

7030 Ryburn Dr. Millington, TN

Phone: (901) 873-5300

Fax: (901) 873-5301

www.gohispeed.com

December 13, 2021

St. Jude Research Hospital Memphis, TN

The following is a summary of findings from the 2021 annual Chili's AHU and EF vibration survey.

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.

Chili's Building

<u>AHU P SF</u>

Data of the motor is still showing bearing issues along with some electrical vibrations. This has likely led to electrical fluting of the motor bearings. Motor should be inspected as scheduling. Rated as a **CLASS II** defect.

<u>AHU P RF</u>

Measured vibration data is all within acceptable limits. No work is recommended at this time.

AHU 1 SF

Measured vibration data is all within acceptable limits. No work is recommended at this time.

AHU 1 RF

Measured vibration data is all within acceptable limits. No work is recommended at this time.

AHU 2 SF

Overall peak to peak waveform amplitude has increased in the motor drive end bearing from 1.2 g's to over 8 g's peak to peak in a years' time. Data of the motor is suggesting bearing issues. This may be electrical fluting of the motor bearings and or lubrication issue. Motor should be inspected as time allows. Rated as a **CLASS II** defect.

<u>AHU 2 RF</u>

Motor data indicates increased high frequency vibration at the axial direction of the motor which appears to be caused by electrical fluting of the motor bearings. We will monitor this closely. Rated as a **CLASS I** defect.

<u>AHU 3 SF</u>

Measured vibration data is all within acceptable limits. No work is recommended at this time.

AHU 3 RF

Motor data indicates significant high frequency vibration which appears to be caused by electrical fluting of the motor bearings. Motor will need attention SOON. Rated as a **CLASS III** defect.

<u>AHU 4 SF</u>

Measured vibration data is all within acceptable limits. No work is recommended at this time.

AHU 4 RF

Measured vibration data is all within acceptable limits. No work is recommended at this time.

AHU 5 SF

Measured vibration data is all within acceptable limits. No work is recommended at this time.

AHU 5 RF

Measured vibration data is all within acceptable limits. No work is recommended at this time.

AHU 6 SF

Measured vibration data is all within acceptable limits. No work is recommended at this time.

AHU 6 RF

Measured vibration data is all within acceptable limits. No work is recommended at this time.

EF1 Toilet

Measured vibration data is all within acceptable limits. No work is recommended at this time.

EF2 General Building

Measured vibration data is all within acceptable limits. No work is recommended at this time.

EF3 Isolation

Measured vibration data is all within acceptable limits. No work is recommended at this time.

EF5 Cyclotron

Motor and fan axial vibration has high amplitude this survey. Data indicates sheave and or belt issue. Inspect sheave alignment and ensure sheaves do not have axial run-out. Ensure belts are in good shape and tensioned properly. Rated as a **CLASS II** defect.

EF6 Cyclotron Standby

Motor and fan bearings appear to have bearing issues. Unit may need to be scheduled for motor and fan bearing replacement within the next few months. Rated as a **CLASS II** defect.

Abbreviated Last Measurement Summa. ***********	ry *********************	****	
Database: stjude~1 Station: CHILIS	.rbm		
MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD	
AHU P-SF - AHU P-SF	(10-Dec-21)		
	OVERALL LEVEL	1 - 20 KHz	
MOH	.171 In/Sec	.567 G-s	
MIH	.111 In/Sec	.733 G-s	
MIA	.286 In/Sec	.317 G-s	
AHU P RF - AHU P-RF	(10-Dec-21)		
	OVERALL LEVEL	1 - 20 KHz	
MOH	.101 In/Sec	.463 G-s	
MIH	.074 In/Sec	.342 G-s	
MIA	.151 In/Sec	.426 G-s	
AHU 1SF - AHU 1 SUPPLY	(10-Dec-21)		
	OVERALL LEVEL	1 - 20 KHz	
MOH	.082 In/Sec	.459 G-s	
MIH	.066 In/Sec	.333 G-s	
MIA	.059 In/Sec	.217 G-s	
AHU 1 RF - AHU 1 RETURN	(10-Dec-21)		
	OVERALL LEVEL	1 - 20 KHz	
MOH	.055 In/Sec	.091 G-s	
MIH	.060 In/Sec	.169 G-s	
MIA	.089 In/Sec	.151 G-s	
AHU 2SF - AHU 2 SUPPLY	(10-Dec-21)		
	OVERALL LEVEL	1 - 20 KHz	
MOH	.091 In/Sec	.796 G-s	
MIH	.099 In/Sec	1.277 G-s	
MIA	.156 In/Sec	.737 G-s	

HU 3SF - A MOH MIH MIA - A MOH MIH FOH A A A A A A A A A A A A A	ни 3 ни 3 ни 5	SUPPLY	OVERALL LEVEL .084 In/Sec .052 In/Sec .118 In/Sec (1) OVERALL LEVEL .179 In/Sec .108 In/Sec .103 In/Sec .102 In/Sec .157 In/Sec (1) OVERALL LEVEL .316 In/Sec .296 In/Sec	1 - 20 KHz .080 G-s .097 G-s .127 G-s 0-Dec-21) 1 - 20 KHz 1.906 G-s 1.700 G-s 1.178 G-s .239 G-s .377 G-s .342 G-s D-Dec-21) 1 - 20 KHz
HU 3SF - A MOH MIH MIA HU 3SF - A MOH MIH FOH HU 3RF - A MOH MIH MIA FOH HU 5 SF - A	ни 3 ни 3 ни 5	SUPPLY	.084 In/Sec .052 In/Sec .118 In/Sec (1) OVERALL LEVEL .179 In/Sec .108 In/Sec .103 In/Sec .102 In/Sec .157 In/Sec (1) OVERALL LEVEL .316 In/Sec .296 In/Sec	.080 G-s .097 G-s .127 G-s 0-Dec-21) 1 - 20 KHz 1.906 G-s 1.700 G-s 1.178 G-s .239 G-s .377 G-s .342 G-s 0-Dec-21) 1 - 20 KHz
MIH MIA 4U 3SF - A MOH MIH FIA FIA FIA FIA FIA FIA FIA FIA FIA FIA	ни 3 ни 3 ни 5	SUPPLY	.052 In/Sec .118 In/Sec (1) OVERALL LEVEL .179 In/Sec .108 In/Sec .103 In/Sec .102 In/Sec .157 In/Sec (1) OVERALL LEVEL .316 In/Sec .296 In/Sec	.097 G-s .127 G-s 0-Dec-21) 1 - 20 KHz 1.906 G-s 1.700 G-s 1.178 G-s .239 G-s .377 G-s .342 G-s D-Dec-21) 1 - 20 KHz
HU 3SF - A MOH MIH FIA FIA FIA FIA FIA FIA FIA FIA FIA FIA	HU 3 HU 3	SUPPLY	.118 In/Sec (1) OVERALL LEVEL .179 In/Sec .108 In/Sec .103 In/Sec .149 In/Sec .102 In/Sec .157 In/Sec (1) OVERALL LEVEL .316 In/Sec .296 In/Sec	.127 G-s 0-Dec-21) 1 - 20 KHz 1.906 G-s 1.700 G-s 1.178 G-s .239 G-s .377 G-s .342 G-s D-Dec-21) 1 - 20 KHz
HU 3SF - A MOH MIH FIA FIA FIH FOH MOH MIH HU 5 SF - A MOH MIA FOH	HU 3 HU 3	SUPPLY	(1) OVERALL LEVEL .179 In/Sec .108 In/Sec .103 In/Sec .149 In/Sec .102 In/Sec .157 In/Sec (1) OVERALL LEVEL .316 In/Sec .296 In/Sec	0-Dec-21) 1 - 20 KHz 1.906 G-s 1.700 G-s 1.178 G-s .239 G-s .377 G-s .342 G-s D-Dec-21) 1 - 20 KHz
MOH MIH MIA FIA FIH FOH HU 3RF - A MOH MIA FOH HU 5 SF - A MOH MIH MIA HU 5 RF - A	HU 3	RETURN	OVERALL LEVEL .179 In/Sec .108 In/Sec .103 In/Sec .149 In/Sec .102 In/Sec .157 In/Sec (1) OVERALL LEVEL .316 In/Sec .296 In/Sec	1 - 20 KHz 1.906 G-s 1.700 G-s 1.178 G-s .239 G-s .377 G-s .342 G-s D-Dec-21) 1 - 20 KHz
MOH MIH MIA FIA FIH FOH HU 3RF - A MOH MIA FOH LU 5 RF - A	HU 3 HU 5	RETURN	.179 In/Sec .108 In/Sec .103 In/Sec .149 In/Sec .102 In/Sec .157 In/Sec (1 OVERALL LEVEL .316 In/Sec .296 In/Sec	1.906 G-s 1.700 G-s 1.178 G-s .239 G-s .377 G-s .342 G-s D-Dec-21) 1 - 20 KHz
MIH MIA FIA FIH FOH HU 3RF - A MOH MIA FOH HU 5 SF - A MOH MIH MIA HU 5 RF - A	HU 3 HU 5	RETURN	.108 In/Sec .103 In/Sec .149 In/Sec .102 In/Sec .157 In/Sec (1 OVERALL LEVEL .316 In/Sec .296 In/Sec	1.700 G-s 1.178 G-s .239 G-s .377 G-s .342 G-s D-Dec-21) 1 - 20 KHz
MIA FIA FIH FOH HU 3RF - A MOH MIA FOH HU 5 SF - A MOH MIH MIA HU 5 RF - A	ни 3 ни 5	RETURN	.103 In/Sec .149 In/Sec .102 In/Sec .157 In/Sec (1) OVERALL LEVEL .316 In/Sec .296 In/Sec	1.178 G-s .239 G-s .377 G-s .342 G-s D-Dec-21) 1 - 20 KHz
FIA FIH FOH HU 3RF - A MOH MIH FOH HU 5 SF - A MOH MIH MIA HU 5 RF - A	ни 3 ни 5	RETURN	.149 In/Sec .102 In/Sec .157 In/Sec (1 OVERALL LEVEL .316 In/Sec .296 In/Sec	.239 G-s .377 G-s .342 G-s 0-Dec-21) 1 - 20 KHz
FIH FOH HU 3RF - A MOH MIH FOH HU 5 SF - A MOH MIH MIA HU 5 RF - A	HU 3 HU 5	RETURN	.102 In/Sec .157 In/Sec (1 OVERALL LEVEL .316 In/Sec .296 In/Sec	.377 G-s .342 G-s 0-Dec-21) 1 - 20 KHz
FOH HU 3RF - A MOH MIA FOH 5 SF - A MOH MIH MIA HU 5 RF - A	ни 3 ни 5	RETURN	.157 In/Sec (1) OVERALL LEVEL .316 In/Sec .296 In/Sec	.342 G-s 0-Dec-21) 1 - 20 KHz
HU 3RF - A MOH MIH MIA FOH 5 SF - A MOH MIH MIA HU 5 RF - A	HU 3 HU 5	RETURN	(1) OVERALL LEVEL .316 In/Sec .296 In/Sec	0-Dec-21) 1 - 20 KHz
HU SRF - A MOH MIH MIA FOH HU 5 SF - A MOH MIH MIA HU 5 RF - A	HU 5	RETORN	OVERALL LEVEL .316 In/Sec .296 In/Sec	1 - 20 KHz
HU 5 RF - A MOH MIA FOH MOH MIH MIA	.HU 5		.316 In/Sec .296 In/Sec	I = 20 KH2
MOH MIH FOH HU 5 SF - A MOH MIH MIA HU 5 RF - A	.HU 5		.296 In/Sec	2 202 0 -
MIA MIA FOH HU 5 SF - A MOH MIH MIA HU 5 RF - A	HU 5		.296 IN/Sec	3.382 G-S
HU 5 SF - A MOH MIH MIA HU 5 RF - A	HU 5		236 75/800	4.093 G-S
HU 5 SF - A MOH MIH MIA HU 5 RF - A	HU 5		.230 IN/Sec	1.493 G-S
HU 5 SF - A MOH MIH MIA HU 5 RF - A	HU 5		.vo/ in/Sec	.270 G-S
MOH MIH MIA HU 5 RF - A		SUPPLY	(1	0-Dec-21)
MOH MIH MIA HU5RF - A			OVERALL LEVEL	1 - 20 KHz
MIH MIA HU5RF - A			.096 In/Sec	.757 G-s
MIA HU 5 RF - A			.042 In/Sec	.711 G-s
HU 5 RF - A			.061 In/Sec	.273 G-s
	ни 5	RETURN	(1	0-Dec-21)
			OVERALL LEVEL	1 - 20 KHz
MOH			.124 In/Sec	.415 G-s
MIH			.074 In/Sec	.361 G-s
MIA			.107 In/Sec	.235 G-s
HU6SF - A	ни 6	SUPPLY	(1	0-Dec-21)
			OVERALL LEVEL	1 - 20 KHz
MOH			.048 In/Sec	1.580 G-s
MIH			.036 In/Sec	1.636 G-s
MIA			.057 In/Sec	.379 G-s
			(1	0. 5 01.
	0 UI	RETURN	UVERALL LEVET	1 - 20 KH-
MOH			113 Tr/Sec	342 C-6
мтн			090 Tn/Sec	290 6-0
MIA			.122 In/Sec	.305 G-s
				0 - 01
HU4SF – A	но 4	SOPPLY	(1	J-Dec-21)
			OVERALL LEVEL	1 - 20 KHz
MOH			.033 In/Sec	./84 G-s
MIH			.034 In/Sec	.438 G-s
MIA			.045 In/Sec	.546 G-s
HU4RF - A	HU 4	RETURN	(1	0-Dec-21)
			OVERALL LEVEL	1 - 20 KHz
MOH			.037 In/Sec	.544 G-s
MIH			.035 In/Sec	.680 G-s
MIA			.029 In/Sec	.395 G-s

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,

Kevin W. Marcuell

ISO Certified Vibration Analyst, Category III



QualiTest Diagnostics Cell: 901-486-4565 Email: <u>kwilliam@gohispeed.com</u>