

## **OIL ANALYSIS REPORT**

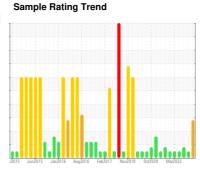




# KEMP QUARRIES / RIVER VALLEY ARKOMA **WL062**

Component **Diesel Engine** 

MOBIL DELVAC 1300 SUPER15W40 (--- GAL)





### DIAGNOSIS

#### Recommendation

We advise that you check the fuel injection system. Oil and filter change at the time of sampling has been noted. We recommend an early resample to monitor this condition.

#### Wear

All component wear rates are normal.

#### Contamination

There is a high amount of fuel present in the oil.

#### Fluid Condition

Fuel is present in the oil and is lowering the viscosity. The oil is no longer serviceable due to the presence of contaminants.

Sample Number         Client Info         PCA0084233         PCA0070342         PCA0070392           Sample Date         Client Info         04 Aug 2023         21 Apr 2023         03 Jan 2023           Machine Age         hrs         Client Info         25405         24885         24267           Oil Age         hrs         Client Info         Changed         Changed Changed         Changed Changed         Changed Changed Changed           Sample Status         Image: Contact Info         SEVERE         NCRMAL         ABNORMAL           CONTAMINATION         method         Imit/base         current         history1         history2           Glycol         WC Method         NEG         NEG         NEG         NEG           WEAR METALS         method         Imit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >20         2         0         1           Nickel         ppm         ASTM D5185m         >20         2         0         1           Unickel         ppm         ASTM D5185m         >2         <1	OAMBLE WEGE	A A TION	neoro ounco	II I I		1.	
Sample Date         Client Info         04 Aug 2023         21 Apr 2023         03 Jan 2023           Machine Age         hrs         Client Info         25405         24885         24267           Oil Age         hrs         Client Info         1500         48315         49426           Oil Changed         Client Info         Changed         Changed Changed         Changed Changed           Sample Status         SEVERE         NORMAL         ABNORMAL           CONTAMINATION         method         Imit base         current         history1         history2           Iron         ppm         ASTM D5185m         >100         100         40         66           Chromium         ppm         ASTM D5185m         >20         2         0         1           Ukckel         ppm         ASTM D5185m         >2         <1	SAMPLE INFORM	VIATION	method	limit/base	current	history1	history2
Machine Age         hrs         Client Info         25405         24885         24267           Oil Age         hrs         Client Info         1500         48315         49426           Oil Changed         Client Info         1500         48315         49426           Sample Status         SEVERE         NORMAL         ABNORMAL           CONTAMINATION         method         Imitibase         current         history1         history2           Glycol         WC Method         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >100         100         40         66           Chromium         ppm         ASTM D5185m         >20         2         0         1           Nickel         ppm         ASTM D5185m         >20         2         0         0           Silver         ppm         ASTM D5185m         >25         2         <1	Sample Number		Client Info		PCA0084233	PCA0070342	PCA0070392
Oil Age         hrs         Client Info         1500         48315         49426           Oil Changed         Change	Sample Date		Client Info		04 Aug 2023	21 Apr 2023	03 Jan 2023
Oil Changed Sample Status         Client Info         Changed SEVERE         Changed NORMAL         Changed ABNORMAL         Changed ABNORMAL         ABNORMAL <t< td=""><td>Machine Age</td><td>hrs</td><td>Client Info</td><td></td><th>25405</th><td>24885</td><td>24267</td></t<>	Machine Age	hrs	Client Info		25405	24885	24267
Sample Status	Oil Age	hrs	Client Info		1500	48315	49426
CONTAMINATION	Oil Changed		Client Info		Changed	Changed	Changed
Glycol         WC Method         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >100         100         40         66           Chromium         ppm         ASTM D5185m         >20         2         0         1           Nickel         ppm         ASTM D5185m         >2         <1         0         <1           Silver         ppm         ASTM D5185m         >2         <1         0         <1           Aluminum         ppm         ASTM D5185m         >2         <1         0         <1           Aluminum         ppm         ASTM D5185m         >2         <1         <1         <1           Lead         ppm         ASTM D5185m         >20         0         0         44           Copper         ppm         ASTM D5185m         >330         9         38         ▲ 446           Tin         ppm         ASTM D5185m         >15         2         0         2           Vanadium         ppm         ASTM D5185m         0         0         0         0 <tr< td=""><td>Sample Status</td><td></td><td></td><td></td><th>SEVERE</th><td>NORMAL</td><td>ABNORMAL</td></tr<>	Sample Status				SEVERE	NORMAL	ABNORMAL
WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >100         100         40         66           Chromium         ppm         ASTM D5185m         >20         2         0         1           Nickel         ppm         ASTM D5185m         >20         2         0         0           Titanium         ppm         ASTM D5185m         >2         <1         0         <1           Sliver         ppm         ASTM D5185m         >2         0         0         0           Aluminum         ppm         ASTM D5185m         >2         2         <1         <1           Lead         ppm         ASTM D5185m         >330         9         38         ▲ 446           Copper         ppm         ASTM D5185m         >330         9         38         ▲ 446           Tin         ppm         ASTM D5185m         >15         2         0         2         2           Vanadium         ppm         ASTM D5185m         >1         2         0         2         2           Vanadium         ppm         ASTM D5185m         0 </th <th>CONTAMINAT</th> <th>ION</th> <th>method</th> <th>limit/base</th> <th>current</th> <th>history1</th> <th>history2</th>	CONTAMINAT	ION	method	limit/base	current	history1	history2
Iron	Glycol		WC Method		NEG	NEG	NEG
Chromium         ppm         ASTM D5185m         >20         2         0         1           Nickel         ppm         ASTM D5185m         >2         <1         0         0           Titanium         ppm         ASTM D5185m         >2         <1         0         <1           Silver         ppm         ASTM D5185m         >2         0         0         0           Aluminum         ppm         ASTM D5185m         >25         2         <1         <1           Lead         ppm         ASTM D5185m         >330         9         38         446           Copper         ppm         ASTM D5185m         >330         9         38         446           Tin         ppm         ASTM D5185m         0         0         0         0           Cadmium         ppm         ASTM D5185m         0         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         0         <1         <1           Boron         ppm         ASTM D5185m         0         31         60 <t< th=""><th>WEAR METAL</th><th>S</th><th>method</th><th>limit/base</th><th>current</th><th>history1</th><th>history2</th></t<>	WEAR METAL	S	method	limit/base	current	history1	history2
Nickel         ppm         ASTM D5185m         >2         <1         0         0           Titanium         ppm         ASTM D5185m         >2         <1	Iron	ppm	ASTM D5185m	>100	100	40	66
Titanium         ppm         ASTM D5185m         >2         <1         0         <1           Silver         ppm         ASTM D5185m         >2         0         0         0           Aluminum         ppm         ASTM D5185m         >25         2         <1	Chromium	ppm	ASTM D5185m	>20	2	0	1
Silver         ppm         ASTM D5185m         >2         0         0         0           Aluminum         ppm         ASTM D5185m         >25         2         <1         <1           Lead         ppm         ASTM D5185m         >40         10         0         4           Copper         ppm         ASTM D5185m         >330         9         38         ▲ 446           Tin         ppm         ASTM D5185m         >15         2         0         2           Vanadium         ppm         ASTM D5185m         0         0         0         0           Cadmium         ppm         ASTM D5185m         0         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         0         <1         <1           Boron         ppm         ASTM D5185m         0         <1         <1         <1           Boron         ppm         ASTM D5185m         0         <1         <1         <1         <1           Barium         ppm         ASTM D5185m         <1         <1	Nickel	ppm	ASTM D5185m	>2	<1	0	0
Aluminum         ppm         ASTM D5185m         >25         2         <1         <1           Lead         ppm         ASTM D5185m         >40         10         0         4           Copper         ppm         ASTM D5185m         >330         9         38         ▲ 446           Tin         ppm         ASTM D5185m         >15         2         0         2           Vanadium         ppm         ASTM D5185m         0         0         0         0           Cadmium         ppm         ASTM D5185m         0         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         <1	Titanium	ppm	ASTM D5185m	>2	<1	0	<1
Lead         ppm         ASTM D5185m         >40         10         0         4           Copper         ppm         ASTM D5185m         >330         9         38         ▲ 446           Tin         ppm         ASTM D5185m         >15         2         0         2           Vanadium         ppm         ASTM D5185m         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         0         <1         <1           Barium         ppm         ASTM D5185m         0         31         60         58           Barium         ppm         ASTM D5185m         0         31         60         58           Manganese         ppm         ASTM D5185m         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <	Silver	ppm	ASTM D5185m	>2	0	0	0
Copper         ppm         ASTM D5185m         >330         9         38         ▲ 446           Tin         ppm         ASTM D5185m         >15         2         0         2           Vanadium         ppm         ASTM D5185m         0         0         0         0           Cadmium         ppm         ASTM D5185m         0         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         <1	Aluminum	ppm	ASTM D5185m	>25	2	<1	<1
Tin         ppm         ASTM D5185m         >15         2         0         2           Vanadium         ppm         ASTM D5185m         0         0         0         0           Cadmium         ppm         ASTM D5185m         0         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         <1         <1         <1         <1         <1         <1         <0         0          <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	Lead	ppm	ASTM D5185m	>40	10	0	4
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         <1         <1           Barium         ppm         ASTM D5185m         0         <1         0         0           Molybdenum         ppm         ASTM D5185m         0         31         60         58           Manganese         ppm         ASTM D5185m         <1         <1         <1         <1           Magnesium         ppm         ASTM D5185m         499         1081         1022           Phosphorus         ppm         ASTM D5185m         466         998         928           Zinc         ppm         ASTM D5185m         583         1254         1106           Sulfur         ppm         ASTM D5185m         583         1254         1106           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm	Copper	ppm	ASTM D5185m	>330	9	38	<b>446</b>
Cadmium         ppm         ASTM D5185m         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         0         <1	Tin	ppm	ASTM D5185m	>15	2	0	2
ADDITIVES	Vanadium	ppm	ASTM D5185m		0	0	0
Boron	Cadmium	ppm	ASTM D5185m		0	0	0
Barium         ppm         ASTM D5185m         0         <1	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum         ppm         ASTM D5185m         0         31         60         58           Manganese         ppm         ASTM D5185m         <1         <1         <1           Magnesium         ppm         ASTM D5185m         0         437         955         837           Calcium         ppm         ASTM D5185m         499         1081         1022           Phosphorus         ppm         ASTM D5185m         466         998         928           Zinc         ppm         ASTM D5185m         583         1254         1106           Sulfur         ppm         ASTM D5185m         583         1254         1106           Sulfur         ppm         ASTM D5185m         25         6         3         5           Sodium         ppm         ASTM D5185m         >25         6         3         5           Sodium         ppm         ASTM D5185m         20         <1         0         <1           Fuel         %         ASTM D5185m         >20         <1         0         <1         0           Potassium         ppm         ASTM D5185m         20         <1         0         <1         0      <	Boron	ppm	ASTM D5185m	0	0	<1	<1
Manganese         ppm         ASTM D5185m         <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         <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 <td>Barium</td> <td>ppm</td> <td>ASTM D5185m</td> <td>0</td> <th>&lt;1</th> <td>0</td> <td>0</td>	Barium	ppm	ASTM D5185m	0	<1	0	0
Magnesium         ppm         ASTM D5185m         0         437         955         837           Calcium         ppm         ASTM D5185m         499         1081         1022           Phosphorus         ppm         ASTM D5185m         466         998         928           Zinc         ppm         ASTM D5185m         583         1254         1106           Sulfur         ppm         ASTM D5185m         1414         3184         2510           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         3         5           Sodium         ppm         ASTM D5185m         2         1         0         <1           Potassium         ppm         ASTM D5185m         >20         <1         0         <1           Fuel         %         ASTM D5185m         >20         <1         0         <1           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         1         0.9         1.6 <t< td=""><td>Molybdenum</td><td>ppm</td><td>ASTM D5185m</td><td>0</td><th>31</th><td>60</td><td>58</td></t<>	Molybdenum	ppm	ASTM D5185m	0	31	60	58
Calcium         ppm         ASTM D5185m         499         1081         1022           Phosphorus         ppm         ASTM D5185m         466         998         928           Zinc         ppm         ASTM D5185m         583         1254         1106           Sulfur         ppm         ASTM D5185m         1414         3184         2510           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         3         5           Sodium         ppm         ASTM D5185m         2         1         0           Potassium         ppm         ASTM D5185m         20         <1	Manganese	ppm	ASTM D5185m		<1	<1	<1
Phosphorus         ppm         ASTM D5185m         466         998         928           Zinc         ppm         ASTM D5185m         583         1254         1106           Sulfur         ppm         ASTM D5185m         1414         3184         2510           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         3         5           Sodium         ppm         ASTM D5185m         2         1         0         <1	Magnesium	ppm	ASTM D5185m	0	437	955	837
Zinc         ppm         ASTM D5185m         583         1254         1106           Sulfur         ppm         ASTM D5185m         1414         3184         2510           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         3         5           Sodium         ppm         ASTM D5185m         2         1         0         <1	Calcium	ppm	ASTM D5185m		499	1081	1022
Sulfur         ppm         ASTM D5185m         1414         3184         2510           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         3         5           Sodium         ppm         ASTM D5185m         2         1         0         0           Potassium         ppm         ASTM D5185m         >20         <1	Phosphorus	ppm	ASTM D5185m		466	998	928
CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         3         5           Sodium         ppm         ASTM D5185m         2         1         0           Potassium         ppm         ASTM D5185m         >20         <1	Zinc	ppm	ASTM D5185m		583	1254	1106
Silicon       ppm       ASTM D5185m       >25       6       3       5         Sodium       ppm       ASTM D5185m       2       1       0         Potassium       ppm       ASTM D5185m       >20       <1       0       <1         Fuel       %       ASTM D3524       >5       51.5       <1.0       <1.0         INFRA-RED       method       limit/base       current       history1       history2         Soot %       "ASTM D7844       >3       1       0.9       1.6         Nitration       Abs/cm       "ASTM D7624       >20       7.5       6.8       8.5         Sulfation       Abs/.1mm       "ASTM D7415       >30       15.6       18.3       20.5         FLUID DEGRADATION       method       limit/base       current       history1       history2         Oxidation       Abs/.1mm       "ASTM D7414       >25       9.3       13.7       15.0	Sulfur	ppm	ASTM D5185m		1414	3184	2510
Sodium         ppm         ASTM D5185m         2         1         0           Potassium         ppm         ASTM D5185m         >20         <1         0         <1           Fuel         %         ASTM D3524         >5         ● 51.5         <1.0         <1.0           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         1         0.9         1.6           Nitration         Abs/cm         *ASTM D7624         >20         7.5         6.8         8.5           Sulfation         Abs/.1mm         *ASTM D7415         >30         15.6         18.3         20.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         9.3         13.7         15.0	CONTAMINAN	TS	method	limit/base	current	history1	history2
Potassium         ppm         ASTM D5185m         >20         <1         0         <1           Fuel         %         ASTM D3524         >5         ● 51.5         <1.0         <1.0           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         1         0.9         1.6           Nitration         Abs/cm         *ASTM D7624         >20         7.5         6.8         8.5           Sulfation         Abs/.1mm         *ASTM D7415         >30         15.6         18.3         20.5           FLUID DEGRADATION method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         9.3         13.7         15.0	Silicon	ppm	ASTM D5185m	>25	6	3	5
Fuel         %         ASTM D3524         >5         51.5         <1.0         <1.0           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         1         0.9         1.6           Nitration         Abs/cm         *ASTM D7624         >20         7.5         6.8         8.5           Sulfation         Abs/.1mm         *ASTM D7415         >30         15.6         18.3         20.5           FLUID DEGRADATION method limit/base current history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         9.3         13.7         15.0	Sodium	ppm	ASTM D5185m		2	1	0
INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         1         0.9         1.6           Nitration         Abs/cm         *ASTM D7624         >20         7.5         6.8         8.5           Sulfation         Abs/.1mm         *ASTM D7415         >30         15.6         18.3         20.5           FLUID DEGRADATION method limit/base current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         9.3         13.7         15.0	Potassium	ppm	ASTM D5185m	>20	<1	0	<1
Soot %         %         *ASTM D7844         >3         1         0.9         1.6           Nitration         Abs/cm         *ASTM D7624         >20         7.5         6.8         8.5           Sulfation         Abs/.1mm         *ASTM D7415         >30         15.6         18.3         20.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         9.3         13.7         15.0	Fuel	%	ASTM D3524	>5	<b>51.5</b>	<1.0	<1.0
Nitration         Abs/cm         *ASTM D7624         >20         7.5         6.8         8.5           Sulfation         Abs/.1mm         *ASTM D7415         >30         15.6         18.3         20.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         9.3         13.7         15.0	INFRA-RED		method	limit/base	current	history1	history2
Sulfation         Abs/.1mm         *ASTM D7415         >30         15.6         18.3         20.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         9.3         13.7         15.0	Soot %	%	*ASTM D7844	>3	1	0.9	1.6
Sulfation         Abs/.1mm         *ASTM D7415         >30         15.6         18.3         20.5           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         9.3         13.7         15.0	Nitration	Abs/cm	*ASTM D7624	>20	7.5	6.8	8.5
Oxidation Abs/.1mm *ASTM D7414 >25 <b>9.3</b> 13.7 15.0	Sulfation				15.6		
	FLUID DEGRAD	OATION	method	limit/base	current	history1	history2
	Oxidation	Abs/.1mm	*ASTM D7414	>25	9.3	13.7	15.0
			ASTM D2896		4.8		



## **OIL ANALYSIS REPORT**





Certificate L2367

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

: 05920142 : 10592056

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 Received : PCA0084233 : 09 Aug 2023 : 11 Aug 2023 Diagnosed Diagnostician : Don Baldridge

Test Package : MOB 1 (Additional Tests: FuelDilution, PercentFuel, 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)

Kemp Quarries - River Valley - Arkoma

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Contact:

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F: