

Analysis Report

Component Information			Sample Information		Customer Information	
Machine Type:	Anti-Friction Bearing	Sump Size: Unknown	Received:	10/02/2014	Great Lakes Generation	
Lubricant:	CONOCO/AW 46		Report:	10/28/2014	20338 Progress Drive	
Machine MFG:	AIR PROD INC		Sample No.:	19 - 1 - 4 - 4	Strongsville, OH 44149	
Machine MOD:	B175A		Data Analyst:	MMM	Contact: Jack Boileman	

PROBLEMS

HIGH IRON.
HIGH LEAD.
High WATER CONTENT.
EXCESSIVE PARTICLE COUNT.

COMMENTS Water content at .689% (6890 ppm) is likely the result of condensation or water ingress. Water contamination can lead to oil degradation, corrosion and reduction in load carrying capacity. If specific source of moisture cannot be located, inspect or install desiccant breathers. The particulate contamination exceeds our limits for a bearing (19/17/16). High particulate contamination will lead to abrasive wear and damage internal components. Reducing particle levels will significantly extend component life. Fluid contamination is a possible contributor to elevated wear metals.

CUSTOMER NOTES

Filter change 1/5/2011

Date Sampled	NEW OIL	8/22/2014	7/18/2014	6/13/2014	5/30/2014	
Lab No	1278905	168113	168112	168111	168110	
Machine / Lube Cond.		C / C	N / M	N / N	N / N	
Lube Hours		2016	1176	336	0	

ELEMENTAL SPECTROSCOPY (ppm) ASTM D5185 Mod (-) indicates below detection limit

Wear Metals	Iron	-	85	25	5	-
	Copper	-	-	-	-	-
	Lead	-	49	9	-	-
	Aluminum	-	-	-	-	-
	Tin	-	-	-	-	-
	Nickel	-	-	-	-	-
	Chromium	-	-	-	-	-
	Titanium	-	-	-	-	-
	Vanadium	-	-	-	-	-
Additives	Silver	-	-	-	-	-
	Calcium	174	50	44	39	41
	Magnesium	2	-	-	-	-
	Phosphorus	429	329	318	341	321
	Zinc	659	495	495	472	484
	Barium	-	-	-	-	-
Contaminants	Molybdenum	3	-	-	-	-
	Silicon	4	14	7	9	6
	Boron	-	-	-	-	-
	Lithium	-	-	-	-	-
	Sodium	-	-	-	-	-
	Potassium	-	-	-	-	-

FTIR SPECTROSCOPY (Indexing Numbers) ASTM E2412

Oxidation	2	2	3	2	2
Nitration	3	2	2	2	2
Anti Wear	12	12	12	12	12
Other Fluid	40	118	118	117	117

PARTICLE COUNT (particles per ml) ISO 4406:99

ISO Code	18/16/13	21/19/17	19/17/15	18/17/13	17/16/13
>4 Micron	1543	10156	2518	1456	899
>6 Micron	600	2695	789	654	401
>14 Micron	45	1256	198	78	52
>50 Micron	2	25	5	2	1
>100 Micron	0	12	2	0	0

VISCOSITY (centistokes) ASTM D445

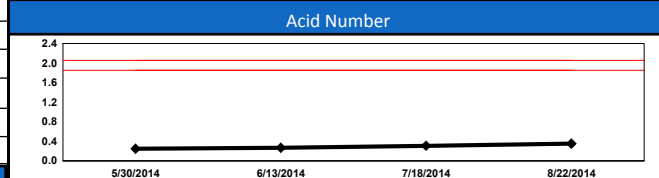
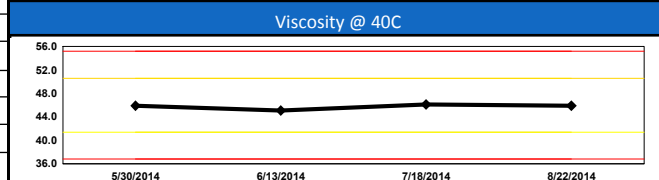
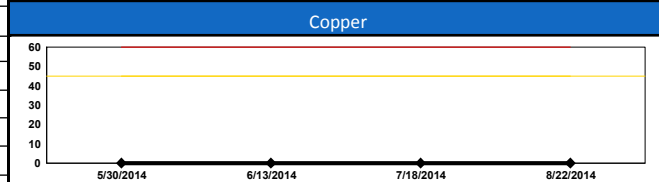
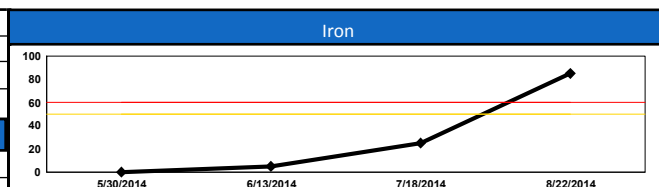
Viscosity@40°C	42.4	45.9	46.1	45.1	45.9
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ACID NUMBER (mg KOH/g) ASTM D974

Acid Number	0.94	0.35	0.31	0.27	0.25
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WATER (%) a-ASTM D6304A b-IWI-133 c-ASTM D6304C d-IWI-134* e-IWI-135* f-IWI-136* g-Crackle h-IWI-370*

Water		0.689 (a)	0.325 (a)	0.043 (a)	0.009 (a)
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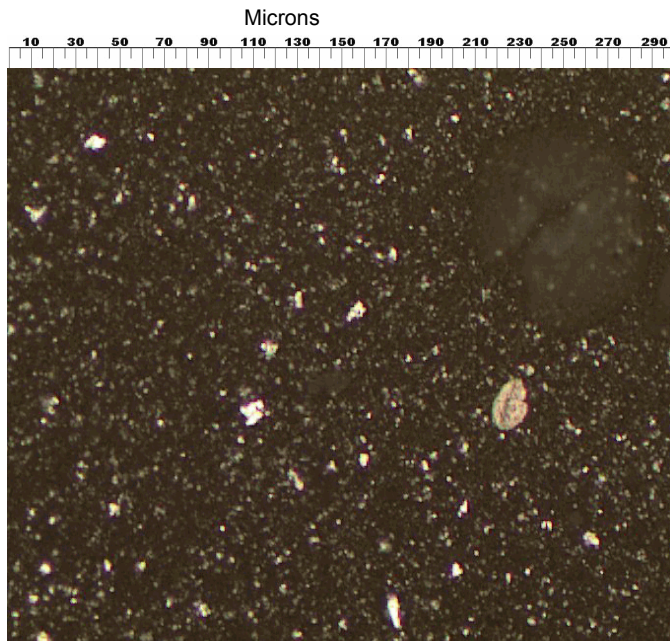


Date	Customer Corrective Actions
11/19/13	changed oil ; Angela Ritchie
3/21/12	corrected oil leak ;
6/3/10	replaced bearing ;

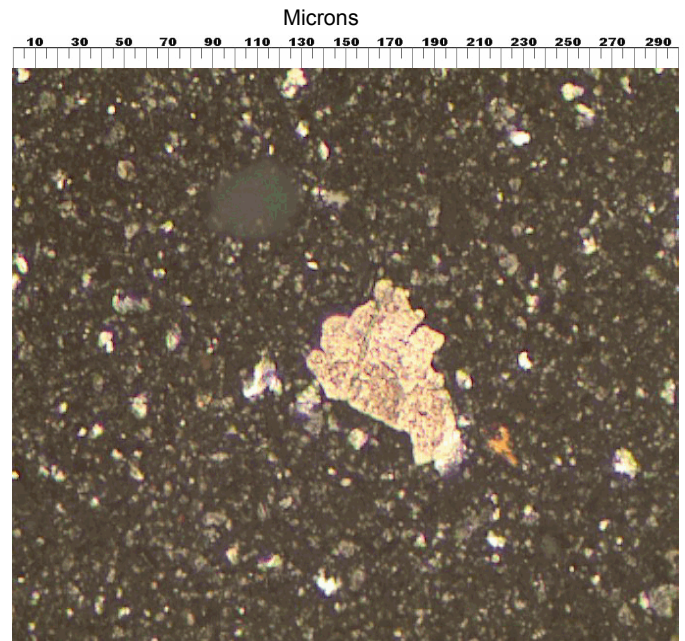
Wear Particle Analysis Report

	Trace	Light	Moderate	Heavy	Max. Size	Particle Composition
Rubbing Wear					15-30	Ferrous
Rolling Contact						
Sliding Wear					>100	Ferrous
Rolling/Sliding Wear						
Cutting Wear						
Chunks						
Spheres						
Corrosion						
Dark Metallic Oxides						
Red Oxides						
Dust/Dirt						
Other Contaminants						
Oxidation By-Products						

Observations: Analytical ferrography has discovered the following abnormalities. Heavy levels of ferrous rubbing wear particles up to 30 microns in size. Rubbing wear particles are generated as the result of normal sliding wear in a machine. Excessive particulate contamination in the lubricating system can significantly increase the generation of rubbing wear particles. Heavy levels of ferrous sliding wear particles over 100 microns in size. Severe sliding wear occurs under excessive load and/or speed. These particles are distinguished by linear striations indicating sliding contact. High levels of dark metallic oxides. Dark metallic oxides, partially oxidized ferrous wear particles, are typically generated under high temperatures and loads.



100x Severe sliding wear particles.



100x Severe wear debris.