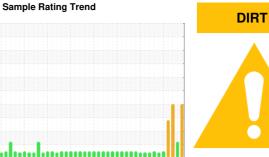


OIL ANALYSIS REPORT





Component **Diesel Engine**

PETRO CANADA DURON SHP 15W40 (10 GAL)

DIAGNOSIS

Recommendation

We advise that you check for the source of the coolant leak. Check for low coolant level. 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

Sodium and/or potassium levels are high. Elemental level of silicon (Si) above normal indicating ingress of seal material.

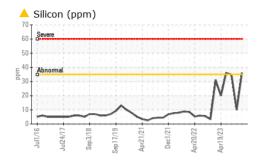
▲ Fluid Condition

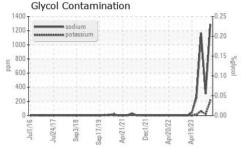
The BN result indicates that there is suitable alkalinity remaining in the oil.

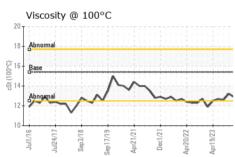
SAMPLE INFORMATION method limit/base current history1 history2	2016 Ju2017 Sep2018 Sep2019 Apr2021 Dec2021 Apr2022 Apr2023								
Sample Date Client Info 15 Mar 2024 09 Jan 2024 23 Oct 2023 Machine Age hrs Client Info 24861 24499 23928 Oil Age hrs Client Info 362 600 600 Oil Changed Client Info Changed Changed Changed Changed Sample Status Client Info Changed ABNORMAL ABNORMAL ABNORMAL ABNORMAL CONTAMINATION method limit/base current history1 history2 WEAR WC Method >0.2 1.0 <1.0	SAMPLE INFOR	MATION	method	limit/base	current	history1	history2		
Machine Age hrs Client Info 24861 24499 23928 Oil Age hrs Client Info 362 600 600 Oil Changed Client Info Changed Changed Changed Changed Sample Status Location Location ABNORMAL ABNORMAL ABNORMAL CONTAMINATION method limit/base current history1 history2 Fuel WC Method >3.0 <1.0	Sample Number		Client Info		PCA0113462	PCA0101776	PCA0095856		
Machine Age hrs Client Info 362 600 600 Oil Age hrs Client Info 362 600 600 Oil Changed Client Info Changed			Client Info		15 Mar 2024	09 Jan 2024	23 Oct 2023		
Oil Changed Sample Status Client Info Changed ABNORMAL ABNORMA		hrs	Client Info		24861	24499	23928		
Oil Changed Sample Status Client Info Changed ABNORMAL ABNORMA	Oil Age	hrs	Client Info		362	600	600		
ABNORMAL ABNORMAL ABNORMAL CONTAMINATION method imit/base current history1 history2	-				Changed	Changed	Changed		
Fuel WC Method 30.0 <1.0 <1.0 <1.0 NEG NEG NEG	-				_	ABNORMAL	ABNORMAL		
Water WC Method >0.2 NEG NEG NEG WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >165 55 8 66 Chromium ppm ASTM D5185m >4 0 <1	CONTAMINAT	ION	method	limit/base	current	history1	history2		
WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >165 55 8 66 Chromium ppm ASTM D5185m >5 <1	Fuel		WC Method	>3.0	<1.0	<1.0	<1.0		
Iron	Water		WC Method	>0.2	NEG	NEG	NEG		
Chromium ppm ASTM D5185m >5 <1 <1 2 Nickel ppm ASTM D5185m >4 0 <1	WEAR METAL	.S	method	limit/base	current	history1	history2		
Nickel	Iron	ppm	ASTM D5185m	>165	55	8	66		
Titanium ppm ASTM D5185m >2 0 0 <1 Silver ppm ASTM D5185m >2 0 0 0 Aluminum ppm ASTM D5185m >20 5 2 6 Lead ppm ASTM D5185m >90 12 4 15 Copper ppm ASTM D5185m >90 12 4 15 Tin ppm ASTM D5185m >0 <1	Chromium	ppm	ASTM D5185m	>5	<1	<1	2		
Silver ppm ASTM D5185m >2 0 0 0 Aluminum ppm ASTM D5185m >20 5 2 6 Lead ppm ASTM D5185m >150 1 1 18 Copper ppm ASTM D5185m >90 12 4 15 Tin ppm ASTM D5185m 0 <1 <1 1 Vanadium ppm ASTM D5185m 0 <1 <1 <1 Vanadium ppm ASTM D5185m 0 <1 <1 <1 Cadmium ppm ASTM D5185m 0 <1 <0 <1 Boron ppm ASTM D5185m 0 27 20 22 2 Barium ppm ASTM D5185m 0 27 20 22 2 Barium ppm ASTM D5185m 0 151 72 119 3 119 4 4 1	Nickel	ppm	ASTM D5185m	>4	0	<1	<1		
Aluminum ppm ASTM D5185m >20 5 2 6 Lead ppm ASTM D5185m >150 1 1 18 Copper ppm ASTM D5185m >90 12 4 15 Tin ppm ASTM D5185m 0 <1	Titanium	ppm	ASTM D5185m	>2	0	0	<1		
Lead ppm ASTM D5185m >150 1 1 18 Copper ppm ASTM D5185m >90 12 4 15 Tin ppm ASTM D5185m >5 0 <1 <1 Vanadium ppm ASTM D5185m 0 <1 0 Cadmium ppm ASTM D5185m 0 0 <1 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 27 20 22 Barium ppm ASTM D5185m 0 <1 0 3 Molybdenum ppm ASTM D5185m 0 <1 1 0 3 Molybdenum ppm ASTM D5185m 0 <1 1 7 119 Manganese ppm ASTM D5185m 0 0 <1 <1 <1 Calcium ppm ASTM D5185m 1010	Silver	ppm	ASTM D5185m	>2	0	0	0		
Copper ppm ASTM D5185m >90 12 4 15 Tin ppm ASTM D5185m >5 0 <1	Aluminum	ppm	ASTM D5185m	>20	5	2	6		
Tin ppm ASTM D5185m >5 0 <1 <1 Vanadium ppm ASTM D5185m 0 <1 0 Cadmium ppm ASTM D5185m 0 0 <1 0 ADDITIVES method limit/base current history1 history2 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 27 20 22 Barium ppm ASTM D5185m 0 151 72 119 Manganese ppm ASTM D5185m 0 0 <1 <1 Magnesium ppm ASTM D5185m 1010 1124 693 812 Calcium ppm ASTM D5185m 1070 2297 1253 1236 Phosphorus ppm ASTM D5185m 1270 1952 1181	Lead	ppm	ASTM D5185m	>150	1	1	18		
Vanadium ppm ASTM D5185m 0 <1 0 Cadmium ppm ASTM D5185m 0 0 <1 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 27 20 22 Barium ppm ASTM D5185m 0 <1 0 3 Molybdenum ppm ASTM D5185m 0 0 <1 <1 119 Manganese ppm ASTM D5185m 0 0 <1 <1 <1 Magnesium ppm ASTM D5185m 1010 1124 693 812 Calcium ppm ASTM D5185m 1070 2297 1253 1236 Phosphorus ppm ASTM D5185m 1150 1661 957 983 Zilico ppm ASTM D5185m 2060 5656 3176 3313	Copper	ppm	ASTM D5185m	>90	12	4	15		
Cadmium ppm ASTM D5185m 0 0 <1 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 27 20 22 Barium ppm ASTM D5185m 0 <1	Tin	ppm	ASTM D5185m	>5	0	<1	<1		
ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 27 20 22 Barium ppm ASTM D5185m 0 <1	Vanadium	ppm	ASTM D5185m		0	<1	0		
Boron ppm ASTM D5185m 0 27 20 22 Barium ppm ASTM D5185m 0 <1 0 3 Molybdenum ppm ASTM D5185m 60 151 72 119 Manganese ppm ASTM D5185m 0 0 <1 <1 Magnesium ppm ASTM D5185m 1010 1124 693 812 Calcium ppm ASTM D5185m 1070 2297 1253 1236 Phosphorus ppm ASTM D5185m 1070 297 1253 1236 Phosphorus ppm ASTM D5185m 1270 1952 1181 1218 Sulfur ppm ASTM D5185m 2060 5656 3176 3313 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >35 \$36 10 \$35 Sodium ppm ASTM D5185m <td>Cadmium</td> <td>ppm</td> <td>ASTM D5185m</td> <td></td> <th>0</th> <td>0</td> <td><1</td>	Cadmium	ppm	ASTM D5185m		0	0	<1		
Barium ppm ASTM D5185m 0 <1	ADDITIVES		method	limit/base	current	history1	history2		
Molybdenum ppm ASTM D5185m 60 151 72 119 Manganese ppm ASTM D5185m 0 0 <1 <1 Magnesium ppm ASTM D5185m 1010 1124 693 812 Calcium ppm ASTM D5185m 1070 2297 1253 1236 Phosphorus ppm ASTM D5185m 1070 1661 957 983 Zinc ppm ASTM D5185m 1270 1952 1181 1218 Sulfur ppm ASTM D5185m 2060 5656 3176 3313 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >35 ▲ 36 10 ▲ 35 Sodium ppm ASTM D5185m >20 ▲ 1287 ▲ 309 ▲ 1165 Potassium ppm ASTM D5185m >20 ▲ 215 19 ▲ 60 Glycol %<	Boron	ppm	ASTM D5185m	0	27	20	22		
Manganese ppm ASTM D5185m 0 0 <1 <1 Magnesium ppm ASTM D5185m 1010 1124 693 812 Calcium ppm ASTM D5185m 1070 2297 1253 1236 Phosphorus ppm ASTM D5185m 1150 1661 957 983 Zinc ppm ASTM D5185m 1270 1952 1181 1218 Sulfur ppm ASTM D5185m 2060 5656 3176 3313 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >35 ▲ 36 10 ▲ 35 Sodium ppm ASTM D5185m >30 1287 ▲ 309 ▲ 1165 Potassium ppm ASTM D5185m >20 ▲ 215 19 ▲ 60 Glycol % *ASTM D2982 NEG NEG NEG INFRA-RED method li		ppm	ASTM D5185m	0	<1	0	3		
Magnesium ppm ASTM D5185m 1010 1124 693 812 Calcium ppm ASTM D5185m 1070 2297 1253 1236 Phosphorus ppm ASTM D5185m 1150 1661 957 983 Zinc ppm ASTM D5185m 1270 1952 1181 1218 Sulfur ppm ASTM D5185m 2060 5656 3176 3313 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >35 ▲ 36 10 ▲ 35 Sodium ppm ASTM D5185m >35 ▲ 36 10 ▲ 35 Potassium ppm ASTM D5185m >20 ▲ 215 19 ▲ 60 Glycol % *ASTM D5185m >20 ▲ 215 19 ▲ 60 INFRA-RED method limit/base current history1 history2 Soot % %	Molybdenum	ppm	ASTM D5185m	60	151	72	119		
Calcium ppm ASTM D5185m 1070 2297 1253 1236 Phosphorus ppm ASTM D5185m 1150 1661 957 983 Zinc ppm ASTM D5185m 1270 1952 1181 1218 Sulfur ppm ASTM D5185m 2060 5656 3176 3313 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >35 ▲ 36 10 ▲ 35 Sodium ppm ASTM D5185m >30 1287 ▲ 309 ▲ 1165 Potassium ppm ASTM D5185m >20 ▲ 215 19 ▲ 60 Glycol % *ASTM D5185m >20 ▲ 215 19 ▲ 60 REG NEG NEG NEG NEG INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >7.5 0.5	Manganese	ppm	ASTM D5185m	0	0	<1	<1		
Phosphorus ppm ASTM D5185m 1150 1661 957 983 Zinc ppm ASTM D5185m 1270 1952 1181 1218 Sulfur ppm ASTM D5185m 2060 5656 3176 3313 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >35 ▲ 36 10 ▲ 35 Sodium ppm ASTM D5185m >30 ▲ 1287 ▲ 309 ▲ 1165 Potassium ppm ASTM D5185m >20 ▲ 215 19 ▲ 60 Glycol % *ASTM D5185m >20 ▲ 215 19 ▲ 60 Glycol % *ASTM D2982 NEG NEG NEG INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7624 >20 11.0 7.2 13.4 Sulfation Abs/.1mm *ASTM	Magnesium	ppm	ASTM D5185m	1010	1124	693	812		
Zinc ppm ASTM D5185m 1270 1952 1181 1218 Sulfur ppm ASTM D5185m 2060 5656 3176 3313 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >35 ▲ 36 10 ▲ 35 Sodium ppm ASTM D5185m >35 ▲ 1287 ▲ 309 ▲ 1165 Potassium ppm ASTM D5185m >20 ▲ 215 19 ♠ 60 Glycol % *ASTM D2982 NEG NEG NEG INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >7.5 0.5 0.2 0.9 Nitration Abs/cm *ASTM D7624 >20 11.0 7.2 13.4 Sulfation Abs/.1mm *ASTM D7415 >30 21.2 18.1 23.6 FLUID DEGRADATION method	Calcium	ppm	ASTM D5185m	1070	2297	1253	1236		
Sulfur ppm ASTM D5185m 2060 5656 3176 3313 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >35 ▲ 36 10 ▲ 35 Sodium ppm ASTM D5185m > 20 ▲ 1287 ▲ 309 ▲ 1165 Potassium ppm ASTM D5185m > 20 ▲ 215 19 ♠ 60 Glycol % *ASTM D2982 NEG NEG NEG INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 > 7.5 0.5 0.2 0.9 Nitration Abs/cm *ASTM D7624 > 20 11.0 7.2 13.4 Sulfation Abs/.1mm *ASTM D7415 > 30 21.2 18.1 23.6 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm <t< td=""><td>Phosphorus</td><td>ppm</td><td>ASTM D5185m</td><td>1150</td><th>1661</th><td>957</td><td>983</td></t<>	Phosphorus	ppm	ASTM D5185m	1150	1661	957	983		
CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >35 ▲ 36 10 ▲ 35 Sodium ppm ASTM D5185m ▲ 1287 ▲ 309 ▲ 1165 Potassium ppm ASTM D5185m >20 ▲ 215 19 ▲ 60 Glycol % *ASTM D2982 NEG NEG NEG INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >7.5 0.5 0.2 0.9 Nitration Abs/cm *ASTM D7624 >20 11.0 7.2 13.4 Sulfation Abs/.1mm *ASTM D7415 >30 21.2 18.1 23.6 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 16.7 13.2 18.5	Zinc	ppm	ASTM D5185m	1270	1952	1181	1218		
Silicon ppm ASTM D5185m >35 ▲ 36 10 ▲ 35 Sodium ppm ASTM D5185m ► 1287 ▲ 309 ▲ 1165 Potassium ppm ASTM D5185m >20 ▲ 215 19 ▲ 60 Glycol % *ASTM D2982 NEG NEG NEG INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >7.5 0.5 0.2 0.9 Nitration Abs/cm *ASTM D7624 >20 11.0 7.2 13.4 Sulfation Abs/.1mm *ASTM D7415 >30 21.2 18.1 23.6 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 16.7 13.2 18.5	Sulfur	ppm	ASTM D5185m	2060	5656	3176	3313		
Sodium ppm ASTM D5185m ▲ 1287 ▲ 309 ▲ 1165 Potassium ppm ASTM D5185m >20 ▲ 215 19 ▲ 60 Glycol % *ASTM D2982 NEG NEG NEG INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >7.5 0.5 0.2 0.9 Nitration Abs/cm *ASTM D7624 >20 11.0 7.2 13.4 Sulfation Abs/.1mm *ASTM D7415 >30 21.2 18.1 23.6 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 16.7 13.2 18.5	CONTAMINAN	ITS	method	limit/base	current	history1	history2		
Potassium ppm ASTM D5185m >20 ▲ 215 19 ▲ 60 Glycol % *ASTM D2982 NEG NEG NEG INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >7.5 0.5 0.2 0.9 Nitration Abs/cm *ASTM D7624 >20 11.0 7.2 13.4 Sulfation Abs/.1mm *ASTM D7415 >30 21.2 18.1 23.6 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 16.7 13.2 18.5	Silicon	ppm	ASTM D5185m	>35	▲ 36	10	△ 35		
Glycol % *ASTM D2982 NEG NEG NEG INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >7.5 0.5 0.2 0.9 Nitration Abs/cm *ASTM D7624 >20 11.0 7.2 13.4 Sulfation Abs/.1mm *ASTM D7415 >30 21.2 18.1 23.6 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 16.7 13.2 18.5	Sodium	ppm	ASTM D5185m		<u> </u>	▲ 309	<u></u> 1165		
INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >7.5 0.5 0.2 0.9 Nitration Abs/cm *ASTM D7624 >20 11.0 7.2 13.4 Sulfation Abs/.1mm *ASTM D7415 >30 21.2 18.1 23.6 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 16.7 13.2 18.5	Potassium	ppm	ASTM D5185m	>20	<u> </u>	19	6 0		
Soot % % *ASTM D7844 >7.5 0.5 0.2 0.9 Nitration Abs/cm *ASTM D7624 >20 11.0 7.2 13.4 Sulfation Abs/.1mm *ASTM D7415 >30 21.2 18.1 23.6 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 16.7 13.2 18.5	Glycol	%	*ASTM D2982		NEG	NEG	NEG		
Nitration Abs/cm *ASTM D7624 >20 11.0 7.2 13.4 Sulfation Abs/.1mm *ASTM D7415 >30 21.2 18.1 23.6 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 16.7 13.2 18.5	INFRA-RED		method	limit/base	current	history1	history2		
Sulfation Abs/.1mm *ASTM D7415 >30 21.2 18.1 23.6 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 16.7 13.2 18.5	Soot %	%	*ASTM D7844	>7.5	0.5	0.2	0.9		
FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 16.7 13.2 18.5	Nitration	Abs/cm	*ASTM D7624	>20	11.0	7.2	13.4		
Oxidation Abs/.1mm *ASTM D7414 >25 16.7 13.2 18.5	Sulfation	Abs/.1mm	*ASTM D7415	>30	21.2	18.1	23.6		
	FLUID DEGRAI	NOITAC	method	limit/base	current	history1	history2		
Base Number (BN) mg KOH/g ASTM D2896 9.8 8.6 8.9 9.2	Oxidation	Abs/.1mm	*ASTM D7414	>25	16.7	13.2	18.5		
	Base Number (BN)	mg KOH/g	ASTM D2896	9.8	8.6	8.9	9.2		

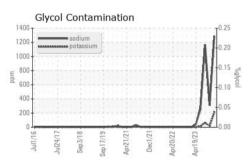


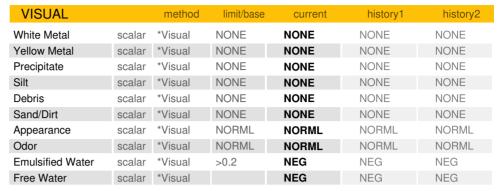
OIL ANALYSIS REPORT





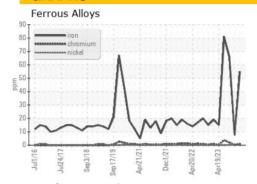


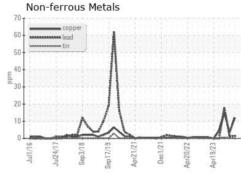


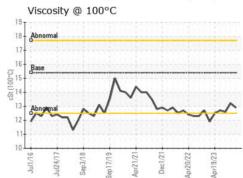


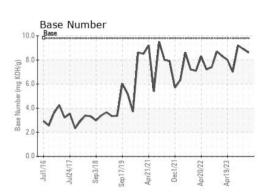
FLUID PROPE	RHES	method	limit/base	current	history1	history2
Visc @ 100°C	cSt	ASTM D445	15.4	12.9	13.2	12.6

GRAPHS













Certificate L2367

Laboratory Sample No. Lab Number

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

: PCA0113462 : 06120634

Received **Unique Number** : 10929467

Tested Diagnosed Test Package: FLEET (Additional Tests: Glycol)

: 18 Mar 2024 : 20 Mar 2024

: 20 Mar 2024 - Jonathan Hester

GFL Environmental - 002 - Vance-Granville

241 Vanco Mill Rd Henderson, NC US 27537

Contact: Cameron King cameron.king@gflenv.com

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: (252)431-1635

Submitted By: Cameron King

T: (252)438-5333