MRT LABORATORIES

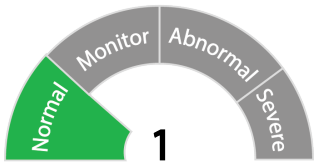
Maximize Run Time

Sample Number : 19110033

Equipment : Main Air Blower

Description : 1 MAB Lube Oil

Overall Assessment



Customer Information		Sample Information		Equipment Information	
Customer Number :	9999002	Point ID :	0003	Fluid : Your Brand ISOVG 32	
Company Name :	Your Company Inc	Site :	Your Plant	Gallons In Use :	1500 gals
Address :	999 Plant Road Your City, TX 55555-0009	Area :	Area 1	Last Fluid Change :	
		Unit :	Unit 1	Last Filter Change :	
Contact Name :	Ernie Engineer	Equipment :	Main Air Blower	Micron Size :	15 u
		Description :	1 MAB Lube Oil	Cooling Source :	Cooling Tower Water

Laboratory Comments

Overall conditions: NORMAL.

Detected Phenols RUL = 95%, which indicates healthy antioxidant conditions. Recommend another RULER analysis in 6 months, 3 months if gas turbine.

The MPC dE = 6.4, which indicates an acceptably low level of soft contaminants due to oil degradation. No action recommended. Consider running another MPC analysis in 6 months.

No indication of abnormal wear. Negligible levels of fluid degradation and contamination detected. Recommend another routine analysis in 1 to 3 months.

Equipment Condition — Normal

Fluid Condition — Normal

Sample Information		Wear Metals (ppm)									Fluid Properties			Additive Metals (ppm)						
Sample Number	Sample Date	Iron (Fe)	Copper (Cu)	Tin (Sn)	Lead (Pb)	Chromium (Cr)	Nickel (Ni)	Aluminum (Al)	Titanium (Ti)	Silver (Si)	Viscosity 40°C cSt	Color	Acid Number (mg KOH/g)	Calcium (Ca)	Magnesium (Mg)	Zinc (Zn)	Phosphorus (P)	Barium (Ba)	Molybdenum (Mo)	Antimony (Sb)
19110033	11-01-2019	0	0	0	0	0	0	0	0	0	32.5	1.5	0.09	0	0	0	0	0	0	0
16013003	10-23-2019	0	0	0	0	0	0	0	0	0	32.2	1.5	0.08	0	0	0	0	0	0	0
15123003	09-17-2019	0	0	0	0	0	0	0	0	0	31.5	0.5	0.05	0	0	0	0	0	0	0
15113003	01-06-2020	6	0	54	2	0	0	0	0	0	33.8	5.5	0.26	0	0	0	0	0	0	0
15103003	01-06-2020	2	0	12	0	0	0	0	0	0	32.3	2	0.22	0	0	0	0	0	0	0
15093003	01-06-2020	0	0	2	0	0	0	0	0	0	31.2	1.5	0.08	0	0	0	0	0	0	0
Watch Advisory		10	10	10	10	5	5	10	5	5	28.8 - 35.2	5	0.3	-	-	-	-	-	-	-
Warning Advisory		20	20	20	20	10	10	20	10	10	27.2 - 36.8	6	0.4	-	-	-	-	-	-	-
Reference																				

Contamination Level — Normal

Sample Information			Fluid Contamination		Contaminant Metals					Particle Count (particles / mL)					
Sample Number	Sample Date	Hours / Miles	H2O ppm	Flash Point °F	Silicon (Si)	Sodium (Na)	Boron (B)	Potassium (K)	Vanadium (V)	ISO Cleanliness Code Based On 4/6/14	> 4 µm	> 6 µm	> 14 µm	> 21 µm	> 38 µm
19110033	11-01-2019		58	405	0	0	0	0	0	17/15/12	982	202	83	1	0
16013003	10-23-2019	5600	44	390	0	0	0	0	0	16/14/11	334	89	18	1	0
15123003	09-17-2019	4900	62	385	0	0	0	0	0	14/13/11	117	56	13	3	1
15113003	01-06-2020	4200	69	390	3	0	0	0	0	20/18/13	5362	1643	70	25	4
15103003	01-06-2020	3500	55	390	0	0	0	0	0	18/15/11	1523	297	14	3	2
15093003	01-06-2020	2800	66	385	0	0	0	0	0	16/14/11	388	130	13	8	2
Watch Advisory			150	375	10	40	10	15	10	20/18/16	-	-	-	-	-
Warning Advisory			300	350	20	40	20	30	20	21/19/17	-	-	-	-	-
Reference															

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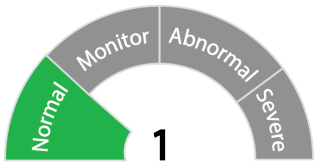
Overall Assessment



Sample Information			Advanced Testing						
Sample Number	Sample Date	Hours / Miles	Copper Corrosion	Pour Point °F	Membrane Patch Colorimetry MPC ΔE	Ruler Phenols %	Water Separability mL	RPVOT Minutes	Foaming T/S mL
19110033	11-01-2019		1A	-38	6.4	95	40/40/0 (15)	852	30/0
16013003	10-23-2019	5600	-	-	7.2	-	-	-	-
15123003	09-17-2019	4900	-	-	5.8	-	-	-	-
15113003	01-06-2020	4200	-	-	8.0	-	-	-	-
Watch Advisory			1B	-	15	-	-	-	-
Warning Advisory			2A	-	35	-	-	-	-
Reference									

Laboratory Comments

The MPC dE is 6.4, which is NORMAL. The MPC has detected an acceptably low level of soft contaminants due to oil degradation. No action recommended. Consider running another MPC analysis in 6 months.

Detected Phenols RUL = 95%, which is NORMAL. Recommend another RULER analysis in 6 months, 3 months if gas turbine.

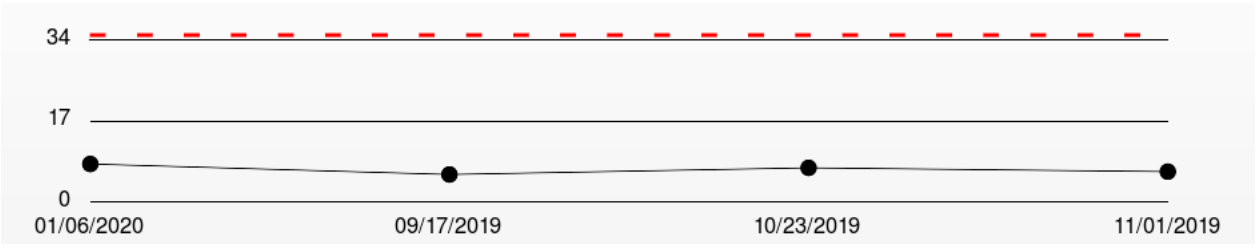
Membrane Patch Colorimetry, ASTM D7843


15113003

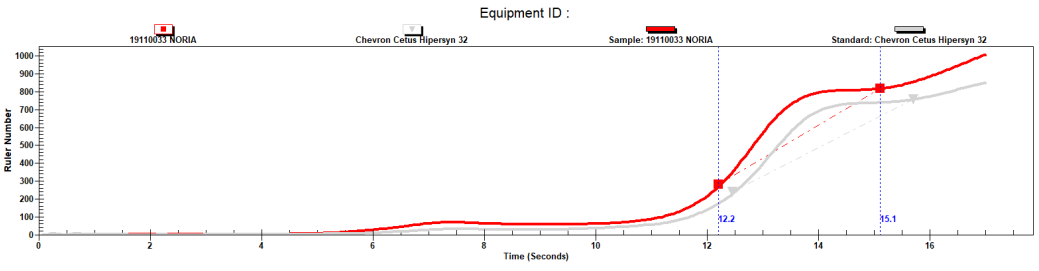

15123003


16013003


19110033



Remaining Useful Life Evaluation Routine, ASTM D6971



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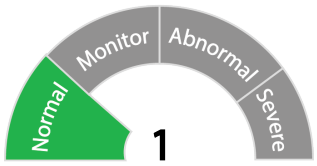
Sample Number : **19110033**

Equipment : **Main Air Blower**

Description : 1 MAB Lube Oil

Overall Assessment



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Address :	999 Plant Road Your City, TX 55555-0009	Area :	Area 1	Last Fluid Change :	
		Unit :	Unit 1	Last Filter Change :	
Contact Name :	Ernie Engineer	Equipment :	Main Air Blower	Micron Size :	15 u
		Description :	1 MAB Lube Oil	Cooling Source :	Cooling Tower Water

Sample No.	Sample Date	Hrs/Miles	Laboratory Comments
19110033	11-01-2019		Overall conditions: NORMAL. Detected Phenols RUL = 95%, which indicates healthy antioxidant conditions. Recommend another RULER analysis in 6 months, 3 months if gas turbine. The MPC dE = 6.4, which indicates an acceptably low level of soft contaminants due to oil degradation. No action recommended. Consider running another MPC analysis in 6 months. No indication of abnormal wear. Negligible levels of fluid degradation and contamination detected. Recommend another routine analysis in 1 to 3 months.
16013003	10-23-2019		No significant abnormalities noted. Fluid is in good condition for continued use. Negligible levels of wear and contaminant metals detected. No indication of oxidation or significant water contamination. Sample again at the next regular interval.
15123003	09-17-2019		Significant overall improvement in oil conditions. The oil appears to have been replaced. Superior oil cleanliness. No significant abnormalities noted. Fluid is in good condition for continued use. Negligible levels of wear and contaminant metals detected. No indication of oxidation or significant water contamination. Sample again at the next regular interval.
15113003	01-06-2020		Overall assessment of SEVERE. Sharply increasing level of tin in the oil, which is likely Babbitt material from the sacrificial layer of a sleeve bearing. SEE MICROSCOPIC IMAGES on the following page. Very high acid number, and since this unit has been sampled on a monthly basis the sharp increase in acid number is more likely from a contaminant rather than from oil oxidation. Investigate alternatives to remove any possible contaminant from the oil. Sharply increasing oil color which also indicates contamination. We recommend Filtered the oil in the immediate term and monitoring for abnormal vibration.
15103003	01-06-2020		Note increasing KF water, TAN, and Potassium. Slight cooler leak may be indicated. Recommend you resample and check cooler for leak.
15093003	01-06-2020		Lubricant appears in good condition for continued use: no evidence of oxidation, no water or other product contamination detected, oil cleanliness is acceptable, and no material wear metals detected. Sample at the normal interval.

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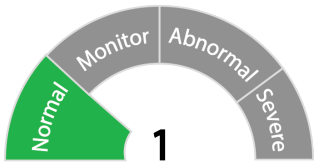
Overall Assessment



Laboratory Comments	
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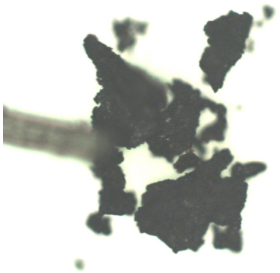
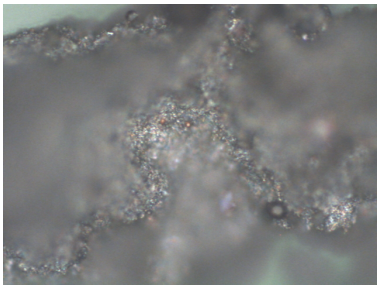
Sample: 15113003

Synopsis: There is evidence of significant Babbitt bearing wear and corrosion. The level of oxidation on the individual particles indicate a probable corrosion attack. Recommend you change the oil to remove corrosive constituents and monitor closely.



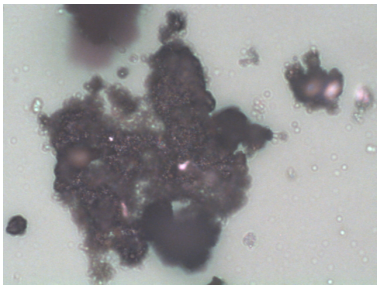
At 100 times magnification

The entry deposit showed a few large Babbitt scale particles and a few fibers.



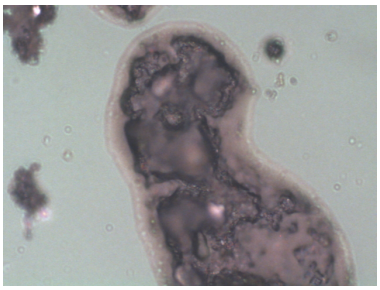
At 500 times magnification

At 1000x the stippled appearance of oxidized Babbitt is visible



At 1000 times magnification

Heavily oxidized Babbitt particles were present along much of the slide.



At 100 times magnification

A few carbonaceous particles were also present. These are indicative of o-ring or seal material, but not considered excessive.