

## **OIL ANALYSIS REPORT**

# Sample Rating Trend

NORMAL



# TTH038

Component **Diesel Engine** 

PETRO CANADA DURON SHP 15W40 (--- 0

### 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.

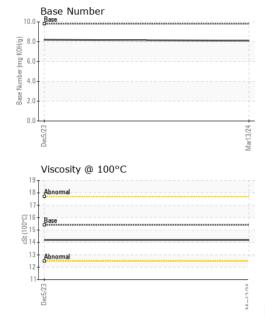
### **Fluid Condition**

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

SAMPLE INFORMATION   method   limit/base   current   history1   history2	AL)						
Content   Cont	<u> </u>	MATION	mothod			history1	history?
Sample Date   Client Info   13 Mar 2024   05 Dec 2023		MATION		IIIIIIVDase			
Machine Age						. 0/100/0012	
Dil Changed	•						
Changed   Changed   Changed   Changed   Changed   Changed   NORMAL   NORMAL   CONTAMINATION   Method   Society   Contamination   Contaminati	•						
CONTAMINATION   method   militibase   current   history1   history2		nrs			-		
CONTAMINATION			Client Info		_	J	
Vicinity   Vicinity	•			11 10 11			
Weight   Wideling		ION					
WEAR METALS							
WEAR METALS         method         limit/base         current         history1         history2           ron         ppm         ASTM D5185m         >100         11         11				>0.2			
Chromium			WC Method		NEG	NEG	
ASTM D5185m	WEAR METAL	.S	method	limit/base	current	history1	history2
Activation							
Silver		ppm					
Silver	lickel	ppm		>4			
ASTM D5185m   >20   2   1		ppm	ASTM D5185m		<1	0	
December   December		ppm	ASTM D5185m	>3	<1	0	
Copper	Aluminum	ppm	ASTM D5185m	>20	2	1	
Acade   Acad	ead	ppm	ASTM D5185m	>40	1	0	
Anadium	Copper	ppm	ASTM D5185m	>330	2	2	
ADDITIVES	- Tin	ppm	ASTM D5185m	>15	1	<1	
ADDITIVES	/anadium	ppm	ASTM D5185m		<1	0	
Soron   ppm   ASTM D5185m   0   3   17	Cadmium	ppm	ASTM D5185m		<1	0	
Description	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum         ppm         ASTM D5185m         60         62         43            Manganese         ppm         ASTM D5185m         0         1         <1	Boron	ppm	ASTM D5185m	0	3	17	
Manganese         ppm         ASTM D5185m         0         1         <1            Magnesium         ppm         ASTM D5185m         1010         939         741            Calcium         ppm         ASTM D5185m         1070         1152         1469            Phosphorus         ppm         ASTM D5185m         1150         1004         1070            Zinc         ppm         ASTM D5185m         1270         1273         1334            Sulfur         ppm         ASTM D5185m         2060         3136         3383            CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         5         4            Goldium         ppm         ASTM D5185m         >20         2         3            Potassium         ppm         ASTM D5185m         >20         2         3            INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844	Barium	ppm	ASTM D5185m	0	1	0	
Magnesium         ppm         ASTM D5185m         1010         939         741            Calcium         ppm         ASTM D5185m         1070         1152         1469            Phosphorus         ppm         ASTM D5185m         1150         1004         1070            Zinc         ppm         ASTM D5185m         1270         1273         1334            Sulfur         ppm         ASTM D5185m         2060         3136         3383            CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         5         4            Sodium         ppm         ASTM D5185m         >20         2         3            Potassium         ppm         ASTM D5185m         >20         2         3            INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7624         >20         8.4         8.3            Sulfation         Abs/.1mm         *ASTM D7414 <td>Molybdenum</td> <td>ppm</td> <td>ASTM D5185m</td> <td>60</td> <td>62</td> <td>43</td> <td></td>	Molybdenum	ppm	ASTM D5185m	60	62	43	
Calcium         ppm         ASTM D5185m         1 070         1152         1469            Phosphorus         ppm         ASTM D5185m         1 150         1004         1 070            Pinc         ppm         ASTM D5185m         1 270         1 273         1 334            Sulfur         ppm         ASTM D5185m         2060         3136         3383            CONTAMINANTS         method         limit/base         current         history1         history2           Solicon         ppm         ASTM D5185m         >25         5         4            Solicon         ppm         ASTM D5185m         >20         2         3            Potassium         ppm         ASTM D5185m         >20         2         3            INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.2         0.2            Sulfation         Abs/.1mm         *ASTM D7415         >30         19.8         20.3            FLUID DEGRADATION         method         <	Manganese	ppm	ASTM D5185m	0	1	<1	
Phosphorus         ppm         ASTM D5185m         1 150         1004         1070            Zinc         ppm         ASTM D5185m         1 270         1273         1 334            Sulfur         ppm         ASTM D5185m         2060         3136         3383            CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         5         4            Sodium         ppm         ASTM D5185m         20         2         3            Potassium         ppm         ASTM D5185m         >20         2         3            INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.2         0.2            Sulfation         Abs/.1mm         *ASTM D7415         >30         19.8         20.3            FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm	//agnesium	ppm	ASTM D5185m	1010	939	741	
Contamination   State   Stat	Calcium	ppm	ASTM D5185m	1070	1152	1469	
Sulfur         ppm         ASTM D5185m         2060         3136         3383            CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         5         4            Godium         ppm         ASTM D5185m         1         1            Potassium         ppm         ASTM D5185m         >20         2         3            INFRA-RED         method         limit/base         current         history1         history2           Goot %         %         *ASTM D7844         >3         0.2         0.2            Sulfration         Abs/cm         *ASTM D7624         >20         8.4         8.3            FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         16.6         16.9	Phosphorus	ppm	ASTM D5185m	1150	1004	1070	
CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         5         4            Sodium         ppm         ASTM D5185m         1         1            Potassium         ppm         ASTM D5185m         >20         2         3            INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.2         0.2            Nitration         Abs/cm         *ASTM D7624         >20         8.4         8.3            Sulfation         Abs/.1mm         *ASTM D7415         >30         19.8         20.3            FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         16.6         16.9	Zinc	ppm	ASTM D5185m	1270	1273	1334	
Solicon   ppm   ASTM D5185m   >25   5   4     Solicon   ppm   ASTM D5185m   1   1   1     Potassium   ppm   ASTM D5185m   >20   2   3       INFRA-RED   method   limit/base   current   history1   history2   Solot %   % *ASTM D7844   >3   0.2   0.2     Solitration   Abs/cm *ASTM D7624   >20   8.4   8.3     Solifation   Abs/.1mm *ASTM D7415   >30   19.8   20.3     Solifation   Abs/.1mm *ASTM D7414   >25   16.6   16.9     Solidation   A	Sulfur	ppm	ASTM D5185m	2060	3136	3383	
Sodium	CONTAMINAN	ITS	method	limit/base	current	history1	history2
Potassium         ppm         ASTM D5185m         >20         2         3            INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.2         0.2            Vitration         Abs/cm         *ASTM D7624         >20         8.4         8.3            Sulfation         Abs/.1mm         *ASTM D7415         >30         19.8         20.3            FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         16.6         16.9	Silicon	ppm	ASTM D5185m	>25	5	4	
INFRA-RED	Sodium	ppm	ASTM D5185m		1	1	
Goot %         %         *ASTM D7844         >3         0.2         0.2            Nitration         Abs/cm         *ASTM D7624         >20         8.4         8.3            Sulfation         Abs/.1mm         *ASTM D7415         >30         19.8         20.3            FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         16.6         16.9	Potassium	ppm	ASTM D5185m	>20	2	3	
Abs/cm   *ASTM D7624   >20   8.4   8.3       Sulfation   Abs/.1mm   *ASTM D7415   >30   19.8   20.3       FLUID DEGRADATION   method   limit/base   current   history1   history2     Dividation   Abs/.1mm   *ASTM D7414   >25   16.6   16.9	INFRA-RED		method	limit/base	current	history1	history2
Sulfation         Abs/.1mm         *ASTM D7415         >30         19.8         20.3            FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         16.6         16.9	Soot %	%	*ASTM D7844	>3	0.2	0.2	
Sulfation         Abs/.1mm         *ASTM D7415         >30         19.8         20.3            FLUID DEGRADATION         method         limit/base         current         history1         history2           Dxidation         Abs/.1mm         *ASTM D7414         >25         16.6         16.9	Nitration	Abs/cm	*ASTM D7624	>20	8.4	8.3	
Oxidation Abs/.1mm *ASTM D7414 >25 <b>16.6</b> 16.9	Sulfation	Abs/.1mm	*ASTM D7415	>30		20.3	
	FLUID DEGRA	NOITAC	method	limit/base	current	history1	history2
		Abs/.1mm	*ASTM D7414	>25	16.6	16.9	
	Base Number (BN)	mg KOH/g	ASTM D2896		8.1	8.2	



### **OIL ANALYSIS REPORT**



VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE	
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	
Precipitate	scalar	*Visual	NONE	NONE	NONE	
Silt	scalar	*Visual	NONE	NONE	NONE	
Debris	scalar	*Visual	NONE	NONE	NONE	
Sand/Dirt	scalar	*Visual	NONE	NONE	NONE	
Appearance	scalar	*Visual	NORML	NORML	NORML	
Odor	scalar	*Visual	NORML	NORML	NORML	
<b>Emulsified Water</b>	scalar	*Visual	>0.2	NEG	NEG	
Free Water	scalar	*Visual		NEG	NEG	
FLUID PROPE	RTIES	method	limit/base	current	history1	history2
Visc @ 100°C	cSt	ASTM D445	15.4	14.2	14.2	

Visc @ 100°C	cSt	ASTM D445	15.4	14.2	14.2		
GRAPHS							
Iron (ppm)				Lead (ppm)			
Severe				80 Severe			
Abnormal				E GO Abnormal			
100 - Abnormal		***************************************		Abnormal			
50				20			
Dec5/23 1			Mar13/24	Dec5/23		600	3/24
			Mari			2	Mar
Aluminum (ppm)				Chromium (	ppm)		
40 Severe				40 Severe			
Abnormal				Abnormal			
10		***************************************	-	20	***************************************		
0				0			-
Dec5/23			Mar13/24	Dec5/23		200	Mar I 3/24
Copper (ppm)			×	Silicon (ppm	)	2	Š
400 Severe Publicational				80 Severe	· · · · · · · · · · · · · · · · · · ·		-
300				60+			
튎 200 -				E 40			
100-				Abnormal			-
0 23			24	0		20	1 + 7
Dec5/23			Mar13/24	Dec5/23		200	Mari 3/24
Viscosity @ 100°	С			Base Numbe	er		
Abnormal							
				8.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0			
Base  Abnormal				4.0 +			
12 +				2.0			
Dec5/23			Mar13/24 +	Dec5/23 +1		200	Mari 3/24
Dec			Mar1	Dec		2	Mar





Laboratory

Unique Number : 10941624

**Sample No.** : PCA0109004 Lab Number : 06127473

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 Received : 25 Mar 2024 **Tested** : 26 Mar 2024

Diagnosed : 27 Mar 2024 - Don Baldridge Test Package: MOB 1 (Additional Tests: TBN)

3395 W 50th St N Porter, OK US 74454

Contact: muskogee@muskogeesand.com

Kemp Quarries - Muskogee Sand

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)

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F: