

OIL ANALYSIS REPORT

Sample Rating Trend

NORMAL



KEMP QUARRIES / MUSKOGEE SAND [67431] Machine Id WL001

Component

Diesel Engine

PETRO CANADA DURON SHP 15W40 (--- GAL)

DIAGNOSIS

Recommendation

Resample at the next service interval to monitor. (Customer Sample Comment: PM-2 changed fluid and filters)

Wear

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.

			100

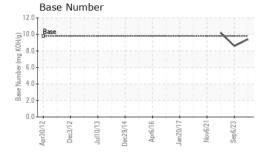
SAMPLE INFORM	MATION	method	limit/base	current	history1	history2
Sample Number		Client Info		PCA0086545	PCA0037711	PCA0070485
Sample Date		Client Info		29 Feb 2024	06 Sep 2023	08 Jul 2022
Machine Age	hrs	Client Info		3895	3441	2975
Oil Age	hrs	Client Info		3895	0	140
Oil Changed	1113	Client Info		Changed	N/A	Changed
Sample Status		Ollerit IIIIO		NORMAL	ABNORMAL	NORMAL
				NONWAL	ADNORMAL	NORIVIAL
CONTAMINATI	ION	method	limit/base	current	history1	history2
Fuel		WC Method	>5	<1.0	<1.0	<1.0
Water		WC Method	>0.2	NEG	NEG	NEG
Glycol		WC Method		NEG	NEG	NEG
WEAR METALS	S	method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m	>100	36	64	13
Chromium	ppm	ASTM D5185m		2	6	<1
Nickel	ppm	ASTM D5185m		- <1	3	0
Titanium	ppm	ASTM D5185m		0	1	0
Silver	ppm	ASTM D5185m	>2	0	0	0
Aluminum	ppm	ASTM D5185m	>25	3	13	2
Lead	ppm	ASTM D5185m	>40	10	20	3
Copper	ppm	ASTM D5185m		6	21	3
Tin	ppm	ASTM D5185m	>15	<1	5	<1
Antimony	ppm	ASTM D5185m	>10	< I		
Vanadium		ASTM D5185m		0	0	0
	ppm					
Codmium		ACTM DE10Em				
Cadmium	ppm	ASTM D5185m		0	<1	0
ADDITIVES	ppm	method	limit/base	current	history1	history2
ADDITIVES Boron	ppm	method ASTM D5185m	0	current 2	history1	history2
ADDITIVES Boron Barium		method	0	current	history1 2 45	history2 6 0
ADDITIVES Boron	ppm	method ASTM D5185m	0 0 60	current 2	history1	history2
ADDITIVES Boron Barium Molybdenum Manganese	ppm ppm	method ASTM D5185m ASTM D5185m	0	current 2 0	history1 2 45	history2 6 0
ADDITIVES Boron Barium Molybdenum	ppm ppm ppm	method ASTM D5185m ASTM D5185m ASTM D5185m	0 0 60	current 2 0 66	history1 2 45 64	history2 6 0 63
ADDITIVES Boron Barium Molybdenum Manganese	ppm ppm ppm	method ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 0 60 0	current 2 0 66 <1	history1 2 45 64 2	history2 6 0 63 <1
ADDITIVES Boron Barium Molybdenum Manganese Magnesium	ppm ppm ppm ppm	method ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 0 60 0 1010	current 2 0 66 <1 1048	history1 2 45 64 2 915	history2 6 0 63 <1 965
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium	ppm ppm ppm ppm ppm	method ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 0 60 0 1010 1070	current 2 0 66 <1 1048 1174	history1 2 45 64 2 915 1011	history2 6 0 63 <1 965 1129
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus	ppm ppm ppm ppm ppm ppm	method ASTM D5185m	0 0 60 0 1010 1070 1150	current 2 0 66 <1 1048 1174 1007	history1 2 45 64 2 915 1011 915	history2 6 0 63 <1 965 1129 1068
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc	ppm ppm ppm ppm ppm ppm ppm ppm	method ASTM D5185m	0 0 60 0 1010 1070 1150	current 2 0 66 <1 1048 1174 1007 1253	history1 2 45 64 2 915 1011 915 1160	history2 6 0 63 <1 965 1129 1068 1290
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur	ppm ppm ppm ppm ppm ppm ppm ppm	method ASTM D5185m	0 0 60 0 1010 1070 1150 1270 2060	current 2 0 66 <1 1048 1174 1007 1253 3254	history1 2 45 64 2 915 1011 915 1160 3010	history2 6 0 63 <1 965 1129 1068 1290 3147
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN	ppm ppm ppm ppm ppm ppm ppm ppm ppm	method ASTM D5185m	0 0 60 0 1010 1070 1150 1270 2060	current 2 0 66 <1 1048 1174 1007 1253 3254 current	history1 2 45 64 2 915 1011 915 1160 3010 history1	history2 6 0 63 <1 965 1129 1068 1290 3147 history2
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	method ASTM D5185m	0 0 60 0 1010 1070 1150 1270 2060	current 2 0 66 <1 1048 1174 1007 1253 3254 current 8	history1 2 45 64 2 915 1011 915 1160 3010 history1	history2 6 0 63 <1 965 1129 1068 1290 3147 history2 4
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	method ASTM D5185m	0 0 60 0 1010 1070 1150 1270 2060 limit/base	current 2 0 66 <1 1048 1174 1007 1253 3254 current 8 56	history1 2 45 64 2 915 1011 915 1160 3010 history1 25 4	history2 6 0 63 <1 965 1129 1068 1290 3147 history2 4 0
ADDITIVES 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	method ASTM D5185m	0 0 60 0 1010 1070 1150 1270 2060 limit/base >25	current 2 0 66 <1 1048 1174 1007 1253 3254 current 8 56 2 current	history1 2 45 64 2 915 1011 915 1160 3010 history1 25 4 5	history2 6 0 63 <1 965 1129 1068 1290 3147 history2 4 0 <1
ADDITIVES 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	method ASTM D5185m method ASTM D5185m	0 0 60 0 1010 1070 1150 1270 2060 limit/base >25 >20 limit/base	current 2 0 66 <1 1048 1174 1007 1253 3254 current 8 56 2 current 0.4	history1 2 45 64 2 915 1011 915 1160 3010 history1 100 100 100 100 100 100 100	history2 6 0 63 <1 965 1129 1068 1290 3147 history2 4 0 <1 history2 0.2
ADDITIVES 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	method ASTM D5185m method ASTM D5185m	0 0 60 0 1010 1150 1270 2060 limit/base >25 >20 limit/base	current 2 0 66 <1 1048 1174 1007 1253 3254 current 8 56 2 current 0.4 8.1	history1 2 45 64 2 915 1011 915 1160 3010 history1 ▲ 25 4 5 history1 0.3 7.1	history2 6 0 63 <1 965 1129 1068 1290 3147 history2 4 0 <1 history2 7.4
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation	ppm	method ASTM D5185m method *ASTM D5185m *ASTM D5185m ASTM D5185m *ASTM D5185m ASTM D5185m *ASTM D5185m *ASTM D5185m *ASTM D7844 *ASTM D7624 *ASTM D7415	0 0 0 0 1010 1070 1150 1270 2060 limit/base >25 >20 limit/base >3 >20 >30	current 2 0 66 <1 1048 1174 1007 1253 3254 current 8 56 2 current 0.4 8.1 19.6	history1 2 45 64 2 915 1011 915 1160 3010 history1 25 4 5 history1 0.3 7.1 18.7	history2 6 0 63 <1 965 1129 1068 1290 3147 history2 4 0 <1 history2 0.2 7.4 19.4
ADDITIVES Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium Potassium INFRA-RED Soot % Nitration	ppm	method ASTM D5185m method ASTM D5185m	0 0 0 1010 1070 1150 1270 2060 limit/base >25 >20 limit/base >3 >20 >3 limit/base	current 2 0 66 <1 1048 1174 1007 1253 3254 current 8 56 2 current 0.4 8.1	history1 2 45 64 2 915 1011 915 1160 3010 history1 ▲ 25 4 5 history1 0.3 7.1	history2 6 0 63 <1 965 1129 1068 1290 3147 history2 4 0 <1 history2 7.4

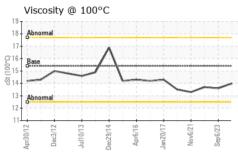
Base Number (BN) mg KOH/g ASTM D2896 9.8

10.2



OIL ANALYSIS REPORT





VISUAL		method				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	>0.2	NEG	NEG	NEG
Free Water	scalar	*Visual		NEG	NEG	NEG
FLUID DDODE	DTIEO		11 11 11		11.	1:

L LLOID PROPI		method			riistory i	HISTORYZ
Visc @ 100°C	cSt	ASTM D445	15.4	14.0	13.6	13.7

GRAPHS				
Iron (ppm)		Lead (ppm)		
250 Severe		Severe Severe		
		00		
Abnomal		Abnormal		
50	^	20		
0 2 2 5 0	3	3 2 2 0	4	33
Apr30/12 Dec3/12 Jul10/13 Apr6/16	Jan 20/17 Nov6/21 Sep6/23	Apr30/12 Dec3/12 Jul10/13	Dec29/14 Apr6/16	Jan20/17 Nov6/21 Sep6/23
Aluminum (ppm)	7	Chromium (p		7
50 7		50 T	7-1-1-1-	
40 Severe		40 - Severe		
Abnormal	***************************************	Abnormal		
10-		10		
	~~\\	0		
Apr30/12 Dec3/12 Jul10/13 Apr6/16	Jan 20/17 Nov6/21 Sep6/23	Apr30/12 Dec3/12 Jul10/13	Dec29/14 -	Jan20/17 Nov6/21 Sep6/23
Α	Jar S. S.		Dec	Jar S. S.
Copper (ppm)	J	Silicon (ppm)		
300 SEXESTAND		60		
E 200		E 40		
100		Abnormal 20		
			~	/\
Dec3/12	Jan 20/17 Nov6/21 Sep 6/23	Apr30/12 + Dec3/12 + Jul10/13 +	ec29/14 -	lan 20/17 Nov6/21 Sep6/23
Apr30/12 Dec3/12 Jul10/13 Dec29/14	Jan2 Nov	Apr3(Dec29/14 Apr6/16	Jan 20/17 Nov6/21 Sep 6/23
Viscosity @ 100°C		Base Number		
20 18 Abnormal		12.0 E 10.0 Base		
		Base Mumber (mg KOH) (0.0 8 8.0		
514		6.0 E 4.0		
Abnormal		器 2.0		
10 2 2 2 01	21	0.0	4 9	23
Apr30/12 Dec3/12 Jul10/13 Apr6/16	Jan 20/17 - Nov6/21 - Sep 6/23 -	Apr30/12 Dec3/12 Jul10/13	Dec29/14 -	Jan20/17 Nov6/21 Sep6/23
	~	4		





Laboratory Sample No.

Lab Number : 06114794 Unique Number: 10923627

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 : PCA0086545 Received

Tested Diagnosed

: 11 Mar 2024 : 12 Mar 2024 : 13 Mar 2024 - Jonathan Hester

Kemp Quarries - Muskogee Sand 3395 W 50th St N Porter, OK

US 74454 Contact: MUSCOGEE NOTIFICATIONS

T:

F:

Test Package: MOB 1 (Additional Tests: TBN) To discuss this sample report, contact Customer Service at 1-800-237-1369.

muskogee@muskogeesand.com

* - 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)