

RAYNESFORD BALANCING SERVICE, INC.

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Lakewood, CA 90715
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July 26, 21XX

Sample Company
1234 Street Ave.
Industry, CA 90001

Attention: Maintenance Engineer

Reference: Service Agreement/PO #, Our job V49999, Annual Vibration Survey report

Dear Sir:

I came to your premises to perform the vibration survey on your usual agreed-upon equipment. The spectrum and waterfall (where appropriate) plots enclosed show the digital data that I recorded while there.

Summary of Recommendations (items in each section not in order of priority)

URGENT (address in weeks)

- none

IMMEDIATE ATTENTION (address in weeks-months)

- Elec. Fire Pump 1-1: check pump bearings (and monitor)
- Chilled Water Pump 7-2: evidence of looseness (bearing, coupling?)

ATTENTION AT YOUR CONVENIENCE (address in 6 months-year)

- Chilled Water Pump 9: inspect for looseness (bearings, coupling?)
- Kitchen Exhaust Fan: inspect motor mount
- Laundry Exhaust Fan: possible looseness/chattering, fan bearings

IMPROVED UNITS

- Cooling Tower 1A-3

MONITOR OCCASIONALLY

- Oil Heater Pump 2: drive pump bearing, early bearing deterioration(?)`
- Cooling Tower 2A-3: fan bearings, monitor and keep lubricated

I have established the following overall vibration level alarms, based on ISO standards:

	<u>1st alarm (alert)</u>	<u>2nd alarm (danger)</u>
velocity vibration Inch Per Second (IPS) peak	0.20	0.35
High Freq. G's (HFG, acceleration)	2.5	3.5

(compare the levels of vibration mentioned in the report to this table for reference)

Specific comments are as follows:

Electric Fire Pump 3-1

Running speed and overall vibration continues at good levels with good spectrum plots. No recommendation.

Electric Fire Pump 1-1

The electrically-related vibration on the motor continues at similar levels-about .35 IPS; which is higher than I'd like, but is remaining stable.

The pump bearings may be in the middle to late stages of bearing failure. The spectrum plots look somewhat OK, but the feel of each bearing was what I call "on the rough side." The unaveraged time waveform for the non-drive bearing was also higher than I'd like. My 1st alarm level for this measurement is around 4 Gs and the 2nd alarm is around 9 Gs. The level was at 18 two years ago, 7 last year, and 9 Gs this survey. This measurement can show some of the water turbulence energy, so I can't use it exclusively. **My recommendation is to feel the bearings and monitor them for any changes in sound and/or feel that might indicate a worsening condition. This should be done at least once before I come back in six months.**

Domestic Pump 2

Running speed and overall vibration continues at good levels with good spectrum plots. No recommendation.

Condenser Water Pump P11

Running speed and overall vibration continues at good levels with good spectrum plots. The drive pump bearing, to me, felt like there was more vibration than it read on the plots. The axial reading there was a bit higher than last time, but at the high end of acceptable. No recommendation.

Chilled Water Pump P7-2

Running speed and overall vibration is at good levels. However the spectrum plots for the drive motor and drive pump bearings have a worse-looking pattern than the last survey (and other surveys). The presence of several peaks at multiples/harmonics of running speed suggest looseness in the bearing (or possibly the coupling). The bearings themselves felt a little on the rough side.

I recommend investigating all bearings for feel of a possibly worsening condition. You should also check the coupling for looseness. From previous surveys, it seems like this unit has more evidence of looseness (chattering) than other units like it. If you have been going through bearings here more than usual, you should find out what is chattering (bearings, coupling, base) as it may be shortening your bearing life.

The non-drive end motor bearing showed higher than normal high frequency energy. It has about 4 Gs of vibration, compared to 6 last time (also not too good). The reason I mention this is that Chilled Water Pump 9 showed between 3 and 7 Gs before its motor bearings were changed recently. You may want to check out these motor bearings for this reason also.

Laundry Supply Fan

Running speed and overall vibration continues at good levels with good spectrum plots. No recommendation.

Oil Heater Pump 2

Running speed and overall vibration is at good levels with mostly good spectrum plots. The spectral patterns on the pump bearings are the same, maybe a bit worse, than last time. Also, the High Frequency plots still show relatively high (compared to previous surveys). **I still recommend monitoring these pump bearings occasionally for changes in sound and feel that might indicate a worsening condition.**

Kitchen Exhaust Fan

Running speed and overall vibration is at good levels with good spectrum plots. The motor readings are showing evidence of looseness in the form of peaks at multiples of fan speed. This is a little strange, but I have seen it before. What it means is that the fan speed vibration is the largest amount of energy, and so causes the motor mount to vibrate. Since I'm seeing evidence of looseness, there may be some bolts loose or cracks in the motor mount assembly. I recommend inspecting there.

The fan speed vibration (from imbalance) is not horrendous, but is between my 1st and 2nd alarm levels for this speed a fan. This could be shortening your bearings useful life. However, since it is so difficult to find a practical time to balance this unit based on your schedule, I don't recommend balancing at this time until it is worse.

Laundry Exhaust Fan

Running speed and overall vibration continues at good levels with good spectrum plots. I was told new fan bearings were put in here. If they were put in after February, then the spectrum plots don't show much of a change in the vibration signature. They actually look a little worse than pre-February surveys. There is evidence of looseness in the form of peaks at multiples of running speed (relatively high 2x, 5x and 6x).

One possible easy check for some excess clearance is to open up the pillowblock (if you can) and put some .003" PlasticGage (from an auto parts store) in and replace the cap, bolting it down. Take it off again, and check if the PlasticGage flattened out, indicating there is less than .003" inside.

This is a pretty large impeller, so a bump test looking for clearance may be tough to do. However, I do recommend occasional monitoring of the fan bearings, in addition to my own surveys, in case what I'm seeing is indeed looseness or chattering of the bearings (or fit of the bearings and shaft).

Cooling Tower 1A-3

Running speed and overall vibration is at good levels with good spectrum plots. I believe this unit had new bearings put in, and the spectrum plots look much better. The balance is still good. No recommendation.

Cooling Tower 2A-3

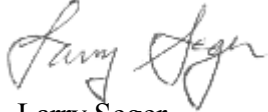
Running speed and overall vibration is at good levels with good spectrum plots. I don't think the fan bearings felt as bad this time, but the spectrum plots still show signs of possible looseness.

This could be from the bearing (excess clearance or loose on the bearing support) or even the structure. **At this point, I recommend monitoring it occasionally and keep it lubricated until the next survey.**

This concludes the report. If you have any questions or comments, please give me a call. Thanks for this opportunity to be of service.

Sincerely,

RAYNESFORD BALANCING SERVICE, Inc.

A handwritten signature in cursive script, appearing to read "Larry Seger".

Larry Seger
Vibration Specialist, Category II

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