

Sample Rating Trend



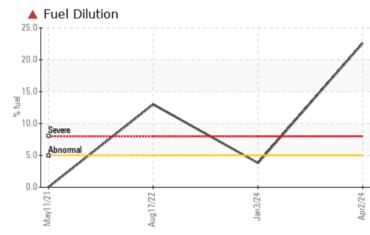
# Area [22733]

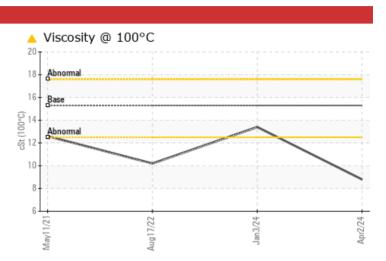
**40-98** Component

Diesel Engine

CONOCO PHILLIPS GUARDOL ECT 15W40 (--- GAL)

# COMPONENT CONDITION SUMMARY





**FUEL** 

## RECOMMENDATION

We advise that you check the fuel injection system. Oil and filter change at the time of sampling has been noted. We recommend an early resample to monitor this condition.

PROBLEMATIC TEST RESULTS								
Sample Status				SEVERE	MARGINAL	SEVERE		
Fuel	%	ASTM D3524	>5	<b>A</b> 22.6	<b>A</b> 3.8	<b>1</b> 3.0		
Visc @ 100°C	cSt	ASTM D445	15.3	<b>8.8</b>	13.4	<b>1</b> 0.2		

Customer Id: MANTUL Sample No.: WC0836142 Lab Number: 06147970 Test Package: CONST



To manage this report scan the QR code

*To discuss the diagnosis or test data:* Jonathan Hester +1 919-379-4092 x4092 <u>jhester@wearcheckusa.com</u>

*To change component or sample information:* Customer Service +1 1-800-237-1369 <u>customerservice@wearcheck.com</u>

RECOMMENDED ACTIONS						
Action Change Fluid	Status	Date	Done By ?	<b>Description</b> Oil and filter change at the time of sampling has been noted.		
Change Filter			?	Oil and filter change at the time of sampling has been noted.		
Resample			?	We recommend an early resample to monitor this condition.		
Check Fuel/injector System			?	We advise that you check the fuel injection system.		

### HISTORICAL DIAGNOSIS

#### 03 Jan 2024 Diag: Wes Davis

The oil change at the time of sampling has been noted. Resample at the next service interval to monitor. No other corrective action is recommended at this time.All component wear rates are normal. Light fuel dilution occurring. No other contaminants were detected in the oil. The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.





#### 17 Aug 2022 Diag: Jonathan Hester

We advise that you check the fuel injection system. Oil and filter change at the time of sampling has been noted. We recommend an early resample to monitor this condition.All component wear rates are normal. There is a high amount of fuel present in the oil. Fuel is present in the oil and is lowering the viscosity. The BN result indicates that there is suitable alkalinity remaining in the oil. The oil is no longer serviceable due to the presence of contaminants.





NORMAL

#### 11 May 2021 Diag: Don Baldridge

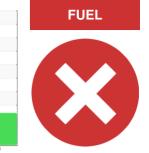
Resample at the next service interval to monitor.All component wear rates are normal. There is no indication of any contamination in the oil. The condition of the oil is acceptable for the time in service.





# **OIL ANALYSIS REPORT**

Sample Rating Trend



#### Fluid CONOCO PHILLIPS GUARDOL ECT 15W40 (--- GAL)

# DIAGNOSIS

**Diesel Engine** 

[22733]

40-98

### Recommendation

We advise that you check the fuel injection system. Oil and filter change at the time of sampling has been noted. We recommend an early resample to monitor this condition.

# Wear

Area

All component wear rates are normal.

## Contamination

There is a high amount of fuel present in the oil.

#### Fluid Condition

Fuel is present in the oil and is lowering the viscosity. The BN result indicates that there is suitable alkalinity remaining in the oil. The oil is no longer serviceable due to the presence of contaminants.

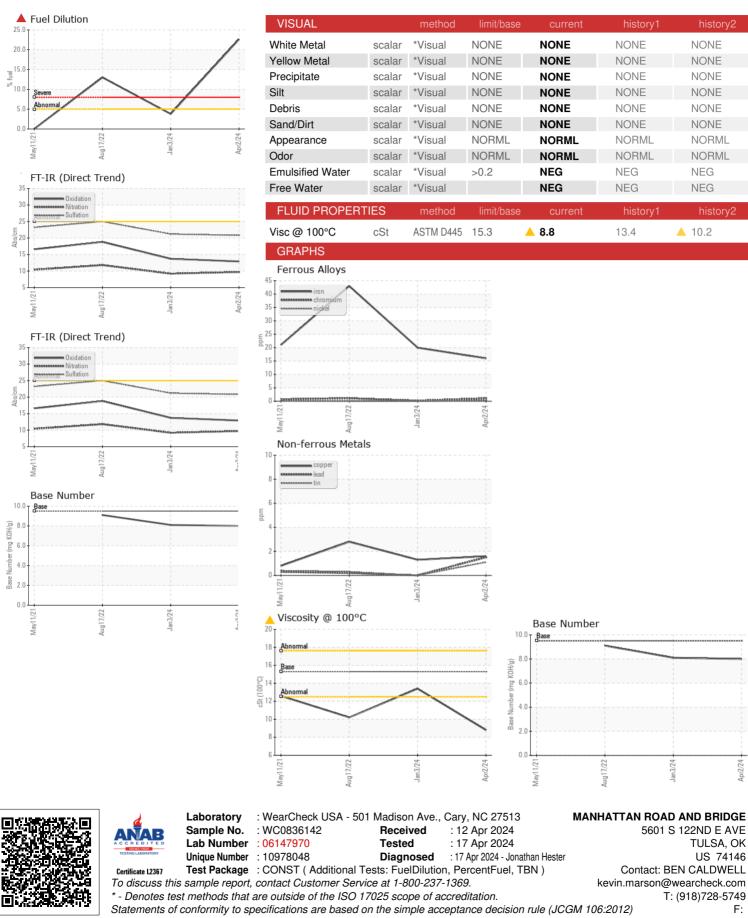
Sample NumberClient InfoWC0836142WC0836142WC0709444Sample DateClient InfoQ 2 Apr 202403 Jan 20273 Aug 2023Machine AgehrsClient Info274491243Oil AngedLeint InfoZir491243Oil AngedClient InfoSEVEREMARGINALSEVERECONTAMINATIONWethInit/baseNEGNEGQueronVC MethodSO.2NEGNEGGuyolUWC MethodSO.2NEGNEGMarcinappmASTM 051655>100162043ChromiumppmASTM 051655>100162043NickelppmASTM 051655>10162043MarcinappmASTM 051655>100<1111NickelppmASTM 051655>100<1131JaminumppmASTM 051655>100<1131AuminumppmASTM 051655>10<1131AuminumppmASTM 051655>10<1131AuminumppmASTM 051655>10<1131AuminumppmASTM 051655>10<1131AuminumppmASTM 051655>10<1131AuminumppmASTM 05165>10<1131AuminumppmASTM 05165>10<11<	SAMPLE INFORM	<b>IATION</b>	method	limit/base	current	history1	history2
Sample Date         Client Info         02 Apr 2024         03 Jan 2024         17 Aug 2022           Machine Age         hrs         Client Info         5338         5084         4593           Oil Age         hrs         Client Info         274         491         248           Oil Changed         Client Info         EVERE         MARGINAL         SEVERE           CONTAMINATION         method         Imit/base         current         History1         History2           Water         WC Method         >0.2         NEG         NEG         NEG           WEAR METALS         method         Imit/base         current         History1         History2           Iron         ppm         ASTM D5185m         >100         16         20         43           Chromium         ppm         ASTM D5185m         >4         <1	Sample Number		Client Info		WC0836142	WC0836156	WC0709444
Machine Age     hrs     Client Info     5358     5084     4593       Oil Age     hrs     Client Info     274     491     243       Oil Changed     Client Info     274     491     243       Sample Status     I     Client Info     SEVERE     MARGINAL     SEVERE       CONTAMINATION     wethod     >0.2     NEG     NEG     NEG       Water     WC Method     >0.2     NEG     NEG     NEG       Wetar     WC Method     >0.2     NEG     NEG     NEG       Oli Agino     ppm     ASTM 05185     >100     16     20     43       Chromium     ppm     ASTM 05185     >20     1     -1     1       Nickel     ppm     ASTM 05185     >20     1     -1     1       Nickel     ppm     ASTM 05185     >20     2     2     5       Lead     ppm     ASTM 05185     >20     2     2     5       Lead     ppm     ASTM 05185     >40     2     0     -1       Aluminum     ppm     ASTM 05185     >41     0     0       Cadmium     ppm     ASTM 05185     >51     1     0     -1       Aluminum     <			Client Info		02 Apr 2024	03 Jan 2024	17 Aug 2022
Oil Changed Sample Status     Client Info     Changed SEVERE     Changed MARGINAL     Changed SEVERE     Changed MARGINAL     Changed SEVERE       CONTAMINATION     method     imit/base     current     history1     history2       Water     WC Method     >0.2     NEG     NEG     NEG       WEAR METALS     method     imit/base     current     history1     history2       Iron     ppm     ASTM D5185m     >100     16     20     43       Chromium     ppm     ASTM D5185m     >44     <1     0     0       Copper     ppm     ASTM D5185m     >20     2     2     5       Lead     ppm     ASTM D5185m     >20     2     1     3       Silver     ppm     ASTM D5185m     >30     0     <1     3       Silver     ppm     ASTM D5185m     >30     2     1     3       Tin     ppm     ASTM D5185m     >32     2     1     3       Cadmium     ppm     ASTM D5185m     <-1     0     0       Cadmium     ppm     ASTM D5185m     <-1     0     0       ASTM D5185m       <-1     0     <1       Mangalees     ppm     A	-	hrs	Client Info		-	5084	4593
Sample Status         SEVERE         MARGINAL         SEVERE           CONTAMINATION         method         imit/base         current         history1         history2           Water         WC Method         >0.2         NEG         NEG         NEG           Glycol         WC Method         >0.2         NEG         NEG         NEG           WEAR METALS         method         imit/base         current         history1         history2           Iron         ppm         ASTN D585m         >100         16         20         43           Chromium         ppm         ASTN D585m         >4         1         0         0           Nickel         ppm         ASTN D585m         >4         1         0         <1           Silver         ppm         ASTN D585m         >3         0         0         <1           Copper         ppm         ASTN D585m         >40         2         0         <1           Antimony         ppm         ASTN D585m         >41         0         0         <1           Antimony         ppm         ASTN D585m         <1         0         <1         <1           Antimony         ppm	Oil Age	hrs	Client Info		274	491	248
CONTAMINATION         method         imit/base         current         history1         history2           Water         WC Method         >0.2         NEG         NEG         NEG         NEG           Glycol         WC Method         >0.2         NEG         NEG         NEG         NEG           WEAR METALS         method         imit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >100         16         20         43           Nickel         ppm         ASTM D5185m         >4         <1         0         <1           Silver         ppm         ASTM D5185m         >4         <1         0         <1           Silver         ppm         ASTM D5185m         >30         2         1         3           Lead         ppm         ASTM D5185m         >40         2         0         <1           Antimony         ppm         ASTM D5185m         >41         0         0         0           Vanadium         ppm         ASTM D5185m         <1         0         <1         0         1           Antimony         ppm         ASTM D5185m         <1 <t< th=""><th>Oil Changed</th><th></th><th>Client Info</th><th></th><th>Changed</th><th>Changed</th><th>Changed</th></t<>	Oil Changed		Client Info		Changed	Changed	Changed
Water         WC Method         >0.2         NEG         NEG         NEG           Glycol         I         WC Method         Imil/base         current         history1         history2           Iron         ppm         ASTM D5185m         >100         16         20         43           Chromium         ppm         ASTM D5185m         >20         1         <1         1           Nickel         ppm         ASTM D5185m         >20         2         0         <1           Silver         ppm         ASTM D5185m         >3         0         0         <1           Silver         ppm         ASTM D5185m         >20         2         2         5           Lead         ppm         ASTM D5185m         >20         2         1         3           Tin         ppm         ASTM D5185m         >1         0         <1         0           Cadmium         ppm         ASTM D5185m         >15         1         0         <1           Cadmium         ppm         ASTM D5185m         S5         36         61         58           Barium         ppm         ASTM D5185m         100         0         <1	Sample Status				SEVERE	MARGINAL	SEVERE
Głycoł         WC Method         NEG         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m<>10.0         16         20         43           Chromium         ppm         ASTM D5185m<>20         1         <1         1           Nickel         ppm         ASTM D5185m<>3         0         0         <1           Silver         ppm         ASTM D5185m<>30         0         <1         3           Aluminum         ppm         ASTM D5185m<>30         2         1         3         3           In         ppm         ASTM D5185m         >10         <1         0         <1           Copper         ppm         ASTM D5185m         >15         1         0         <1           Antimony         ppm         ASTM D5185m         <1         0         0         <1           Addium         ppm         ASTM D5185m         <1         0         0         <1           Antimony         ppm         ASTM D5185m         6         1         58         36         61         58	CONTAMINATION	N	method	limit/base	current	history1	history2
WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >100         16         20         43           Chromium         ppm         ASTM D5185m         >20         1         <1         1           Nickel         ppm         ASTM D5185m         >4         <1         0         <1           Silver         ppm         ASTM D5185m         >3         0         0         <1           Aluminum         ppm         ASTM D5185m         >3         0         0         <1           Aluminum         ppm         ASTM D5185m         >40         2         0         <1         3           Tin         ppm         ASTM D5185m         >15         1         0         <1         3           Tin         ppm         ASTM D5185m         <1         0         0         0         <1           Antimony         ppm         ASTM D5185m         <1         0         0         <1           Antimony         ppm         ASTM D5185m         <1         0         0         <1           Madatebenum         ppm         ASTM D5185m	Water		WC Method	>0.2	NEG	NEG	NEG
Iron         ppm         ASTM D5185m         >100         16         20         43           Chromium         ppm         ASTM D5185m         >20         1         <1         1           Nickel         ppm         ASTM D5185m         >4         <1         0         0           Titanium         ppm         ASTM D5185m         >3         0         0         <1           Aluminum         ppm         ASTM D5185m         >20         2         2         5           Lead         ppm         ASTM D5185m         >20         2         0         <1           Antimony         ppm         ASTM D5185m         >20         2         0         <1           Antimony         ppm         ASTM D5185m         <1         0         <1            Vanadium         ppm         ASTM D5185m         <1         0         0         <1           Antimony         ppm         ASTM D5185m         <1         0         0         <1           Addinium         ppm         ASTM D5185m         <1         0         <1         0         <1           Magnaese         ppm         ASTM D5185m         160         1022 </th <th>Glycol</th> <th></th> <th>WC Method</th> <th></th> <th>NEG</th> <th>NEG</th> <th>NEG</th>	Glycol		WC Method		NEG	NEG	NEG
Chromium         ppm         ASTM D5185m         >20         1         <1	WEAR METALS		method	limit/base	current	history1	history2
Nickel         ppm         ASTM D5185m         >4         <1	Iron	ppm	ASTM D5185m	>100	16	20	43
Titanium         ppm         ASTM D5185m         <1	Chromium	ppm	ASTM D5185m	>20	1	<1	1
Silver         ppm         ASTM D5185m         >3         0         0         <1	Nickel	ppm	ASTM D5185m	>4	<1	0	0
Atuminum         ppm         ASTM D5185m         >20         2         2         5           Lead         ppm         ASTM D5185m         >40         2         0         <1           Copper         ppm         ASTM D5185m         >330         2         1         3           Tin         ppm         ASTM D5185m         >15         1         0         <1           Antimony         ppm         ASTM D5185m         <1         0         0           Vanadium         ppm         ASTM D5185m         <1         0         0           Cadmium         ppm         ASTM D5185m         <1         0         0           Cadmium         ppm         ASTM D5185m         <1         0         <1           Molybdenum         ppm         ASTM D5185m         <36         61         58           Barium         ppm         ASTM D5185m         <4         28         4           Magnesium         ppm         ASTM D5185m         <482         529         541           Calcium         ppm         ASTM D5185m         1800         1022         1498         1047           Phosphorus         ppm         ASTM D5185m         <	Titanium	ppm	ASTM D5185m		<1	0	<1
Lead         ppm         ASTM D5185m         >40         2         0         <1	Silver	ppm	ASTM D5185m	>3	0	0	<1
Copper         ppm         ASTM D5185m         >330         2         1         3           Tin         ppm         ASTM D5185m         >15         1         0         <1           Antimony         ppm         ASTM D5185m         >15         1         0         <1           Vanadium         ppm         ASTM D5185m         <1         0         0           Cadmium         ppm         ASTM D5185m         <1         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         85         36         61         58           Barium         ppm         ASTM D5185m         0         0         <1         0           Molybdenum         ppm         ASTM D5185m         350         482         529         541           Calcium         ppm         ASTM D5185m         1000         755         1049         828           Zinc         ppm         ASTM D5185m         3500         2922         3891         3041           CONTAMINANTS         method         limit/base         current         history1         history2	Aluminum	ppm	ASTM D5185m	>20	2	2	5
Tin         ppm         ASTM D5185m         >15         1         0         <1	Lead	ppm	ASTM D5185m	>40	2	0	<1
Antimony         ppm         ASTM D5185m              Vanadium         ppm         ASTM D5185m         <1         0         0           Cadmium         ppm         ASTM D5185m         <1         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         85         36         61         58           Barium         ppm         ASTM D5185m         6         0         <1         0         <1           Molybdenum         ppm         ASTM D5185m         4         28         4         4           Magnese         ppm         ASTM D5185m         50         482         529         541           Calcium         ppm         ASTM D5185m         1800         1022         1498         1047           Phosphorus         ppm         ASTM D5185m         1000         755         1049         828           Zinc         ppm         ASTM D5185m         3500         2922         3891         3041           CONTAMINANTS         method         limit/base         current         history1	Copper	ppm	ASTM D5185m	>330	2	1	3
Vanadium         ppm         ASTM D5185m         <1	Tin	ppm	ASTM D5185m	>15	1	0	<1
Cadmium         ppm         ASTM D5185m         <1	Antimony	ppm	ASTM D5185m				
ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         85         36         61         58           Barium         ppm         ASTM D5185m         0         0         <1           Molybdenum         ppm         ASTM D5185m         4         28         4           Manganese         ppm         ASTM D5185m         41         0         <1           Magnesium         ppm         ASTM D5185m         100         71         0         <1           Magnesium         ppm         ASTM D5185m         1800         1022         1498         1047           Phosphorus         ppm         ASTM D5185m         1000         755         1049         828           Zinc         ppm         ASTM D5185m         1000         755         1049         828           Sulfur         ppm         ASTM D5185m         3500         2922         3891         3041           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >20         3         3         3	Vanadium	ppm	ASTM D5185m		<1	0	0
Boron         ppm         ASTM D5185m         85         36         61         58           Barium         ppm         ASTM D5185m         0         0         <1           Molybdenum         ppm         ASTM D5185m         4         28         4           Manganese         ppm         ASTM D5185m         <1         0         <1           Magnesium         ppm         ASTM D5185m         350         482         529         541           Calcium         ppm         ASTM D5185m         1800         1022         1498         1047           Phosphorus         ppm         ASTM D5185m         1000         755         1049         828           Zinc         ppm         ASTM D5185m         1000         825         1185         978           Sulfur         ppm         ASTM D5185m         1100         825         1185         978           Sulfur         ppm         ASTM D5185m         3500         2922         3891         3041           CONTAMINANTS         method         Imit/base         current         history1         history2           Sulfarion         ppm         ASTM D5185m         >20         3         3	Cadmium	ppm	ASTM D5185m		<1	0	0
Barium         pm         ASTM D5185m         0         0         <1							
Molybdenum         ppm         ASTM D5185m         4         28         4           Manganese         ppm         ASTM D5185m         <         <1         0         <1           Magnesium         ppm         ASTM D5185m         350         482         529         541           Calcium         ppm         ASTM D5185m         1800         1022         1498         1047           Phosphorus         ppm         ASTM D5185m         1000         755         1049         828           Zinc         ppm         ASTM D5185m         1000         825         1185         978           Sulfur         ppm         ASTM D5185m         3500         2922         3891         3041           CONTAMINANTS         method         imit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >20         3         3         2           Potassium         ppm         ASTM D5185m         >20         3         3.8         13.0           INFRA-RED         method         imit/base         current         history1         history2           Soot %         %         'ASTM D7844         >3	ADDITIVES		method	limit/base	current	history1	history2
Manganese       ppm       ASTM D5185m       <1		ppm					
Magnesium         ppm         ASTM D5185m         350         482         529         541           Calcium         ppm         ASTM D5185m         1800         1022         1498         1047           Phosphorus         ppm         ASTM D5185m         1000         755         1049         828           Zinc         ppm         ASTM D5185m         1000         755         1049         828           Sulfur         ppm         ASTM D5185m         1100         825         1185         978           Sulfur         ppm         ASTM D5185m         3500         2922         3891         3041           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         4         4         5           Sodium         ppm         ASTM D5185m         >20         3         3         2           Potassium         ppm         ASTM D5185m         >20         3         3.8         13.0           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844	Boron		ASTM D5185m		36	61	58
Calcium         ppm         ASTM D5185m         1800         1022         1498         1047           Phosphorus         ppm         ASTM D5185m         1000         755         1049         828           Zinc         ppm         ASTM D5185m         1100         825         1185         978           Sulfur         ppm         ASTM D5185m         3500         2922         3891         3041           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         4         4         5           Sodium         ppm         ASTM D5185m         >25         4         4         5           Sodium         ppm         ASTM D5185m         >20         3         3         2           Potassium         ppm         ASTM D5185m         >20         3         3.8         13.0           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         1.6         1.3         1.6           Nitration         Abs/cm         *ASTM D7624 <td< th=""><th>Boron Barium</th><th>ppm</th><th>ASTM D5185m ASTM D5185m</th><th></th><th>36 0</th><th>61 0</th><th>58 &lt;1</th></td<>	Boron Barium	ppm	ASTM D5185m ASTM D5185m		36 0	61 0	58 <1
Phosphorus         ppm         ASTM D5185m         1000         755         1049         828           Zinc         ppm         ASTM D5185m         1100         825         1185         978           Sulfur         ppm         ASTM D5185m         3500         2922         3891         3041           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         4         4         5           Sodium         ppm         ASTM D5185m         >25         4         4         5           Sodium         ppm         ASTM D5185m         >20         3         3         2           Potassium         ppm         ASTM D5185m         >20         3         3         4         13.0           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7624         >3         1.6         1.3         1.6           Nitration         Abs/cm         *ASTM D7624         >20         9.7         9.2         11.8           Sulfation         Abs/.1mm         *ASTM D	Boron Barium Molybdenum	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m		36 0 4	61 0 28	58 <1 4
Zinc         ppm         ASTM D5185m         1100         825         1185         978           Sulfur         ppm         ASTM D5185m         3500         2922         3891         3041           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         4         4         5           Sodium         ppm         ASTM D5185m         >25         4         4         5           Sodium         ppm         ASTM D5185m         >20         3         3         2           Potassium         ppm         ASTM D5185m         >20         3         3.8         13.0           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7624         >3         1.6         1.3         1.6           Nitration         Abs/cm         *ASTM D7624         >20         9.7         9.2         11.8           Sulfation         Abs/1mm         *ASTM D7415         >30         20.8         21.2         25.0           FLUID DEGRADATION         method         limit/base <th>Boron Barium Molybdenum Manganese</th> <th>ppm ppm ppm</th> <th>ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m</th> <th>85</th> <th>36 0 4 &lt;1</th> <th>61 0 28 0 529</th> <th>58 &lt;1 4 &lt;1 541</th>	Boron Barium Molybdenum Manganese	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	85	36 0 4 <1	61 0 28 0 529	58 <1 4 <1 541
SulfurppmASTM D5185m3500292238913041CONTAMINANTSmethodlimit/basecurrenthistory1history2SiliconppmASTM D5185m>25445SodiumppmASTM D5185m>20332PotassiumppmASTM D5185m>20333Fuel%ASTM D5185m>2033.8▲ 13.0INFRA-REDmethodlimit/basecurrenthistory1history2Soot %%*ASTM D7844>31.61.31.6NitrationAbs/cm*ASTM D7624>209.79.211.8SulfationAbs/1mm*ASTM D7415>3020.821.225.0FLUID DEGRADATIONmethodlimit/basecurrenthistory1history2OxidationAbs/.1mm*ASTM D7414>2512.913.718.8Base Number (BN)mg KOHgASTM D28969.58.08.19.1	Boron Barium Molybdenum Manganese Magnesium	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	85 350	36 0 4 <1 482 1022	61 0 28 0 529	58 <1 4 <1 541
CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         4         4         5           Sodium         ppm         ASTM D5185m         >25         4         4         5           Potassium         ppm         ASTM D5185m         >20         3         3         2           Potassium         ppm         ASTM D5185m         >20         3         3         3           Fuel         %         ASTM D3524         >5         ▲ 22.6         ▲ 3.8         ▲ 13.0           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         1.6         1.3         1.6           Nitration         Abs/cm         *ASTM D7624         >20         9.7         9.2         11.8           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.8         21.2         25.0           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D74142	Boron Barium Molybdenum Manganese Magnesium Calcium	ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	85 350 1800	36 0 4 <1 482 1022 755	61 0 28 0 529 1498 1049	58 <1 4 <1 541 1047 828
Silicon       ppm       ASTM D5185m       >25       4       4       5         Sodium       ppm       ASTM D5185m       5       3       2         Potassium       ppm       ASTM D5185m       >20       3       3       3         Fuel       %       ASTM D5185m       >20       3       3.8       ▲ 13.0         INFRA-RED       method       limit/base       current       history1       history2         Soot %       %       *ASTM D7624       >30       1.6       1.3       1.6         Nitration       Abs/cm       *ASTM D7624       >20       9.7       9.2       11.8         Sulfation       Abs/.1mm       *ASTM D7624       >20       9.7       9.2       11.8         FLUID DEGRADATION       method       limit/base       current       history1       history2         Oxidation       Abs/.1mm       *ASTM D7414       >25       12.9       13.7       18.8         Base Number (BN)       mg KOHg       ASTM D286       9.5       8.0       8.1       9.1	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	85 350 1800 1000	36 0 4 <1 482 1022 755	61 0 28 0 529 1498 1049	58 <1 4 <1 541 1047 828
Sodium         ppm         ASTM D5185m         5         3         2           Potassium         ppm         ASTM D5185m         >20         3         3         3           Fuel         %         ASTM D3524         >5         ▲ 22.6         ▲ 3.8         ▲ 13.0           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         1.6         1.3         1.6           Nitration         Abs/cm         *ASTM D7624         >20         9.7         9.2         11.8           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.8         21.2         25.0           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         12.9         13.7         18.8           Base Number (BN)         mg KOH/g         ASTM D2896         9.5         8.0         8.1         9.1	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc	ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	85 350 1800 1000 1100	36 0 4 <1 482 1022 755 825	61 0 28 0 529 1498 1049 1185	58 <1 4 <1 541 1047 828 978
Potassium         ppm         ASTM D5185m         >20         3         3         3           Fuel         %         ASTM D3524         >5         ▲ 22.6         ▲ 3.8         ▲ 13.0           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         1.6         1.3         1.6           Nitration         Abs/cm         *ASTM D7624         >20         9.7         9.2         11.8           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.8         21.2         25.0           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         12.9         13.7         18.8           Base Number (BN)         mg KOH/g         ASTM D2896         9.5         8.0         8.1         9.1	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	85 350 1800 1000 1100 3500	36 0 4 <1 482 1022 755 825 2922	61 0 28 0 529 1498 1049 1185 3891	58 <1 4 <1 541 1047 828 978 3041
Fuel       %       ASTM D3524       >5       ▲ 22.6       ▲ 3.8       ▲ 13.0         INFRA-RED       method       limit/base       current       history1       history2         Soot %       %       *ASTM D7844       >3       1.6       1.3       1.6         Nitration       Abs/cm       *ASTM D7624       >20       9.7       9.2       11.8         Sulfation       Abs/.1mm       *ASTM D7415       >30       20.8       21.2       25.0         FLUID DEGRADATION       method       limit/base       current       history1       history2         Oxidation       Abs/.1mm       *ASTM D7414       >25       12.9       13.7       18.8         Base Number (BN)       mg KOH/g       ASTM D2896       9.5       8.0       8.1       9.1	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>	85 350 1800 1000 1100 3500	36 0 4 <1 482 1022 755 825 2922 current 4	61 0 28 0 529 1498 1049 1185 3891 history1 4	58 <1 4 <1 541 1047 828 978 3041 history2 5
INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         1.6         1.3         1.6           Nitration         Abs/cm         *ASTM D7624         >20         9.7         9.2         11.8           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.8         21.2         25.0           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         12.9         13.7         18.8           Base Number (BN)         mg KOH/g         ASTM D2896         9.5         8.0         8.1         9.1	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 ASTM D5185m ASTM D5185m	85 350 1800 1000 1100 3500 <b>limit/base</b> >25	36 0 4 <1 482 1022 755 825 2922 Current 4 5	61 0 28 0 529 1498 1049 1185 3891 history1 4 3	58 <1 4 <1 541 1047 828 978 3041 history2 5 2
Soot %         %         *ASTM D7844         >3         1.6         1.3         1.6           Nitration         Abs/cm         *ASTM D7624         >20         9.7         9.2         11.8           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.8         21.2         25.0           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         12.9         13.7         18.8           Base Number (BN)         mg KOH/g         ASTM D2896         9.5         8.0         8.1         9.1	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	85 350 1800 1000 1100 3500 <b>limit/base</b> >25	36 0 4 <1 482 1022 755 825 2922 Current 4 5 3	61 0 28 0 529 1498 1049 1185 3891 history1 4 3 3 3	58 <1 4 <1 541 1047 828 978 3041 <b>history2</b> 5 2 2 3
Nitration         Abs/cm         *ASTM D7624         >20         9.7         9.2         11.8           Sulfation         Abs/.1mm         *ASTM D7415         >30         20.8         21.2         25.0           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         12.9         13.7         18.8           Base Number (BN)         mg KOH/g         ASTM D2896         9.5         8.0         8.1         9.1	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	85 350 1800 1000 1100 3500 <b>limit/base</b> >25	36 0 4 <1 482 1022 755 825 2922 Current 4 5 3	61 0 28 0 529 1498 1049 1185 3891 history1 4 3 3 3	58 <1 4 <1 541 1047 828 978 3041 <b>history2</b> 5 2 2 3
Sulfation         Abs/.1mm         *ASTM D7415         >30         20.8         21.2         25.0           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         12.9         13.7         18.8           Base Number (BN)         mg KOH/g         ASTM D2896         9.5         8.0         8.1         9.1	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Fuel INFRA-RED	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	85 350 1800 1000 1100 3500 <b>limit/base</b> >25 >20 >5	36 0 4 <1 482 1022 755 825 2922 Current 4 5 3 3 ▲ 22.6 Current	61 0 28 0 529 1498 1049 1185 3891 history1 4 3 3 3 3 3 3 18 18 18 18 18 18 18 18 18 18	58 <1 4 <1 541 1047 828 978 3041 <b>history2</b> 5 2 3 ▲ 13.0
FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         12.9         13.7         18.8           Base Number (BN)         mg KOH/g         ASTM D2896         9.5         8.0         8.1         9.1	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Fuel INFRA-RED Soot %	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	85 350 1800 1000 1100 3500 <b>limit/base</b> >25 >20 >5	36 0 4 <1 482 1022 755 825 2922 <b>current</b> 4 5 3 2 22.6 <b>current</b> 1.6	61 0 28 0 529 1498 1049 1185 3891 <b>history1</b> 4 3 3 3 ▲ 3.8 <b>history1</b> 1.3	58 <1 4 <1 541 1047 828 978 3041 <b>bistory2</b> 5 2 3 ↓ 13.0 <b>bistory2</b> 1.6
Oxidation         Abs/.1mm         *ASTM D7414         >25         12.9         13.7         18.8           Base Number (BN)         mg KOH/g         ASTM D2896         9.5         8.0         8.1         9.1	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Fuel INFRA-RED Soot % Nitration	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	85 350 1800 1000 1100 3500 <b>limit/base</b> >25 >20 >5 <b>limit/base</b> >3	36 0 4 <1 482 1022 755 825 2922 Current 4 5 3 22.6 22.6 200 22.6	61 0 28 0 529 1498 1049 1185 3891 history1 4 3 3 3 3 3 3.8 history1 1.3 9.2	58 <1 4 <1 541 1047 828 978 3041 <b>history2</b> 5 2 3 ↓ 13.0 <b>history2</b> 1.6 11.8
Base Number (BN)         mg KOH/g         ASTM D2896         9.5         8.0         8.1         9.1	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Fuel INFRA-RED Soot % Nitration	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D3524 ASTM D3524 *ASTM D7844	85 350 1800 1000 1100 3500 <b>limit/base</b> >25 >20 <b>limit/base</b> >3 >20	36 0 4 <1 482 1022 755 825 2922 Current 4 5 3 22.6 22.6 200 22.6	61 0 28 0 529 1498 1049 1185 3891 history1 4 3 3 3 3 3 3.8 history1 1.3 9.2	58 <1 4 <1 541 1047 828 978 3041 <b>history2</b> 5 2 3 ↓ 13.0 <b>history2</b> 1.6 11.8
	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Fuel INFRA-RED Soot % Nitration Sulfation	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	85 350 1800 1000 1100 3500 <b>Imit/base</b> >25 >20 >5 <b>Imit/base</b> >3 >20 >3 >20	36 0 4 <1 482 1022 755 825 2922 <b>current</b> 4 5 3 2 22.6 <b>current</b> 1.6 9.7 20.8	<ul> <li>61</li> <li>0</li> <li>28</li> <li>0</li> <li>529</li> <li>1498</li> <li>1049</li> <li>1185</li> <li>3891</li> <li>history1</li> <li>4</li> <li>3</li> <li>3</li> <li>3.8</li> <li>history1</li> <li>1.3</li> <li>9.2</li> <li>21.2</li> </ul>	58 <1 4 <1 541 1047 828 978 3041 <b>bistory2</b> 5 2 3 ▲ 13.0 <b>bistory2</b> 1.6 11.8 25.0
:30:24) Rev: 1 Submitted By: JAMES STEELMON	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Fuel INFRA-RED Soot % Nitration Sulfation FLUID DEGRADA Oxidation	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D7844 *ASTM D7624 *ASTM D7414	85 350 1800 1000 1100 3500 <b>Iimit/base</b> >25 20 >5 <b>Iimit/base</b> >3 >20 30 <b>Iimit/base</b> >3	36 0 4 4 1022 755 825 2922 Current 4 5 3 22.6 Current 1.6 9.7 20.8 Current 1.2.9	61 0 28 0 529 1498 1049 1185 3891 history1 4 3 3 3 3 3 1.3 9.2 21.2 history1 13.7	58 <1 4 541 1047 828 978 3041 <b>bistory2</b> 5 2 3 ↓ 13.0 <b>bistory2</b> 1.6 11.8 25.0 <b>bistory2</b> 18.8

Submitted By: JAMES STEELMON

Page 3 of 4



# **OIL ANALYSIS REPORT**



Submitted By: JAMES STEELMON

an3/24

Page 4 of 4

E:

TULSA, OK

US 74146

NONE

NONE

NONE

NONE

NONE

NONE

NORML

NORML

NEG

NEG

▲ 10.2