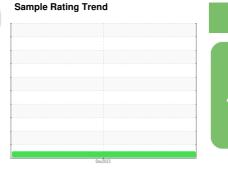


OIL ANALYSIS REPORT

TULSA [20708] Alex tug boat

Component
Right Diesel Engine
Fluid

SHELL ROTELLA T 15W40 (--- 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

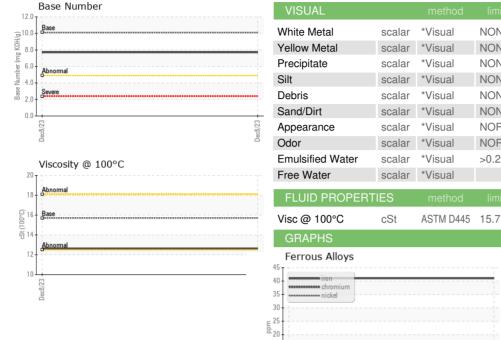
Fluid Condition

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

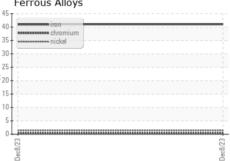
SAMPLE INFORMATION method limit/bass current history1 history2					Dec2023		
Sample Number	SAMDLE INFORM	MATION	mathad			hiotory 1	history?
Sample Date		IATION		iiiiii/base		nistory i	nistoryz
Machine Age hrs Client Info 5456 Oil Age hrs Client Info 453 Oil Changed Client Info Changed Sample Status NORMAL CONTAMINATION method limit/base current history1 history2 Fuel WC Method >2.1 <1.0 Water WC Method NEG Glycol WC Method NEG WEAR METALS method limit/base current history1 history2 Iron ppm ASTM 05185m >51 41 Chromium ppm ASTM 05185m >51 41 Chromium ppm ASTM 05185m >5 1 Chromium ppm ASTM 05185m >3 0 Chromium pp	·						
Oil Age hrs Client Info 453							
Oil Changed Sample Status Client Info Changed NORMAL CONTAMINATION method limit/base current history1 history2 Fuel WC Method >2.1 <1.0 Water WC Method >0.21 NEG Glycol WC Method NEG WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >51 41 Chromium ppm ASTM D5185m >51 41 Chromium ppm ASTM D5185m >51 1 Chromium ppm ASTM D5185m >3 0 Iron ppm ASTM D5185m >31 4 Silver ppm ASTM D5185m >26 2 Lead <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>							
Sample Status	•	hrs					
CONTAMINATION method limit/base current history1 history2 Fuel WC Method >2.1 <1.0 Water WC Method 0.2:1 NEG Glycol WC Method NEG WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >51 41 Chromium ppm ASTM D5185m >51 1 Nickel ppm ASTM D5185m >5 1 Silver ppm ASTM D5185m >3 0 Silver ppm ASTM D5185m >31 4 Silver ppm ASTM D5185m >26 0 Lead ppm ASTM D5185m >26 2 Van			Client Info				
Fuel WC Method Value V	Sample Status				NORMAL		
Water Glycol WC Method WC Method >0.21 NEG WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >51 41 Chromium ppm ASTM D5185m >51 41 Nickel ppm ASTM D5185m >5 1 Sliver ppm ASTM D5185m >5 1 Sliver ppm ASTM D5185m >31 4 Aluminum ppm ASTM D5185m >26 0 Lead ppm ASTM D5185m >26 2 Copper ppm ASTM D5185m >4 0 Vanadium ppm ASTM D5185m >4 0 Vanadium ppm ASTM D5185m 0 <	CONTAMINATION	١	method	limit/base	current	history1	history2
WEAR METALS	Fuel		WC Method	>2.1	<1.0		
WEAR METALS	Water		WC Method	>0.21	NEG		
Iron	Glycol		WC Method		NEG		
Chromium ppm ASTM D5185m >11 <1	WEAR METALS		method	limit/base	current	history1	history2
Nickel	Iron	ppm	ASTM D5185m	>51	41		
Titanium	Chromium	ppm	ASTM D5185m	>11	<1		
Silver	Nickel	ppm		>5	1		
Aluminum		ppm	ASTM D5185m		23		
Lead							
Copper ppm ASTM D5185m >26 2 Tin ppm ASTM D5185m >4 0 Vanadium ppm ASTM D5185m 0 Cadmium ppm ASTM D5185m 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 316 60 Barium ppm ASTM D5185m 0.0 0 Manganese ppm ASTM D5185m 1.2 6 Magnesium ppm ASTM D5185m 24 112 Calcium ppm ASTM D5185m 24 112 Phosphorus ppm ASTM D5185m 1064 1092 Sulfur ppm ASTM D5185m 1160 1354 <td>Aluminum</td> <td>ppm</td> <td>ASTM D5185m</td> <td>>31</td> <th>-</th> <td></td> <td></td>	Aluminum	ppm	ASTM D5185m	>31	-		
Tin ppm ASTM D5185m >4 0 Vanadium ppm ASTM D5185m < 1 Cadmium ppm ASTM D5185m 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 316 60 Barium ppm ASTM D5185m 0.0 0 Molybdenum ppm ASTM D5185m 0.0 0 Magnesium ppm ASTM D5185m 1.2 6 Magnesium ppm ASTM D5185m 24 112 Calcium ppm ASTM D5185m 2292 2982 Phosphorus ppm ASTM D5185m 1160 1354 Sulfur ppm ASTM D5185m 222 4	Lead	ppm		>26	-		
Vanadium ppm ASTM D5185m <1 Cadmium ppm ASTM D5185m 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 316 60 Barium ppm ASTM D5185m 0.0 0 Molybdenum ppm ASTM D5185m 0.0 0 Manganese ppm ASTM D5185m 1.2 6 Magnesium ppm ASTM D5185m 24 112 Calcium ppm ASTM D5185m 2292 2982 Phosphorus ppm ASTM D5185m 1064 1092 Sulfur ppm ASTM D5185m 4996 4481 CONTAMINANTS method limit/base current h	• •						
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Boron							
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Barium	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum ppm ASTM D5185m 1.2 6 Manganese ppm ASTM D5185m 24 112 Magnesium ppm ASTM D5185m 24 112 Calcium ppm ASTM D5185m 2292 2982 Phosphorus ppm ASTM D5185m 1064 1092 Zinc ppm ASTM D5185m 1160 1354 Sulfur ppm ASTM D5185m 4996 4481 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >22 4 Sodium ppm ASTM D5185m >31 <1 Potassium ppm ASTM D5185m >20 6 INFRA-RED method </td <td>Boron</td> <td>ppm</td> <td>ASTM D5185m</td> <td>316</td> <th>60</th> <td></td> <td></td>	Boron	ppm	ASTM D5185m	316	60		
Manganese ppm ASTM D5185m <1 Magnesium ppm ASTM D5185m 24 112 Calcium ppm ASTM D5185m 2292 2982 Phosphorus ppm ASTM D5185m 1064 1092 Zinc ppm ASTM D5185m 1160 1354 Sulfur ppm ASTM D5185m 4996 4481 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >22 4 Sodium ppm ASTM D5185m >31 <1	Barium	ppm	ASTM D5185m	0.0	0		
Magnesium ppm ASTM D5185m 24 112 Calcium ppm ASTM D5185m 2292 2982 Phosphorus ppm ASTM D5185m 1064 1092 Zinc ppm ASTM D5185m 1160 1354 Sulfur ppm ASTM D5185m 4996 4481 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >22 4 Sodium ppm ASTM D5185m >31 <1	Molybdenum	ppm		1.2	6		
Calcium ppm ASTM D5185m 2292 2982 Phosphorus ppm ASTM D5185m 1064 1092 Zinc ppm ASTM D5185m 1160 1354 Sulfur ppm ASTM D5185m 4996 4481 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >22 4 Sodium ppm ASTM D5185m >31 <1	•	ppm	ASTM D5185m		<1		
Phosphorus ppm ASTM D5185m 1064 1092 Zinc ppm ASTM D5185m 1160 1354 Sulfur ppm ASTM D5185m 4996 4481 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >22 4 Sodium ppm ASTM D5185m >31 <1	-						
Zinc ppm ASTM D5185m 1160 1354 Sulfur ppm ASTM D5185m 4996 4481 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >22 4 Sodium ppm ASTM D5185m >31 <1 Potassium ppm ASTM D5185m >20 6 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.1 Nitration Abs/.1mm *ASTM D7624 >20 8.9 Sulfation Abs/.1mm *ASTM D7415 >30 19.4 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *AS		ppm					
Sulfur ppm ASTM D5185m 4996 4481 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >22 4 Sodium ppm ASTM D5185m >31 <1							
CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >22 4 Sodium ppm ASTM D5185m >31 <1 Potassium ppm ASTM D5185m >20 6 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.1 Nitration Abs/cm *ASTM D7624 >20 8.9 Sulfation Abs/.1mm *ASTM D7415 >30 19.4 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 14.7	-						
Silicon ppm ASTM D5185m >22 4 Sodium ppm ASTM D5185m >31 <1 Potassium ppm ASTM D5185m >20 6 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.1 Nitration Abs/cm *ASTM D7624 >20 8.9 Sulfation Abs/.1mm *ASTM D7415 >30 19.4 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 14.7					4481		
Sodium ppm ASTM D5185m >31 <1			method			history1	history2
Potassium ppm ASTM D5185m >20 6 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.1 Nitration Abs/cm *ASTM D7624 >20 8.9 Sulfation Abs/.1mm *ASTM D7415 >30 19.4 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 14.7							
INFRA-RED							
Soot % % *ASTM D7844 >3 0.1 Nitration Abs/cm *ASTM D7624 >20 8.9 Sulfation Abs/.1mm *ASTM D7415 >30 19.4 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 14.7	Potassium	ppm	ASTM D5185m	>20	6		
Nitration Abs/cm *ASTM D7624 >20 8.9 Sulfation Abs/.1mm *ASTM D7415 >30 19.4 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 14.7	INFRA-RED		method	limit/base	current	history1	history2
Sulfation Abs/.1mm *ASTM D7415 >30 19.4 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 14.7	Soot %	%		>3	0.1		
FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 14.7	Nitration	Abs/cm	*ASTM D7624	>20	8.9		
Oxidation	Sulfation	Abs/.1mm	*ASTM D7415	>30	19.4		
	FLUID DEGRADA	TION	method	limit/base	current	history1	history2
Base Number (BN) mg KOH/g ASTM D2896 10.1 7.7	Oxidation	Abs/.1mm	*ASTM D7414	>25	14.7		
	Base Number (BN)	mg KOH/g	ASTM D2896	10.1	7.7		



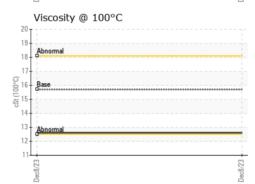
OIL ANALYSIS REPORT

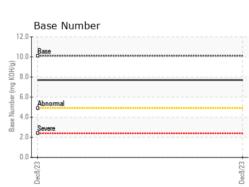


VISUAL		method				history2
White Metal	scalar	*Visual	NONE	NONE		
Yellow Metal	scalar	*Visual	NONE	NONE		
Precipitate	scalar	*Visual	NONE	NONE		
Silt	scalar	*Visual	NONE	NONE		
Debris	scalar	*Visual	NONE	NONE		
Sand/Dirt	scalar	*Visual	NONE	NONE		
Appearance	scalar	*Visual	NORML	NORML		
Odor	scalar	*Visual	NORML	NORML		
Emulsified Water	scalar	*Visual	>0.21	NEG		
Free Water	scalar	*Visual		NEG		
FLUID PROPERT	IES	method	limit/base	current	history1	history2
Via - @ 10000	- C+	ACTM DAAF	157	10.0		
Visc @ 100°C	cSt	ASTM D445	15.7	12.6		



Non-ferrous Metals









Laboratory Sample No. Lab Number

: WC0836187 : 06077589 Unique Number : 10859680

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

: 01 Feb 2024 : 04 Feb 2024 Diagnostician : Don Baldridge

Test Package : CONST (Additional Tests: TBN) Certificate L2367 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.

MANHATTAN ROAD AND BRIDGE

5601 S 122ND E AVE TULSA, OK US 74146

Contact: JAMES STEELMON

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T: F:

Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012)