

OIL ANALYSIS REPORT

Sample Rating Trend

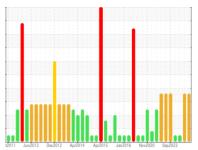
SOOT



KEMP QUARRIES / RIVER VALLEY ARKOMA **WL049**

Component **Diesel Engine**

MOBIL DELVAC 1300 SUPER15W40 (--- GAL)





DIAGNOSIS

Recommendation

We advise that you check for faulty combustion, plugged air filters, or aftercoolers. Oil and filter change at the time of sampling has been noted. We recommend an early resample to monitor this condition. NOTE: High solids (carbon/soot) in the sample have limited the accuracy of Infra-Red data including Total Base Number (TBN) value.

All component wear rates are normal.

Contamination

There is an abnormal amount of solids and carbon present in the oil.

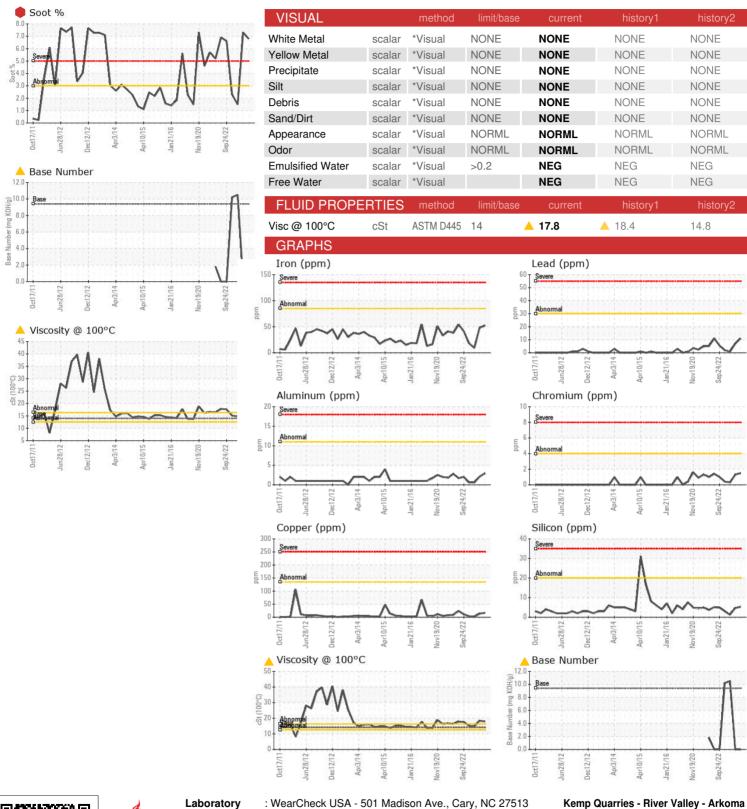
Fluid Condition

The oil viscosity is higher than normal. The BN level is low. The oil is no longer serviceable due to the presence of contaminants.

Sample Number Client Info PCA0034671 PCA0070346 PCA0070378	` ` ` · · · · · · · · · · · · · · · · ·						
Sample Date Client Info 04 Aug 2023 23 Mar 2023 02 Dec 2022 Machine Age hrs Client Info 4581 4603 1753 Oil Age hrs Client Info 500 4603 1753 Oil Changed Client Info Changed Changed Changed Changed Changed Changed Sample Status SEVERE SEVERE NEGMAL CONTAMINATION method limit/base current history1 history2 Fuel WC Method >5 <1.0	SAMPLE INFOR	MATION	method	limit/base	current	history1	history2
Machine Age hrs Client Info 4581 4603 1753 Oil Age hrs Client Info 500 4603 1753 Oil Changed Client Info 500 4603 1753 Sample Status Client Info Changed <	Sample Number		Client Info		PCA0034671	PCA0070346	PCA0070378
Oil Age hrs Client Info 500 4603 1753 Oil Changed Changed </td <td>Sample Date</td> <td></td> <td>Client Info</td> <td></td> <th>04 Aug 2023</th> <td>23 Mar 2023</td> <td>02 Dec 2022</td>	Sample Date		Client Info		04 Aug 2023	23 Mar 2023	02 Dec 2022
Oil Changed Sample Status Client Info Changed SEVERE Changed SEVERE Changed SEVERE Changed NORMAL CONTAMINATION method Imit/base current history1 history2 Fuel WC Method NEG NEG NEG WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >85 52 48 9 Chromium ppm ASTM D5185m >4 2 1 1 Nickel ppm ASTM D5185m >2 <1	Machine Age	hrs	Client Info		4581	4603	1753
SEVERE SEVERE NORMAL	Oil Age	hrs	Client Info		500	4603	1753
Fuel	Oil Changed		Client Info		Changed	Changed	Changed
Fuel	Sample Status				SEVERE	SEVERE	NORMAL
WEAR METALS	CONTAMINAT	ION	method	limit/base	current	history1	history2
WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >85 52 48 9 Chromium ppm ASTM D5185m >4 2 1 <1	Fuel		WC Method	>5	<1.0	<1.0	<1.0
Iron	Glycol		WC Method		NEG	NEG	NEG
Chromium ppm ASTM D5185m >4 2 1 <1 Nickel ppm ASTM D5185m >4 1 1 0 Titanium ppm ASTM D5185m >2 <1	WEAR METAL	.S	method	limit/base	current	history1	history2
Nickel	Iron	ppm	ASTM D5185m	>85	52	48	9
Titanium ppm ASTM D5185m >2 <1 <1 <1 Silver ppm ASTM D5185m >2 0 0 0 Aluminum ppm ASTM D5185m >11 3 2 <1	Chromium	ppm	ASTM D5185m	>4	2	1	<1
Silver ppm ASTM D5185m >2 0 0 0 Aluminum ppm ASTM D5185m >11 3 2 <1 Lead ppm ASTM D5185m >30 11 7 <1 Copper ppm ASTM D5185m >4 <1 1 0 Vanadium ppm ASTM D5185m >4 <1 1 0 Vanadium ppm ASTM D5185m <1 0 0 0 Cadmium ppm ASTM D5185m <1 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 <1 <1 0 Barium ppm ASTM D5185m 0 67 68 64 Manganesium ppm ASTM D5185m <1 <1 <1 <1 Phosphorus ppm ASTM D5185m 990 1041 1002	Nickel	ppm	ASTM D5185m	>4	1	1	0
Aluminum ppm ASTM D5185m >11 3 2 <1 Lead ppm ASTM D5185m >30 11 7 <1	Titanium	ppm	ASTM D5185m	>2	<1	<1	<1
Aluminum ppm ASTM D5185m >11 3 2 <1 Copper ppm ASTM D5185m >30 11 7 <1	Silver	ppm	ASTM D5185m	>2	0	0	0
Copper ppm ASTM D5185m >135 17 13 2 Tin ppm ASTM D5185m >4 <1	Aluminum	ppm	ASTM D5185m	>11	3	2	<1
Tin ppm ASTM D5185m >4 <1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Lead	ppm	ASTM D5185m	>30	11	7	<1
Tin ppm ASTM D5185m >4 <1 1 1 0 Vanadium ppm ASTM D5185m	Copper	ppm	ASTM D5185m	>135	17	13	2
Vanadium ppm ASTM D5185m <1 0 0 Cadmium ppm ASTM D5185m 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 <1 <1 0 Barium ppm ASTM D5185m 0 1 2 1 Molybdenum ppm ASTM D5185m 0 67 68 64 Manganese ppm ASTM D5185m 0 981 956 927 Calcium ppm ASTM D5185m 0 981 1129 1094 Phosphorus ppm ASTM D5185m 990 1041 1002 Zinc ppm ASTM D5185m 2939 2907 3579 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 5 5 1 Sod		ppm	ASTM D5185m	>4	<1	1	0
Cadmium ppm ASTM D5185m 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 <1	Vanadium		ASTM D5185m		<1	0	0
Boron ppm ASTM D5185m 0	Cadmium	ppm	ASTM D5185m		0	0	0
Barium ppm ASTM D5185m 0 1 2 1 Molybdenum ppm ASTM D5185m 0 67 68 64 Manganese ppm ASTM D5185m 0 981 956 927 Calcium ppm ASTM D5185m 1098 1129 1094 Phosphorus ppm ASTM D5185m 990 1041 1002 Zinc ppm ASTM D5185m 990 1041 1002 Zinc ppm ASTM D5185m 2939 2907 3579 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 5 5 1 Sodium ppm ASTM D5185m >20 2 4 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 6.8 7.3 1.5	ADDITIVES		method	limit/base	current	history1	history2
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Magnesium ppm ASTM D5185m 0 981 956 927 Calcium ppm ASTM D5185m 1098 1129 1094 Phosphorus ppm ASTM D5185m 990 1041 1002 Zinc ppm ASTM D5185m 1228 1252 1253 Sulfur ppm ASTM D5185m 2939 2907 3579 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 5 5 1 Sodium ppm ASTM D5185m >20 2 4 0 INFRA-RED method limit/base current history1 history2 Soot % *ASTM D7844 >3 6.8 7.3 1.5 Nitration Abs/cm *ASTM D7624 >20 16.7 16.9 6.7 Sulfation Abs/.1mm *ASTM D7415 >30 35.6 36.8 21.1	Molybdenum	ppm	ASTM D5185m	0	67	68	64
Calcium ppm ASTM D5185m 1098 1129 1094 Phosphorus ppm ASTM D5185m 990 1041 1002 Zinc ppm ASTM D5185m 1228 1252 1253 Sulfur ppm ASTM D5185m 2939 2907 3579 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 5 5 1 Sodium ppm ASTM D5185m >20 2 4 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 6.8 7.3 1.5 Nitration Abs/cm *ASTM D7624 >20 16.7 16.9 6.7 Sulfation Abs/.1mm *ASTM D7415 >30 35.6 36.8 21.1 FLUID DEGRADATION method limit/base current history1 his	Manganese	ppm	ASTM D5185m		<1	<1	<1
Phosphorus ppm ASTM D5185m 990 1041 1002 Zinc ppm ASTM D5185m 1228 1252 1253 Sulfur ppm ASTM D5185m 2939 2907 3579 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 5 5 1 Sodium ppm ASTM D5185m >20 2 4 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 6.8 7.3 1.5 Nitration Abs/cm *ASTM D7624 >20 16.7 16.9 6.7 Sulfation Abs/.1mm *ASTM D7415 >30 35.6 36.8 21.1 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 25.	Magnesium	ppm	ASTM D5185m	0	981	956	927
Zinc ppm ASTM D5185m 1228 1252 1253 Sulfur ppm ASTM D5185m 2939 2907 3579 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 5 5 1 Sodium ppm ASTM D5185m >20 2 4 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 6.8 7.3 1.5 Nitration Abs/cm *ASTM D7624 >20 16.7 16.9 6.7 Sulfation Abs/.1mm *ASTM D7415 >30 35.6 36.8 21.1 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 25.0 25.4 14.1	Calcium	ppm	ASTM D5185m		1098	1129	1094
Sulfur ppm ASTM D5185m 2939 2907 3579 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 5 5 1 Sodium ppm ASTM D5185m 20 2 2 2 Potassium ppm ASTM D5185m >20 2 4 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 6.8 7.3 1.5 Nitration Abs/cm *ASTM D7624 >20 16.7 16.9 6.7 Sulfation Abs/.1mm *ASTM D7415 >30 35.6 36.8 21.1 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 25.0 25.4 14.1	Phosphorus	ppm	ASTM D5185m		990	1041	1002
CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 5 5 1 Sodium ppm ASTM D5185m 12 22 2 Potassium ppm ASTM D5185m >20 2 4 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 6.8 7.3 1.5 Nitration Abs/cm *ASTM D7624 >20 16.7 16.9 6.7 Sulfation Abs/.1mm *ASTM D7415 >30 35.6 36.8 21.1 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 25.0 25.4 14.1	Zinc	ppm	ASTM D5185m		1228	1252	1253
Silicon ppm ASTM D5185m >20 5 5 1 Sodium ppm ASTM D5185m 12 22 2 Potassium ppm ASTM D5185m >20 2 4 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 6.8 7.3 1.5 Nitration Abs/cm *ASTM D7624 >20 16.7 16.9 6.7 Sulfation Abs/.1mm *ASTM D7415 >30 35.6 36.8 21.1 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 25.0 25.4 14.1	Sulfur	ppm	ASTM D5185m		2939	2907	3579
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INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 ● 6.8 ● 7.3 1.5 Nitration Abs/cm *ASTM D7624 >20 16.7 16.9 6.7 Sulfation Abs/.1mm *ASTM D7415 >30 35.6 36.8 21.1 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 25.0 25.4 14.1	Silicon					•	
Soot % % *ASTM D7844 >3 ● 6.8 ● 7.3 1.5 Nitration Abs/cm *ASTM D7624 >20 16.7 16.9 6.7 Sulfation Abs/.1mm *ASTM D7415 >30 35.6 36.8 21.1 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 25.0 25.4 14.1		ppm	ASTM D5185m		5	5	1
Nitration Abs/cm *ASTM D7624 >20 16.7 16.9 6.7 Sulfation Abs/.1mm *ASTM D7415 >30 35.6 36.8 21.1 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 25.0 25.4 14.1	Sodium	ppm	ASTM D5185m ASTM D5185m	>20	5 12	5 22	1 2
Sulfation Abs/.1mm *ASTM D7415 >30 35.6 36.8 21.1 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 25.0 25.4 14.1	Sodium Potassium	ppm	ASTM D5185m ASTM D5185m ASTM D5185m	>20 >20	5 12 2 current	5 22 4	1 2 0
FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 25.0 25.4 14.1	Sodium Potassium INFRA-RED	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m method	>20 >20 limit/base	5 12 2 current	5 22 4 history1	1 2 0 history2
Oxidation Abs/.1mm *ASTM D7414 >25 25.0 25.4 14.1	Sodium Potassium INFRA-RED Soot %	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m method *ASTM D7844	>20 >20 limit/base >3	5 12 2 current • 6.8	5 22 4 history1	1 2 0 history2 1.5
	Sodium Potassium INFRA-RED Soot % Nitration	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m method *ASTM D7844 *ASTM D7624	>20 >20 limit/base >3 >20	5 12 2 current • 6.8 16.7	5 22 4 history1 7.3 16.9	1 2 0 history2 1.5 6.7
Base Number (BN) mg KOH/g ASTM D2896 9.4 ▲ 0.0 ▲ 0.0 10.5	Sodium Potassium INFRA-RED Soot % Nitration Sulfation	ppm ppm ppm % Abs/cm Abs/.1mm	ASTM D5185m ASTM D5185m ASTM D5185m method *ASTM D7844 *ASTM D7624 *ASTM D7415	>20 >20 limit/base >3 >20 >30	5 12 2 current • 6.8 16.7 35.6	5 22 4 history1 • 7.3 16.9 36.8	1 2 0 history2 1.5 6.7 21.1
	Sodium Potassium INFRA-RED Soot % Nitration Sulfation FLUID DEGRA	ppm ppm ppm % Abs/cm Abs/.1mm	ASTM D5185m ASTM D5185m ASTM D5185m method *ASTM D7844 *ASTM D7624 *ASTM D7415 method	>20 >20 limit/base >3 >20 >30 limit/base	5 12 2 current • 6.8 16.7 35.6 current	5 22 4 history1 7.3 16.9 36.8 history1	1 2 0 history2 1.5 6.7 21.1 history2



OIL ANALYSIS REPORT







Certificate L2367

Laboratory Sample No. Lab Number **Unique Number**

: 05920147

: PCA0034671 : 10592061

Received Diagnosed Diagnostician

: 09 Aug 2023 : 10 Aug 2023 : Don Baldridge

Test Package : MOB 1 (Additional Tests: TBN) 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. Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012)

12971 HWY 9a Shawnee, OK

US 74804 Contact:

arkomashop@kempquarries.net

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