

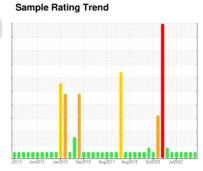
OIL ANALYSIS REPORT



KEMP QUARRIES / RVM-BUTTERFIELD [68553] WL081

Diesel Engine

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





DIAGNOSIS

Recommendation

Resample at the next service interval to monitor. (Customer Sample Comment: PM-1 changed filters and fluid)

All component wear rates are normal.

Contamination

There is no indication of any contamination in the

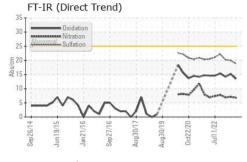
Fluid Condition

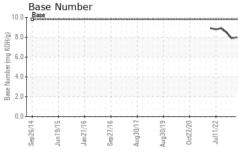
The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

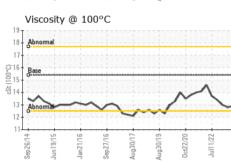
SAMPLE INFORMATION method limit/base current history1 PCA0085780 Sample Number Client Info O7 May 2024 08 Nov 2023 01 Jun 2023 41808 Client Info 42798 42315 41808 Client Info Changed Cha	•	,					
Sample Date	SAMPLE INFOR	MATION	method	limit/base	current	history1	history2
Machine Age hrs Client Info 42798 42315 41808 Oil Age hrs Client Info 42798 42315 41808 Oil Changed Client Info Changed Cha	Sample Number		Client Info		PCA0108658	PCA0087071	PCA0085780
Oil Age hrs Client Info 42798 42315 41808 Oil Changed Chang	Sample Date		Client Info		07 May 2024	08 Nov 2023	01 Jun 2023
Changed Sample Status	Machine Age	hrs	Client Info		42798	42315	41808
Sample Status	Oil Age	hrs	Client Info		42798	42315	41808
CONTAMINATION method limit/base current history1 history2 Fuel WC Method >5 <1.0 <1.0 <1.0 <1.0 Water WC Method >0.2 NEG NEG NEG Glycol WC Method Imit base NEG NEG NEG WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >100 23 23 19 Chromium ppm ASTM D5185m >20 <1 <1 0 Nickel ppm ASTM D5185m >2 <1 <1 0 Silver ppm ASTM D5185m >2 0 0 0 Lead ppm ASTM D5185m >40 2 3 <1 Tin ppm ASTM D5185m >15 2 1 <1 0 Copper ppm ASTM D5185m >15 2 1	Oil Changed		Client Info		Changed	Changed	Changed
Fuel	Sample Status				NORMAL	NORMAL	NORMAL
Water WC Method >0.2 NEG NEG NEG Glycol WC Method Imit/base current history1 history2 WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >100 23 23 19 Chromium ppm ASTM D5185m >20 <1 <1 0 Nickel ppm ASTM D5185m >2 <1 <1 0 Silver ppm ASTM D5185m >2 <1 <1 0 Silver ppm ASTM D5185m >2 0 0 0 Aluminum ppm ASTM D5185m >40 2 3 <1 Copper ppm ASTM D5185m >15 2 1 <1 Tin ppm ASTM D5185m >15 2 1 <1 0 Cadmium ppm ASTM D5185m >1 2 0	CONTAMINAT	ION	method	limit/base	current	history1	history2
WEAR METALS	Fuel		WC Method	>5	<1.0	<1.0	<1.0
WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >100 23 23 19 Chromium ppm ASTM D5185m >20 <1	Water		WC Method	>0.2	NEG	NEG	NEG
Iron	Glycol		WC Method		NEG	NEG	NEG
Chromium ppm ASTM D5185m >20 <1	WEAR METAL	S	method	limit/base	current	history1	history2
Nickel	Iron	ppm	ASTM D5185m	>100	23	23	19
Titanium ppm ASTM D5185m >2 <1 <1 0 Silver ppm ASTM D5185m >2 0 0 0 Aluminum ppm ASTM D5185m >25 4 6 6 Lead ppm ASTM D5185m >40 2 3 <1 Copper ppm ASTM D5185m >330 8 18 17 Tin ppm ASTM D5185m >15 2 1 <1 Vanadium ppm ASTM D5185m >15 2 1 <1 0 Cadmium ppm ASTM D5185m <1 <1 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 2 0 0 ADDITIVES method limit/base current history1 history2 ADDITIVES method limit/base current histo	Chromium	ppm	ASTM D5185m	>20	<1	<1	0
Stiver	Nickel	ppm	ASTM D5185m	>2	<1	<1	0
Aluminum ppm ASTM D5185m >25 4 6 6 Lead ppm ASTM D5185m >40 2 3 <1	Titanium	ppm	ASTM D5185m	>2	<1	<1	
Lead ppm ASTM D5185m >40 2 3 <1 Copper ppm ASTM D5185m >330 8 18 17 Tin ppm ASTM D5185m >15 2 1 <1 Vanadium ppm ASTM D5185m <1 0 0 Cadmium ppm ASTM D5185m <1 <1 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 2 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 2 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 2 0 0 Barium ppm ASTM D5185m 0 41 41 103 Ma	Silver	ppm	ASTM D5185m	>2	0	0	0
Copper ppm ASTM D5185m >330 8 18 17 Tin ppm ASTM D5185m >15 2 1 <1 Vanadium ppm ASTM D5185m <1 0 0 Cadmium ppm ASTM D5185m <1 <1 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 2 0 0 Barium ppm ASTM D5185m 0 0 9 0 Molybdenum ppm ASTM D5185m 0 -1 <1 0 Marganese ppm ASTM D5185m 0 -1 <1 0 Magnesium ppm ASTM D5185m 1010 843 842 899 Calcium ppm ASTM D5185m 1070 994 974 1037 Phosphorus ppm ASTM D5185m 1270 1138 1120 1165 <th>Aluminum</th> <th>ppm</th> <th>ASTM D5185m</th> <th>>25</th> <th>4</th> <th>6</th> <th>6</th>	Aluminum	ppm	ASTM D5185m	>25	4	6	6
Tin ppm ASTM D5185m >15 2 1 <1	Lead	ppm	ASTM D5185m	>40	2	3	<1
Vanadium ppm ASTM D5185m <1	Copper	ppm	ASTM D5185m	>330	8	18	17
Cadmium ppm ASTM D5185m <1 <1 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 2 0 0 Barium ppm ASTM D5185m 0 0 9 0 Molybdenum ppm ASTM D5185m 0 <1	Tin	ppm	ASTM D5185m	>15	2	1	<1
ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 2 0 0 Barium ppm ASTM D5185m 0 0 9 0 Molybdenum ppm ASTM D5185m 60 58 57 56 Manganese ppm ASTM D5185m 0 <1 <1 0 Magnesium ppm ASTM D5185m 1010 843 842 899 Calcium ppm ASTM D5185m 1070 994 974 1037 Phosphorus ppm ASTM D5185m 1150 937 961 950 Zinc ppm ASTM D5185m 1270 1138 1120 1165 Sulfur ppm ASTM D5185m >2060 4276 3435 3476 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m	Vanadium	ppm	ASTM D5185m		<1	0	0
Boron	Cadmium	ppm	ASTM D5185m		<1	<1	0
Barium ppm ASTM D5185m 0 0 9 0 Molybdenum ppm ASTM D5185m 60 58 57 56 Manganese ppm ASTM D5185m 0 <1 <1 0 Magnesium ppm ASTM D5185m 1010 843 842 899 Calcium ppm ASTM D5185m 1070 994 974 1037 Phosphorus ppm ASTM D5185m 1150 937 961 950 Zinc ppm ASTM D5185m 1270 1138 1120 1165 Sulfur ppm ASTM D5185m 2060 4276 3435 3476 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 8 8 2 Sodium ppm ASTM D5185m >20 2 3 4 INFRA-RED method limit/base	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum ppm ASTM D5185m 60 58 57 56 Manganese ppm ASTM D5185m 0 <1	Boron	ppm	ASTM D5185m	0	2	0	0
Manganese ppm ASTM D5185m 0 <1 <1 0 Magnesium ppm ASTM D5185m 1010 843 842 899 Calcium ppm ASTM D5185m 1070 994 974 1037 Phosphorus ppm ASTM D5185m 1150 937 961 950 Zinc ppm ASTM D5185m 1270 1138 1120 1165 Sulfur ppm ASTM D5185m 2060 4276 3435 3476 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 8 8 2 Sodium ppm ASTM D5185m >20 2 3 4 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7624 >20 6.8 7.1 6.9 Sulfation Abs/.1mm <t< td=""><th>Barium</th><td>ppm</td><td>ASTM D5185m</td><td>0</td><th>0</th><td>9</td><td>0</td></t<>	Barium	ppm	ASTM D5185m	0	0	9	0
Magnesium ppm ASTM D5185m 1010 843 842 899 Calcium ppm ASTM D5185m 1070 994 974 1037 Phosphorus ppm ASTM D5185m 1150 937 961 950 Zinc ppm ASTM D5185m 1270 1138 1120 1165 Sulfur ppm ASTM D5185m 2060 4276 3435 3476 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 8 8 2 Sodium ppm ASTM D5185m >20 2 3 4 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.9 1.1 1 Nitration Abs/cm *ASTM D7624 >20 6.8 7.1 6.9 Sulfation Abs/.1mm *AST	Molybdenum	ppm	ASTM D5185m	60	58	57	56
Calcium ppm ASTM D5185m 1070 994 974 1037 Phosphorus ppm ASTM D5185m 1150 937 961 950 Zinc ppm ASTM D5185m 1270 1138 1120 1165 Sulfur ppm ASTM D5185m 2060 4276 3435 3476 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 8 8 2 Sodium ppm ASTM D5185m >20 2 3 4 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.9 1.1 1 Nitration Abs/cm *ASTM D7415 >30 18.8 20.0 20.2 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm <td< th=""><th>Manganese</th><th>ppm</th><th>ASTM D5185m</th><th>0</th><th><1</th><th><1</th><th>0</th></td<>	Manganese	ppm	ASTM D5185m	0	<1	<1	0
Phosphorus ppm ASTM D5185m 1150 937 961 950 Zinc ppm ASTM D5185m 1270 1138 1120 1165 Sulfur ppm ASTM D5185m 2060 4276 3435 3476 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 8 8 2 Sodium ppm ASTM D5185m >20 2 3 4 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.9 1.1 1 Nitration Abs/cm *ASTM D7624 >20 6.8 7.1 6.9 Sulfation Abs/.1mm *ASTM D7415 >30 18.8 20.0 20.2 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm <td< th=""><th>Magnesium</th><th>ppm</th><th>ASTM D5185m</th><th>1010</th><th>843</th><th>842</th><th>899</th></td<>	Magnesium	ppm	ASTM D5185m	1010	843	842	899
Zinc ppm ASTM D5185m 1270 1138 1120 1165 Sulfur ppm ASTM D5185m 2060 4276 3435 3476 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 8 8 2 Sodium ppm ASTM D5185m >20 2 3 4 Potassium ppm ASTM D5185m >20 2 3 4 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.9 1.1 1 Nitration Abs/cm *ASTM D7624 >20 6.8 7.1 6.9 Sulfation Abs/.1mm *ASTM D7415 >30 18.8 20.0 20.2 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm	Calcium	ppm	ASTM D5185m	1070	994	974	1037
Sulfur ppm ASTM D5185m 2060 4276 3435 3476 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 8 8 2 Sodium ppm ASTM D5185m >20 2 3 4 Potassium ppm ASTM D5185m >20 2 3 4 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.9 1.1 1 Nitration Abs/cm *ASTM D7624 >20 6.8 7.1 6.9 Sulfation Abs/.1mm *ASTM D7415 >30 18.8 20.0 20.2 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 13.5 15.2 14.2	·	ppm	ASTM D5185m	1150	937		
CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 8 8 2 Sodium ppm ASTM D5185m <1	Zinc	ppm	ASTM D5185m	1270	1138	1120	1165
Silicon ppm ASTM D5185m >25 8 8 2 Sodium ppm ASTM D5185m <1			ASTM D5185m	2060	4276	3435	3476
Sodium ppm ASTM D5185m <1	CONTAMINAN	TS	method	limit/base	current	history1	history2
Potassium ppm ASTM D5185m >20 2 3 4 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.9 1.1 1 Nitration Abs/cm *ASTM D7624 >20 6.8 7.1 6.9 Sulfation Abs/.1mm *ASTM D7415 >30 18.8 20.0 20.2 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 13.5 15.2 14.2	Silicon	ppm	ASTM D5185m	>25	8	8	
INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.9 1.1 1 Nitration Abs/cm *ASTM D7624 >20 6.8 7.1 6.9 Sulfation Abs/.1mm *ASTM D7415 >30 18.8 20.0 20.2 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 13.5 15.2 14.2	Sodium	ppm	ASTM D5185m		<1	1	3
Soot % % *ASTM D7844 >3 0.9 1.1 1 Nitration Abs/cm *ASTM D7624 >20 6.8 7.1 6.9 Sulfation Abs/.1mm *ASTM D7415 >30 18.8 20.0 20.2 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 13.5 15.2 14.2	Potassium	ppm	ASTM D5185m	>20	2	3	4
Nitration Abs/cm *ASTM D7624 >20 6.8 7.1 6.9 Sulfation Abs/.1mm *ASTM D7415 >30 18.8 20.0 20.2 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 13.5 15.2 14.2	INFRA-RED		method	limit/base	current	history1	history2
Sulfation Abs/.1mm *ASTM D7415 >30 18.8 20.0 20.2 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 13.5 15.2 14.2	Soot %	%	*ASTM D7844	>3	0.9	1.1	1
FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 13.5 15.2 14.2	Nitration	Abs/cm	*ASTM D7624	>20	6.8	7.1	6.9
Oxidation	Sulfation	Abs/.1mm	*ASTM D7415	>30	18.8	20.0	20.2
	FLUID DEGRA	OATION	method	limit/base	current	history1	history2
Base Number (BN) mg KOH/g ASTM D2896 9.8 8.0 7.9 8.5	Oxidation	Abs/.1mm	*ASTM D7414	>25	13.5	15.2	14.2
	Base Number (BN)	mg KOH/g	ASTM D2896	9.8	8.0	7.9	8.5



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	>0.2	NEG	NEG	NEG
Free Water	scalar	*Visual		NEG	NEG	NEG

FLUID PROPERTIES		method	limit/base		history1	history2	
Visc @ 100°C	cSt	ASTM D445	15.4	12.9	12.8	13.0	

GRAPHS				
Iron (ppm)		Lead (ppm)		
Severe	100	Covere		
	80	,		
Abnormal	E 60	Abnormal		
Na Na	201111111111111111111111111111111111111	Torritoria		
~~~	~	0		$\sim$
Sep26/14 Jun19/15 Jan21/16 Sep27/16 Aug30/17 Aug30/19 Oct22/20	Jul11/22	Sep26/14- Jun19/15-	Sep27/16	Aug30/19 - Oct22/20 Jul11/22 -
Sep26/14 Jun19/15 Jun19/16 Sep27/16 Aug30/17 Aug30/19 Oct22/20	Lin C	Sep2 Jun1 Jan2	Sep27/16 Aug30/17	Aug30/19 0ct22/20 Jul11/22
Aluminum (ppm)		Chromium (p	pm)	
Severe	50	Severe		
	40			
Abnormal	E 20	Abnormal		
	100000000000000000000000000000000000000			
~~~		0		
Sep26/14 Jun19/15 Jan21/16 Sep27/16 Aug30/17 Oct22/20	Jul11/22	Sep26/14 Jun19/15 Jan21/16	Sep27/16-	Aug30/19 Oct22/20
Sep? Sep? Aug:	Jul	Sep?	Sep	Aug: Octi
Copper (ppm)		Silicon (ppm)		
		Severe		
	V et	A Committee of the Comm		
	E 41	Abnormal		
- Appressional	20	Abnormal A	Λ	$\Lambda \Lambda \Lambda$
			V ~~~	ノン・レ
Sep26/14 Jun19/15 Jan21/16 Sep27/16 Aug30/17 Oct22/20	Jul11/22	Sep26/14 Jun19/15 Jan21/16	Sep27/16 Aug30/17	Aug30/19 . Oct22/20 . Jul11/22 .
N.D. 2621 '91 NAS 800 GM	lu l	2001 5050		Aug Oct
Viscosity @ 100°C	10	Base Number		
Abnormal	10.1 8.0 8.1			
0	2 0.1			





Certificate 12367

Sample No.

: PCA0108658 Lab Number : 06178057 Unique Number : 11029383

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

Received **Tested** Diagnosed

: 13 May 2024 : 14 May 2024

: 15 May 2024 - Sean Felton

Sase Number 2.0

> 8651 Farm Rd 2115 Purdy, MO US 65734

Kemp Quarries - RVM-Butterfield

Contact: LEE DUCHANOIS Iduchanois@kempquarries.com T:

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)

F: