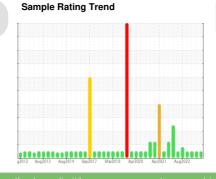


# **OIL ANALYSIS REPORT**

# KEMP QUARRIES / MUSKOGEE SAND **WL056**

Component **Diesel Engine** 

**DIESEL ENGINE OIL SAE 40 (--- GAL)** 





### DIAGNOSIS

### Recommendation

Resample at the next service interval to monitor. Please specify the component make and model with your next sample.

All component wear rates are normal.

### Contamination

There is no indication of any contamination in the oil.

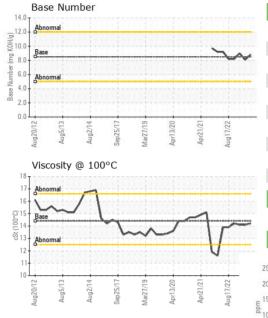
### **Fluid Condition**

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

SAMPLE INFORI	MATION	method	limit/base	current	history1	history2
Sample Number		Client Info		PCA0087098	PCA0087164	PCA0087170
Sample Date		Client Info		10 Aug 2023	06 Jun 2023	28 Feb 2023
Machine Age	hrs	Client Info		33775	33310	32585
Oil Age	hrs	Client Info		665	725	410
Oil Changed		Client Info		Changed	Changed	Changed
Sample Status				NORMAL	NORMAL	NORMAL
CONTAMINAT	ION	method	limit/base	current	history1	history2
	ION					
Fuel		WC Method	>5	<1.0	<1.0	<1.0
Glycol		WC Method		NEG	NEG	NEG
WEAR METAL	S	method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m	>100	35	34	18
Chromium	ppm	ASTM D5185m	>20	<1	<1	<1
Nickel	ppm	ASTM D5185m	>4	<1	<1	0
Titanium	ppm	ASTM D5185m		0	0	0
Silver	ppm	ASTM D5185m	>3	0	0	0
Aluminum	ppm	ASTM D5185m	>20	<1	2	<1
Lead	ppm	ASTM D5185m	>40	1	4	1
Copper	ppm	ASTM D5185m	>330	6	11	35
Tin	ppm	ASTM D5185m	>15	2	2	<1
Vanadium	ppm	ASTM D5185m		0	<1	0
Cadmium	ppm	ASTM D5185m		0	0	0
A D D I T I V F O						
ADDITIVES		method				history2
Boron	ppm	method ASTM D5185m	limit/base	current 0	history1 5	history2 1
	ppm ppm					
Boron		ASTM D5185m	250	0	5	1
Boron Barium	ppm	ASTM D5185m ASTM D5185m	250 10	0 0	5 0	1
Boron Barium Molybdenum	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m	250 10	0 0 62	5 0 61	1 0 59
Boron Barium Molybdenum Manganese	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100	0 0 62 0	5 0 61 1	1 0 59 <1
Boron Barium Molybdenum Manganese Magnesium	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450	0 0 62 0 982	5 0 61 1 1004	1 0 59 <1 941
Boron Barium Molybdenum Manganese Magnesium Calcium	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450 3000	0 0 62 0 982 1112	5 0 61 1 1004 1172	1 0 59 <1 941 1148
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus	ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150	0 0 62 0 982 1112 1001	5 0 61 1 1004 1172 1087	1 0 59 <1 941 1148 1014
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc	ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150 1350	0 0 62 0 982 1112 1001	5 0 61 1 1004 1172 1087 1401	1 0 59 <1 941 1148 1014 1328
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur	ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150 1350 4250	0 0 62 0 982 1112 1001 1272 3034	5 0 61 1 1004 1172 1087 1401 3931	1 0 59 <1 941 1148 1014 1328 3491
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >25	0 0 62 0 982 1112 1001 1272 3034 current	5 0 61 1 1004 1172 1087 1401 3931 history1	1 0 59 <1 941 1148 1014 1328 3491 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >25	0 0 62 0 982 1112 1001 1272 3034 current	5 0 61 1 1004 1172 1087 1401 3931 history1	1 0 59 <1 941 1148 1014 1328 3491 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >25 >216	0 0 62 0 982 1112 1001 1272 3034 current 4	5 0 61 1 1004 1172 1087 1401 3931 history1 4	1 0 59 <1 941 1148 1014 1328 3491 history2 4
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium Potassium INFRA-RED	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >25 >216 >20 limit/base	0 0 62 0 982 1112 1001 1272 3034 current 4 3 <1	5 0 61 1 1004 1172 1087 1401 3931 history1 4 2 2	1 0 59 <1 941 1148 1014 1328 3491 history2 4 2 2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium Potassium	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >25 >216 >20 limit/base >3	0 0 62 0 982 1112 1001 1272 3034 current 4 3 <1	5 0 61 1 1004 1172 1087 1401 3931 history1 4 2 2 history1 0.4	1 0 59 <1 941 1148 1014 1328 3491 history2 4 2 2 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium Potassium INFRA-RED Soot %	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >25 >216 >20 limit/base >3	0 0 62 0 982 1112 1001 1272 3034 current 4 3 <1	5 0 61 1 1004 1172 1087 1401 3931 history1 4 2 2	1 0 59 <1 941 1148 1014 1328 3491 history2 4 2 2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium Potassium INFRA-RED Soot % Nitration	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m  Method ASTM D5185m ASTM D7844 *ASTM D7624 *ASTM D76145	250 10 100 450 3000 1150 1350 4250 limit/base >25 >216 >20 limit/base >3 >20	0 0 62 0 982 1112 1001 1272 3034 current 4 3 <1 current 0.5 8.8	5 0 61 1 1004 1172 1087 1401 3931 history1 4 2 2 history1 0.4 9.1	1 0 59 <1 941 1148 1014 1328 3491 history2 4 2 2 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation FLUID DEGRAE	ppm	ASTM D5185m  Method ASTM D5185m ASTM D5185m  ASTM D5185m  ASTM D5185m  ASTM D5185m  ASTM D5185m  ASTM D5185m  Method  *ASTM D7844  *ASTM D7624  *ASTM D7415  Method	250 10 100 100 450 3000 1150 1350 4250 limit/base >25 >216 >20 limit/base >3 >20 >30 limit/base	0 0 62 0 982 11112 1001 1272 3034 current 4 3 <1 current 0.5 8.8 20.0 current	5 0 61 1 1004 1172 1087 1401 3931 history1 4 2 2 history1 0.4 9.1 21.4	1 0 59 <1 941 1148 1014 1328 3491 history2 4 2 2 history2 0.2 7.5 19.8 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m  Method ASTM D5185m ASTM D7844 *ASTM D7624 *ASTM D76145	250 10 100 450 3000 1150 1350 4250 limit/base >25 >216 >20 limit/base >3 >20 >30 limit/base >25	0 0 62 0 982 1112 1001 1272 3034 current 4 3 <1 current 0.5 8.8 20.0	5 0 61 1 1004 1172 1087 1401 3931 history1 4 2 2 history1 0.4 9.1 21.4	1 0 59 <1 941 1148 1014 1328 3491 history2 4 2 2 history2 0.2 7.5 19.8



# **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
<b>Emulsified Water</b>	scalar	*Visual	>0.2	NEG	NEG	NEG
Free Water	scalar	*Visual		NEG	NEG	NEG

FLUID PROPE	ERITES	metnoa	ilmit/base	current	nistory i	nistory2
Visc @ 100°C	cSt	ASTM D445	14.4	14.2	14.1	14.1

sc @ 100°	C		cSt	AS	TM D4	45 14.4	1	4.2		14	.1		14.	1
GRAPH	S													
Iron (ppm	)						Le	ad (pp	om)					
Severe							100 Sev	rere						
10001100						11 1111	00							
Abnormal				13.11			E .	normal		Λ			A	
						11113131	20			1	- ^	^ ^	14	
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Aug20/12 Aug5/13	Aug2/14	Sep25/17	Mar27/19	Apr13/20	Apr21/21	Aug17/22	Aug20/12	Aug5/13	Aug2/14	Sep25/17	Mar27/19	Apr13/20	Apr21/21	Aug17/22
d'			N	Ap	A	Au					Ž	Ap	A	Au
Aluminum	(ppm	) -:-:-:-	cestt				50 <sub>T</sub> 333	romiu	ım (pr	om )				TT.
Severe		-					40 - Sev	ere						
							8 20 - Ab							
Abnormal		+++		+++++			20 - Abi	normal		++++		+++++		+++
							10							Ħ
/13	4	7	19	120	12/	122	0 12	/13	14	15	19	/20	12/	/22
Aug20/12 Aug5/13	Aug2/14	Sep25/17	Mar27/19	Apr13/20	Apr21/21	Aug17/22	Aug20/12	Aug5/13	Aug2/14	Sep25/17	Mar27/19	Apr13/20	Apr21/21	Aug17/22
Copper (p	pm)							icon (	ppm)					
	11111						80 - Sev	ere						
						A	60-							
S6/6/8mal						$\Lambda$	튭 40							
F. 1 - 1 - 1 - 1 - 1 - 1 - 1			<u></u>	11411			20 -	normal					^	
				_^	<u> </u>	11	0	-	_	<u>~</u>	-		~	<u>~</u>
Aug2U/12.	Aug2/14	Sep25/17	Mar27/19	Apr13/20	Apr21/21	Aug17/22	Aug20/12	Aug5/13	Aug2/14	Sep25/17	Mar27/19	Apr13/20	Apr21/21	Aug17/22
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Viscosity (	ī 100	ی ر				7.7.7.7.7.7.7.7.7.7.7.7.7.7.7.7.7.7.7.7.	15.0-	se Nu	mber					
Abnormal	7					-	KOH/g	normal				100		
Base	1	-			-1		E 10.0 Bas	e					•	>
Abnormal		1	~~	_	1		Base Number (mg KOH/g)	normal		111				
111111111						4	as se							
Aug20/12 +	Aug2/14 -	Sep25/17	Mar27/19	Apr13/20	Apr21/21-	Aug17/22	Aug20/12	Aug5/13 -	Aug2/14	Sep25/17	Mar27/19 +	Apr13/20 -	Apr21/21-	Aug17/22
		LO	100	CO	2	-	0	LO.	CV	LO	100	CO	green.	P-





Laboratory Sample No. Lab Number

Unique Number : 10676071

: PCA0087098 : 05969520

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 Received Diagnosed

: 04 Oct 2023 : 05 Oct 2023

Diagnostician : Wes Davis 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.

Kemp Quarries - Muskogee Sand

3395 W 50th St N Porter, OK

US 74454 Contact:

muskogee@muskogeesand.com

T: F:

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