.166 In/Sec	.867 G-s
PIH	.257 In/Sec	1.056 G-s
MIV	.108 In/Sec	.255 G-s
PIV	.147 In/Sec	.467 G-s
8C - LUBE OIL COOLER FAN 1	(02-Sep-22)	
	OVERALL LEVEL	1-20 KHz
MOH	.114 In/Sec	.973 G-s
MIH	.112 In/Sec	.856 G-s
MIA	.160 In/Sec	1.572 G-s
MOV	.139 In/Sec	.360 G-s
MIV	.198 In/Sec	1.270 G-s
8F - LUBE OIL COOLER FAN 2	(02-Sep-22)	
	OVERALL LEVEL	1-20 KHz
MOH	.224 In/Sec	.236 G-s
MIH	.139 In/Sec	.397 G-s
MIA	.074 In/Sec	.269 G-s
MOV	.090 In/Sec	.242 G-s
MIV	.093 In/Sec	.193 G-s

8J - LUBE OIL VAPOR EXTRACTOR 1 (02-Sep-22)

	OVERALL LEVEL	1-20 KHz
MOH	.194 In/Sec	.271 G-s
MIH	.197 In/Sec	.348 G-s
MIA	.095 In/Sec	.108 G-s
MOV	.254 In/Sec	.077 G-s
MIV	.260 In/Sec	.238 G-s

8M - LUBE OIL VAPOR EXTRACTOR 2 (02-Sep-22)

	OVERALL LEVEL	1-20 KHz
MOH	.257 In/Sec	.190 G-s
MIH	.224 In/Sec	.181 G-s
MIA	.068 In/Sec	.105 G-s
MOV	1.069 In/Sec	.060 G-s
MIV	1.223 In/Sec	.132 G-s

1G - TURNING GEAR (02-Sep-22)

	OVERALL LEVEL	1-20 KHz
MOH	.103 In/Sec	.198 G-s
MIH	.059 In/Sec	.143 G-s
MIA	.025 In/Sec	.035 G-s
EIA	.027 In/Sec	.039 G-s
EIH	.027 In/Sec	.108 G-s
EOH	.030 In/Sec	.117 G-s
MOV	.047 In/Sec	.098 G-s
MIV	.038 In/Sec	.093 G-s
EIV	.036 In/Sec	.053 G-s
EOV	.032 In/Sec	.061 G-s

2M DC - EMERGENCY LUBE OIL PUMP (02-Sep-22)

	OVERALL LEVEL	1-20 KHz
MOH	.256 In/Sec	.408 G-s
MIH	.062 In/Sec	.254 G-s
MIA	.105 In/Sec	.106 G-s
MOV	.284 In/Sec	.205 G-s
MIV	.101 In/Sec	.135 G-s

AIRCOMP - RECIPROCATING AIR COMPRESSOR (02-Sep-22)

	OVERALL LEVEL	1-20 KHz
MOH	.593 In/Sec	.116 G-s
MIH	.470 In/Sec	.109 G-s
MIA	1.726 In/Sec	.085 G-s
FIA	.189 In/Sec	.183 G-s
FIH	.191 In/Sec	.530 G-s
FOH	.196 In/Sec	.638 G-s
MOV	1.101 In/Sec	.083 G-s
MIV	1.075 In/Sec	.080 G-s
FIV	.551 In/Sec	.188 G-s
FOV	.554 In/Sec	.214 G-s

EHCPUMP1 - EHC PUMP 1 (02-Sep-22)

	OVERALL LEVEL	1-20 KHz
MOH	.076 In/Sec	.250 G-s
MIH	.050 In/Sec	.403 G-s

EHCPUMP2 - EHC PUMP 2 (02-Sep-22)

	OVERALL LEVEL	1-20 KHz
MOH	.059 In/Sec	.427 G-s
MIH	.031 In/Sec	.447 G-s

EHCCOOLFAN - EHC COOLING FAN (02-Sep-22)

	OVERALL LEVEL	1-20 KHz
MOH	.232 In/Sec	.062 G-s
MIH	.058 In/Sec	.011 G-s

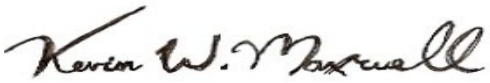
Clarification Of Vibration Units:

Acc --> G-s RMS

Vel --> In/Sec PK

As always, it has been a pleasure to serve AECI Essex Power. If there are any comments or questions, do not hesitate to contact us.

Sincerely,



ISO Certified Vibration Analyst, Category III

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