

## **OIL ANALYSIS REPORT**

### Area Tri State [Tri State] Oil - Starboard Reduction Gear Component

**Starboard Reduction Gear DIESEL ENGINE OIL SAE 40 (8 GAL)** 

#### Recommendation

Resample at the next service interval to monitor. Please specify the brand, type, and viscosity of the oil on your next sample.

### Wear

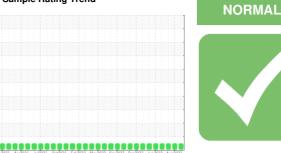
All component wear rates are normal.

#### Contamination

The water content is negligible. There is no indication of any contamination in the oil.

#### Fluid Condition

The AN level is acceptable for this fluid. The condition of the oil is suitable for further service.





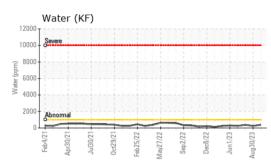
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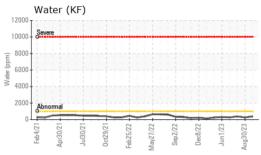
Sample Rating Trend

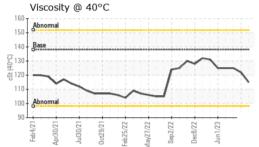
SAMPLE INFORM	IATION	method	limit/base	current	history1	history2
Sample Number		Client Info		WC0846094	WC0805269	WC0769163
Sample Date		Client Info		30 Oct 2023	30 Aug 2023	27 Jul 2023
Machine Age	hrs	Client Info		19493	18404	0
Oil Age	hrs	Client Info		1812	723	4440
Oil Changed		Client Info		Changed	Oil Added	Changed
Sample Status				NORMAL	NORMAL	NORMAL
WEAR METALS		method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m	>150	3	5	8
Chromium	ppm	ASTM D5185m	>10	0	<1	<1
Nickel	ppm	ASTM D5185m	>10	0	0	0
Titanium	ppm	ASTM D5185m		<1	2	4
Silver	ppm	ASTM D5185m		0	0	0
Aluminum	ppm	ASTM D5185m	>25	0	<1	0
Lead	ppm	ASTM D5185m	>100	0	0	<1
Copper	ppm	ASTM D5185m	>50	1	1	2
Tin	ppm	ASTM D5185m	>10	0	0	0
Vanadium	ppm	ASTM D5185m		0	0	<1
Cadmium	ppm	ASTM D5185m		0	0	<1
ADDITIVES		method	limit/base	current	history1	history2
ADDITIVES Boron	ppm	method ASTM D5185m	limit/base 250	current 5	history1 5	history2 10
	ppm ppm				,	
Boron		ASTM D5185m	250	5	5	10
Boron Barium	ppm	ASTM D5185m ASTM D5185m	250 10	5 0	5	10 0
Boron Barium Molybdenum	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m	250 10	5 0 38	5 0 37	10 0 34
Boron Barium Molybdenum Manganese	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100	5 0 38 <1	5 0 37 <1	10 0 34 <1
Boron Barium Molybdenum Manganese Magnesium	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450	5 0 38 <1 625	5 0 37 <1 653	10 0 34 <1 567
Boron Barium Molybdenum Manganese Magnesium Calcium	ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450 3000	5 0 38 <1 625 858	5 0 37 <1 653 975	10 0 34 <1 567 1308
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus	ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150	5 0 38 <1 625 858 800	5 0 37 <1 653 975 838	10 0 34 <1 567 1308 817
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	250 10 100 450 3000 1150 1350	5 0 38 <1 625 858 800 879	5 0 37 <1 653 975 838 1003	10 0 34 <1 567 1308 817 954
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	250 10 100 450 3000 1150 1350 4250	5 0 38 <1 625 858 800 879 2374	5 0 37 <1 653 975 838 1003 3171	10 0 34 <1 567 1308 817 954 3357
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS	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	5 0 38 <1 625 858 800 879 2374 current	5 0 37 <1 653 975 838 1003 3171 history1	10 0 34 <1 567 1308 817 954 3357 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m <b>method</b>	250 10 100 450 3000 1150 1350 4250 <b>limit/base</b> >50	5 0 38 <1 625 858 800 879 2374 current 2	5 0 37 <1 653 975 838 1003 3171 history1 2	10 0 34 <1 567 1308 817 954 3357 history2 2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m <b>method</b> ASTM D5185m	250 10 100 450 3000 1150 1350 4250 <b>limit/base</b> >50 >216	5 0 38 <1 625 858 800 879 2374 2374 current 2 2 2	5 0 37 <1 653 975 838 1003 3171 history1 2 3	10 0 34 <1 567 1308 817 954 3357 history2 2 3
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150 1350 4250 <b>imit/base</b> >50 >216 >20	5 0 38 <1 625 858 800 879 2374 2374 current 2 2 2 2	5 0 37 <1 653 975 838 1003 3171 history1 2 3 3 <1	10 0 34 <1 567 1308 817 954 3357 history2 2 3 2 2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Water	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150 1350 4250 <b>binit/base</b> >50 >216 >20 >0.1	5 0 38 <1 625 858 800 879 2374 <u>current</u> 2 2 2 2 2 2 0.037	5 0 37 <1 653 975 838 1003 3171 <u>history1</u> 2 3 <1 0.025	10 0 34 <1 567 1308 817 954 3357 history2 2 3 2 3 2 0.036



# **OIL ANALYSIS REPORT**







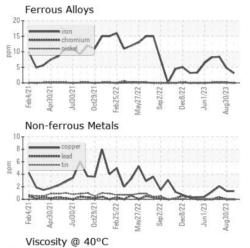
VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual	NONE	NONE	NONE	NONE
Appearance	scalar	*Visual	NORML	NORML	NORML	NORML
Odor	scalar	*Visual	NORML	NORML	NORML	NORML
Emulsified Water	scalar	*Visual	>0.1	NEG	NEG	NEG
Free Water	scalar	*Visual		NEG	NEG	NEG
FLUID PROPERT	IES	method	limit/base	current	history1	history2
Visc @ 40°C	cSt	ASTM D445	138	115	122	125
SAMPLE IMAGES	S	method	limit/base	current	history1	history2

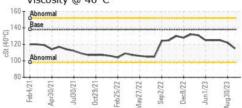
Color



Bottom







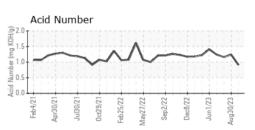
Received

Diagnosed

Diagnostician : Wes Davis

:01 Nov 2023

: 02 Nov 2023



MARATHON PETROLEUM CO. : WearCheck USA - 501 Madison Ave., Cary, NC 27513 101 12TH ST CATLETTSBURG, KY US 41169 Contact: CORY GUMBERT cagumbert@marathonpetroleum.com T: (606)585-3950 F: x: Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012)



Report Id: MARCAT [WUSCAR] 05995693 (Generated: 11/02/2023 15:45:50) Rev: 1

Certificate L2367

Laboratory

Sample No.

Lab Number

Unique Number

: WC0846094

Test Package : IND 2 (Additional Tests: KF)

\* - Denotes test methods that are outside of the ISO 17025 scope of accreditation.

: 05995693

: 10724053

To discuss this sample report, contact Customer Service at 1-800-237-1369.

Submitted By: M/V MAP RUNNER