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The following is a summary of findings from the 2021 annual vibration survey at the Data Center. Please let us know if there are any questions or comments.

QualiTest® uses a four step rating system for defects.

<u>Class I:</u> Defect is present, but effect on reliability is not clear; no immediate action is required. Continue to normally monitor.

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

<u>Class III</u>; 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.

<u>Class IV;</u> 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

Hi-Speed Industrial Service tests and inspects industrial machinery and equipment and makes recommendations concerning maintenance and repairs based on its experience in the field of industrial repair and maintenance. The information contained herein is provided as an opinion only, not as a guaranty or warranty of the matters discussed herein.

<u>Chill Water Pump 1</u> Unit could not be swapped over due to issues with Tower 1.

Chill Water Pump 2

Vibration appeared to be within acceptable condition during this survey.

Condenser Water Pump 1

Unit could not be swapped over due to issues with Tower 1. The following likely still applies: This unit has a high 1 x rpm vibration at the motor inboard axial. Overall amplitude was near .85 inches per second peak. Equipment such as this pump in newer condition should have overall vibration below .2 inches per second peak. This particular vibration appears to be resonant as the vibration seemed to decrease nonlinear with the speed fluctuation. Resonance occurs when a system natural frequency coincides with a forcing frequency such as 1 x rpm. For now, it is recommended to inspect the shaft alignment. Rated as a **CLASS II** defect.

Condenser Water Pump 2

Motor has a higher than normal 1 x rpm vibration at the motor inboard axial. Overall amplitude is 1 inch per second peak. Equipment such as this pump in newer condition should have overall vibration below .2 inches per second peak. This vibration may be caused by resonance. Resonance occurs when a system natural frequency coincides with a forcing frequency such as 1 x rpm. For now, it is recommended to realign motor to pump with precision laser equipment. Hi-Speed offers this service. If vibration persists, then a coast down test is recommended. This test will tell us at what frequencies the unit vibration at the most. We would then try and eliminate these speeds through the VFD programming. Rated as a **CLASS II** defect.

Cooling Tower 1

Unit could not turned on this survey due to issues with the vibration switch.

Cooling Tower 2

Motor and outboard end of gearbox has high vibration this survey. Vibration appears to be at 29.5 Hz. This maybe 1 x motor rpm. Considering that this tower runs on a VFD, resonance may also play a factor in this vibration. For now, it is highly recommended to inspect the motor fasteners, base/frame for looseness and flexibility. Ensure belt is properly tightened and sheaves are mounted correctly and not misaligned. Rated as a **CLASS III** defect.

Abbreviated Last Measurement Summary ************************************											
D	atabase: Station:	stjuc DATA	de~1.1 CENTI	rbm ER							
MEASUREMEN	IT POINT		c	OVERALI	L LEVEL		HFD / V	VHFD			
			-								
CHWP-2	- CHILL	WATER	PUMP	2		(07-Ju	11-21)				
				OVERAI	LL LEVEL	1	L – 20 P	KHz			
MOH	I			.066	In/Sec		.504 G-	-s			
MOV	7			.048	In/Sec		.396 G-	-s			
MIH	I			.039	In/Sec		.374 G-	-s			

	MIV			.123	In/Sec	. 539	G-s	
	MIA			.124	In/Sec	.232	G-s	
	PIA			.043	In/Sec	.305	G-s	
	PIH			.047	In/Sec	.268	G-s	
	PIV			.090	In/Sec	.224	G-s	
	POH			.037	In/Sec	.191	G-s	
	POV			.079	In/Sec	.190	G-s	
CWP-2	- (CONDENSER	WATER	PUMP 2		(07-Jul-21)		
				OVERAI	L LEVEI	1 - 20	KHz	
	MOH			.075	In/Sec	.966	G-s	
	MOV			.232	In/Sec	.580	G-s	
	MIH			.105	In/Sec	.647	G-s	
	MIV			.244	In/Sec	.676	G-s	
	MIA			1.001	In/Sec	.319	G-s	
	PIA			.103	In/Sec	.805	G-s	
	PIH			.074	In/Sec	.750	G-s	
	PIV			.078	In/Sec	. 599	G-s	
	POH			.058	In/Sec	.660	G-s	
	POV			.042	In/Sec	.548	G-s	
CT-2	- (COOLING TO	OWER 2	(07-Jul-21)				
				OVERAI	L LEVEI	1 - 20	KHz	
	MOH			.332	In/Sec	1.262	G-s	
	MIH			.696	In/Sec	.913	G-s	
	MIA			.262	In/Sec	.752	G-s	
	GIH			.179	In/Sec	.015	G-s	
	GOH			.560	In/Sec	.031	G-s	
Clarifica	tion Of	Vibratio	n Units	 :				
Acc	>	G-s	RMS					
Vel	>	In/Sec	PK					

As always, it has been a pleasure to serve St. Jude Research Hospital. If there are any comments or questions, do not hesitate to contact us.

Sincerely,

Kerin W. Maxuell

ISO Certified Vibration Analyst, Category III



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