

OIL ANALYSIS REPORT

Sample Rating Trend

NORMAL

Thompson Falls Machine Id THF02 Governor

Component

Case Drain Governor System

LUBRICATION ENG 6802 MULTEC IND OIL 46 (40 GAL)

DIAGNOSIS

Recommendation

Resample at the next service interval to monitor.

Wear

All component wear rates are normal.

Contamination

The amount and size of particulates present in the system are acceptable. There is no indication of any contamination in the oil.

Fluid Condition

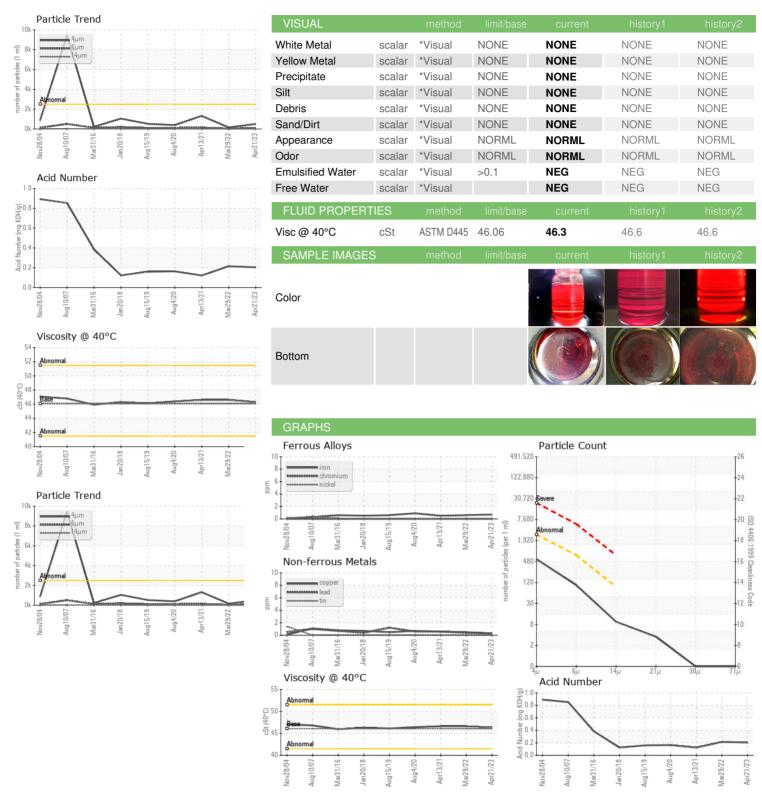
The AN level is acceptable for this fluid. The condition of the oil is suitable for further service.

SAMPLE INFORMATION method limit/base current history1 history2	10 (10 GAL)		Nov2004 Au	2007 Mar2016 Jan2018	Aug2019 Aug2020 Apr2021 Mar20	22 Apr2023	
Sample Date Client Info 21 Apr 2023 29 Mar 2022 13 Apr 2021 Machine Age yrs Client Info 20 19 18	SAMPLE INFORM	MATION	method	limit/base	current	history1	history2
Machine Age yrs Client Info 20 19 18 18 Oil Age yrs Client Info 20 19 18 18 Oil Changd Not Changd Not Changd Not Changd Not Changd Not Changd Not Changd NormAL NORMAL NORMAL NORMAL	Sample Number		Client Info		WCI2326281	WCI2326107	WCI2326293
Oil Age yrs Client Info 20 19 18 Oil Changed Client Info Not Changd Not Changd Not Changd Sample Status method limit/base normal NoRMAL NORMAL NORMAL NORMAL WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >50 <1 <1 <1 Chromium ppm ASTM D5185m >10 0 0 0 Nickel ppm ASTM D5185m >10 0 0 0 Aluminum ppm ASTM D5185m >3 1 <1 <1 <1 Lead ppm ASTM D5185m >5 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <th>Sample Date</th> <th></th> <th>Client Info</th> <th></th> <th>21 Apr 2023</th> <th>29 Mar 2022</th> <th>13 Apr 2021</th>	Sample Date		Client Info		21 Apr 2023	29 Mar 2022	13 Apr 2021
Oil Changed Sample Status Client Info Not Changd NORMAL Not Changd NoRMAL	Machine Age	yrs	Client Info		20	19	18
NORMAL NORMAL NORMAL WEAR METALS method limit/base current history1 history2	Oil Age	yrs	Client Info		20	19	18
WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >50 <1 <1 <1 Chromium ppm ASTM D5185m >10 0 0 0 Nickel ppm ASTM D5185m 0 0 0 0 Silver ppm ASTM D5185m 0 0 0 0 Aluminum ppm ASTM D5185m 0 0 0 0 Aluminum ppm ASTM D5185m >3 1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1	Oil Changed		Client Info		Not Changd	Not Changd	Not Changd
Iron	Sample Status				NORMAL	NORMAL	NORMAL
Chromium ppm ASTM D5165m >10 0 0 0 Nickel ppm ASTM D5165m >10 0 0 0 Titanium ppm ASTM D5165m 0 0 0 0 Silver ppm ASTM D5165m 0 0 0 0 Aluminum ppm ASTM D5165m >75 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1	WEAR METALS		method	limit/base	current	history1	history2
Nickel ppm ASTM D5185m >10 0 0 0 Titanium ppm ASTM D5185m 0 0 0 0 Silver ppm ASTM D5185m 0 0 0 0 Aluminum ppm ASTM D5185m >3 1 <1 0 Lead ppm ASTM D5185m >75 <1 <1 <1 Copper ppm ASTM D5185m >55 0 0 0 Vanadium ppm ASTM D5185m >5 0 Vanadium ppm ASTM D5185m 0 0 0 0 Vanadium ppm ASTM D5185m 0 0 0 0 Cadmium ppm ASTM D5185m 0 0 0 0 Barium ppm ASTM D5185m 0 0 0 0 Barium ppm ASTM D5185m 0 0 0 0	Iron	ppm	ASTM D5185m	>50	<1	<1	<1
Titanium ppm ASTM D5185m 0 0 0 Silver ppm ASTM D5185m 0 0 0 Aluminum ppm ASTM D5185m >3 1 <1 0 Lead ppm ASTM D5185m >75 <1 <1 <1 Copper ppm ASTM D5185m >55 <1 <1 <1 Tin ppm ASTM D5185m >55 0 0 0 Antimony ppm ASTM D5185m 0 0 0 0 Vanadium ppm ASTM D5185m 0 0 0 0 Cadmium ppm ASTM D5185m 0 0 0 0 Boron ppm ASTM D5185m 0 0 0 0 Barium ppm ASTM D5185m 0 0 0 0 Molybdenum ppm ASTM D5185m 0 0 0 0 Margaesium	Chromium	ppm	ASTM D5185m	>10	0	0	0
Silver ppm ASTM D5185m 0 0 0 Aluminum ppm ASTM D5185m >3 1 <1 0 Lead ppm ASTM D5185m >75 <1 <1 <1 Copper ppm ASTM D5185m >15 <1 <1 <1 Tin ppm ASTM D5185m >5 0 0 0 Antimony ppm ASTM D5185m 0 0 0 0 Vanadium ppm ASTM D5185m 0 0 0 0 Cadmium ppm ASTM D5185m 0 0 0 0 Boron ppm ASTM D5185m 0 0 0 0 Barium ppm ASTM D5185m 0 0 0 0 Mangaesium ppm ASTM D5185m 0 0 0 0 Magnesium ppm ASTM D5185m 110 115 115 115	Nickel	ppm	ASTM D5185m	>10	0	0	0
Aluminum ppm ASTM D5185m >3 1 <1	Titanium	ppm	ASTM D5185m		0	0	0
Lead	Silver	ppm	ASTM D5185m		0	0	0
Copper ppm ASTM D5185m >15 <1	Aluminum	ppm	ASTM D5185m	>3	1	<1	0
Tin ppm ASTM D5185m >55 0 0 0 Antimony ppm ASTM D5185m >5 0 Vanadium ppm ASTM D5185m 0 0 0 Cadmium ppm ASTM D5185m 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 <1	Lead	ppm	ASTM D5185m	>75	<1	<1	<1
Antimony ppm ASTM D5185m >5 0 Vanadium ppm ASTM D5185m 0 0 0 Cadmium ppm ASTM D5185m 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 0 0 0 Barium ppm ASTM D5185m 0 0 0 0 Molybdenum ppm ASTM D5185m 0 0 0 0 Magnesium ppm ASTM D5185m 1 0 0 0 Magnesium ppm ASTM D5185m 110 115 115 Phosphorus ppm ASTM D5185m 315 343 319 Zinc ppm ASTM D5185m 997 813 786 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185	Copper	ppm	ASTM D5185m	>15	<1	<1	<1
Vanadium ppm ASTM D5185m 0 0 0 Cadmium ppm ASTM D5185m 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 <1	Tin	ppm	ASTM D5185m	>55	0	0	0
Cadmium ppm ASTM D5185m 0 0 0 0	Antimony	ppm	ASTM D5185m	>5			0
Cadmium ppm ASTM D5185m 0 0 0 0	Vanadium	ppm	ASTM D5185m		0	0	0
Boron ppm ASTM D5185m 0 <1	Cadmium		ASTM D5185m		0	0	0
Barium ppm ASTM D5185m 0 0 0 Molybdenum ppm ASTM D5185m 0 0 0 Magnesium ppm ASTM D5185m 1 0 <1	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum ppm ASTM D5185m 0 0 0 Manganese ppm ASTM D5185m 0 0 0 Magnesium ppm ASTM D5185m 1 0 <1	Boron	ppm	ASTM D5185m		0	<1	0
Manganese ppm ASTM D5185m 0 0 0 Magnesium ppm ASTM D5185m 1 0 <1 Calcium ppm ASTM D5185m 110 115 115 Phosphorus ppm ASTM D5185m 315 343 319 Zinc ppm ASTM D5185m 194 188 192 Sulfur ppm ASTM D5185m 997 813 786 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >8 <1 <1 0 Sodium ppm ASTM D5185m >8 <1 <1 0 Sodium ppm ASTM D5185m >0 2 <1 0 Potassium ppm ASTM D5185m >20 <1 0 <1 FLUID CLEANLINESS method limit/base current history1 history2 Particles >	Barium	ppm	ASTM D5185m		0	0	0
Magnesium ppm ASTM D5185m 1 0 <1	Molybdenum	ppm	ASTM D5185m		0	0	0
Calcium ppm ASTM D5185m 110 115 115 Phosphorus ppm ASTM D5185m 315 343 319 Zinc ppm ASTM D5185m 194 188 192 Sulfur ppm ASTM D5185m 997 813 786 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >8 <1 <1 0 Sodium ppm ASTM D5185m >8 <1 <1 0 Sodium ppm ASTM D5185m >20 <1 0 <1 FLUID CLEANLINESS method limit/base current history1 history2 Particles >4μm ASTM D7647 >2500 495 156 1303 Particles >51μm ASTM D7647 >80 8 9 11 Particles >21μm ASTM D7647 >20 3 3 3 <	Manganese	ppm	ASTM D5185m		0	0	0
Phosphorus ppm ASTM D5185m 315 343 319 Zinc ppm ASTM D5185m 194 188 192 Sulfur ppm ASTM D5185m 997 813 786 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >8 <1 <1 0 Sodium ppm ASTM D5185m >8 <1 <1 0 Sodium ppm ASTM D5185m >20 <1 0 <1 Potassium ppm ASTM D5185m >20 <1 0 <1 FLUID CLEANLINESS method limit/base current history1 history2 Particles >4µm ASTM D7647 >2500 495 156 1303 Particles >6µm ASTM D7647 >80 8 9 11 Particles >21µm ASTM D7647 >20 3 3 3 Par	Magnesium	ppm	ASTM D5185m		1	0	<1
Zinc ppm ASTM D5185m 194 188 192 Sulfur ppm ASTM D5185m 997 813 786 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >8 <1 <1 0 Sodium ppm ASTM D5185m 0 2 <1 Potassium ppm ASTM D5185m >20 <1 0 <1 FLUID CLEANLINESS method limit/base current history1 history2 Particles >4μm ASTM D7647 >2500 495 156 1303 Particles >6μm ASTM D7647 >640 89 37 136 Particles >1μm ASTM D7647 >80 8 9 11 Particles >21μm ASTM D7647 >4 0 0 0 Particles >71μm ASTM D7647 >3 0 0 0 Oil Cleanliness ISO 44	Calcium	ppm	ASTM D5185m		110	115	115
Zinc ppm ASTM D5185m 194 188 192 Sulfur ppm ASTM D5185m 997 813 786 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >8 <1 <1 0 Sodium ppm ASTM D5185m 0 2 <1 0 Potassium ppm ASTM D5185m >20 <1 0 <1 FLUID CLEANLINESS method limit/base current history1 history2 Particles >4μm ASTM D7647 >2500 495 156 1303 Particles >6μm ASTM D7647 >80 8 9 11 Particles >1μm ASTM D7647 >20 3 3 3 Particles >21μm ASTM D7647 >4 0 0 0 Particles >71μm ASTM D7647 >3 0 0 0 Oil Cleanliness	Phosphorus	ppm	ASTM D5185m		315	343	319
CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >8 <1 <1 0 Sodium ppm ASTM D5185m >20 <1 0 <1 Potassium ppm ASTM D5185m >20 <1 0 <1 FLUID CLEANLINESS method limit/base current history1 history2 Particles >4μm ASTM D7647 >2500 495 156 1303 Particles >6μm ASTM D7647 >640 89 37 136 Particles >14μm ASTM D7647 >80 8 9 11 Particles >21μm ASTM D7647 >20 3 3 3 Particles >71μm ASTM D7647 >3 0 0 0 Oil Cleanliness ISO 4406 (c) >18/16/13 16/14/10 14/12/10 18/14/11 FLUID DEGRADATION method limit/base current history1 history2 <th></th> <th>ppm</th> <th>ASTM D5185m</th> <th></th> <th>194</th> <th>188</th> <th>192</th>		ppm	ASTM D5185m		194	188	192
Silicon ppm ASTM D5185m >8 <1	Sulfur	ppm	ASTM D5185m		997	813	786
Sodium ppm ASTM D5185m 0 2 <1	CONTAMINANTS		method	limit/base	current	history1	history2
Sodium ppm ASTM D5185m 0 2 <1	Silicon	ppm	ASTM D5185m	>8	<1	<1	0
FLUID CLEANLINESS method limit/base current history1 history2 Particles >4μm ASTM D7647 >2500 495 156 1303 Particles >6μm ASTM D7647 >640 89 37 136 Particles >14μm ASTM D7647 >80 8 9 11 Particles >21μm ASTM D7647 >20 3 3 3 Particles >38μm ASTM D7647 >4 0 0 0 Particles >71μm ASTM D7647 >3 0 0 0 Oil Cleanliness ISO 4406 (c) >18/16/13 16/14/10 14/12/10 18/14/11 FLUID DEGRADATION method limit/base current history1 history2	Sodium		ASTM D5185m		0	2	<1
Particles >4μm ASTM D7647 >2500 495 156 1303 Particles >6μm ASTM D7647 >640 89 37 136 Particles >14μm ASTM D7647 >80 8 9 11 Particles >21μm ASTM D7647 >20 3 3 3 Particles >38μm ASTM D7647 >4 0 0 0 Particles >71μm ASTM D7647 >3 0 0 0 Oil Cleanliness ISO 4406 (c) >18/16/13 16/14/10 14/12/10 18/14/11 FLUID DEGRADATION method limit/base current history1 history2	Potassium	ppm	ASTM D5185m	>20	<1	0	<1
Particles >6μm ASTM D7647 >640 89 37 136 Particles >14μm ASTM D7647 >80 8 9 11 Particles >21μm ASTM D7647 >20 3 3 3 Particles >38μm ASTM D7647 >4 0 0 0 Particles >71μm ASTM D7647 >3 0 0 0 Oil Cleanliness ISO 4406 (c) >18/16/13 16/14/10 14/12/10 18/14/11 FLUID DEGRADATION method limit/base current history1 history2	FLUID CLEANLIN	ESS	method	limit/base	current	history1	history2
Particles >14μm ASTM D7647 >80 8 9 11 Particles >21μm ASTM D7647 >20 3 3 3 Particles >38μm ASTM D7647 >4 0 0 0 Particles >71μm ASTM D7647 >3 0 0 0 Oil Cleanliness ISO 4406 (c) >18/16/13 16/14/10 14/12/10 18/14/11 FLUID DEGRADATION method limit/base current history1 history2	Particles >4µm		ASTM D7647	>2500	495	156	1303
Particles >21μm ASTM D7647 >20 3 3 3 Particles >38μm ASTM D7647 >4 0 0 0 Particles >71μm ASTM D7647 >3 0 0 0 Oil Cleanliness ISO 4406 (c) >18/16/13 16/14/10 14/12/10 18/14/11 FLUID DEGRADATION method limit/base current history1 history2	Particles >6µm		ASTM D7647	>640	89	37	136
Particles >38μm ASTM D7647 >4 0 0 0 Particles >71μm ASTM D7647 >3 0 0 0 Oil Cleanliness ISO 4406 (c) >18/16/13 16/14/10 14/12/10 18/14/11 FLUID DEGRADATION method limit/base current history1 history2	Particles >14μm		ASTM D7647	>80	8	9	11
Particles >71μm ASTM D7647 >3 0 0 0 Oil Cleanliness ISO 4406 (c) >18/16/13 16/14/10 14/12/10 18/14/11 FLUID DEGRADATION method limit/base current history1 history2	Particles >21µm		ASTM D7647	>20	3	3	3
Particles >71μm ASTM D7647 >3 0 0 0 Oil Cleanliness ISO 4406 (c) >18/16/13 16/14/10 14/12/10 18/14/11 FLUID DEGRADATION method limit/base current history1 history2	Particles >38µm		ASTM D7647	>4	0	0	0
Oil Cleanliness ISO 4406 (c) >18/16/13 16/14/10 14/12/10 18/14/11 FLUID DEGRADATION method limit/base current history1 history2	•		ASTM D7647	>3	0	0	0
	•		ISO 4406 (c)	>18/16/13	16/14/10	14/12/10	18/14/11
Acid Number (AN) mg KOH/g ASTM D8045 0.204 0.215 0.122	FLUID DEGRADA	TION	method	limit/base	current	history1	history2
	Acid Number (AN)	mg KOH/g	ASTM D8045		0.204	0.215	0.122

Contact/Location: STANLEY BOGNATZ - PPLBUT



OIL ANALYSIS REPORT







Laboratory Sample No. Lab Number

Unique Number : 10673559

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 Received : 02 Oct 2023 : WCI2326281 : 05967008 Diagnosed : 04 Oct 2023

Diagnostician : Jonathan Hester Test Package : IND 2 (Additional Tests: PrtCount)

To discuss this sample report, contact Customer Service at 1-800-237-1369. * - Denotes test methods that are outside of the ISO 17025 scope of accreditation.

NORTHWESTERN ENERGY

6700 RAINBOW DAM RD GREAT FALLS, MT

US 59404

Contact: STANLEY BOGNATZ

Contact/Location: STANLEY BOGNATZ - PPLBUT

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Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012)