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December 16, 2019

NUCOR Melt Shop Subject: December vibration survey

Most of the machines surveyed were found to be in good condition with the exception of the following:

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.

Defects

West Caster Mold Water Pump

High 1 x rpm vibration is present in the motor axial. This indicates angular misalignment. Perform a precision alignment with less than .003" offset and angularity. Ensure there is no soft foot present. Rated as a **CLASS II** defect.

East Caster Mold Water Pump

Pump is showing some signs of internal wear. Coupling may also be wearing due to misalignment. Perform a precision alignment with less than .003" offset and angularity. Ensure there is no soft foot present. Rated as a **CLASS II** defect.

West Booster Pump

Pump data shows another increase in non-synchronous vibration at the outboard end of the pump. This is good indication of bearing defects taking place in the pump bearings. Pump will need attention SOON. Rated as a **CLASS III** defect.

Cooling Tower #6 Supply Pump

The pump bearing vibration data still indicates there is bearing wear, and possibly cavitation in the pump. Inspect ODE pump bearing SOON. Ensure the pump has no inlet restrictions and is operating in the correct part of the curve. Rated as a **CLASS II** defect.

Cooling Tower #3 Supply Pump

The pump appears to have cavitation which is causing a high noise floor in the spectrum. This is also making the ODE pump bearing have high acceleration. This could also be a bearing issues but the noise floor is masking the data somewhat. Pump impeller or other pump internals could also be worn which could be causing this vibration. Pump needs to be inspected as time allows. Rated as a **CLASS II** defect.

Cooling Tower #2 Supply Pump

The pump appears to have cavitation which is causing a high noise floor in the spectrum. This is also making the ODE pump bearing have high acceleration. This could also be a bearing issues but the noise floor is masking the data somewhat. Pump impeller or other pump internals may also be worn which could be causing this vibration. Pump needs to be inspected as time allows. Rated as a **CLASS II** defect.

Furnace Reverse Air Fan

Drive end fan bearing axial data shows some impacting occurring within the bearing. This could be signs of axial thrusting or some other type of aerodynamic forces being generated by the fan. For now, it is recommended to inspect the fan bearing as time allows. Rated as a **CLASS II** defect.

Spray Chamber Exhaust Fan

The DE fan bearing data shows a high 1 x fan rpm vibration. Motor still has a high 1 x fan rpm vibration as well. This may be due to the fan operating near a critical speed or resonance. We will monitor this closely. Rated as a **CLASS II** defect.

As always, it has been a pleasure to serve NUCOR Steel Flowood-Jackson, MS. If there are any comments or questions, do not hesitate to contact us.

Sincerely,

Kerin W. Maxuell

ISO Certified Vibration Analyst, Category III



QualiTest Diagnostics

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> Database: nucorja9.rbm Station: Melt Shop Report Date: 16-Dec-19 10:27

MEASUREMEN	T POINT				L LEVEL		/ VHF
WCMWP	- WEST	CASTER	MOLD	WATER	PUMP	(09-Dec-19)	
						1K-201	
MOH				.182	In/Sec	. 394	G-s
MIH				.127	In/Sec	. 549	G-s
MIA				.309	In/Sec	.401	
PIA				.446	In/Sec	.963	G-s
PIH				.286	In/Sec In/Sec	1.340	G-s
POH				.101	In/Sec	. 939	G-s
ECMWP	- EAST	CASTER	MOLD	WATER	PUMP	(09-Dec-19))
				OVERAI	LL LEVEI	1K-201 .149	KHz
MOH				.119	In/Sec	.149	
MIH					In/Sec		
MIA				.284	In/Sec	.213	
PIA				.323	In/Sec	.980	G-s
PIH				.240	In/Sec In/Sec	.755	
POH							
WBOSTRP	- WEST	Booster		2		(09-Dec-19))
				OVERAI	LL LEVEI	1K-201 .273	KHz
MOH				.050	In/Sec	.273	
MIH					In/Sec		
MIA				.035	In/Sec	.217	
PIA				.161	In/Sec	. 636	
PIH				.189	In/Sec	1.571 3.901	G-s
POH				.430	In/Sec	3.901	G-s
ECSWP 11FT	- EAST	CASTER	SPRAY	WP 1	LEFT	(09-Dec-19))
				OVERAL	니 니氏/오디 - /~	1K-201 .534	KHZ
MOH							
MIH						1.831	
MIA				.125	IN/Sec	. 537	G-S
MCSWP 3RT	- MID (CASTER S				(09-Dec-19) 1K-201	
MOIT							
MOH					In/Sec		
MIH MIA				.135	In/Sec In/Sec	.849 .151	G-S
				152	In/Sec	151	1

WCSWP 4RT -	WEST CASTER SPRAY WP 4 RIG	
	OVERALL L	EVEL 1K-20KHz
MOH	.167 In/s	Sec .384 G-s
MIH	.095 In/s	Sec .558 G-s
MIA	.087 In/s	Sec .639 G-s
ESERVOHYDP -	EAST SERVO Hyd PUMP	(09-Dec-19)
MOH	034 Tp/	EVEL 1K-20KHz Sec .130 G-s
MIH	065 Tp/	Sec .107 G-s
PIV		Sec .419 G-s
PIV	.126 11/3	Sec .419 G-S
WOEDVOUVDD -	WEST SERVO Hyd PUMP	(09 - D - 2 - 19)
WSERVOITIDE -	WEST SERVO Hyd FOMF	(09-Dec-19)
		EVEL 1K-20KHz
MOH	.137 11/3	Sec .224 G-s Sec .226 G-s
MIH	.085 In/s	Sec .226 G-s
PIV	.101 In/s	Sec .897 G-s
SERVOHRECP -	SERVO Hyd RECIRC PUMP	
	OVERALL L	EVEL 1K-20KHz
MOH	.073 In/s	Sec .095 G-s Sec .270 G-s Sec .681 G-s
MIH	.049 In/s	Sec .270 G-s
PIV	.096 In/s	Sec .681 G-s
2DEKRECIP -	2ND DECK L&S Hyd RECIRC PU	M (09-Dec-19)
	OVERALL L	EVEL 1K-20KHz
MOH		Sec .072 G-s
MIH	.141 In/	Sec .130 G-s
PIV	358 Tn/	Sec .130 G-s Sec .303 G-s
M2DECKHYDP -	MIDDLE 2ND DECK Hyd PUMP	(09-Dec-19)
MEDDOMIDI		EVEL 1K-20KHz
МОН		Sec .208 G-s
MUH	157 To //	Sec .193 G-s
	.15/ 11/3	Sec .195 G-S
		1 005 0 -
PIV	1.045 In/s	Sec 1.005 G-s
	1.045 In/s	Sec 1.005 G-s
	1.045 In/: SOUTH 2ND DECK Hyd PUMP	Sec 1.005 G-s (09-Dec-19)
S2DECKHYDP -	1.045 In/: SOUTH 2ND DECK Hyd PUMP	Sec 1.005 G-s (09-Dec-19)
S2DECKHYDP - MOH	1.045 In/: SOUTH 2ND DECK Hyd PUMP OVERALL LI .720 In/:	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s
S2DECKHYDP - MOH MIH	1.045 In/: SOUTH 2ND DECK Hyd PUMP OVERALL LI .720 In/: .743 In/:	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s Sec .378 G-s
S2DECKHYDP - MOH	1.045 In/: SOUTH 2ND DECK Hyd PUMP OVERALL LI .720 In/: .743 In/:	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s
S2DECKHYDP - MOH MIH PIV	1.045 In/: SOUTH 2ND DECK Hyd PUMP OVERALL LU .720 In/: .743 In/: .261 In/:	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s Sec .378 G-s Sec .704 G-s
S2DECKHYDP - MOH MIH PIV	1.045 In/: SOUTH 2ND DECK Hyd PUMP OVERALL LI .720 In/: .743 In/: .261 In/: #1 Supply Pump	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s Sec .378 G-s Sec .704 G-s (09-Dec-19)
S2DECKHYDP - MOH MIH PIV	1.045 In/3 SOUTH 2ND DECK Hyd PUMP OVERALL LI .720 In/3 .743 In/3 .261 In/3 #1 Supply Pump OVERALL LI	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s Sec .378 G-s Sec .704 G-s (09-Dec-19) EVEL 1K-20KHz
S2DECKHYDP - MOH MIH PIV	1.045 In/3 SOUTH 2ND DECK Hyd PUMP OVERALL LI .720 In/3 .743 In/3 .261 In/3 #1 Supply Pump OVERALL LI .080 In/3	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s Sec .378 G-s Sec .704 G-s (09-Dec-19) EVEL 1K-20KHz Sec .183 G-s
S2DECKHYDP - MOH MIH PIV 1SUPLYP -	1.045 In/3 SOUTH 2ND DECK Hyd PUMP OVERALL LI .720 In/3 .743 In/3 .261 In/3 #1 Supply Pump OVERALL LI	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s Sec .378 G-s Sec .704 G-s (09-Dec-19) EVEL 1K-20KHz Sec .183 G-s
S2DECKHYDP - MOH MIH PIV 1SUPLYP - MOH	1.045 In/3 SOUTH 2ND DECK Hyd PUMP OVERALL LI .720 In/3 .743 In/3 .261 In/3 #1 Supply Pump OVERALL LI .080 In/3	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s Sec .378 G-s Sec .704 G-s (09-Dec-19) EVEL 1K-20KHz Sec .183 G-s Sec .187 G-s
S2DECKHYDP - MOH MIH PIV 1SUPLYP - MOH MIH	1.045 In/3 SOUTH 2ND DECK Hyd PUMP OVERALL LI .720 In/3 .743 In/3 .261 In/3 #1 Supply Pump OVERALL LI .080 In/3 .077 In/3	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s Sec .378 G-s Sec .704 G-s (09-Dec-19) EVEL 1K-20KHz Sec .183 G-s Sec .187 G-s Sec .131 G-s
S2DECKHYDP - MOH MIH PIV 1SUPLYP - MOH MIH MIA	1.045 In/3 SOUTH 2ND DECK Hyd PUMP OVERALL LI .720 In/3 .743 In/3 .261 In/3 #1 Supply Pump OVERALL LI .080 In/3 .077 In/3 .080 In/3	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s Sec .378 G-s Sec .704 G-s (09-Dec-19) EVEL 1K-20KHz Sec .183 G-s Sec .187 G-s Sec .131 G-s Sec .265 G-s
S2DECKHYDP - MOH PIV 1SUPLYP - MOH MIH MIA PIA	1.045 In/3 SOUTH 2ND DECK Hyd PUMP OVERALL LI .720 In/3 .743 In/3 .261 In/3 #1 Supply Pump WERALL LI .080 In/3 .077 In/3 .080 In/3 .218 In/3	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s Sec .378 G-s Sec .704 G-s (09-Dec-19) EVEL 1K-20KHz Sec .183 G-s Sec .187 G-s Sec .131 G-s Sec .265 G-s Sec .876 G-s
S2DECKHYDP - MOH PIV 1SUPLYP - MOH MIH MIA PIA PIH	1.045 In/3 SOUTH 2ND DECK Hyd PUMP OVERALL LI .720 In/3 .743 In/3 .261 In/3 #1 Supply Pump WERALL LI .080 In/3 .077 In/3 .080 In/3 .218 In/3 .169 In/3	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s Sec .378 G-s Sec .704 G-s (09-Dec-19) EVEL 1K-20KHz Sec .183 G-s Sec .187 G-s Sec .131 G-s Sec .265 G-s Sec .876 G-s
S2DECKHYDP - MOH PIV 1SUPLYP - MOH MIH MIA PIA PIH POH	1.045 In/3 SOUTH 2ND DECK Hyd PUMP OVERALL LI .720 In/3 .743 In/3 .261 In/3 #1 Supply Pump WERALL LI .080 In/3 .077 In/3 .080 In/3 .218 In/3 .169 In/3	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s Sec .378 G-s Sec .704 G-s (09-Dec-19) EVEL 1K-20KHz Sec .183 G-s Sec .187 G-s Sec .131 G-s Sec .265 G-s Sec .876 G-s
S2DECKHYDP - MOH PIV 1SUPLYP - MOH MIH MIA PIA PIH POH	1.045 In/: SOUTH 2ND DECK Hyd PUMP OVERALL LI .720 In/: .743 In/: .261 In/: #1 Supply Pump WERALL LI .080 In/: .077 In/: .080 In/: .169 In/: .193 In/:	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s Sec .378 G-s Sec .704 G-s (09-Dec-19) EVEL 1K-20KHz Sec .183 G-s Sec .187 G-s Sec .131 G-s Sec .265 G-s Sec .876 G-s Sec .607 G-s (09-Dec-19)
S2DECKHYDP - MOH PIV 1SUPLYP - MOH MIH MIA PIA PIH POH	1.045 In/3 SOUTH 2ND DECK Hyd PUMP OVERALL LI .720 In/3 .743 In/3 .261 In/3 #1 Supply Pump OVERALL LI .080 In/3 .077 In/3 .080 In/3 .169 In/3 .193 In/3	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s Sec .378 G-s Sec .704 G-s (09-Dec-19) EVEL 1K-20KHz Sec .183 G-s Sec .187 G-s Sec .131 G-s Sec .265 G-s Sec .607 G-s (09-Dec-19) EVEL 1K-20KHz
S2DECKHYDP - MOH PIV 1SUPLYP - MOH MIH MIA PIA PIH POH 2SUPLYP -	1.045 In/3 SOUTH 2ND DECK Hyd PUMP OVERALL LI .720 In/3 .743 In/3 .261 In/3 #1 Supply Pump WERALL LI .080 In/3 .077 In/3 .080 In/3 .169 In/3 .193 In/3 #2 Supply Pump OVERALL LI .038 In/3	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s Sec .378 G-s Sec .704 G-s (09-Dec-19) EVEL 1K-20KHz Sec .183 G-s Sec .187 G-s Sec .131 G-s Sec .265 G-s Sec .876 G-s Sec .607 G-s (09-Dec-19) EVEL 1K-20KHz Sec .347 G-s
S2DECKHYDP - MOH PIV - 1SUPLYP - MOH MIH PIA PIH POH 2SUPLYP - MOH MIH	1.045 In/3 SOUTH 2ND DECK Hyd PUMP OVERALL LI .720 In/3 .743 In/3 .261 In/3 #1 Supply Pump #1 Supply Pump OVERALL LI .080 In/3 .077 In/3 .080 In/3 .193 In/3 #2 Supply Pump #2 Supply Pump OVERALL LI .038 In/3 .068 In/3	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s Sec .378 G-s Sec .704 G-s (09-Dec-19) EVEL 1K-20KHz Sec .183 G-s Sec .187 G-s Sec .131 G-s Sec .265 G-s Sec .607 G-s (09-Dec-19) EVEL 1K-20KHz Sec .347 G-s Sec .1114 G-s
S2DECKHYDP - MOH PIV - 1SUPLYP - MOH MIH PIA PIA PIA PIA PIA PIA PIA PIA PIA PIA	1.045 In/: SOUTH 2ND DECK Hyd PUMP OVERALL LI .720 In/: .743 In/: .261 In/: #1 Supply Pump #1 Supply Pump OVERALL LI .080 In/: .077 In/: .080 In/: .193 In/: #2 Supply Pump #2 Supply Pump WERALL LI .038 In/: .068 In/: .070 In/:	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s Sec .378 G-s Sec .704 G-s (09-Dec-19) EVEL 1K-20KHz Sec .183 G-s Sec .187 G-s Sec .131 G-s Sec .265 G-s Sec .607 G-s (09-Dec-19) EVEL 1K-20KHz Sec .347 G-s Sec .513 G-s
S2DECKHYDP - MOH PIV - 1SUPLYP - MOH MIH PIA PIA PIH POH 2SUPLYP -	1.045 In/: SOUTH 2ND DECK Hyd PUMP OVERALL LI .720 In/: .743 In/: .261 In/: #1 Supply Pump #1 Supply Pump OVERALL LI .080 In/: .077 In/: .080 In/: .193 In/: #2 Supply Pump #2 Supply Pump #2 Supply Pump OVERALL LI .038 In/: .068 In/: .210 In/: .210 In/:	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s Sec .378 G-s Sec .704 G-s (09-Dec-19) EVEL 1K-20KHz Sec .183 G-s Sec .187 G-s Sec .131 G-s Sec .265 G-s Sec .607 G-s (09-Dec-19) EVEL 1K-20KHz Sec .347 G-s Sec .513 G-s Sec .513 G-s Sec .711 G-s
S2DECKHYDP - MOH PIV - 1SUPLYP - NOH MIH MIA PIA PIH POH 2SUPLYP - MOH MIH MIA PIA PIH	1.045 In/: SOUTH 2ND DECK Hyd PUMP OVERALL LI .720 In/: .743 In/: .261 In/: #1 Supply Pump #1 Supply Pump OVERALL LI .080 In/: .077 In/: .080 In/: .193 In/: #2 Supply Pump #2 Supply Pump #2 Supply Pump #2 Supply Pump OVERALL LI .038 In/: .068 In/: .210 In/: .210 In/: .185 In/:	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s Sec .378 G-s Sec .704 G-s (09-Dec-19) EVEL 1K-20KHz Sec .183 G-s Sec .187 G-s Sec .131 G-s Sec .265 G-s Sec .607 G-s (09-Dec-19) EVEL 1K-20KHz Sec .347 G-s Sec .513 G-s Sec .513 G-s Sec .711 G-s Sec .461 G-s
S2DECKHYDP - MOH PIV - 1SUPLYP - MOH MIH PIA PIA PIH POH 2SUPLYP -	1.045 In/: SOUTH 2ND DECK Hyd PUMP OVERALL LI .720 In/: .743 In/: .261 In/: #1 Supply Pump #1 Supply Pump OVERALL LI .080 In/: .077 In/: .080 In/: .193 In/: #2 Supply Pump #2 Supply Pump #2 Supply Pump OVERALL LI .038 In/: .068 In/: .210 In/: .210 In/:	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s Sec .378 G-s Sec .704 G-s (09-Dec-19) EVEL 1K-20KHz Sec .183 G-s Sec .187 G-s Sec .131 G-s Sec .265 G-s Sec .607 G-s Sec .607 G-s (09-Dec-19) EVEL 1K-20KHz Sec .347 G-s Sec .513 G-s Sec .513 G-s Sec .711 G-s Sec .461 G-s
S2DECKHYDP - MOH PIV 1SUPLYP - NOH PIA PIH POH 2SUPLYP - MOH MIH MIA PIA PIA PIH POH	1.045 In/: SOUTH 2ND DECK Hyd PUMP OVERALL LI .720 In/: .743 In/: .261 In/: #1 Supply Pump #1 Supply Pump OVERALL LI .080 In/: .077 In/: .080 In/: .193 In/: .193 In/: #2 Supply Pump #2 Supply Pump WERALL LI .038 In/: .068 In/: .210 In/: .210 In/: .282 In/:	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s Sec .378 G-s Sec .704 G-s (09-Dec-19) EVEL 1K-20KHz Sec .183 G-s Sec .187 G-s Sec .131 G-s Sec .265 G-s Sec .607 G-s Sec .607 G-s (09-Dec-19) EVEL 1K-20KHz Sec .347 G-s Sec .1114 G-s Sec .513 G-s Sec .711 G-s Sec .461 G-s Sec 2.714 G-s
S2DECKHYDP - MOH PIV 1SUPLYP - NOH PIA PIH POH 2SUPLYP - MOH MIH MIA PIA PIA PIH POH	1.045 In/3 SOUTH 2ND DECK Hyd PUMP OVERALL LI .720 In/3 .743 In/3 .261 In/3 #1 Supply Pump #1 Supply Pump OVERALL LI .080 In/3 .077 In/3 .080 In/3 .077 In/3 .080 In/3 .193 In/3 #2 Supply Pump #2 Supply Pump OVERALL LI .038 In/3 .068 In/3 .210 In/3 .282 In/3	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s Sec .378 G-s Sec .704 G-s (09-Dec-19) EVEL 1K-20KHz Sec .183 G-s Sec .187 G-s Sec .131 G-s Sec .265 G-s Sec .265 G-s Sec .607 G-s (09-Dec-19) EVEL 1K-20KHz Sec .347 G-s Sec .513 G-s Sec .513 G-s Sec .711 G-s Sec .714 G-s Sec .2.714 G-s (09-Dec-19)
S2DECKHYDP - МОН	1.045 In/: SOUTH 2ND DECK Hyd PUMP OVERALL LI .720 In/: .743 In/: .743 In/: .743 In/: .743 In/: .743 In/: .261 In/: .261 In/: .080 In/: .077 In/: .080 In/: .077 In/: .080 In/: .169 In/: .169 In/: .193 In/: #2 Supply Pump OVERALL LI .038 In/: .068 In/: .070 In/: .210 In/: .282 In/:	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s Sec .378 G-s Sec .704 G-s (09-Dec-19) EVEL 1K-20KHz Sec .183 G-s Sec .187 G-s Sec .187 G-s Sec .131 G-s Sec .265 G-s Sec .265 G-s Sec .607 G-s (09-Dec-19) EVEL 1K-20KHz Sec .347 G-s Sec .513 G-s Sec .513 G-s Sec .711 G-s Sec .714 G-s Sec .2714 G-s (09-Dec-19) EVEL 1K-20KHz
S2DECKHYDP - МОН PIV - 1SUPLYP - Л SUPLYP - МОН 2SUPLYP - МОН 2SUPLYP - ЗSUPLYP -	1.045 In/: SOUTH 2ND DECK Hyd PUMP OVERALL LI .720 In/: .743 In/: .743 In/: .743 In/: .743 In/: .743 In/: .261 In/: .261 In/: .080 In/: .077 In/: .080 In/: .077 In/: .080 In/: .169 In/: .169 In/: .193 In/: #2 Supply Pump OVERALL LI .038 In/: .068 In/: .210 In/: .210 In/: .282 In/: .293 In/:	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s Sec .378 G-s Sec .704 G-s (09-Dec-19) EVEL 1K-20KHz Sec .183 G-s Sec .187 G-s Sec .187 G-s Sec .131 G-s Sec .265 G-s Sec .265 G-s Sec .607 G-s (09-Dec-19) EVEL 1K-20KHz Sec .513 G-s Sec .513 G-s Sec .711 G-s Sec .711 G-s Sec .2714 G-s (09-Dec-19) EVEL 1K-20KHz Sec .628 G-s
S2DECKHYDP - MOH MIH PIV - 1SUPLYP - MOH MIH PIA PIA PIH POH 2SUPLYP - MOH MIH PIA PIA PIH POH 3SUPLYP - MOH MIH MIH PIA MIH MIA PIA PIA PIA PIA MIH MIA PIA PIA MIH MIA PIA PIA PIA PIA MIH PIA PIA PIA PIA	1.045 In/: SOUTH 2ND DECK Hyd PUMP OVERALL LI .720 In/: .743 In/: .743 In/: .261 In/: #1 Supply Pump OVERALL LI .080 In/: .080 In/: .080 In/: .169 In/: .193 In/: #2 Supply Pump OVERALL LI .038 In/: .068 In/: .210 In/: .210 In/: .282 In/: .283 In/: .282 In/: .282 In/: .283 In/: .282 In/: .283 In/: .283 In/: .283 In/: .283 In/: .283 In/: .282 In/: .283 In/: .293	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s Sec .378 G-s Sec .704 G-s (09-Dec-19) EVEL 1K-20KHz Sec .183 G-s Sec .187 G-s Sec .187 G-s Sec .131 G-s Sec .131 G-s Sec .265 G-s Sec .607 G-s (09-Dec-19) EVEL 1K-20KHz Sec .347 G-s Sec .513 G-s Sec .711 G-s Sec .711 G-s Sec .461 G-s Sec .2714 G-s Sec .628 G-s Sec .664 G-s
S2DECKHYDP - MOH MIH PIV - 1SUPLYP - MOH MIH PIA PIA PIH POH 2SUPLYP - MOH MIH PIA PIA PIH POH 3SUPLYP - MOH MIH MIH PIA MIH MIA PIH PIA PIH PIA MIH MIA MIH MIA PIH PIA PIH PIA PIH PIA MIH MIA	1.045 In/: SOUTH 2ND DECK Hyd PUMP OVERALL LI .720 In/: .743 In/: .261 In/: #1 Supply Pump OVERALL LI .080 In/: .080 In/: .080 In/: .169 In/: .193 In/: #2 Supply Pump OVERALL LI .038 In/: .068 In/: .070 In/: .210 In/: .282 In/: .283 In/: .282 In/: .283 In/: .282 In/: .282 In/: .285 In/: .058 In/: .058 In/: .056 In/:	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s Sec .378 G-s Sec .704 G-s (09-Dec-19) EVEL 1K-20KHz Sec .183 G-s Sec .187 G-s Sec .187 G-s Sec .131 G-s Sec .131 G-s Sec .265 G-s Sec .607 G-s (09-Dec-19) EVEL 1K-20KHz Sec .513 G-s Sec .513 G-s Sec .711 G-s Sec .714 G-s Sec .2714 G-s Sec .628 G-s Sec .664 G-s Sec .405 G-s
S2DECKHYDP - MOH MIH PIV - 1SUPLYP - MOH MIH PIA PIA PIH POH 2SUPLYP - MOH MIH PIA PIA PIH POH 3SUPLYP - MOH MIH MIA PIA PIA PIA PIA PIA	1.045 In/: SOUTH 2ND DECK Hyd PUMP OVERALL LI .720 In/: .743 In/: .261 In/: #1 Supply Pump OVERALL LI .080 In/: .080 In/: .080 In/: .169 In/: .193 In/: #2 Supply Pump OVERALL LI .038 In/: .068 In/: .070 In/: .210 In/: .282 In/: .293 In/: .295	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s Sec .378 G-s Sec .704 G-s (09-Dec-19) EVEL 1K-20KHz Sec .183 G-s Sec .187 G-s Sec .187 G-s Sec .131 G-s Sec .131 G-s Sec .265 G-s Sec .607 G-s (09-Dec-19) EVEL 1K-20KHz Sec .513 G-s Sec .513 G-s Sec .711 G-s Sec .714 G-s Sec .461 G-s Sec .628 G-s Sec .664 G-s Sec .628 G-s Sec .528 G-s
S2DECKHYDP - MOH MIH PIV - 1SUPLYP - MOH MIH PIA PIA PIH POH 2SUPLYP - MOH MIH PIA PIA PIH POH 3SUPLYP - MOH MIH MIA PIA PIA PIA PIH PIA PIH PIA PIH PIA PIA PIA PIA PIA PIA PIA PIA PIA	1.045 In/: SOUTH 2ND DECK Hyd PUMP OVERALL LI .720 In/: .743 In/: .261 In/: #1 Supply Pump OVERALL LI .080 In/: .080 In/: .080 In/: .169 In/: .169 In/: .193 In/: #2 Supply Pump OVERALL LI .038 In/: .068 In/: .185 In/: .282 In/: #3 Supply Pump OVERALL LI .053 In/: .058 In/: .056 In/: .174 In/: .161 In/:	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s Sec .378 G-s Sec .704 G-s (09-Dec-19) EVEL 1K-20KHz Sec .183 G-s Sec .187 G-s Sec .187 G-s Sec .131 G-s Sec .131 G-s Sec .265 G-s Sec .607 G-s (09-Dec-19) EVEL 1K-20KHz Sec .513 G-s Sec .513 G-s Sec .711 G-s Sec .711 G-s Sec .461 G-s Sec .461 G-s Sec .628 G-s Sec .664 G-s Sec .528 G-s Sec .528 G-s Sec .528 G-s Sec .528 G-s Sec .528 G-s
S2DECKHYDP - MOH MIH PIV - 1SUPLYP - MOH MIH PIA PIA PIH POH 2SUPLYP - MOH MIH PIA PIA PIH POH 3SUPLYP - MOH MIH MIA PIA PIA PIA PIA PIA	1.045 In/: SOUTH 2ND DECK Hyd PUMP OVERALL LI .720 In/: .743 In/: .261 In/: #1 Supply Pump OVERALL LI .080 In/: .080 In/: .080 In/: .169 In/: .193 In/: #2 Supply Pump OVERALL LI .038 In/: .068 In/: .070 In/: .210 In/: .282 In/: .293 In/: .295	Sec 1.005 G-s (09-Dec-19) EVEL 1K-20KHz Sec .394 G-s Sec .378 G-s Sec .704 G-s (09-Dec-19) EVEL 1K-20KHz Sec .183 G-s Sec .187 G-s Sec .187 G-s Sec .131 G-s Sec .131 G-s Sec .265 G-s Sec .607 G-s (09-Dec-19) EVEL 1K-20KHz Sec .347 G-s Sec .1114 G-s Sec .1114 G-s Sec .1114 G-s Sec .711 G-s Sec .711 G-s Sec .461 G-s Sec .628 G-s Sec .664 G-s Sec .528 G-s Sec .528 G-s Sec .528 G-s Sec .528 G-s

6SUPLYP	- #6 Supply Pump		(09-Dec-19)
0001111	"o pabbil i gub	OVERALL LEVEI	
МОН		.042 In/Sec	
MIH		.069 In/Sec	
MIA		.079 In/Sec	.167 G-s
PIA		.192 In/Sec	.878 G-s
PIH		.237 In/Sec .220 In/Sec	1.027 G-s
POH		.220 In/Sec	1.546 G-s
CBRA	- CASTER BAGHOUSE		•
			L 1K-20KHz
MOH		.047 In/Sec	.523 G-s
MIH		.035 In/Sec	.211 G-s
MIA		.018 in/sec	.168 G-s .431 G-s
FIH			
FOH		.052 IN/Sec	.121 G-s
CBID	- CASTER BAGHOUSE	ID FAN	(09-Dec-19)
-		OVERALL LEVEI	
MOH		.043 In/Sec	.093 G-s
MOV		.043 In/Sec .036 In/Sec	.083 G-s
MIH		.042 In/Sec	.111 G-s
MIV		.040 In/Sec	.142 G-s
MIA		.029 In/Sec	.177 G-s
FIA			.957 G-s
FIH		.085 In/Sec	1.557 G-s
FIV		.072 In/Sec	.854 G-s
FOH			.591 G-s
FOV		.021 In/Sec	.621 G-s
	- Furnace REVERSE	ATD For	(10 Dec 10)
FRAF	- Furnace REVERSE	OVERALL LEVEI	
* МОН		.082 In/Sec	.069 G-s
* MIH		.059 In/Sec	.225 G-s
* MIA		.048 In/Sec	.253 G-s
FIA		.129 In/Sec	.518 G-s
FIH		.097 In/Sec	.466 G-s
* ғон		.080 In/Sec	.397 G-s
EFBHF	- East Furnace Ba	-	
			L 1K-20KHz
MOH		.045 In/Sec	
MIH		.064 In/Sec	
MIA		.069 In/Sec	.628 G-s .712 G-s
FIA FIH		.067 IN/Sec	./12 G-S
FOH		.001 IN/Sec	.648 G-s 1.171 G-s
		,	1.1.1 0 0
WFBHF	- WEST Furnace Ba	g House Fan	(09-Dec-19)
		OVERALL LEVEI	1K-20KHz .234 G-s
MOH		.096 In/Sec	.234 G-s
MIH		.118 In/Sec	.287 G-s
MIA		.049 In/Sec .100 In/Sec	.504 G-s .427 G-s
FIA		.100 In/Sec	.427 G-s
FIH			.761 G-s
FOH		.116 In/Sec	.917 G-s
NCHYDD	- North CASTER Hy		(09 - D - a - 19)
MCHIDE			(09-Dec-19) L 1K-20KHz
MOH		.065 In/Sec	.284 G-s
MIH		.044 In/Sec	.284 G-s .302 G-s
PIH		.086 In/Sec	.316 G-s
SCHYDP	- SOUTH CASTER Hy		
			L 1K-20KHz
MOH		.042 In/Sec	.213 G-s
MIH		.024 In/Sec	.220 G-s .271 G-s
PIH		.140 In/Sec	.271 G-s
CORVERN	- CDDAY CUANDER T		(10 - Dcc - 10)
SCEAFAN	- SPRAY CHAMBER E	ARAUST Fan	(10-D6C-13)

	OVERALL LEVEL	1K-20KHz	
МОН	.514 In/Sec	.039 G-s	
MIH	.458 In/Sec	.084 G-s	
MIA	.175 In/Sec	.058 G-s	
FIH	.260 In/Sec	.267 G-s	
FOH	.194 In/Sec	.344 G-s	
Clarification Of Vibration	Units:		
Acc> G-s	RMS		
Vel> In/Sec	PK		

* - Indicates Data Has Date/Time Different From Machine Date/Time