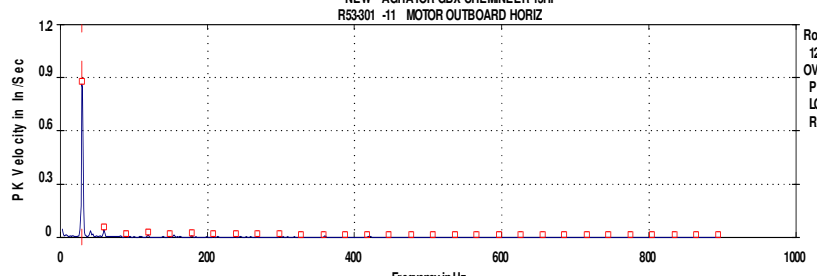
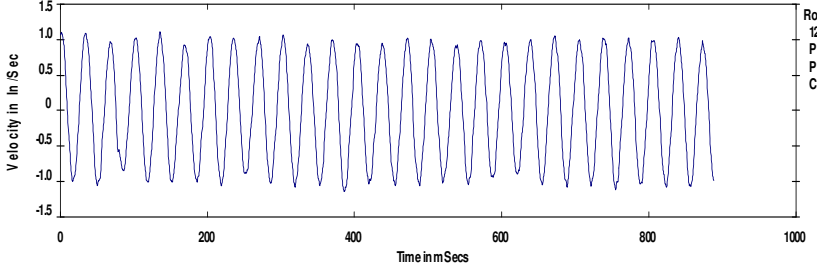
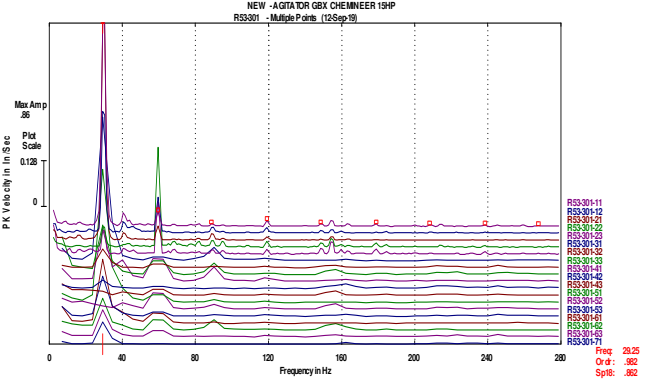




Client	Penn A Kem	Survey Date	9-12/18-19
Location	53	Report Date	9-19-19
Machine	R53-301 Agitator	QMS No.	140477
Component	Motor/coupling	Analyst	DWS

Defect Rating for this machine	<b>CLASS III</b>
Defect Rating System	
<b>Class I:</b> Defect is present, but effect on reliability is not clear; no immediate action is required. Continue normal monitoring.	<b>Class III:</b> 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.
<b>Class II:</b> Defect (s) present that may cause problem in long term (2-6 mos.). Repair during normal maintenance scheduling. Continue to monitor.	<b>Class IV:</b> Defect (s) present that makes continued reliability unpredictable, and possibility of secondary damage is high. <b>Repairs should be made ASAP. An unscheduled shutdown should be considered for repairs.</b>

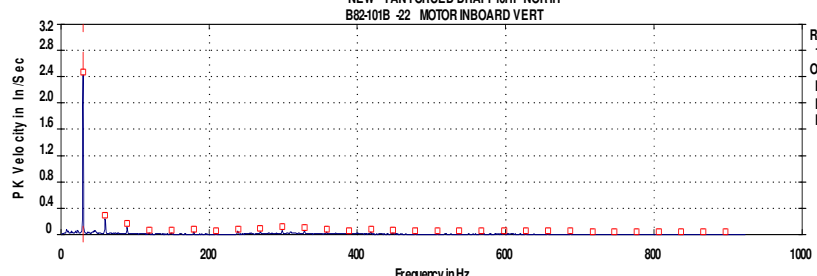
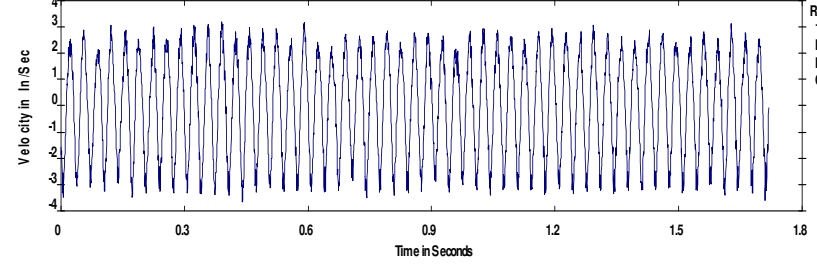
Vibration Data	Analysis
<p>NEW - AGITATOR GBX CHEMNEER 15HP R53-301 -11 MOTOR OUTBOARD HORIZ</p>  <p>Route Spectrum 12-Sep-19 13:36:21 OVERALL=1.01 V-DG PK = 1.01 LOAD = 100.0 RPM = 1788 (29.80 Hz)</p>  <p>Route Waveform 12-Sep-19 13:36:21 PK = 1.02 PK(μ)=1.12/1.14 CRESTF=1.59</p> <p>Freq: 29.80 Ord: 1.000 Spec: 1.006</p>	<p>Dominant shaft speed vibration in motor data at over 1"/sec velocity peak. Secondary vibration at 2x.</p>

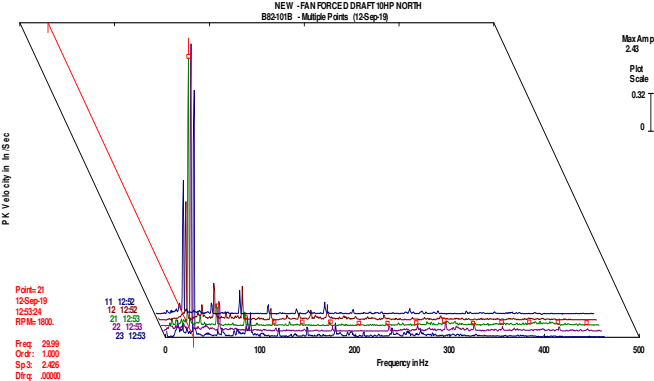
Discussion / Repair recommendations	Data
<p>The high amplitude vibration data could indicate an issue in or adjacent to the motor. Ensure all fasteners are tight. Inspect the motor cooling fan and the shaft coupling for wear or damage. Have the shaft alignment checked and adjusted if necessary. Vibrations over 1"/sec velocity peak require attention. <b>Rated a Class III Defect.</b></p>	 <p>NEW - AGITATOR GBX CHEMNEER 15HP R53-301 - Multiple Points (12-Sep-19)</p> <p>Max Amp .86 Plot Scale 0.128</p> <p>Freq: 29.25 Ord: .862 Sp16: .862</p>



Client	Penn A Kem	Survey Date	9-12/18-19
Location	82	Report Date	9-19-19
Machine	B82-101B FD Fan North	QMS No.	140477
Component	Unit	Analyst	DWS

Defect Rating for this machine	<b>CLASS IV</b>
Defect Rating System	
<b>Class I:</b> Defect is present, but effect on reliability is not clear; no immediate action is required. Continue normal monitoring.	<b>Class III:</b> 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.
<b>Class II:</b> Defect (s) present that may cause problem in long term (2-6 mos.). Repair during normal maintenance scheduling. Continue to monitor.	<b>Class IV:</b> Defect (s) present that makes continued reliability unpredictable, and possibility of secondary damage is high. <b>Repairs should be made ASAP. An unscheduled shutdown should be considered for repairs.</b>

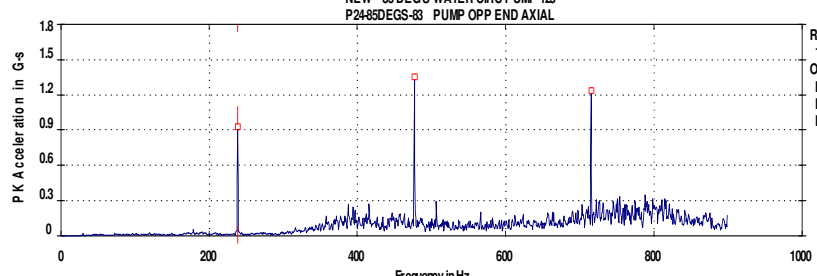
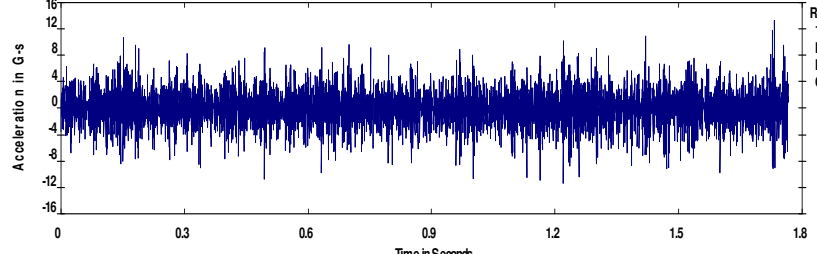
Vibration Data	Analysis
<p>NEW - FAN FORCED DRAFT 10HP NORTH B82-101B -22 MOTOR INBOARD VERT</p>  <p>Route Spectrum 12-Sep-19 12:53:41 OVERALL=2.64 V-DG PK = 2.64 LOAD = 100.0 RPM = 1793. (29.88 Hz)</p>  <p>Route Waveform 12-Sep-19 12:53:41 PK = 2.69 PK(4/3) = 3.19/3.65 CRESTF= 1.92</p> <p>Freq: 29.88 Ord: 1.000 Spec: 2.590</p>	<p>Dominant shaft speed vibration in the motor at over 3"/sec peak velocity.</p>

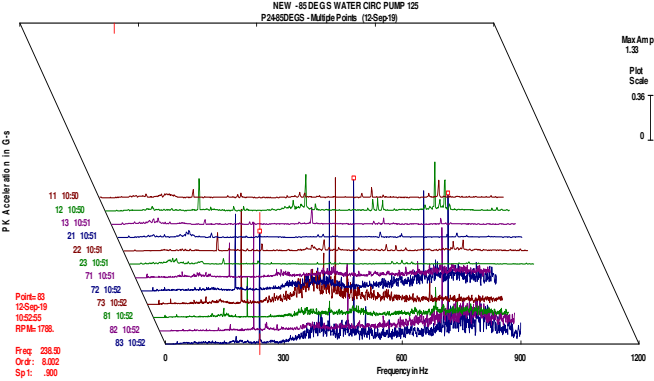
Discussion / Repair recommendations	Data
<p>This unit should be shut down and inspected as soon as possible. The likelihood of secondary damage is extremely conceivable if allowed to run. Unit area should be barricaded until repairs are completed. Vibrations are over 3"/sec velocity peak in the time waveform of the motor inboard vertical and dominated by the shaft fundamental. We suspect imbalance and other factors such as loose fasteners, looseness in the bearing fits and possible structural defects. <b>Rated a Class IV Defect.</b></p>	 <p>NEW - FAN FORCED DRAFT 10HP NORTH B82-101B - Multiple Points (12-Sep-19)</p> <p>Max Amp 2.43 Plot Scale 0.32</p> <p>Points: 21 12-Sep-19 12:53:41 RPM: 1800.</p> <p>11: 12:52 12: 12:53 21: 12:53 22: 12:53 23: 12:53</p> <p>Freq: 29.88 Ord: 1.000 Sp: 2.426 Orq: .00000</p>



Client	Penn A Kem	Survey Date	9-12/18-19
Location	Pump House 24	Report Date	9-19-19
Machine	P24-85DEGS 85 Degree South Circulating Water Pump	QMS No.	140477
Component	Pump	Analyst	DWS

Defect Rating for this machine	<b>CLASS II</b>
Defect Rating System	
<b>Class I:</b> Defect is present, but effect on reliability is not clear; no immediate action is required. Continue normal monitoring.	<b>Class III:</b> 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.
<b>Class II:</b> Defect (s) present that may cause problem in long term (2-6 mos.). Repair during normal maintenance scheduling. Continue to monitor.	<b>Class IV:</b> Defect (s) present that makes continued reliability unpredictable, and possibility of secondary damage is high. <b>Repairs should be made ASAP. An unscheduled shutdown should be considered for repairs.</b>

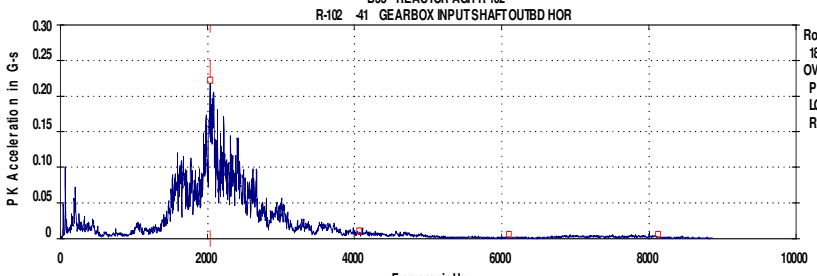
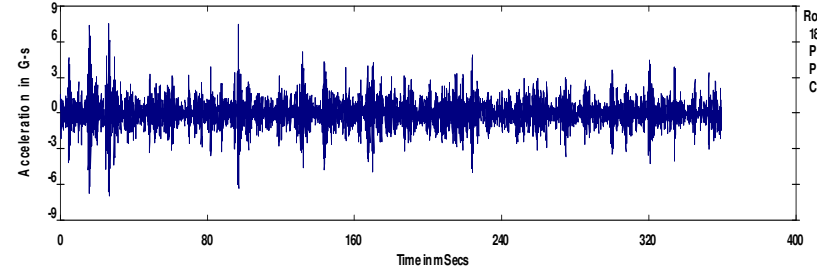
Vibration Data	Analysis
<p>NEW -85 DEGS WATER CIRC PUMP 125 P24-85DEGS-83 PUMP OPP END AXIAL</p>  <p>Route Spectrum 12-Sep-19 10:52:55 OVERALL= .5031 V-DG PK = 4.16 LOAD = 100.0 RPM = 1789. (29.82 Hz)</p>  <p>Route Waveform 12-Sep-19 10:52:55 PK = 4.15 PK(+) = 13.24/11.42 CREST= 4.51</p> <p>Freq: 238.57 Ordr: 8.000 Spec: .901</p>	<p>8x RPM vibration peak and 2 harmonics show suspected vane pass.</p>

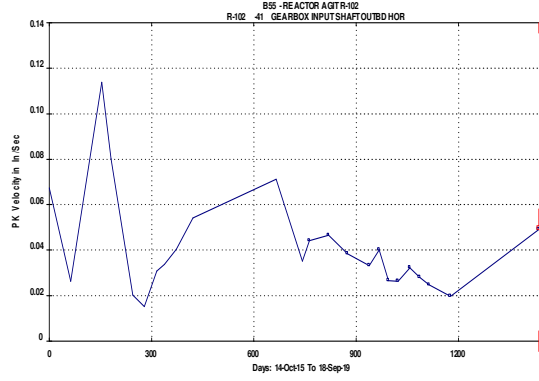
Discussion / Repair recommendations	Data
<p>Vibration data consists of: vane pass and harmonics, slightly elevated noise floor and impacting in the time waveform. We suspect the pump is worn and not running in the optimal area of the performance curve. Have the flow and pressure's checked as time allows. We will watch for changes. <b>Rated a Class II Defect.</b></p>	 <p>NEW -85 DEGS WATER CIRC PUMP 125 P24-85DEGS - Multiple Points (12-Sep-19)</p> <p>Max Amp 1.33 Plot Scale 0.36 0</p> <p>Point: 83 12-Sep-19 10:52:55 RPM=1789</p> <p>11 10:50 12 10:50 13 10:51 21 10:51 22 10:51 23 10:51 71 10:51 72 10:52 73 10:52 81 10:52 82 10:52 83 10:52</p> <p>Freq: 238.57 Ordr: 8.002 Sp1: .900</p>



Client	Penn A Kem	Survey Date	9-12/18-19
Location	B55	Report Date	9-19-19
Machine	R55-102 Reactor Agitator	QMS No.	140477
Component	Gearbox	Analyst	DWS

Defect Rating for this machine	<b>CLASS II</b>
Defect Rating System	
<b>Class I:</b> Defect is present, but effect on reliability is not clear; no immediate action is required. Continue normal monitoring.	<b>Class III:</b> 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.
<b>Class II:</b> Defect (s) present that may cause problem in long term (2-6 mos.). Repair during normal maintenance scheduling. Continue to monitor.	<b>Class IV:</b> Defect (s) present that makes continued reliability unpredictable, and possibility of secondary damage is high. <b>Repairs should be made ASAP. An unscheduled shutdown should be considered for repairs.</b>

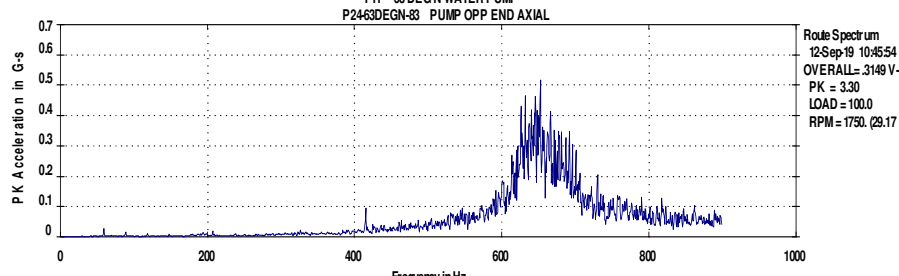
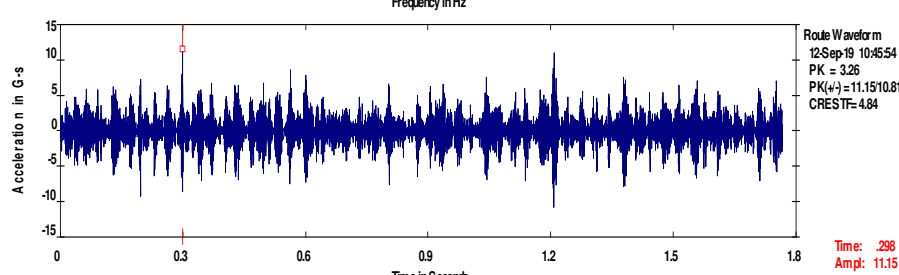
Vibration Data	Analysis
<p>B55 - REACTOR AGTR-102 R-102 -41 GEARBOX INPUT SHAFT OUTBD HOR</p>  <p>Route Spectrum 18-Sep-19 10:04:58 OVERALL= .1682 V-DG PK = 1.65 LOAD = 100.0 RPM = 1760. (29.33 Hz)</p>  <p>Route Waveform 18-Sep-19 10:04:58 PK = 1.75 PK(μ)= 7.567.00 CRESTF= 6.12</p> <p>Freq: 2032.9 Ord: 69.30 Spec: .218</p>	<p>Noise hump in the acceleration spectrum and impacting in the time domain.</p>

Discussion / Repair recommendations	Trend Data
<p>The unit gearbox could be in distress. We recommend a visual inspection and Oil analysis to confirm. This is the first survey so we will only rate this <b>Class II at this time.</b></p>	 <p>Trend Display of HI FREQ VEL</p> <p>Baseline Value: .06732 Date: 14-Oct-15</p> <p>Date: 18-Sep-19 Time: 10:04:59 Ampl: .04014</p>



Client	Penn A Kem	Survey Date	9-12/18-19
Location	24 Pump House	Report Date	9-19-19
Machine	P24-63DEGN 63 Degree North Water Pump	QMS No.	140477
Component	Pump	Analyst	DWS

Defect Rating for this machine	<b>CLASS III</b>
Defect Rating System	
<b>Class I:</b> Defect is present, but effect on reliability is not clear; no immediate action is required. Continue normal monitoring.	<b>Class III:</b> 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.
<b>Class II:</b> Defect (s) present that may cause problem in long term (2-6 mos.). Repair during normal maintenance scheduling. Continue to monitor.	<b>Class IV:</b> Defect (s) present that makes continued reliability unpredictable, and possibility of secondary damage is high. <b>Repairs should be made ASAP. An unscheduled shutdown should be considered for repairs.</b>

Vibration Data	Analysis
<p>PH -63 DEGN WATER PUMP P2463DEGN-83 PUMP OPP END AXIAL</p>  	<p>Elevated noise floor and impacting in the acceleration time waveform.</p>

Discussion / Repair recommendations	Trend Data
<p>Random impacting in the data is usually a good indicator of the presence of bearing defects. The addition of a large noise hump could help to support the analysis or sometimes it could indicate cavitation in the pump or both. We suspect the bearings are in some distress with possible cavitation. Inspect the outboard pump bearing and check process parameters. <b>Rated a Class III Defect.</b></p>	