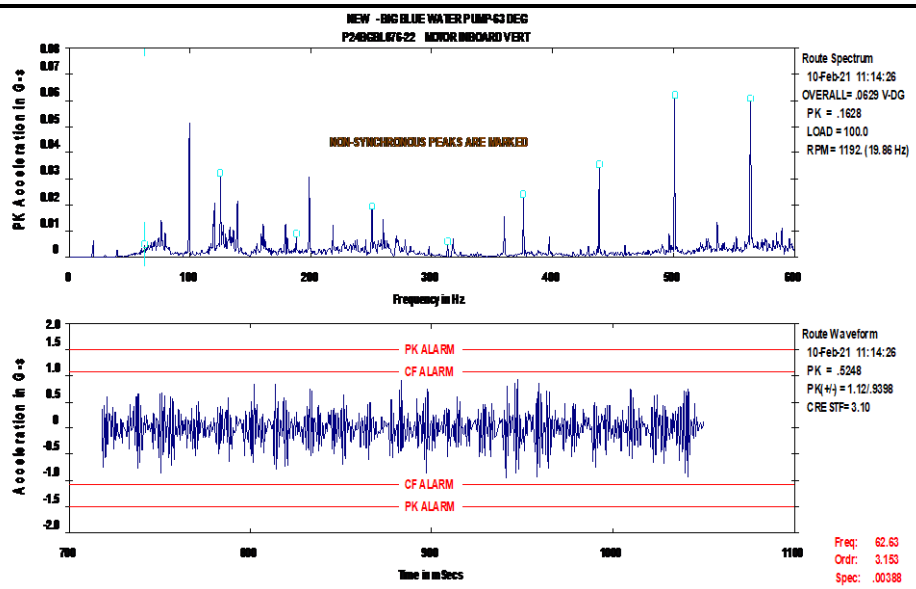
HI-SPEED PREDICTIVE MAINTENANCE

Machinery Vibration Report

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



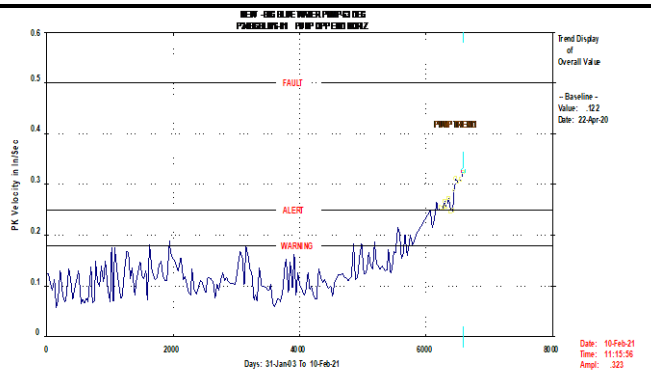
Analysis

Non-synchronous vibrations in the drive end bearing of the motor. Increase overall vibrations in the outboard pump bearing.

Discussion / Repair recommendations

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.**

Trend Data



HI-SPEED PREDICTIVE MAINTENANCE

Machinery Vibration Report

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.
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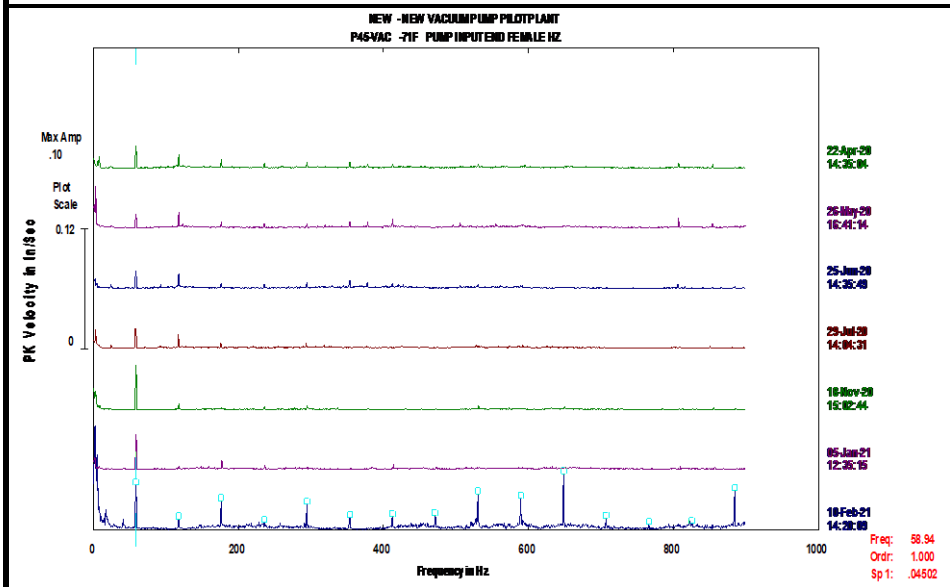
Vibration Data



Analysis

Large increase in shaft speed harmonics. Sub-synchronous noise.

Discussion / Repair recommendations

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.**

Trend Data