

7030 Ryburn Dr. Millington, TN

Phone: (901) 873-5300

Fax: (901) 873-5301

www.gohispeed.com

November 20, 2023

Seth McMillan Lanxess Memphis, TN

Seth,

The following is a summary of findings from the November 2023 quarterly vibration survey at your facility. 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.

Machine Summary Table

	Date Collected											
Month	Month 5 8 1 9 11											
Day	3	18	10	22	16							
Year	22	22	23	23	23							
						1	1	1	1	1		
					-							
Item		1			Co	ondit	ion	1	1	1	1	
Refrigeration Compressor A												
Refrigeration Compressor B			NR	NR	NR							
East Cooling Tower Pump				NR	NR							
Middle Cooling Tower Pump	NR		NR									
West Cooling Tower Pump		NR										
West Neutralization Pump	NR	NR	NR	NR	NR							
East Neutralization Pump												
KOH Feed Pump												
Peroxide Feed Pump												
Crystallizer Recirc Pump												
Slurry Transfer Pump												
Quench Tank Pump												
Centrifuge Feed Pump												
Caro's Acid Pump												
Scrubber Circulation Pump												
Dust Collector Blower	NA											
Quench Tank Blower												
Vent Scrubber Blower	NA											
Hold Tank Agitator	NA											
Crystallizer Agitator	NA											
Pre-Crusher	NA											
Grinder	NA											
Brine Tank Pump	NR	NR	NR									
Two Stage Water Pump												

	E S F	Database: Station: Route No.	oxone.rb MEMPHIS 1: LANX	m OXONE ESS			
MEASURE	EMEN	IT POINT		OVERALI	L LEVEL	HFD	/ VHFD
7371-03	2		COOLING		IMD	(16-Nov-2)	31
/3/1-03	,	- MIDDLE	COOLING	OVERAI	LL LEVEL	1-20	kHZ
	11			.297	In/Sec	1.45	0 G-s
	12			.122	In/Sec	1.84	7 G-s
	13			.246	In/Sec	3.86	6 G-s
	14			.192	In/Sec	2.23	7 G-s
7371-05	5	- WEST CO	OLING TO	WER PUMI	2	(16-Nov-2	3)
				OVERAI	LL LEVEL	1-20	kHZ
	11			.047	In/Sec	1.35	3 G-s
	12			.115	In/Sec	1.06	2 G-s
	13			.067	In/Sec	1.39	0 G-s
	14			.071	In/Sec	2.93	1 G-s
X 2		- EAST NE	UTRALIZA	TION PUL	1P	(16-Nov-2	3)
				OVERAI	LL LEVEL	1-20	kHZ
	11			.063	In/Sec	. 95	0 G-s
	12			.099	In/Sec	.75	8 G-s
362-13		– KOH FEE	D PUMP			(16-Nov-2	3)
				OVERAI	LL LEVEL	1-20	kHZ
	11			.053	In/Sec	. 95	3 G-s
	21			.060	In/Sec	. 68	4 G-s
	23			.045	In/Sec	.12	2 G-s
	71			.106	In/Sec	1.01	9 G-s
	72			.123	In/Sec	.54	9 G-s
357-13		- PEROXII	DE FEED P	UMP		(16-Nov-2	3)
				OVERAI	LL LEVEL	1-20	kHZ
	11			.023	In/Sec	.09	b G-s
	21			.022	In/Sec	. 10	
	23 71			.037		.04.	5 G-5 6 C-5
	72			.073	In/Sec	.03	7 G-s
363-06		- CRYSTAI	LIZER RE	CIRC PUN	4P	(16-Nov-2)	3)
				OVERAL	-L LEVEL 	1-20	кни
	11 21			.014	In/Sec	.23	2 G-S 2 C-S
	23			.013	In/Sec	. 52.	5 G-5 6 C-9
	71			027	In/Sec	07	5 G-s
	72			.027	In/Sec	.03	2 G-s
	81			.021	In/Sec	.07	0 G-s
363-074	4	- SLURRY	TRANSFER			(16-Nov-2)	3)
	-			OVERAI	LL LEVEL	1-20	kHZ
	11			.096	In/Sec	2.13	7 G-s
	21			.062	In/Sec	2.07	8 G-s
	23			.050	In/Sec	. 37	2 G-s
	71			.064	In/Sec	. 30	4 G-s
	72			.058	In/Sec	.06	3 G-s
106-01		- PUMP,#2	QUENCH	TANK		(16-Nov-2	3)
				OVERAI	LL LEVEL	1-20	kHZ
	11			.049	In/Sec	. 92	1 G-s
	21			.050	In/Sec	.73	6 G-s
	23			.130	In/Sec	.10	2 G-s
	71			.708	In/Sec	1.55	8 G-s
	72			.177	In/Sec	.51	L G-S

363-13		-	CENTRIFUC	ΞE	FEED	PUMP		(16-Nov-23)
						OVERA	LL LEVEL	1-20 kHZ
	11					.189	In/Sec	.410 G-s
	21					.123	In/Sec	1.178 G-s
	23					.142	In/Sec	.222 G-s
	71					.284	In/Sec	.456 G-S
	12					.244	In/Sec	.304 G-S
360-05		_	CARO'S AC	DIC	PUM	2		(16-Nov-23)
						OVERA	LL LEVEL	1-20 kHZ
	11					.060	In/Sec	.732 G-s
	21					.065	In/Sec	.689 G-s
	23					.072	In/Sec	.120 G-s
	71					.109	In/Sec	.248 G-s
	72					.105	In/Sec	.106 G-s
266-41		_	COMPRES	ст			IMD	(16-Nov-22)
300-41		-	SCRUBBER	CI	RCOLF	OVERA	II. I.EVET	(10-NOV-23)
	11					.199	In/Sec	4.600 G-s
	21					.140	In/Sec	3.144 G-s
	23					.119	In/Sec	.669 G-s
	71					.214	In/Sec	.780 G-s
	81					.297	In/Sec	.247 G-s
DC BLO	WER	-	BLOWER, I	ous	т соі	LECTOR		(16-Nov-23)
						OVERA	ьь телет Телет	1 - 20 KHZ
	10					.130	In/Sec	1.570 G-s
	12					.105	In/Sec	.239 G-S
	21					120	In/Sec	.230 G-S
	21					123	In/Sec	1.245 G-S 364 G-s
	23					171	In/Sec	418 G-s
	71					.109	In/Sec	1.976 G-s
	81					.294	In/Sec	1.717 G-s
	-						•	
106-08		-	BLOWER, Ç)UE	NCH 7	TANK		(16-Nov-23)
106-08		-	BLOWER, Ç	QUE	NCH 7	TANK OVERAI	LL LEVEL	(16-Nov-23) 1-20 kHZ
106-08	11	-	BLOWER, Ç	QUE	NCH 1	OVERAL . 604	LL LEVEL In/Sec	(16-Nov-23) 1-20 kHZ .918 G-s
106-08	11 12	-	BLOWER, Ç	QUE	NCH 7	CANK OVERAL . 604 . 876	LL LEVEL In/Sec In/Sec	(16-Nov-23) 1-20 kHZ .918 G-s .157 G-s
106-08	11 12 13	-	BLOWER, (QUE	NCH 1	CANK OVERAL . 604 . 876 . 816	LL LEVEL In/Sec In/Sec In/Sec	(16-Nov-23) 1-20 kHZ .918 G-s .157 G-s .165 G-s
106-08	11 12 13 21	-	BLOWER, (QUE	NCH 1	CANK OVERAL . 604 . 876 . 816 . 146 . 071	LL LEVEL In/Sec In/Sec In/Sec In/Sec	(16-Nov-23) 1-20 kHZ .918 G-s .157 G-s .165 G-s .935 G-s
106-08	11 12 13 21 22	-	BLOWER, Ç	QUE	NCH 1	CANK OVERAL .604 .876 .816 .146 .971	LL LEVEL In/Sec In/Sec In/Sec In/Sec In/Sec	(16-Nov-23) 1-20 kHZ .918 G-s .157 G-s .165 G-s .935 G-s .164 G-s 122 C-c
106-08	11 12 13 21 22 23 71	-	BLOWER, Ç	QUE	NCH 1	CANK OVERAJ .604 .876 .816 .146 .971 .492 .363	LL LEVEL In/Sec In/Sec In/Sec In/Sec In/Sec	(16-Nov-23) 1-20 kHZ .918 G-s .157 G-s .165 G-s .935 G-s .164 G-s .122 G-s 3 306 G-s
106-08	11 12 13 21 22 23 71 81	-	BLOWER, Ç	QUE	NCH 1	CANK OVERAJ .604 .876 .816 .146 .971 .492 .363 490	LL LEVEL In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec	(16-Nov-23) 1-20 kHZ .918 G-s .157 G-s .165 G-s .935 G-s .164 G-s .122 G-s 3.306 G-s 1 125 G-s
106-08	11 12 13 21 22 23 71 81	-	BLOWER, Ç	QUE	NCH 1	CANK OVERAJ .604 .876 .816 .146 .971 .492 .363 .490	LL LEVEL In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec	(16-Nov-23) 1-20 kHZ .918 G-s .157 G-s .165 G-s .935 G-s .164 G-s .122 G-s 3.306 G-s 1.125 G-s
106-08 VNTSCRI	11 12 13 21 22 23 71 81 BBLW	-	BLOWER, G	QUE 7EN	NCH 1 T SCE	CANK OVERAJ .604 .876 .816 .146 .971 .492 .363 .490 RUBBER	LL LEVEL In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec	(16-Nov-23) 1-20 kHZ .918 G-s .157 G-s .165 G-s .935 G-s .164 G-s .122 G-s 3.306 G-s 1.125 G-s (16-Nov-23)
106-08 VNTSCRI	11 12 13 21 22 23 71 81 BBLW	-	BLOWER, (QUE 7EN	NCH 1 T SCE	CANK OVERAJ .604 .876 .816 .146 .971 .492 .363 .490 RUBBER OVERAJ	LL LEVEL In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec	(16-Nov-23) 1-20 kHZ .918 G-s .157 G-s .165 G-s .935 G-s .164 G-s .122 G-s 3.306 G-s 1.125 G-s (16-Nov-23) 1-20 kHZ
106-08 VNTSCRI	11 12 13 21 22 23 71 81 BBLW 11	-	BLOWER, ()UE 7EN	NCH 1 T SCE	CANK OVERAJ .604 .876 .816 .146 .971 .492 .363 .490 RUBBER OVERAJ .062	LL LEVEL In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec LL LEVEL In/Sec	(16-Nov-23) 1-20 kHZ .918 G-s .157 G-s .165 G-s .935 G-s .164 G-s .122 G-s 3.306 G-s 1.125 G-s (16-Nov-23) 1-20 kHZ 1.155 G-s
106-08 VNTSCRI	11 12 13 21 22 23 71 81 BBLW 11 12	-	BLOWER, ()UE VEN	NCH 1 T SCE	CANK OVERAJ .604 .876 .816 .146 .971 .492 .363 .490 RUBBER OVERAJ .062 .062	LL LEVEL In/Sec In/Sec In/Sec In/Sec In/Sec LL LEVEL In/Sec In/Sec	(16-Nov-23) 1-20 kHZ .918 G-s .157 G-s .165 G-s .935 G-s .164 G-s .122 G-s 3.306 G-s 1.125 G-s (16-Nov-23) 1-20 kHZ 1.155 G-s .234 G-s
106-08 VNTSCRI	11 12 13 21 22 23 71 81 BBLW 11 12 13 21	-	BLOWER, ()UE	NCH 1	CANK OVERAJ .604 .876 .816 .146 .971 .492 .363 .490 RUBBER OVERAJ .062 .062 .083	LL LEVEL In/Sec In/Sec In/Sec In/Sec In/Sec LL LEVEL In/Sec In/Sec	(16-Nov-23) 1-20 kHZ .918 G-s .157 G-s .165 G-s .935 G-s .164 G-s .122 G-s 3.306 G-s 1.125 G-s (16-Nov-23) 1-20 kHZ 1.155 G-s .234 G-s .261 G-s
106-08 VNTSCRI	11 12 13 21 22 23 71 81 BBLW 11 12 13 21 22	-	BLOWER, ()UE	NCH 1	CANK OVERAJ .604 .876 .816 .146 .971 .492 .363 .490 RUBBER OVERAJ .062 .083 .065	LL LEVEL In/Sec In/Sec In/Sec In/Sec In/Sec LL LEVEL In/Sec In/Sec In/Sec In/Sec	(16-Nov-23) 1-20 kHZ .918 G-s .157 G-s .165 G-s .935 G-s .164 G-s .122 G-s 3.306 G-s 1.125 G-s (16-Nov-23) 1-20 kHZ 1.155 G-s .234 G-s .261 G-s 1.405 G-s
106-08 VNTSCRI	11 12 23 71 81 BBLW 11 12 13 21 22 23	-	BLOWER, ()UE	NCH 1	CANK OVERAJ .604 .876 .816 .146 .971 .492 .363 .490 RUBBER OVERAJ .062 .062 .083 .065 .067	LL LEVEL In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec	(16-Nov-23) 1-20 kHZ .918 G-s .157 G-s .165 G-s .935 G-s .164 G-s .122 G-s 3.306 G-s 1.125 G-s (16-Nov-23) 1-20 kHZ 1.155 G-s .234 G-s 1.405 G-s .298 G-s 413 C-s
106-08 VNTSCRI	11 12 23 71 81 BBLW 11 12 23 71	_	BLOWER, ()UE VEN	NCH T	CANK OVERAJ .604 .876 .816 .146 .971 .492 .363 .490 RUBBER OVERAJ .062 .062 .062 .063 .065 .067 .071 .240	LL LEVEL In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec	(16-Nov-23) 1-20 kHZ .918 G-s .157 G-s .165 G-s .935 G-s .164 G-s .122 G-s 3.306 G-s 1.125 G-s (16-Nov-23) 1-20 kHZ 1.155 G-s .234 G-s .261 G-s 1.405 G-s .298 G-s .413 G-s
106-08 VNTSCRI	11 12 23 71 81 BBLW 11 12 13 21 22 23 71 81	-	BLOWER, ()UE VEN	NCH T	CANK OVERAJ .604 .876 .816 .146 .971 .492 .363 .490 RUBBER OVERAJ .062 .062 .062 .063 .065 .067 .071 .240 .154	LL LEVEL In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec	(16-Nov-23) 1-20 kHZ .918 G-s .157 G-s .165 G-s .935 G-s .164 G-s .122 G-s 3.306 G-s 1.125 G-s (16-Nov-23) 1-20 kHZ 1.155 G-s .234 G-s .24 G-s .24 G-s .298 G-s .413 G-s .493 G-s 1.147 G-s
106-08 VNTSCRI	11 12 22 23 71 81 BBLW 11 12 13 21 22 23 71 81	-	BLOWER, V	<u>j</u> ue ven	NCH T	CANK OVERAJ . 604 . 876 . 816 . 146 . 971 . 492 . 363 . 490 RUBBER OVERAJ . 062 . 062 . 083 . 065 . 067 . 071 . 240 . 154	LL LEVEL In/Sec In/Sec In/Sec In/Sec In/Sec LL LEVEL In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec	(16-Nov-23) 1-20 kHZ .918 G-s .157 G-s .165 G-s .935 G-s .164 G-s .122 G-s 3.306 G-s 1.125 G-s (16-Nov-23) 1-20 kHZ 1.155 G-s .234 G-s .261 G-s 1.405 G-s .298 G-s .413 G-s .493 G-s 1.147 G-s
106-08 VNTSCRJ 363-18	11 12 21 22 23 71 81 BBLW 11 12 13 21 22 23 71 81	-	BLOWER, V)UE VEN	NCH T T SCE	CANK OVERAJ . 604 . 876 . 876 . 146 . 971 . 492 . 363 . 490 RUBBER OVERAJ . 062 . 062 . 062 . 063 . 065 . 067 . 071 . 240 . 154 CANK	LL LEVEL In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec	(16-Nov-23) 1-20 kHZ .918 G-s .157 G-s .165 G-s .935 G-s .164 G-s .122 G-s 3.306 G-s 1.125 G-s (16-Nov-23) 1-20 kHZ 1.155 G-s .234 G-s .298 G-s .413 G-s .493 G-s 1.147 G-s (16-Nov-23)
106-08 VNTSCRJ 363-18	11 12 13 21 22 23 71 81 BBLW 11 12 13 21 22 23 71 81	-	BLOWER, V)UE VEN	NCH T T SCH	CANK OVERAJ .604 .876 .816 .146 .971 .492 .363 .490 RUBBER OVERAJ .062 .062 .062 .062 .063 .065 .067 .071 .240 .154	LL LEVEL In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec	(16-Nov-23) 1-20 kHZ .918 G-s .157 G-s .165 G-s .935 G-s .164 G-s .122 G-s 3.306 G-s 1.125 G-s (16-Nov-23) 1-20 kHZ 1.155 G-s .234 G-s .261 G-s 1.405 G-s .298 G-s .413 G-s .493 G-s 1.147 G-s (16-Nov-23) 1-20 kHZ
106-08 VNTSCRJ 363-18	11 12 13 21 22 23 71 81 BBLW 11 12 13 21 22 23 71 81	-	BLOWER, V)UE VEN	NCH 1	CANK OVERAJ .604 .876 .816 .146 .971 .492 .363 .490 RUBBER OVERAJ .062 .062 .062 .062 .062 .065 .067 .071 .240 .154 CANK OVERAJ .097	LL LEVEL In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec	(16-Nov-23) 1-20 kHZ .918 G-s .157 G-s .165 G-s .935 G-s .164 G-s .122 G-s 3.306 G-s 1.125 G-s (16-Nov-23) 1-20 kHZ 1.155 G-s .234 G-s .261 G-s 1.405 G-s .298 G-s .413 G-s .493 G-s 1.147 G-s (16-Nov-23) 1-20 kHZ .522 G-s
106-08 VNTSCRI 363-18	11 12 13 21 22 37 1 81 BBLW 11 12 13 21 22 371 81 11 21 22	-	BLOWER, V	VEN	NCH 1	CANK OVERAJ .604 .876 .816 .146 .971 .492 .363 .490 RUBBER OVERAJ .062 .062 .062 .062 .063 .067 .071 .240 .154 CANK OVERAJ .097 .105	LL LEVEL In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec	(16-Nov-23) 1-20 kHZ .918 G-s .157 G-s .165 G-s .935 G-s .164 G-s .122 G-s 3.306 G-s 1.125 G-s (16-Nov-23) 1-20 kHZ 1.155 G-s .234 G-s .24 G-s .403 G-s .413 G-s .493 G-s 1.147 G-s (16-Nov-23) 1-20 kHZ .522 G-s .881 G-s
106-08 VNTSCRI 363-18	11 12 23 71 81 12 23 71 81 12 23 71 81 11 21 23 11 21 23 31	-	BLOWER, V	QUE VEN	NCH T	CANK OVERAJ .604 .876 .816 .146 .971 .492 .363 .490 RUBBER OVERAJ .062 .062 .062 .062 .063 .067 .071 .240 .154 CANK OVERAJ .097 .105 .152 .009	LL LEVEL In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec	(16-Nov-23) 1-20 kHZ .918 G-s .157 G-s .165 G-s .935 G-s .164 G-s .122 G-s 3.306 G-s 1.125 G-s (16-Nov-23) 1-20 kHZ 1.155 G-s .234 G-s .24 G-s .403 G-s .493 G-s 1.147 G-s (16-Nov-23) 1-20 kHZ .522 G-s .881 G-s .179 G-s 1.682 G-s
106-08 VNTSCRI 363-18	11 12 23 71 81 12 23 71 81 12 23 71 81 11 22 23 71 81 11 21 23 32	_	BLOWER, V	ZUE VEN	NCH T	CANK OVERAJ .604 .876 .816 .146 .971 .492 .363 .490 RUBBER OVERAJ .062 .062 .062 .062 .062 .062 .063 .067 .071 .240 .154 CANK OVERAJ .097 .105 .152 .098 .048	LL LEVEL In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec	(16-Nov-23) 1-20 kHZ .918 G-s .157 G-s .165 G-s .935 G-s .164 G-s .122 G-s 3.306 G-s 1.125 G-s (16-Nov-23) 1-20 kHZ 1.155 G-s .234 G-s .24 G-s .413 G-s .493 G-s 1.147 G-s (16-Nov-23) 1-20 kHZ .522 G-s .881 G-s .179 G-s 1.688 G-s .496 G-s
106-08 VNTSCRI 363-18	11 12 23 71 81 33 21 22 37 1 81 11 22 23 71 81 11 21 23 71 81 11 21 23 31 32	_	BLOWER, V	ZUE VEN	NCH T	CANK OVERAJ .604 .876 .816 .146 .971 .492 .363 .490 RUBBER OVERAJ .062 .062 .062 .063 .065 .067 .071 .240 .154 COVERAJ .097 .154 COVERAJ .097 .155 .098 .048	LL LEVEL In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec	(16-Nov-23) 1-20 kHZ .918 G-s .157 G-s .165 G-s .935 G-s .164 G-s .122 G-s 3.306 G-s 1.125 G-s (16-Nov-23) 1-20 kHZ 1.155 G-s .234 G-s .234 G-s .246 G-s (16-Nov-23) 1-20 kHZ .522 G-s .881 G-s .179 G-s 1.688 G-s .496 G-s
106-08 VNTSCRJ 363-18 363-03	11 12 13 21 22 37 81 81 81 11 12 13 21 22 37 1 81 11 21 23 71 81 11 21 23 71 81 32 23 71 81 32 23 71 81 32 23 71 81 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 23 23 71 81 23 23 71 81 23 23 71 81 23 23 71 81	-	BLOWER, V BLOWER, V AGITATOR,	ZUE ZEN H	NCH T T SCH OLD T	CANK OVERAJ .604 .876 .816 .971 .492 .363 .490 RUBBER OVERAJ .062 .062 .062 .063 .065 .067 .071 .240 .154 CANK OVERAJ .097 .154 CANK OVERAJ .097 .154 CANK .097 .152 .098 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .058 .057 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .071 .240 .054 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .067 .068 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048 .048	LL LEVEL In/Sec In/Sec In/Sec In/Sec In/Sec LL LEVEL In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec	(16-Nov-23) 1-20 kHZ .918 G-s .157 G-s .165 G-s .935 G-s .164 G-s .122 G-s 3.306 G-s 1.125 G-s (16-Nov-23) 1-20 kHZ 1.155 G-s .234 G-s .261 G-s 1.405 G-s .298 G-s .413 G-s .493 G-s 1.147 G-s (16-Nov-23) 1-20 kHZ .522 G-s .881 G-s .179 G-s 1.688 G-s .496 G-s (16-Nov-23)
106-08 VNTSCRJ 363-18 363-03	11 12 13 21 22 37 81 81 81 11 12 13 21 22 37 1 81 11 21 23 71 81 11 21 23 71 81 32 23 71 81 32 23 71 81 32 23 71 81 81 81 81 81 81 81 81 81 81 81 81 81	-	BLOWER, V BLOWER, V AGITATOR,	QUE VEN H	NCH T T SCF OLD T	CRYSTALL OVERAJ OVERAJ OVERAJ OVERAJ OVERAJ OVERAJ OVERAJ OVERAJ OVERAJ OVERAJ OVERAJ OVERAJ OVERAJ	LL LEVEL In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec	(16-Nov-23) 1-20 kHZ .918 G-s .157 G-s .165 G-s .935 G-s .164 G-s .122 G-s 3.306 G-s 1.125 G-s (16-Nov-23) 1-20 kHZ 1.155 G-s .234 G-s .298 G-s .413 G-s .493 G-s 1.147 G-s (16-Nov-23) 1-20 kHZ .522 G-s .881 G-s .179 G-s 1.688 G-s .496 G-s (16-Nov-23) 1K-20K HZ
106-08 VNTSCRJ 363-18 363-03	11 12 13 21 22 37 81 81 81 11 12 13 21 22 37 1 81 11 22 23 71 81 11 21 22 37 1 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 81 22 23 71 82 22 23 71 82 22 23 71 81 22 23 71 82 22 23 71 82 22 23 71 82 22 23 71 82 22 23 71 82 22 23 71 82 22 23 72 22 23 72 22 23 72 22 23 72 22 23 72 23 72 82 22 23 71 82 22 23 71 82 22 23 71 82 22 23 71 82 22 23 71 82 22 23 71 82 22 22 23 71 82 22 23 22 23 22 22 23 22 22 23 22 23 22 22	-	BLOWER, V BLOWER, V AGITATOR,	ZUE ZEN . H	NCH T T SCF OLD T	CRYSTALL OVERAJ OVERAJ . 604 . 876 . 816 . 146 . 971 . 492 . 363 . 490 OVERAJ . 062 . 062 . 062 . 083 . 065 . 067 . 071 . 240 . 154 CANK OVERAJ . 097 . 105 . 152 . 098 . 048	LL LEVEL In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec In/Sec	(16-Nov-23) 1-20 kHZ .918 G-s .157 G-s .165 G-s .935 G-s .164 G-s .122 G-s 3.306 G-s 1.125 G-s (16-Nov-23) 1-20 kHZ 1.155 G-s .234 G-s .261 G-s 1.405 G-s .298 G-s .413 G-s .493 G-s 1.147 G-s (16-Nov-23) 1-20 kHZ .522 G-s .881 G-s .179 G-s 1.688 G-s .496 G-s (16-Nov-23) 1K-20K HZ .023 G-s

GOH	1			.126	In/Sec	.728 (G-s
				OVERA	LL LEVEL	1-20 k	HZ
GIH	I			.146	In/Sec	1.331 (G-s
21				.194	In/Sec	.376 (G-s
11				.185	In/Sec	.318 (G-s
7368-03	- PI	RECRUSHE	r oxon	E		(16-Nov-23)	
				OVERA	LL LEVEL	1-20 ki	HZ
23				.155	In/Sec	.099 (G-s
11				.231	In/Sec	. 427 (G-s
21				.246	In/Sec	.747 (G-s
22				.145	In/Sec	.229 (G-s
71				. 395	In/Sec	6.864	G-s
81				.223	In/Sec	2.335 (G-s
370-03	- GI	RINDER, O	XONE			(16-Nov-23)	
				OVERA	LL LEVEL	1-20 ki	HZ
11				.163	In/Sec	.246 (G-s
71				.187	In/Sec	2.712 0	G-s
110-04	- BI	RINE TAN	K PUMP			(16-Nov-23)	
				OVERA	LL LEVEL	1-20 ki	HZ
11				.145	In/Sec	.494 (G-s
21				.125	In/Sec	.954 (G-s
23				.116	In/Sec	.324 (G-s
71				.132	In/Sec	.258 (G-s
72				.176	In/Sec	.089 (G-s
2STAGEWTR	- TI	WO STAGE	WATER	PUMP		(16-Nov-23)	
				OVERA	LL LEVEL	1-20 ki	HZ
11				.064	In/Sec	.757 (G-s
21				.069	In/Sec	.706 (G-s
23				.073	In/Sec	.102 (G-s
71				.154	In/Sec	3.580 (G-s
72				.132	In/Sec	.867 (G-s
larification	Of '	Vibratio -	n Unit	s:			
Acc -	-> (G-s	PK				
Vel -	-> :	In/Sec	PK				

Vibration Analysis

Refrigeration Compressor A CLASS I



Observation:

The two spectrums above are the compressor input outboard vertical(C2V) and the inlet piping at the elbow in the vertical direction(P10). Both spectrums shows a peak at 240 HZ which is 4 x rpm.

Recommendation:

The 4 x rpm vibration that can be seen in the outboard end of the compressor in the vertical direction appears to be excited by the very high vibration in the inlet piping of the compressor. The piping vibration is over 1 ips and is highest in the vertical direction. It is unclear if this is a resonance in the piping or if the vibration is being influenced by some type of flow turbulence.

Middle Cooling Tower Pump MOTOR CLASS I



Observation:

Motor data shows a peak at 68 orders of rpm with 120 HZ. sidebands.

Recommendation:

Motor data shows an increase in high frequency amplitude. Motor also has a slightly high 1 x rpm vibration. The 68 orders peak is likely either 2 x rotor bar or stator slot pass frequency. The 120 HZ. sidebands are electrical related as well. Motor may have an air gap issue or rotor issue. We will continue to monitor this closely.

KOH Feed Pump CLASS I



Observation:

Multi-point waterfall of motor and pump shows some non-synchronous peaks in pump (71-72).

Recommendation:

Pump data shows some signs of bearing issues. This does not appear to be severe at this time. We are monitoring this closely over the next few surveys.

Slurry Transfer Pump MOTOR



Observation:

Motor inboard data shows high frequency non-synchronous vibration with high amplitude. Waveform shows impacting with amplitude of 15 g's peak to peak.

Recommendation:

Motor data suggests defects of the motor bearings. Motor will likely need attention in the next few months.

Quench Tank Pump CLASS II



Observation:

Pump horizontal data shows a dominant vibration at 6 x rpm. Trend data shows an increase in overall vibration.

Recommendation:

If impeller has 6 vanes, then this vibration is pump vane pass and may be caused by internal pump/impeller issue or pump flow issue. Ensure pump is operating within the proper flow parameters and inspect pump as scheduling allows.

Quench Tank Blower CLASS II



Observation:

Multipoint spectra shows a high vibration throughout the blower and motor. This peak appears to be 1 x blower rpm.

Recommendation:

Data suggests imbalance of the blower or possible sheave issue. Inspect blower wheel for build up and or damage. Ensure sheaves are in good shape and properly aligned. Ensure belts are also in good shape.

Dust Collector Blower CLASS III



Observation:

Multipoint spectra show excessive vibration in the blower bearings. Peaks are mostly non-synchronous which indicate bearing defects.

Recommendation:

Data indicates defects/wear in the blower bearings. They are very noisy as well and will need attention very soon.

Grinder CLASS II



Observation:

Data above is the outboard grinder bearing. Waveform shows impacting while spectral data shows a large noise floor throughout the spectrum. Trend data shows a slight decrease in high frequency amplitude since last survey.

Recommendation:

Data still indicates likely bearing wear of the grinder bearings. Please note that this has been downgraded to a CLASS II defect but still is recommended to inspect bearings for wear as down time allows.

Scrubber Circulation Pump CLASS III



Observation:

Multi-point spectral waterfall shows high amplitude acceleration and non-synchronous peaks in motor spectra. Trend data shows high 1-20 Khz. amplitude.

Recommendation:

Motor bearings are showing signs of defect/wear. We are monitoring this closely. Motor should to be replaced at next major down time.

Pre-Crusher CLASS III



Observation:

Data shown is the inboard pre crusher bearing. Data shows non-synchronous peaks with a high noise floor. Waveform shows high amplitude of 44 g's peak to peak. Trend data also shows an increase in overall 1-20 Khz. amplitude.

Recommendation:

Pre crusher has bearing issues according to inboard bearing data. Inspect bearings soon.

As always, it has been a pleasure to serve the Lanxess Oxone Memphis Plant. If there are any comments or questions, do not hesitate to contact us.

Sincerely,

Keven W. Maxwell

ISO Certified Vibration Analyst, Category III



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