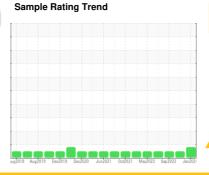


OIL ANALYSIS REPORT

KEMP QUARRIES / RIVER VALLEY ARKOMA **WP057**

Component **Diesel Engine**

MOBIL DELVAC 1300 SUPER15W40 (--- GAL)





DIAGNOSIS

Recommendation

Oil and filter change at the time of sampling has been noted. No corrective action is recommended at this time. Resample at the next service interval to monitor.

Wear

Cylinder, crank, or cam shaft wear is indicated.

Contamination

There is no indication of any contamination in the

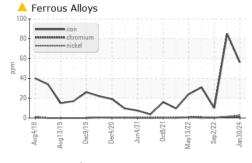
Fluid Condition

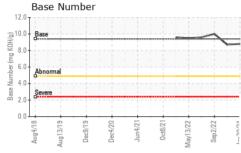
The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

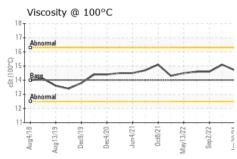
SAMPLE INFORMATION method limit/base current history1 history2	AL)		ug2018 Aug2	019 Dec2019 Dec2020	Jun 2021 Oct 2021 May 2022 Sep 2	2022 Jan 202	
Sample Date	SAMPLE INFOR	MATION	method	limit/base	current	history1	history2
Machine Age hrs Client Info 405 12 7552 Oil Age hrs Client Info 7552 0 7552 Oil Changed Client Info Changed Changed Changed Changed Sample Status Bashormal NCRMAL NCRMAL NCRMAL NCRMAL CONTAMINATION method limit/base current history1 history2 Fuel WC Method >2.1 <1.0	Sample Number		Client Info		PCA0084474	PCA0084179	PCA0062696
Oil Age hrs Client Info 7552 0 7552 Oil Changed Sample Status Client Info Changed C	Sample Date		Client Info		30 Jan 2024	06 Oct 2023	02 Sep 2022
Oil Changed Sample Status Client Info Changed ABNORMAL NORMAL Changed NORMAL NORMAL Changed NORMAL NORMAL Changed ABNORMAL NORMAL Changed NORMAL NorMAL Change	Machine Age	hrs	Client Info		405	12	7552
CONTAMINATION	Oil Age	hrs	Client Info		7552	0	7552
CONTAMINATION method limit/base current history1 history2 Fuel WC Method >2.1 <1.0	Oil Changed		Client Info		Changed	Changed	Changed
Fuel	Sample Status				ABNORMAL	NORMAL	NORMAL
Water Glycol WC Method WC Method >0.21 NEG NEG NEG NEG NEG NEG NEG NEG WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >51 56 85 10 Chromium ppm ASTM D5185m >51 3 1 0 Nickel ppm ASTM D5185m >5 3 1 0 Silver ppm ASTM D5185m >5 3 1 0 Silver ppm ASTM D5185m >31 4 3 1 Aluminum ppm ASTM D5185m >26 7 8 8 Copper ppm ASTM D5185m >26 2 2 -1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <td< th=""><th>CONTAMINAT</th><th>ION</th><th>method</th><th>limit/base</th><th>current</th><th>history1</th><th>history2</th></td<>	CONTAMINAT	ION	method	limit/base	current	history1	history2
WEAR METALS	Fuel		WC Method	>2.1	<1.0	<1.0	<1.0
WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >51 ▲ 56 85 10 Chromium ppm ASTM D5185m >51 ▲ 56 85 10 Nickel ppm ASTM D5185m >5 3 1 0 Titanium ppm ASTM D5185m >3 <1	Water		WC Method	>0.21	NEG	NEG	NEG
Iron	Glycol		WC Method		NEG	NEG	NEG
Chromium ppm ASTM D5185m >11 <1 1 <1 <1 Nickel ppm ASTM D5185m >5 3 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 1 0 1 1 1 0 1 <td>WEAR METAL</td> <td>.S</td> <td>method</td> <td>limit/base</td> <th>current</th> <td>history1</td> <td>history2</td>	WEAR METAL	.S	method	limit/base	current	history1	history2
Nickel	Iron	ppm	ASTM D5185m	>51	△ 56	85	10
Titanium	Chromium	ppm	ASTM D5185m	>11	<1	1	<1
Silver ppm ASTM D5185m >3 <1 0 <1 Aluminum ppm ASTM D5185m >31 4 3 1 Lead ppm ASTM D5185m >26 7 8 8 Copper ppm ASTM D5185m >26 2 2 <1 Vanadium ppm ASTM D5185m >4 <1 <1 <1 <1 Vanadium ppm ASTM D5185m 0 0 0 0 0 Cadmium ppm ASTM D5185m 0 0 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 2 3 4 Barium ppm ASTM D5185m 0 0 0 <1 1 Molybdenum ppm ASTM D5185m 0 924 914 912 Calcium ppm ASTM D5185m	Nickel	ppm	ASTM D5185m	>5	3	1	0
Aluminum	Titanium	ppm	ASTM D5185m		<1	<1	0
Lead	Silver	ppm	ASTM D5185m	>3	<1	0	<1
Copper ppm ASTM D5185m >26 2 2 <1 Tin ppm ASTM D5185m >4 <1	Aluminum	ppm	ASTM D5185m	>31	4	3	1
Tin	Lead	ppm	ASTM D5185m	>26	7	8	8
Tin	Copper	ppm	ASTM D5185m	>26	2	2	<1
Cadmium ppm ASTM D5185m 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 2 3 4 Barium ppm ASTM D5185m 0 0 0 <1	• •	ppm	ASTM D5185m	>4	<1	<1	<1
ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 2 3 4 Barium ppm ASTM D5185m 0 0 0 <1	Vanadium	ppm	ASTM D5185m		<1	0	0
Boron	Cadmium	ppm	ASTM D5185m		0	0	0
Barium ppm ASTM D5185m 0 0 0 <1 Molybdenum ppm ASTM D5185m 0 61 60 60 Manganese ppm ASTM D5185m 1 1 <1 Magnesium ppm ASTM D5185m 0 924 914 912 Calcium ppm ASTM D5185m 1006 1031 1045 Phosphorus ppm ASTM D5185m 1011 1007 1017 Zinc ppm ASTM D5185m 1255 1245 1257 Sulfur ppm ASTM D5185m 3025 2824 3143 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >22 4 5 3 Sodium ppm ASTM D5185m >31 2 2 1 Potassium ppm ASTM D5185m >20 5 1 0 INFRA-RED </td <td>ADDITIVES</td> <td></td> <td>method</td> <td>limit/base</td> <th>current</th> <td>history1</td> <td>history2</td>	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum ppm ASTM D5185m 0 61 60 60 Manganese ppm ASTM D5185m 1 1 <1 Magnesium ppm ASTM D5185m 0 924 914 912 Calcium ppm ASTM D5185m 1006 1031 1045 Phosphorus ppm ASTM D5185m 1011 1007 1017 Zinc ppm ASTM D5185m 1255 1245 1257 Sulfur ppm ASTM D5185m 3025 2824 3143 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >22 4 5 3 Sodium ppm ASTM D5185m >31 2 2 1 Potassium ppm ASTM D5185m >20 5 1 0 INFRA-RED method limit/base current history1 history2 Soot %	Boron	ppm	ASTM D5185m	0	2	3	4
Manganese ppm ASTM D5185m 1 1 <1 Magnesium ppm ASTM D5185m 0 924 914 912 Calcium ppm ASTM D5185m 1006 1031 1045 Phosphorus ppm ASTM D5185m 1011 1007 1017 Zinc ppm ASTM D5185m 1255 1245 1257 Sulfur ppm ASTM D5185m 3025 2824 3143 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >22 4 5 3 Sodium ppm ASTM D5185m >31 2 2 1 Potassium ppm ASTM D5185m >20 5 1 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7624 >20 9.2 9.0 6.7	Barium	ppm	ASTM D5185m	0	0	0	<1
Magnesium ppm ASTM D5185m 0 924 914 912 Calcium ppm ASTM D5185m 1006 1031 1045 Phosphorus ppm ASTM D5185m 1011 1007 1017 Zinc ppm ASTM D5185m 1255 1245 1257 Sulfur ppm ASTM D5185m 3025 2824 3143 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >22 4 5 3 Sodium ppm ASTM D5185m >31 2 2 1 Potassium ppm ASTM D5185m >20 5 1 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7624 >20 9.2 9.0 6.7 Sulfation Abs/.1mm *ASTM D7415 >30 19.7 21.4 19.0	Molybdenum	ppm	ASTM D5185m	0	61	60	60
Calcium ppm ASTM D5185m 1006 1031 1045 Phosphorus ppm ASTM D5185m 1011 1007 1017 Zinc ppm ASTM D5185m 1255 1245 1257 Sulfur ppm ASTM D5185m 3025 2824 3143 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >22 4 5 3 Sodium ppm ASTM D5185m >31 2 2 1 Potassium ppm ASTM D5185m >20 5 1 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 1.6 2.3 0.3 Nitration Abs/cm *ASTM D7415 >30 19.7 21.4 19.0 FLUID DEGRADATION method limit/base current history1	Manganese	ppm	ASTM D5185m		1	1	<1
Phosphorus ppm ASTM D5185m 1011 1007 1017 Zinc ppm ASTM D5185m 1255 1245 1257 Sulfur ppm ASTM D5185m 3025 2824 3143 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >22 4 5 3 Sodium ppm ASTM D5185m >31 2 2 1 Potassium ppm ASTM D5185m >20 5 1 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 1.6 2.3 0.3 Nitration Abs/cm *ASTM D7624 >20 9.2 9.0 6.7 Sulfation Abs/.1mm *ASTM D7415 >30 19.7 21.4 19.0 FLUID DEGRADATION method limit/base current	Magnesium	ppm	ASTM D5185m	0	924	914	912
Zinc ppm ASTM D5185m 1255 1245 1257 Sulfur ppm ASTM D5185m 3025 2824 3143 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >22 4 5 3 Sodium ppm ASTM D5185m >31 2 2 1 Potassium ppm ASTM D5185m >20 5 1 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 1.6 2.3 0.3 Nitration Abs/cm *ASTM D7624 >20 9.2 9.0 6.7 Sulfation Abs/.1mm *ASTM D7415 >30 19.7 21.4 19.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 <td< td=""><td>Calcium</td><td>ppm</td><td>ASTM D5185m</td><td></td><th>1006</th><td>1031</td><td>1045</td></td<>	Calcium	ppm	ASTM D5185m		1006	1031	1045
Sulfur ppm ASTM D5185m 3025 2824 3143 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >22 4 5 3 Sodium ppm ASTM D5185m >31 2 2 1 Potassium ppm ASTM D5185m >20 5 1 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 1.6 2.3 0.3 Nitration Abs/cm *ASTM D7624 >20 9.2 9.0 6.7 Sulfation Abs/.1mm *ASTM D7415 >30 19.7 21.4 19.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 15.1 14.7 14.8	Phosphorus	ppm	ASTM D5185m		1011	1007	1017
CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >22 4 5 3 Sodium ppm ASTM D5185m >31 2 2 1 Potassium ppm ASTM D5185m >20 5 1 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 1.6 2.3 0.3 Nitration Abs/cm *ASTM D7624 >20 9.2 9.0 6.7 Sulfation Abs/.1mm *ASTM D7415 >30 19.7 21.4 19.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 15.1 14.7 14.8	Zinc	ppm	ASTM D5185m		1255	1245	1257
Silicon ppm ASTM D5185m >22 4 5 3 Sodium ppm ASTM D5185m >31 2 2 1 Potassium ppm ASTM D5185m >20 5 1 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 1.6 2.3 0.3 Nitration Abs/cm *ASTM D7624 >20 9.2 9.0 6.7 Sulfation Abs/.1mm *ASTM D7415 >30 19.7 21.4 19.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 15.1 14.7 14.8	Sulfur	ppm	ASTM D5185m		3025	2824	3143
Sodium ppm ASTM D5185m >31 2 2 1 Potassium ppm ASTM D5185m >20 5 1 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 1.6 2.3 0.3 Nitration Abs/cm *ASTM D7624 >20 9.2 9.0 6.7 Sulfation Abs/.1mm *ASTM D7415 >30 19.7 21.4 19.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 15.1 14.7 14.8	CONTAMINAN	ITS	method	limit/base	current	history1	history2
Potassium ppm ASTM D5185m >20 5 1 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 1.6 2.3 0.3 Nitration Abs/cm *ASTM D7624 >20 9.2 9.0 6.7 Sulfation Abs/.1mm *ASTM D7415 >30 19.7 21.4 19.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 15.1 14.7 14.8	Silicon	ppm	ASTM D5185m	>22	4	5	3
INFRA-RED	Sodium	ppm	ASTM D5185m	>31	2	2	1
Soot % % *ASTM D7844 >3 1.6 2.3 0.3 Nitration Abs/cm *ASTM D7624 >20 9.2 9.0 6.7 Sulfation Abs/.1mm *ASTM D7415 >30 19.7 21.4 19.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 15.1 14.7 14.8	Potassium	ppm	ASTM D5185m	>20	5	1	0
Nitration Abs/cm *ASTM D7624 >20 9.2 9.0 6.7 Sulfation Abs/.1mm *ASTM D7415 >30 19.7 21.4 19.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 15.1 14.7 14.8	INFRA-RED		method	limit/base	current	history1	history2
Sulfation Abs/.1mm *ASTM D7415 >30 19.7 21.4 19.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 15.1 14.7 14.8	Soot %	%	*ASTM D7844	>3	1.6	2.3	0.3
FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 15.1 14.7 14.8	Nitration	Abs/cm	*ASTM D7624	>20	9.2	9.0	6.7
Oxidation Abs/.1mm *ASTM D7414 >25 15.1 14.7 14.8	Sulfation	Abs/.1mm	*ASTM D7415	>30	19.7	21.4	19.0
	FLUID DEGRA	NOITAC	method	limit/base	current	history1	history2
	Oxidation	Abs/.1mm	*ASTM D7414	>25	15.1	14.7	14.8
	Base Number (BN)	mg KOH/q			8.8	8.7	10.0



OIL ANALYSIS REPORT





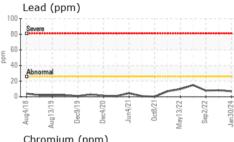


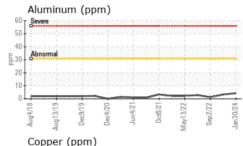
VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual	NONE	NONE	NONE	NONE
Appearance	scalar	*Visual	NORML	NORML	NORML	NORML
Odor	scalar	*Visual	NORML	NORML	NORML	NORML
Emulsified Water	scalar	*Visual	>0.21	NEG	NEG	NEG
Free Water	scalar	*Visual		NEG	NEG	NEG

I LOID I NOI L	ITILO	memou	IIIIIII Dase	Current	HISTOLAL	HISTOLYZ
Visc @ 100°C	cSt	ASTM D445	14	14.7	15.1	14.6

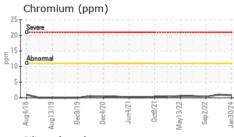
	Iron (ppn	n)				
200 T	Severe			*****		
150 -						
틆 100 -						
50 -	Abnormal					
0	_	_	_		\sim	

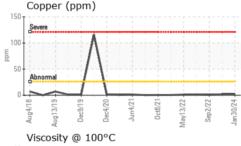
GRAPHS

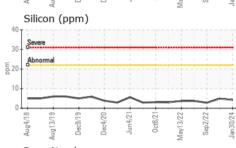


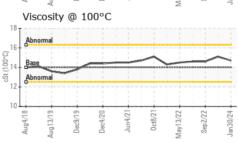


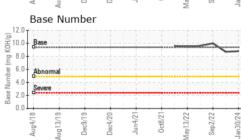
May13/22.













Laboratory Sample No. Lab Number : 06081947

: PCA0084474

Received **Tested**

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 : 06 Feb 2024 : 07 Feb 2024 Diagnosed

: 08 Feb 2024 - Sean Felton

Kemp Quarries - River Valley - Arkoma

12971 HWY 9a Shawnee, OK US 74804 Contact:

Unique Number: 10869392 Test Package : MOB 1 (Additional Tests: TBN)

arkomashop@kempquarries.net

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)

T:

F: