

REAL BIG POWER PARTNERS

Sherwin Alumina
Falls Work, OH

CRITICAL

Sample ID: GPP-0370349302-BFP-1B
Equip. Desc.: BFP-1B Sulzer Pump
Lubricant Type: Chevron AW-46
Reservoir Cap.: 70.00 Gal(s) 264.95 Ltr(s)
Machine Time: 21,457.3 Hr(s)
Lube Time: 1,587.6 Hr(s)

Sample Date: 1/15/2009
Received Date: 1/19/2009
Test Date: 1/21/2009
Prev. Sample: 12/6/2008
First Sample: 4/9/2001
No. Samples: 93

N

Recommendation(s):

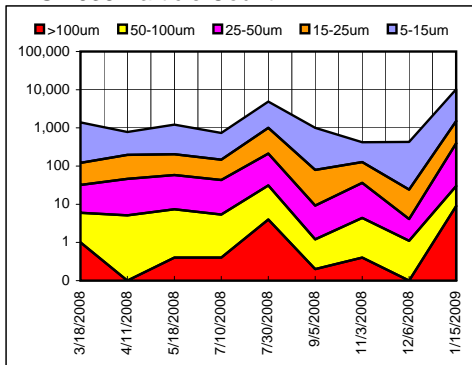
Consider scheduling this pump for maintenance action in the near future. Specifically, an alignment problem, where pump impeller wearing against pump housing. Locate and reduce the source of water contamination. CHANGE OIL to remove large metal debris, water contamination and correct low viscosity. Then RESAMPLE equipment to verify the generation of alignment wear particles.

Discussion of Test Results:

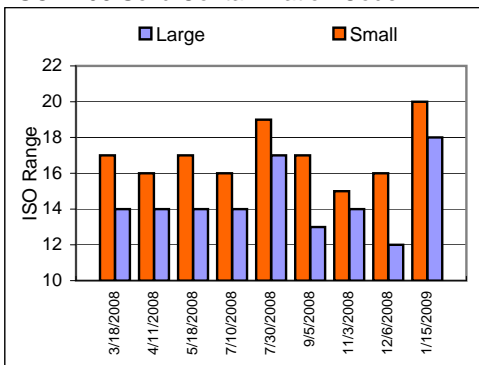
The equipment particle concentration (EPC) has increased significantly for this equipment 429 to 10,257. Analytical results show the appearance of excessive concentration of 140 micrometer (µm) white non-ferrous metal Cutting/Plowing wear particles. Heat treatment of these large Cutting/Plowing wear particles show then to be composed of Aluminum alloy. However, Nickel, Chrome and Stainless steel are also possibilities. The high concentration of these particles and combination of near absent outside contaminants indicate this is an alignment problems. Analysis also shows a high concentration of Black Metal Oxides (Fe₃O₄). Black Metal Oxides typically form as the result of either improper or inadequate lubrication during the formation of the particles.

QUANTITATIVE TESTING:

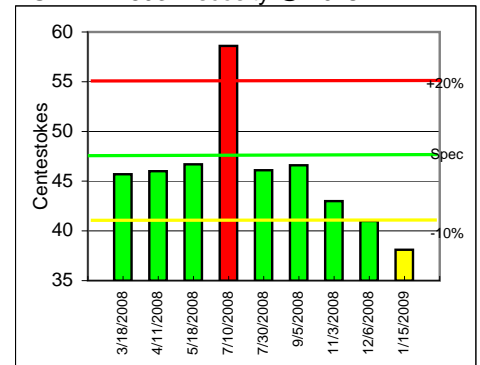
NAS-1638 Particle Count



ISO-4406 Solid Contamination Code



ASTM-D-2893 Viscosity @ 40°C



QUALITATIVE TESTING:

Ferrous Metal Wear:

Classification	1	5	10	µm	Max
Rubbing	~5	~10	~15	≤ 15	
Severe Sliding	~5	~10	~15	75	
Cutting/Plowing	~5	~10	~15	140	
Rolling Cont (Bearing)	~5	~10	~15	140	
Spheres	~5	~10	~15		
Gear	~5	~10	~15		
Black Oxides (Fe ₃ O ₄)	~5	~10	~15	N/A	
Red Oxides (Fe ₂ O ₃)	~5	~10	~15		
Corrosive (FeO)	~5	~10	~15		
Other	~5	~10	~15		

Non-Ferrous Metal Wear:

Classification	1	5	10	µm	Max
Rubbing	~5	~10	~15	≤ 15	
Severe Sliding	~5	~10	~15		
Cutting/Plowing	~5	~10	~15	140	
Rolling Cont (Bearing)	~5	~10	~15		
Spheres	~5	~10	~15		
Gear	~5	~10	~15		
Oxides	~5	~10	~15		
Other	~5	~10	~15		

Contaminants:

Classification	1	5	10	µm	Max
Filming	~5	~10	~15	N/A	
Sand & Dirt	~5	~10	~15	N/A	
Fibers	~5	~10	~15	N/A	
Spheres	~5	~10	~15		
Plastic/Ceramic	~5	~10	~15		
Carbon & Organics	~5	~10	~15		

Non-Ferrous Metal Composition	Copper	White	Babbitt
	~5	~10	~15

Particle Data		Lube Data	
5-15 µm	8,753	40°C cSt:	38.1
15-25 µm	1,112	Water-IR	1,245
25-50 µm	362	PLP	70.7%
50-100 µm	21		
>100 µm	9		
EPC:	10,257		
ISO Scale:	20 18		

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Discussion of Test Results (cont'd):

The supposition of improper lubrication is supported by both the presence of water contamination and low viscosity. The presence of water in the lubricant not only reduce the load carrying capability of the oil but also contributes to forming of Filming (Varnish & Lacquer) compounds and Oxidation of the lubricant.

The viscosity of this sample is more than 10% lower than specification. This low viscosity has been confirmed Kinematically.

Image 1

Interpretation:

Shown in this image are examples 140um white non-ferrous metal Cutting/Plowing wear particles seen in this equipment. Note that this image was taken under low magnification to show the extent of the alignment problem.

Lighting: White Reflected & Green Transmitted

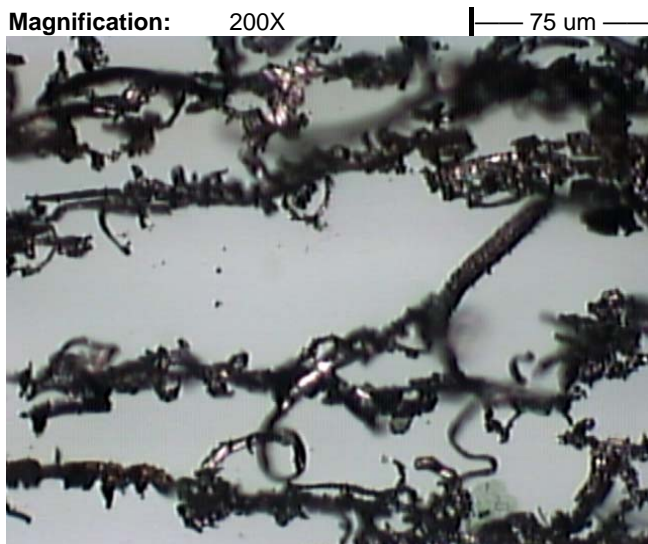


Image 2

Interpretation:

This image displays examples of the excessively large Cutting/Plowing wear particles seen in this equipment.

Lighting: White Reflected & Green Transmitted

