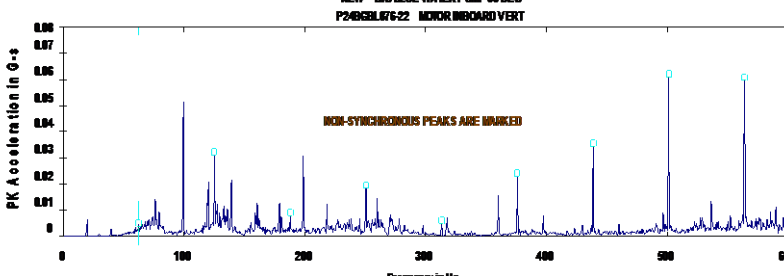
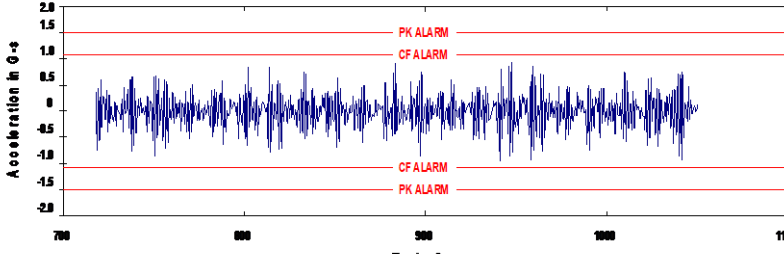
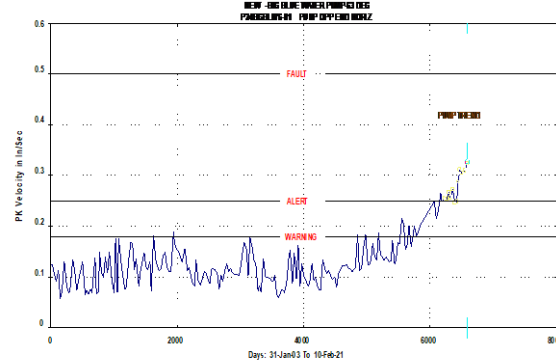




Client	PENNAKEM	Survey Date	2-10-2021
Location	Memphis, TN	Report Date	2-12-2021
Machine	Big Blue 63° Water Pump	QMS No.	144471
Component	Motor and Pump Issues	Analyst	DWS

Defect Rating for this machine	CLASS II
Defect Rating System	
Class I: Defect is present, but effect on reliability is not clear; no immediate action is required. Continue normal monitoring.	Class III: Defect (s) present that may cause failure in short term (less than 2 mos.). Should be addressed as soon as practical, with a high maintenance priority. Increase monitoring frequency.
Class II: Defect (s) present that may cause problem in long term (2-6 mos.). Repair during normal maintenance scheduling. Continue to monitor.	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.

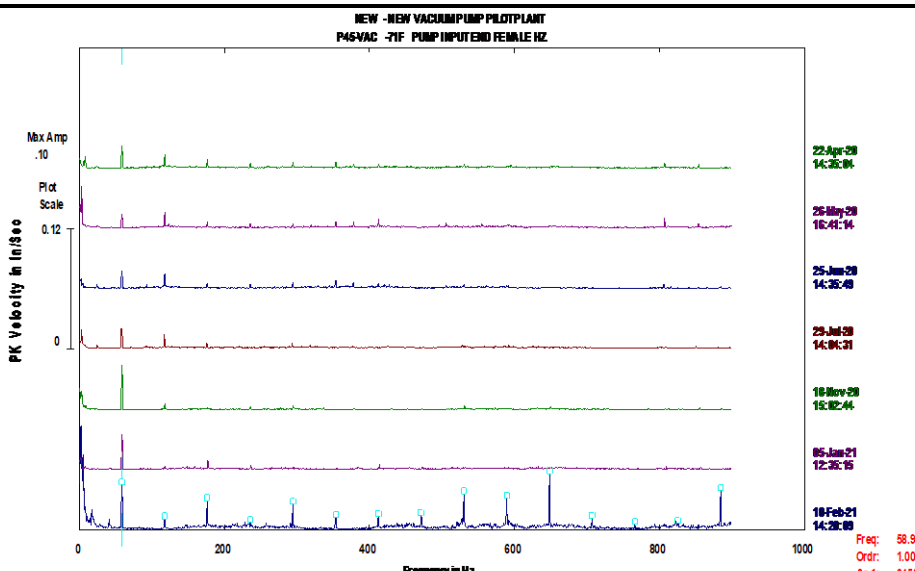
Vibration Data	Analysis
<p>NEW - BIG BLUE WATER PUMP-63 DEG P2483L076-22 MOTOR INBOARD VERT</p>  <p>Route Spectrum 10-Feb-21 11:14:26 OVERALL= .0629 V-DG PK = .1628 LOAD = 100.0 RPM = 1192 (19.86 Hz)</p>  <p>Route Waveform 10-Feb-21 11:14:26 PK = .5248 PK (4x) = 1.12 / 9398 CRE STF= 3.10</p> <p>Freq: 62.63 Ordr: 3.153 Spec: .00388</p>	<p>Non-synchronous vibrations in the drive end bearing of the motor. Increase overall vibrations in the outboard pump bearing.</p>

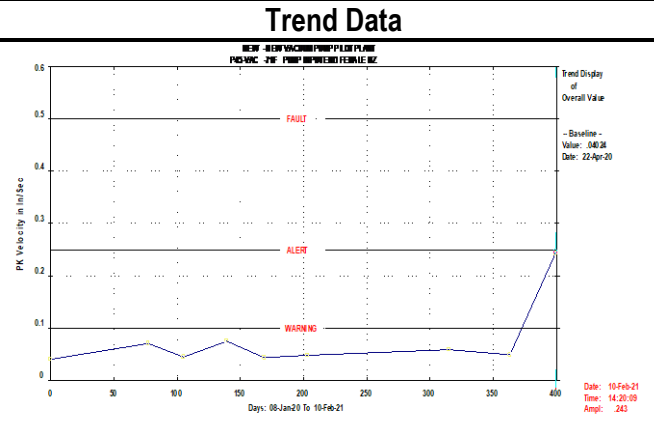
Discussion / Repair recommendations	Trend Data
<p>The pump data still indicates possible slight looseness in the bearing fits as well as wear in the pump, such as imbalance, and vane pass, which we suspect is 5x RPM. The motor data for the inboard bearing shows what we believe to be bearing fundamental outer race defect frequency and harmonics. Rated a Class II Defect.</p>	 <p>Trend Display of Overall Value - Baseline - Value: .022 Date: 22-Apr-20</p> <p>Days: 21-Jan-21 To 10-Feb-21</p> <p>Date: 10-Feb-21 Time: 11:15:56 Ampl: .323</p>



Client	PENNAKEM	Survey Date	2-10-2021
Location	Memphis, TN	Report Date	2-12-2021
Machine	New Vacuum Pump Pilot Plant	QMS No.	144471
Component		Analyst	DWS

Defect Rating for this machine	CLASS II
Defect Rating System	
Class I: Defect is present, but effect on reliability is not clear; no immediate action is required. Continue normal monitoring.	Class III: Defect (s) present that may cause failure in short term (less than 2 mos.). Should be addressed as soon as practical, with a high maintenance priority. Increase monitoring frequency.
Class II: Defect (s) present that may cause problem in long term (2-6 mos.). Repair during normal maintenance scheduling. Continue to monitor.	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.

Vibration Data	Analysis
<p>NEW - NEW VACUUMPUMP PILOTPLANT P45VAC - 71F PUMP INPUT END REMAINEZ</p>  <p>Max Amp .10 Plot Scale 0.12 PK Velocity in In/Sec Frequency in Hz</p> <p>22-Apr-20 14:28:04 26-May-20 10:41:14 25-Jun-20 14:35:40 29-Jul-20 14:04:21 18-Nov-20 15:02:44 05-Jan-21 12:25:15 10-Feb-21 14:20:09</p> <p>Freq: 58.94 Ordr: 1.000 Sp 1: .04502</p>	<p>Large increase in shaft speed harmonics. Sub-synchronous noise.</p>

Discussion / Repair recommendations	Trend Data
<p>The unit was making odd sounds. The waterfall spectrum for the inboard bearing for the second shaft shows a large increase in harmonics and sub-synchronous noise. The unit could be in distress. Inspect the unit soon. Be prepared for service on the unit. Rated a Class II Defect.</p>	 <p>Trend Display of Overall Value Baseline Value: .04024 Date: 22-Apr-20</p> <p>0.6 0.5 0.4 0.3 0.2 0.1 0</p> <p>PK Velocity in In/Sec</p> <p>Days: 08-Jan-20 to 10-Feb-21</p> <p>Date: 10-Feb-21 Time: 14:20:09 Ampl: .243</p>