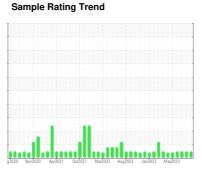


## **OIL ANALYSIS REPORT**

# Detroit Machine Id [Detroit] Oil - Starboard Genset

**Starboard Genset** 

**MOBIL 15W40 (35 GAL)** 





#### DIAGNOSIS

#### Recommendation

Resample at the next service interval to monitor.

#### Wear

All component wear rates are normal.

#### Contamination

There is no indication of any contamination in the oil

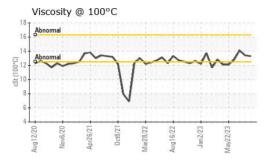
### **Fluid Condition**

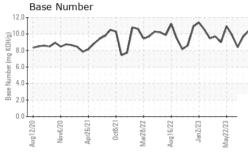
The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

Sample Number   Client Info   WC0769338   WC0769396   WC0769391   Sample Date   Client Info   11 Sep 2023   14 Aug 2023   17 Jul 2023   Machine Age   hrs   Client Info   4   501   1   1   1   1   1   1   1   1   1	SAMPLE INFORM	MATION	method	limit/base	current	history1	history2
Machine Age         hrs         Client Info         7023         6738         6237           Oil Age         hrs         Client Info         4         501         1           Oil Changed         Client Info         N/A         Not Changd         Diff Oil Sample Status           Sample Status         Image: Client Info         NORMAL         NORMAL         NORMAL           VORMAL         NORMAL         NORMAL         NORMAL         NORMAL           VORD         Will More Mark         Image: Current Mistory1         history2           Fuel         WC Method         4-0         <1.0         <1.0           Glycol         WC Method         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM DS186m         >4         0         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1	Sample Number		Client Info		WC0769338	WC0769396	WC0769391
Machine Age         hrs         Client Info         7023         6738         6237           Oil Age         hrs         Client Info         4         501         1           Oil Changed         Client Info         N/A         Not Changd         Diff Oil Sample Status           Sample Status         Image: Client Info         NORMAL         NORMAL         NORMAL           VORMAL         NORMAL         NORMAL         NORMAL         NORMAL           VORD         Will More Mark         Image: Current Mistory1         history2           Fuel         WC Method         4-0         <1.0         <1.0           Glycol         WC Method         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM DS186m         >4         0         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1			Client Info		11 Sep 2023	14 Aug 2023	17 Jul 2023
Oil Age         hrs         Client Info         N/A         Not Changd Diff Oil NORMAL         Nor Changd NORMAL         Diff Oil NORMAL           Sample Status         WC Method Sample Status         Current         Mistory1         history2           Fuel         WC Method Glycol         WC Method WC Method NEG         NEG         NEG         NEG           WEAR METALS         method Imit/base         current         history1         history2           Iron         ppm         ASTM DS185m         >50         4         15         2           Chromium         ppm         ASTM DS185m         >4         0         <1         <1           Nickel         ppm         ASTM DS185m         >2         <1         0         <1           Silver         ppm         ASTM DS185m         >2         <1         0         <1           Silver         ppm         ASTM DS185m         >5         0         0         0           Silver         ppm         ASTM DS185m         >12         <1         4         3           Lead         ppm         ASTM DS185m         >10         0         0         0           Copper         ppm         ASTM DS185m         70 </th <th>•</th> <th>hrs</th> <th></th> <th></th> <th>•</th> <th></th> <th></th>	•	hrs			•		
Oil Changed Sample Status         Client Info         N/A         NORMAL         NORMAL         Diff Oil NORMAL           CONTAMINATION         method         limit/base         current         history1         history2           Fuel         WC Method         >4.0         <1.0         <1.0         <1.0           Glycol         WC Method         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM 05185m         >50         4         15         2           Chromium         ppm         ASTM 05185m         >4         0         <1         <1           Nickel         ppm         ASTM 05185m         >2         <1         0         0           Aluminum         ppm         ASTM 05185m         >2         <1         0         0           Aluminum         ppm         ASTM 05185m         >12         <1         4         3           Lead         ppm         ASTM 05185m         >17         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1		hrs	Client Info				
Sample Status	•		Client Info		N/A	Not Changd	Diff Oil
CONTAMINATION         method         limit/base         current         history1         history2           Fuel         WC Method         4.0         <1.0         <1.0         <1.0         <1.0           Glycol         WC Method         NEG         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >50         4         15         2           Chromium         ppm         ASTM D5185m         >4         0         <1         <1           Nickel         ppm         ASTM D5185m         >2         <1         0         <1           Silver         ppm         ASTM D5185m         >12         <1         4         3           Lead         ppm         ASTM D5185m         >17         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1<					NORMAL	_	NORMAL
Fuel		١	method	limit/base	current		history2
WEAR METALS			WC Method	>4.0	<1.0		
WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >50         4         15         2           Chromium         ppm         ASTM D5185m         >4         0         <1         <1           Nickel         ppm         ASTM D5185m         >2         <1         0         <1           Silver         ppm         ASTM D5185m         >5         0         0         0           Aluminum         ppm         ASTM D5185m         >12         <1         4         3           Lead         ppm         ASTM D5185m         >12         <1         4         3           Lead         ppm         ASTM D5185m         >12         <1         4         3           Lead         ppm         ASTM D5185m         >15         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1				7 1.0			
Iron	,			limit/base		-	
Chromium         ppm         ASTM D5185m         >4         0         <1							
Nickel	-						
Titanium					-		
Silver				>2			
Aluminum				_			
Lead							
Copper         ppm         ASTM D5185m         >70         <1							
Tin         ppm         ASTM D5185m         >15         <1							
Vanadium         ppm         ASTM D5185m         0         0         0           Cadmium         ppm         ASTM D5185m         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         105         82         102           Barium         ppm         ASTM D5185m         0         0         2           Molybdenum         ppm         ASTM D5185m         23         25         24           Manganese         ppm         ASTM D5185m         283         304         263           Calcium         ppm         ASTM D5185m         283         304         263           Calcium         ppm         ASTM D5185m         283         304         263           Calcium         ppm         ASTM D5185m         287         500         455           Silico         ppm         ASTM D5185m         487         500         455           Sulfur         ppm         ASTM D5185m         4243         4913         4152           CONTAMINANTS         method         limit/base         current         history1         histor	• •	ppm					
Cadmium         ppm         ASTM D5185m         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         105         82         102           Barium         ppm         ASTM D5185m         0         0         2           Molybdenum         ppm         ASTM D5185m         23         25         24           Manganese         ppm         ASTM D5185m         283         304         263           Calcium         ppm         ASTM D5185m         283         304         263           Calcium         ppm         ASTM D5185m         2377         2601         2336           Phosphorus         ppm         ASTM D5185m         487         500         455           Zinc         ppm         ASTM D5185m         569         619         554           Sulfur         ppm         ASTM D5185m         22         6         2         13           Sodium         ppm         ASTM D5185m         >25         6         2         13           Sodium         ppm         ASTM D5185m         >20         <1				>15			
ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         105         82         102           Barium         ppm         ASTM D5185m         0         0         2           Molybdenum         ppm         ASTM D5185m         23         25         24           Manganese         ppm         ASTM D5185m         <1         <1         0           Magnesium         ppm         ASTM D5185m         283         304         263           Calcium         ppm         ASTM D5185m         2377         2601         2336           Phosphorus         ppm         ASTM D5185m         487         500         455           Zinc         ppm         ASTM D5185m         569         619         554           Sulfur         ppm         ASTM D5185m         >25         6         2         13           Sodium         ppm         ASTM D5185m         >25         6         2         13           Sodium         ppm         ASTM D5185m         >20         <1         <1         2           InFRA-RED         method         limit/base         cur		ppm			-		
Boron	Cadmium	ppm	ASTM D5185m		0	0	0
Barium         ppm         ASTM D5185m         0         0         2           Molybdenum         ppm         ASTM D5185m         23         25         24           Manganese         ppm         ASTM D5185m         <1         <1         0           Magnesium         ppm         ASTM D5185m         283         304         263           Calcium         ppm         ASTM D5185m         2377         2601         2336           Phosphorus         ppm         ASTM D5185m         487         500         455           Zinc         ppm         ASTM D5185m         569         619         554           Sulfur         ppm         ASTM D5185m         4243         4913         4152            ppm         ASTM D5185m         >25         6         2         13           Sodium         ppm         ASTM D5185m         >25         6         2         13           Sodium         ppm         ASTM D5185m         >20         <1         <1         2           Potassium         ppm         ASTM D5185m         >20         <1         <1         2           INFRA-RED         method         limit/base	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum         ppm         ASTM D5185m         23         25         24           Manganese         ppm         ASTM D5185m         <1	Boron	ppm	ASTM D5185m		105	82	102
Manganese         ppm         ASTM D5185m         <1	Barium	ppm	ASTM D5185m		0	0	2
Magnesium         ppm         ASTM D5185m         283         304         263           Calcium         ppm         ASTM D5185m         2377         2601         2336           Phosphorus         ppm         ASTM D5185m         487         500         455           Zinc         ppm         ASTM D5185m         569         619         554           Sulfur         ppm         ASTM D5185m         4243         4913         4152           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         2         13           Sodium         ppm         ASTM D5185m         >118         1         2         0           Potassium         ppm         ASTM D5185m         >20         <1         <1         2           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         0.1         0.4         0.1           Nitration         Abs/.1mm         *ASTM D7415         >30         20.2         21.9         20.1           FLU	Molybdenum	ppm	ASTM D5185m		23	25	24
Calcium         ppm         ASTM D5185m         2377         2601         2336           Phosphorus         ppm         ASTM D5185m         487         500         455           Zinc         ppm         ASTM D5185m         569         619         554           Sulfur         ppm         ASTM D5185m         4243         4913         4152           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         2         13           Sodium         ppm         ASTM D5185m         >118         1         2         0           Potassium         ppm         ASTM D5185m         >20         <1         <1         2           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         0.1         0.4         0.1           Nitration         Abs/cm         *ASTM D7415         >30         20.2         21.9         20.1           FLUID DEGRADATION         method         limit/base         current         history1         history2	Manganese	ppm	ASTM D5185m		<1	<1	0
Phosphorus         ppm         ASTM D5185m         487         500         455           Zinc         ppm         ASTM D5185m         569         619         554           Sulfur         ppm         ASTM D5185m         4243         4913         4152           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         2         13           Sodium         ppm         ASTM D5185m         >118         1         2         0           Potassium         ppm         ASTM D5185m         >20         <1         <1         2           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         0.1         0.4         0.1           Nitration         Abs/cm         *ASTM D7624         >20         7.4         10.7         6.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.2         21.9         20.1           FLUID DEGRADATION         method         limit/base         current         history1	Magnesium	ppm	ASTM D5185m		283	304	263
Zinc         ppm         ASTM D5185m         569         619         554           Sulfur         ppm         ASTM D5185m         4243         4913         4152           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         2         13           Sodium         ppm         ASTM D5185m         >118         1         2         0           Potassium         ppm         ASTM D5185m         >20         <1         <1         2           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         0.1         0.4         0.1           Nitration         Abs/cm         *ASTM D7624         >20         7.4         10.7         6.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.2         21.9         20.1           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25	Calcium	ppm	ASTM D5185m		2377	2601	2336
Sulfur         ppm         ASTM D5185m         4243         4913         4152           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         2         13           Sodium         ppm         ASTM D5185m         >20         < 1	Phosphorus	ppm	ASTM D5185m		487	500	455
CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         6         2         13           Sodium         ppm         ASTM D5185m         >118         1         2         0           Potassium         ppm         ASTM D5185m         >20         <1	Zinc	ppm	ASTM D5185m		569	619	554
Silicon         ppm         ASTM D5185m         >25         6         2         13           Sodium         ppm         ASTM D5185m         >118         1         2         0           Potassium         ppm         ASTM D5185m         >20         <1	Sulfur	ppm	ASTM D5185m		4243	4913	4152
Sodium         ppm         ASTM D5185m         >118         1         2         0           Potassium         ppm         ASTM D5185m         >20         <1	CONTAMINANTS		method	limit/base	current	history1	history2
Sodium         ppm         ASTM D5185m         >118         1         2         0           Potassium         ppm         ASTM D5185m         >20         <1	Silicon	ppm	ASTM D5185m	>25	6	2	13
INFRA-RED	Sodium		ASTM D5185m	>118	1	2	0
Soot %         %         *ASTM D7844         0.1         0.4         0.1           Nitration         Abs/cm         *ASTM D7624         >20         7.4         10.7         6.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.2         21.9         20.1           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         14.5         18.6         13.6	Potassium	ppm	ASTM D5185m	>20	<1	<1	2
Nitration         Abs/cm         *ASTM D7624         >20         7.4         10.7         6.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.2         21.9         20.1           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         14.5         18.6         13.6	INFRA-RED		method	limit/base	current	history1	history2
Nitration         Abs/cm         *ASTM D7624         >20         7.4         10.7         6.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.2         21.9         20.1           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         14.5         18.6         13.6	Soot %	%	*ASTM D7844		0.1	0.4	0.1
Sulfation         Abs/.1mm         *ASTM D7415         >30         20.2         21.9         20.1           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         14.5         18.6         13.6				>20			
Oxidation         Abs/.1mm         *ASTM D7414         >25         14.5         18.6         13.6							
	FLUID DEGRADA	TION	method	limit/base	current	history1	history2
	Oxidation	Ahs/ 1mm	*ASTM D7414	>25	14.5	18.6	13.6



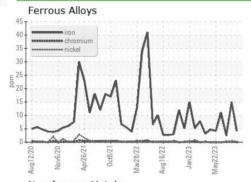
## **OIL ANALYSIS REPORT**

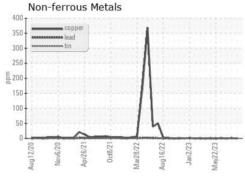


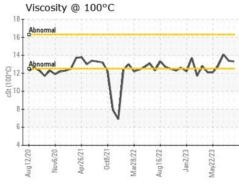


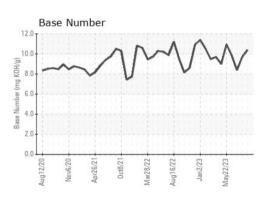
VISUAL		method				history2
White Metal	scalar	*Visual	NONE	NONE	LIGHT	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual	NONE	NONE	NONE	NONE
Appearance	scalar	*Visual	NORML	NORML	NORML	NORML
Odor	scalar	*Visual	NORML	NORML	NORML	NORML
<b>Emulsified Water</b>	scalar	*Visual	>0.1	NEG	NEG	NEG
Free Water	scalar	*Visual		NEG	NEG	NEG

FLUID PROPERTIES		method			history2
Visc @ 100°C	cSt	ASTM D445	13.3	13.4	14.1













Certificate L2367

Laboratory Sample No. Lab Number **Unique Number** Test Package : IND 2

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 : WC0769338 : 05966532 : 10673083

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

Received Diagnosed

: 02 Oct 2023 : 03 Oct 2023 Diagnostician : Sean Felton

MARATHON PETROLEUM CO. 101 12TH ST

CATLETTSBURG, KY US 41169

Contact: SHAWN MCCLASKEY stmcclaskey@marathonpetroleum.com

T: (606)739-2416

\* - 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: x: