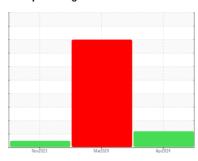


# **OIL ANALYSIS REPORT**

Sample Rating Trend





22402 Component

Diesel Engine {not provided} (--- QTS)

## DIAGNOSIS

Machine Id

### Recommendation

We advise that you check for possible coolant leak. Check for low coolant level. We recommend an early resample to monitor this condition.

All component wear rates are normal.

## Contamination

Sodium and/or potassium levels remain high.

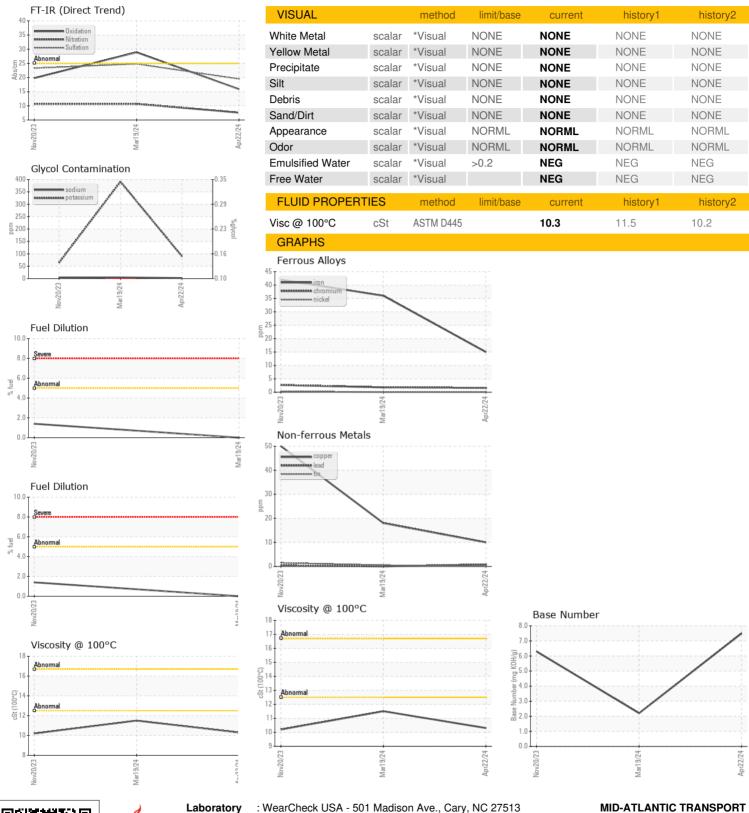
### **Fluid Condition**

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

Sample Number         Client Info         WC0901344         WC0901335         WC080           Sample Date         Client Info         22 Apr 2024         19 Mar 2024         20 Nov           Machine Age         mls         Client Info         182856         167265         111920           Oil Age         mls         Client Info         15000         50000         50000           Oil Changed         Client Info         Not Changd         Changed         Changed           Sample Status         Image: Client Info         Not Changd         Changed         Changed           CONTAMINATION         method         Imitibase         current         history1         hist           WEAR METALS         method         limit/base         current         history1         hist           Iron         ppm         ASTM D5185m         >100         15         36         42           Chromium         ppm         ASTM D5185m         >100         1         1         11         history1         hist           Iron         ppm         ASTM D5185m         >10         0         <1         0         <1         1         0         <1         1         <1         0         <1         1 <th></th> <th></th> <th>29</th> <th>Marž024 Aprž</th> <th>v2023</th> <th>No</th> <th></th> <th></th>			29	Marž024 Aprž	v2023	No		
Sample Date         Client Info         22 Apr 2024         19 Mar 2024         20 Nov           Machine Age         mls         Client Info         182856         167255         111920           Oil Age         mls         Client Info         15000         50000         50000           Oil Changed         Client Info         Not Changed         Changed         Changed           Sample Status         Client Info         Not Changed         Changed         Changed           CONTAMINATION         method         limit/base         current         history1         hist           WEAR METALS         method         limit/base         current         history1         hist           Iron         ppm         ASTM 05185m         >100         15         36         42           Chromium         ppm         ASTM 05185m         >20         2         2         3           Nickel         ppm         ASTM 05185m         >3         0         0         -1           Silver         ppm         ASTM 05185m         >3         0         0         -1           Lead         ppm         ASTM 05185m         >20         7         25         28 <t< th=""><th>istory2</th><th>histo</th><th>history1</th><th>current</th><th>limit/base</th><th>method</th><th>IATION</th><th>SAMPLE INFORM</th></t<>	istory2	histo	history1	current	limit/base	method	IATION	SAMPLE INFORM
Machine Age         mls         Client Info         182856         167265         111920           Oil Age         mls         Client Info         15000         500000         500000           Oil Changed         Client Info         Not Changd         Changed Sample Status         Control Info         Not Changd         SEVERE         NORM/A           CONTAMINATION         method         limit/base         current         history1         hist           Water         WC Method         0.02         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         hist           Iron         ppm         ASTM D5185m         >100         15         36         42           Chromium         ppm         ASTM D5185m         >20         2         2         3           Nickel         ppm         ASTM D5185m         >30         0         0         <1	32061	WC08320	WC0901335	WC0901344		Client Info		Sample Number
Machine Age         mls         Client Info         182856         167265         111920           Oil Age         mls         Client Info         15000         500000         500000           Oil Changed         Client Info         Not Changd         Changed         NoRMA           Sample Status         BABNORMAL         SEVERE         NORMA           CONTAMINATION         method         limit/base         current         history1         hist           Water         WC Method         >0.2         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         hist           Iron         ppm         ASTM D5185m         >10.0         15         36         42           Chromium         ppm         ASTM D5185m         >20         2         2         3           Nickel         ppm         ASTM D5185m         >3         0         0         <1	v 2023	20 Nov 20	19 Mar 2024	22 Apr 2024		Client Info		Sample Date
Oil Changed Sample Status         Client Info         Not Changed ABNORMAL SEVERE         Changed NORMAL SEVERE         Changed NORMAL SEVERE         NORMAL SEVERE <t< td=""><td>20</td><td>111920</td><td>167265</td><th></th><td></td><td>Client Info</td><td>mls</td><td>Machine Age</td></t<>	20	111920	167265			Client Info	mls	Machine Age
CONTAMINATION         method         limit/base         current         history1         hist           Water         WC Method         >0.2         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         hist           Iron         ppm         ASTM D5185m         >100         15         36         42           Chromium         ppm         ASTM D5185m         >20         2         2         3           Nickel         ppm         ASTM D5185m         >4         0         0         <1           Silver         ppm         ASTM D5185m         >3         0         0         <1           Aluminum         ppm         ASTM D5185m         >3         0         0         <1           Aluminum         ppm         ASTM D5185m         >30         0         <1         2         2         28           Lead         ppm         ASTM D5185m         >40         <1         0         <1         2         2         28           Lead         ppm         ASTM D5185m         >15         0         <1         2         2         2         2	)	50000	50000	15000		Client Info	mls	Oil Age
CONTAMINATION         method         limit/base         current         history1         hist           Water         WC Method         >0.2         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         hist           Iron         ppm         ASTM D5185m         >100         15         36         42           Chromium         ppm         ASTM D5185m         >20         2         2         3           Nickel         ppm         ASTM D5185m         >4         0         0         -1           Nickel         ppm         ASTM D5185m         >3         0         0         -1           Titanium         ppm         ASTM D5185m         >3         0         0         -1           Silver         ppm         ASTM D5185m         >20         7         25         28           Lead         ppm         ASTM D5185m         >30         0         -1         2           Copper         ppm         ASTM D5185m         >30         0         -1         2           Vanadium         ppm         ASTM D5185m         >15         0         <1         2	ged	Changed	Changed	Not Changd		Client Info		Oil Changed
Water         WC Method         >0.2         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         hist           Iron         ppm         ASTM D5185m         >100         15         36         42           Chromium         ppm         ASTM D5185m         >20         2         2         3           Nickel         ppm         ASTM D5185m         >4         0         0         <1	ЛAL	NORMAL	SEVERE	ABNORMAL				Sample Status
WEAR METALS         method         limit/base         current         history1         hist           Iron         ppm         ASTM D5185m         >20         2         2         3           Nickel         ppm         ASTM D5185m         >20         2         2         3           Nickel         ppm         ASTM D5185m         >4         0         0         <1           Titanium         ppm         ASTM D5185m         >3         0         0         <1           Aluminum         ppm         ASTM D5185m         >20         7         ▲ 25         28           Lead         ppm         ASTM D5185m         >20         7         ▲ 25         28           Lead         ppm         ASTM D5185m         >40         <1         0         <1         2           Copper         ppm         ASTM D5185m         >40         <1         0         <1         2           Vanadium         ppm         ASTM D5185m         >15         0         <1         0         <1         0           Cadmium         ppm         ASTM D5185m         1         0         <1         0         <1         0         <1         1	istory2	histo	history1	current	limit/base	method	I	CONTAMINATION
Iron	G	NEG	NEG	NEG	>0.2	WC Method		Water
Chromium         ppm         ASTM D5185m         >20         2         2         3           Nickel         ppm         ASTM D5185m         >4         0         0         <1           Titanium         ppm         ASTM D5185m         >3         0         0         <1           Silver         ppm         ASTM D5185m         >3         0         0         <1           Aluminum         ppm         ASTM D5185m         >20         7         25         28           Lead         ppm         ASTM D5185m         >40         <1         0         <1         0         <1         10         <1         0         <1         0         <1         10         <1         2          <1         0         <1         0         <1         0         <1         0         <1         0         <1         0         <1         0         <1         0         <1         0         <1         0         <1         0         <1         0         <1         0         <1         0         <1         0         <1         0         <1         0         <1         0         <1         0         <1         0	istory2	histo	history1	current	limit/base	method		WEAR METALS
Nickel		42	36	15	>100	ASTM D5185m	ppm	Iron
Titanium		3	2	2	>20	ASTM D5185m	ppm	Chromium
Silver         ppm         ASTM D5185m         >3         0         0         <1           Aluminum         ppm         ASTM D5185m         >20         7         ▲ 25         28           Lead         ppm         ASTM D5185m         >40         <1         0         <1           Copper         ppm         ASTM D5185m         >330         10         18         50           Tin         ppm         ASTM D5185m         >15         0         <1         2           Vanadium         ppm         ASTM D5185m         0         <1         0         <1         0           Cadmium         ppm         ASTM D5185m         0         <1         0         <1         0           ADDITIVES         method         limit/base         current         history1         hist           Boron         ppm         ASTM D5185m         12         61         8           Barium         ppm         ASTM D5185m         277         960         71           Manganese         ppm         ASTM D5185m         277         960         71           Magnesium         ppm         ASTM D5185m         681         256         797		<1	0	0	>4	ASTM D5185m	ppm	Nickel
Aluminum         ppm         ASTM D5185m         ≥20         7         ≥25         28           Lead         ppm         ASTM D5185m         >40         <1		0	0	0		ASTM D5185m	ppm	Titanium
Lead         ppm         ASTM D5185m         >40         <1         0         <1           Copper         ppm         ASTM D5185m         >330         10         18         50           Tin         ppm         ASTM D5185m         >15         0         <1         2           Vanadium         ppm         ASTM D5185m         0         <1         0         0           Cadmium         ppm         ASTM D5185m         0         <1         0         0           ADDITIVES         method         limit/base         current         history1         hist           Boron         ppm         ASTM D5185m         12         61         8           Barium         ppm         ASTM D5185m         277         960         71           Molybdenum         ppm         ASTM D5185m         277         960         71           Manganese         ppm         ASTM D5185m         21         1         2           Magnesium         ppm         ASTM D5185m         681         256         797           Calcium         ppm         ASTM D5185m         1189         672         1271           Phosphorus         ppm         ASTM D5		<1	0	0	>3	ASTM D5185m	ppm	Silver
Copper         ppm         ASTM D5185m         >330         10         18         50           Tin         ppm         ASTM D5185m         >15         0         <1		28	<u>\$\times\$</u> 25	7	>20	ASTM D5185m	ppm	Aluminum
Tin         ppm         ASTM D5185m         >15         0         <1         2           Vanadium         ppm         ASTM D5185m         0         <1         0           Cadmium         ppm         ASTM D5185m         <1         0         0           ADDITIVES         method         limit/base         current         history1         hist           Boron         ppm         ASTM D5185m         12         61         8           Barium         ppm         ASTM D5185m         <1         1         0           Molybdenum         ppm         ASTM D5185m         277         960         71           Manganese         ppm         ASTM D5185m         41         1         2           Magnesium         ppm         ASTM D5185m         681         256         797           Calcium         ppm         ASTM D5185m         1189         672         1271           Phosphorus         ppm         ASTM D5185m         965         240         1105           Sulfur         ppm         ASTM D5185m         3613         2090         2212           CONTAMINANTS         method         limit/base         current         history1		<1	0	<1	>40	ASTM D5185m	ppm	Lead
Vanadium         ppm         ASTM D5185m         0         <1         0           Cadmium         ppm         ASTM D5185m         <1         0         0           ADDITIVES         method         limit/base         current         history1         hist           Boron         ppm         ASTM D5185m         12         61         8           Barium         ppm         ASTM D5185m         <1         1         0           Molybdenum         ppm         ASTM D5185m         277         960         71           Manganese         ppm         ASTM D5185m         <1         1         2           Magnesium         ppm         ASTM D5185m         681         256         797           Calcium         ppm         ASTM D5185m         1189         672         1271           Phosphorus         ppm         ASTM D5185m         855         187         891           Zinc         ppm         ASTM D5185m         965         240         1105           Sulfur         ppm         ASTM D5185m         22         7         15         8           Sodium         ppm         ASTM D5185m         22         5         2		50	18	10	>330	ASTM D5185m	ppm	Copper
Cadmium         ppm         ASTM D5185m         <1         0         0           ADDITIVES         method         limit/base         current         history1         hist           Boron         ppm         ASTM D5185m         12         61         8           Barium         ppm         ASTM D5185m         <1		2	<1	0	>15	ASTM D5185m	ppm	Tin
ADDITIVES         method         limit/base         current         history1         hist           Boron         ppm         ASTM D5185m         12         61         8           Barium         ppm         ASTM D5185m         <1		0	<1	0		ASTM D5185m	ppm	Vanadium
Boron         ppm         ASTM D5185m         12         61         8           Barium         ppm         ASTM D5185m         <1         1         0           Molybdenum         ppm         ASTM D5185m         277         960         71           Manganese         ppm         ASTM D5185m         21         1         2           Magnesium         ppm         ASTM D5185m         681         256         797           Calcium         ppm         ASTM D5185m         1189         672         1271           Phosphorus         ppm         ASTM D5185m         855         187         891           Zinc         ppm         ASTM D5185m         965         240         1105           Sulfur         ppm         ASTM D5185m         965         240         1105           Sulfur         ppm         ASTM D5185m         25         7         15         8           Sodium         ppm         ASTM D5185m         >25         7         15         8           Sodium         ppm         ASTM D5185m         >20         90         391         64           Fuel         %         ASTM D5185m         >20         90		0	0	<1		ASTM D5185m	ppm	Cadmium
Barium         ppm         ASTM D5185m         <1	istory2	histo	history1	current	limit/base	method		ADDITIVES
Molybdenum         ppm         ASTM D5185m         277         960         71           Manganese         ppm         ASTM D5185m         <1         1         2           Magnesium         ppm         ASTM D5185m         681         256         797           Calcium         ppm         ASTM D5185m         1189         672         1271           Phosphorus         ppm         ASTM D5185m         855         187         891           Zinc         ppm         ASTM D5185m         965         240         1105           Sulfur         ppm         ASTM D5185m         3613         2090         2212           CONTAMINANTS         method         limit/base         current         history1         hist           Silicon         ppm         ASTM D5185m         >25         7         15         8           Sodium         ppm         ASTM D5185m         >25         7         15         8           Sodium         ppm         ASTM D5185m         >20         90         391         64           Fuel         %         ASTM D5185m         >20         90         391         64           Glycol         *ASTM D5185m <t< td=""><td></td><td>8</td><td>61</td><th>12</th><td></td><td>ASTM D5185m</td><td>ppm</td><td>Boron</td></t<>		8	61	12		ASTM D5185m	ppm	Boron
Manganese         ppm         ASTM D5185m         <1         1         2           Magnesium         ppm         ASTM D5185m         681         256         797           Calcium         ppm         ASTM D5185m         1189         672         1271           Phosphorus         ppm         ASTM D5185m         855         187         891           Zinc         ppm         ASTM D5185m         965         240         1105           Sulfur         ppm         ASTM D5185m         3613         2090         2212           CONTAMINANTS         method         limit/base         current         history1         hist           Silicon         ppm         ASTM D5185m         >25         7         15         8           Sodium         ppm         ASTM D5185m         >25         7         15         8           Sodium         ppm         ASTM D5185m         >20         90         △         391         64           Fuel         %         ASTM D5185m         >20         № 90         △         391         64           Glycol         *ASTM D5185m         >20         № 90         △         391         64		0	1	<1		ASTM D5185m	ppm	Barium
Magnesium         ppm         ASTM D5185m         681         256         797           Calcium         ppm         ASTM D5185m         1189         672         1271           Phosphorus         ppm         ASTM D5185m         855         187         891           Zinc         ppm         ASTM D5185m         965         240         1105           Sulfur         ppm         ASTM D5185m         3613         2090         2212           CONTAMINANTS         method         limit/base         current         history1         hist           Silicon         ppm         ASTM D5185m         >25         7         15         8           Sodium         ppm         ASTM D5185m         22         5         2           Potassium         ppm         ASTM D5185m         20         90         391         64           Fuel         %         ASTM D3524         >5         <1.0         <1.0         1.4           Glycol         %         *ASTM D7892         NEG         0.10         NEG           INFRA-RED         method         limit/base         current         history1         hist           Soot %         %         *ASTM D7844 </td <td></td> <td>71</td> <td>960</td> <th></th> <td></td> <td>ASTM D5185m</td> <td>ppm</td> <td>Molybdenum</td>		71	960			ASTM D5185m	ppm	Molybdenum
Calcium         ppm         ASTM D5185m         1189         672         1271           Phosphorus         ppm         ASTM D5185m         855         187         891           Zinc         ppm         ASTM D5185m         965         240         1105           Sulfur         ppm         ASTM D5185m         3613         2090         2212           CONTAMINANTS         method         limit/base         current         history1         hist           Silicon         ppm         ASTM D5185m         >25         7         15         8           Sodium         ppm         ASTM D5185m         22         5         2           Potassium         ppm         ASTM D5185m         >20         90         391         64           Fuel         %         ASTM D3524         >5         <1.0			1			ASTM D5185m	ppm	Manganese
Phosphorus         ppm         ASTM D5185m         855         187         891           Zinc         ppm         ASTM D5185m         965         240         1105           Sulfur         ppm         ASTM D5185m         3613         2090         2212           CONTAMINANTS         method         limit/base         current         history1         hist           Silicon         ppm         ASTM D5185m         >25         7         15         8           Sodium         ppm         ASTM D5185m         >25         7         15         8           Sodium         ppm         ASTM D5185m         >20         90         ▲ 391         64           Fuel         %         ASTM D3524         >5         <1.0	7	797	256	681		ASTM D5185m	ppm	Magnesium
Zinc         ppm         ASTM D5185m         965         240         1105           Sulfur         ppm         ASTM D5185m         3613         2090         2212           CONTAMINANTS         method         limit/base         current         history1         hist           Silicon         ppm         ASTM D5185m         >25         7         15         8           Sodium         ppm         ASTM D5185m         2         5         2           Potassium         ppm         ASTM D5185m         >20         490         4391         64           Fuel         %         ASTM D3524         >5         <1.0	71	1271	672	1189		ASTM D5185m	ppm	Calcium
Sulfur         ppm         ASTM D5185m         3613         2090         2212           CONTAMINANTS         method         limit/base         current         history1         hist           Silicon         ppm         ASTM D5185m         >25         7         15         8           Sodium         ppm         ASTM D5185m         2         5         2           Potassium         ppm         ASTM D5185m         >20         490         4391         64           Fuel         %         ASTM D3524         >5         <1.0	1	891	187			ASTM D5185m	ppm	Phosphorus
CONTAMINANTS         method         limit/base         current         history1         hist           Silicon         ppm         ASTM D5185m         >25         7         15         8           Sodium         ppm         ASTM D5185m         2         5         2           Potassium         ppm         ASTM D5185m         >20         4         90         4         391         64           Fuel         %         ASTM D3524         >5         <1.0	)5	1105	240	965		ASTM D5185m	ppm	Zinc
Silicon       ppm       ASTM D5185m       >25       7       15       8         Sodium       ppm       ASTM D5185m       2       5       2         Potassium       ppm       ASTM D5185m       >20       90       391       64         Fuel       %       ASTM D3524       >5       <1.0       <1.0       1.4         Glycol       %       *ASTM D2982       NEG       0.10       NEG         INFRA-RED       method       limit/base       current       history1       hist         Soot %       %       *ASTM D7844       >3       0.6       1.4       1.3         Nitration       Abs/cm       *ASTM D7624       >20       7.6       10.7       10.7         Sulfation       Abs/.1mm       *ASTM D7415       >30       19.5       24.8       23.3	12	2212	2090	3613		ASTM D5185m	ppm	Sulfur
Sodium         ppm         ASTM D5185m         2         5         2           Potassium         ppm         ASTM D5185m         >20         ▲ 90         ▲ 391         64           Fuel         %         ASTM D3524         >5         <1.0         <1.0         1.4           Glycol         %         *ASTM D2982         NEG         ▲ 0.10         NEG           INFRA-RED         method         limit/base         current         history1         hist           Soot %         %         *ASTM D7844         >3         0.6         1.4         1.3           Nitration         Abs/cm         *ASTM D7624         >20         7.6         10.7         10.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         19.5         24.8         23.3	istory2	histo	history1	current	limit/base	method		CONTAMINANTS
Potassium         ppm         ASTM D5185m         >20         90         391         64           Fuel         %         ASTM D3524         >5         <1.0         <1.0         1.4           Glycol         %         *ASTM D2982         NEG         0.10         NEG           INFRA-RED         method         limit/base         current         history1         hist           Soot %         %         *ASTM D7844         >3         0.6         1.4         1.3           Nitration         Abs/cm         *ASTM D7624         >20         7.6         10.7         10.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         19.5         24.8         23.3		8	15	7	>25	ASTM D5185m	ppm	Silicon
Fuel       %       ASTM D3524       >5       <1.0       <1.0       1.4         Glycol       %       *ASTM D2982       NEG       ▲ 0.10       NEG         INFRA-RED       method       limit/base       current       history1       hist         Soot %       %       *ASTM D7844       >3       0.6       1.4       1.3         Nitration       Abs/cm       *ASTM D7624       >20       7.6       10.7       10.7         Sulfation       Abs/.1mm       *ASTM D7415       >30       19.5       24.8       23.3		2	5	2		ASTM D5185m	ppm	Sodium
Glycol         %         *ASTM D2982         NEG         ▲ 0.10         NEG           INFRA-RED         method         limit/base         current         history1         hist           Soot %         %         *ASTM D7844         >3         0.6         1.4         1.3           Nitration         Abs/cm         *ASTM D7624         >20         7.6         10.7         10.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         19.5         24.8         23.3		64	<b>△</b> 391	<u>^</u> 90	>20	ASTM D5185m	ppm	Potassium
INFRA-RED         method         limit/base         current         history1         hist           Soot %         %         *ASTM D7844         >3         0.6         1.4         1.3           Nitration         Abs/cm         *ASTM D7624         >20         7.6         10.7         10.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         19.5         24.8         23.3		1.4	<1.0	<1.0	>5	ASTM D3524	%	Fuel
Soot %         %         *ASTM D7844         >3         0.6         1.4         1.3           Nitration         Abs/cm         *ASTM D7624         >20         7.6         10.7         10.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         19.5         24.8         23.3	G	NEG	▲ 0.10	NEG		*ASTM D2982	%	Glycol
Nitration         Abs/cm         *ASTM D7624         >20         7.6         10.7         10.7           Sulfation         Abs/.1mm         *ASTM D7415         >30         19.5         24.8         23.3	istory2	histo	history1	current	limit/base	method		INFRA-RED
Sulfation         Abs/.1mm         *ASTM D7415         >30         19.5         24.8         23.3		1.3	1.4	0.6	>3	*ASTM D7844	%	Soot %
	7	10.7	10.7	7.6	>20	*ASTM D7624	Abs/cm	Nitration
FLUID DEGRADATION method limit/base current history1 hist	3	23.3	24.8	19.5	>30	*ASTM D7415	Abs/.1mm	Sulfation
	istory2	histo	history1	current	limit/base	method	TION	FLUID DEGRADA
Oxidation Abs/.1mm *ASTM D7414 >25 <b>15.9</b> 28.9 19.8	8	19.8	28.9	15.9	>25	*ASTM D7414	Abs/.1mm	Oxidation
<b>Base Number (BN)</b> mg KOH/g ASTM D2896 <b>7.5</b> 2.2 6.3		6.3	2.2	7.5		ASTM D2896	mg KOH/g	Base Number (BN)



# **OIL ANALYSIS REPORT**







Certificate 12367

Laboratory Sample No.

Lab Number : 06176934

: WC0901344 Unique Number : 11022987

Received **Tested** Diagnosed

: 13 May 2024 : 17 May 2024

: 17 May 2024 - Jonathan Hester

Test Package : FLEET ( Additional Tests: FuelDilution ) To discuss this sample report, contact Customer Service at 1-800-237-1369.

 $^st$  - 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)

38 IRONSIDE CT WILLINGBORO, NJ US 08046 Contact: GARY LAWYER

gary@midatlantictrans.com T: (609)864-6948

Contact/Location: GARY LAWYER - MIDWIL