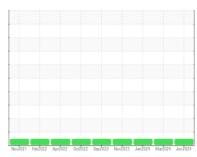


# **OIL ANALYSIS REPORT**

Sample Rating Trend







1721
Component
Diesel Engine

Machine Id

**DIESEL ENGINE OIL SAE 15W40 (--- GAL)** 

### DIAGNOSIS

## Recommendation

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

#### Wear

All component wear rates are normal.

# Contamination

There is no indication of any contamination in the

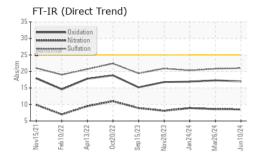
## **Fluid Condition**

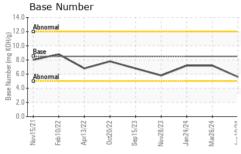
The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

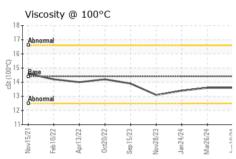
| SAMPLE INFORMATION   method   limit/base   current   history1   history2  |                  |          | Nov2021 Fel | 2022 Apr2022 Oct2022 : | Sep2023 Nov2023 Jan2024 Mar20 | 24 Jun2024  |             |
|---|------------------|----------|-------------|------------------------|-------------------------------|-------------|-------------|
| Sample Date   | SAMPLE INFORM    | MATION   | method      | limit/base             | current                       | history1    | history2    |
| Sample Date         Client Info         10 Jun 2024         26 Mar 2024         24 Jan 2024           Machine Age         mis         Client Info         194522         188913         184354           Oil Age         mis         Client Info         6000         0         0           Oil Changed         Client Info         Changed         N/A         Changed           Sample Status         Client Info         Changed         N/A         Changed           CONTAMINATION         method         Imit base         current         history1         history2           Fuel         WC Method         >5         < 1.0  | Sample Number    |          | Client Info |                        | HRE0000507                    | HRE0000123  | WC0810282   |
| Machine Age         mls         Client Info         194522         189913         184354           Oil Age         mls         Client Info         6000         0         0           Oil Changed         Client Info         Changed         NA         Changed         NA           Sample Status         method         limit/base         current         history1         history2           Fuel         WC Method         >5         <1.0         <1.0         <1.0           Water         WC Method         >0.2         NEG         NEG         NEG           Glycol         WC Method         NEG         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history2         history2           Iron         ppm         ASTM D5185m         >100         19         16         13           Iron         ppm         ASTM D5185m         >20         <1         <1         <1           Silver         ppm         ASTM D5185m         >20         <1         <1         <1         <1           Copper         ppm         ASTM D5185m         >20         3         2         2 <tr< th=""><th>•</th><th></th><th>Client Info</th><th></th><th>10 Jun 2024</th><th>26 Mar 2024</th><th>24 Jan 2024</th></tr<> | •                |          | Client Info |                        | 10 Jun 2024                   | 26 Mar 2024 | 24 Jan 2024 |
| Oil Changed Sample Status         Client Info         Changed NORMAL NORMAL         N/A NORMAL NORMAL         Changed NORMAL NORMAL           CONTAMINATION         method         limit/base         current         history1         history2           Fuel         WC Method         >5         <1.0         <1.0         <1.0           Water         WC Method         >0.2         NEG         NEG         NEG           Glycol         WC Method         NEG         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >100         19         16         13           Chromium         ppm         ASTM D5185m         >20         <1         <1         <1           Nickel         ppm         ASTM D5185m         >3         0         <1         0           Silver         ppm         ASTM D5185m         >3         0         0         0           Lead         ppm         ASTM D5185m         >30         1         2         2           Lead         ppm         ASTM D5185m         >10         0         <1         <1  |                  | mls      | Client Info |                        | 194522                        | 189913      | 184354      |
| Sample Status   | Oil Age          | mls      | Client Info |                        | 6000                          | 0           | 0           |
| CONTAMINATION         method         limit/base         current         history1         history2           Fuel         WC Method         >5         <1.0         <1.0         <1.0         <1.0           Water         WC Method         >0.2         NEG         NEG         NEG           Glycol         WC Method         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM D5185m         >100         19         16         13           Chromium         ppm         ASTM D5185m         >20         <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         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1         <1  | Oil Changed      |          | Client Info |                        | Changed                       | N/A         | Changed     |
| Fuel   WC Method   S5   C1.0   C1.0   C1.0   C1.0   | Sample Status    |          |             |                        | NORMAL                        | NORMAL      | NORMAL      |
| Water         WC Method         >0.2         NEG         NEG         NEG           Glycol         WC Method         Imilibase         current         history1         history2           WEAR METALS         method         limil/base         current         history1         history2           Iron         ppm         ASTM D5185m         >100         19         16         13           Chromium         ppm         ASTM D5185m         >20         <1         <1         <1           Nickel         ppm         ASTM D5185m         >4         0         <1         0           Silver         ppm         ASTM D5185m         >4         0         <1         2           Silver         ppm         ASTM D5185m         >40         0         <1         <1           Silver         ppm         ASTM D5185m         >40         0         <1         <1         <1           Silver         ppm         ASTM D5185m         >40         0         <1         <1         <1           Copper         ppm         ASTM D5185m         >10         0         <1         <1         <1           Tin         ppm         ASTM D5185m         >10<  | CONTAMINATIO     | N        | method      | limit/base             | current                       | history1    | history2    |
| WEAR METALS   | Fuel             |          | WC Method   | >5                     | <1.0                          | <1.0        | <1.0        |
| WEAR METALS   | Water            |          | WC Method   | >0.2                   | NEG                           | NEG         | NEG         |
| Iron  | Glycol           |          | WC Method   |                        | NEG                           | NEG         | NEG         |
| Chromium         ppm         ASTM D5185m         >20         <1   | WEAR METALS      |          | method      | limit/base             | current                       | history1    | history2    |
| Nickel  | Iron             | ppm      | ASTM D5185m | >100                   | 19                            | 16          | 13          |
| Titanium         ppm         ASTM D5185m         -1         2         0           Silver         ppm         ASTM D5185m         >3         0         0         0           Aluminum         ppm         ASTM D5185m         >20         3         2         2           Lead         ppm         ASTM D5185m         >40         0         <1         <1           Copper         ppm         ASTM D5185m         >330         1         2         2           Tin         ppm         ASTM D5185m         >15         0         <1         <1           Vanadium         ppm         ASTM D5185m         0         <1         <1           Vanadium         ppm         ASTM D5185m         0         <1         <0           Cadmium         ppm         ASTM D5185m         0         <1         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         250         175         151         73           Barium         ppm         ASTM D5185m         100         0         0         0         0           Magnesium  | Chromium         | ppm      | ASTM D5185m | >20                    | <1                            | <1          | <1          |
| Silver         ppm         ASTM D5185m         >3         0         0         0           Aluminum         ppm         ASTM D5185m         >20         3         2         2           Lead         ppm         ASTM D5185m         >40         0         <1  | Nickel           | ppm      | ASTM D5185m | >4                     | 0                             | <1          | 0           |
| Aluminum         ppm         ASTM D5185m         >20         3         2         2           Lead         ppm         ASTM D5185m         >40         0         <1         <1           Copper         ppm         ASTM D5185m         >330         1         2         2           Tin         ppm         ASTM D5185m         >15         0         <1         <1           Vanadium         ppm         ASTM D5185m         0         0         0         0           Cadmium         ppm         ASTM D5185m         0         <1         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         0         0         0         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         250         175         151         73           Barium         ppm         ASTM D5185m         100         0         0         0           Marganese         ppm         ASTM D5185m         450         403         352   | Titanium         | ppm      | ASTM D5185m |                        | <1                            | 2           | 0           |
| Lead         ppm         ASTM D5185m         >40         0         <1   | Silver           | ppm      | ASTM D5185m | >3                     | 0                             | _           | 0           |
| Copper         ppm         ASTM D5185m         >330         1         2         2           Tin         ppm         ASTM D5185m         >15         0         <1         <1           Vanadium         ppm         ASTM D5185m         0         0         0           Cadmium         ppm         ASTM D5185m         0         <1         0           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         250         175         151         73           Barium         ppm         ASTM D5185m         10         0         0         0           Molybdenum         ppm         ASTM D5185m         100         74         76         67           Manganese         ppm         ASTM D5185m         100         74         76         67           Magnesium         ppm         ASTM D5185m         450         403         352         279           Calcium         ppm         ASTM D5185m         450         403         352         279           Calcium         ppm         ASTM D5185m         1150         976         1042         967<  | Aluminum         | ppm      | ASTM D5185m | >20                    | 3                             | 2           | 2           |
| Tin   | Lead             | ppm      | ASTM D5185m | >40                    | 0                             | <1          | <1          |
| Vanadium         ppm         ASTM D5185m         0         0         0           Cadmium         ppm         ASTM D5185m         0         <1   | Copper           | ppm      | ASTM D5185m | >330                   | 1                             | 2           | 2           |
| Cadmium         ppm         ASTM D5185m         0         <1  | Tin              | ppm      | ASTM D5185m | >15                    | 0                             | <1          | <1          |
| ADDITIVES   | Vanadium         | ppm      | ASTM D5185m |                        | 0                             | 0           | 0           |
| Boron   | Cadmium          | ppm      | ASTM D5185m |                        | 0                             | <1          | 0           |
| Barium         ppm         ASTM D5185m         10         0         0         0           Molybdenum         ppm         ASTM D5185m         100         74         76         67           Manganese         ppm         ASTM D5185m         100         403         352         279           Calcium         ppm         ASTM D5185m         3000         1515         1641         1601           Phosphorus         ppm         ASTM D5185m         1150         976         1042         967           Zinc         ppm         ASTM D5185m         1350         1202         1151         1144           Sulfur         ppm         ASTM D5185m         4250         3560         3319         3145           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         11         1         10           Sodium         ppm         ASTM D5185m         >20         <1         2         1           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         "ASTM D7624  | ADDITIVES        |          | method      | limit/base             | current                       | history1    | history2    |
| Molybdenum         ppm         ASTM D5185m         100         74         76         67           Manganese         ppm         ASTM D5185m         100         74         76         67           Magnesium         ppm         ASTM D5185m         450         403         352         279           Calcium         ppm         ASTM D5185m         3000         1515         1641         1601           Phosphorus         ppm         ASTM D5185m         1150         976         1042         967           Zinc         ppm         ASTM D5185m         1350         1202         1151         1144           Sulfur         ppm         ASTM D5185m         4250         3560         3319         3145           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         11         11         10           Sodium         ppm         ASTM D5185m         >25         11         11         10           Sodium         ppm         ASTM D5185m         >20         <1   | Boron            | ppm      | ASTM D5185m | 250                    | 175                           | 151         | 73          |
| Manganese         ppm         ASTM D5185m         <1  | Barium           | ppm      | ASTM D5185m | 10                     | 0                             | 0           | 0           |
| Magnesium         ppm         ASTM D5185m         450         403         352         279           Calcium         ppm         ASTM D5185m         3000         1515         1641         1601           Phosphorus         ppm         ASTM D5185m         1150         976         1042         967           Zinc         ppm         ASTM D5185m         1350         1202         1151         1144           Sulfur         ppm         ASTM D5185m         4250         3560         3319         3145           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         11         11         10           Sodium         ppm         ASTM D5185m         >158         4         13         3           Potassium         ppm         ASTM D5185m         >20         <1         2         1           INFRA-RED         method         limit/base         current         history1         history2           Soot %         "ASTM D7624         >20         8.5         8.6         8.9           Sulfation         Abs/.1mm         "ASTM D7415         >30<   | Molybdenum       | ppm      | ASTM D5185m | 100                    | 74                            | 76          | 67          |
| Calcium         ppm         ASTM D5185m         3000         1515         1641         1601           Phosphorus         ppm         ASTM D5185m         1150         976         1042         967           Zinc         ppm         ASTM D5185m         1350         1202         1151         1144           Sulfur         ppm         ASTM D5185m         4250         3560         3319         3145           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         11         11         10           Sodium         ppm         ASTM D5185m         >158         4         13         3           Potassium         ppm         ASTM D5185m         >20         <1         2         1           INFRA-RED         method         limit/base         current         history1         history2           Soot %         "ASTM D7844         >3         0.5         0.5         0.5           Nitration         Abs/cm         "ASTM D7624         >20         8.5         8.6         8.9           Sulfation         Abs/.1mm         "ASTM D7415  | Manganese        | ppm      | ASTM D5185m |                        | <1                            | <1          | <1          |
| Phosphorus         ppm         ASTM D5185m         1150         976         1042         967           Zinc         ppm         ASTM D5185m         1350         1202         1151         1144           Sulfur         ppm         ASTM D5185m         4250         3560         3319         3145           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         11         11         10           Sodium         ppm         ASTM D5185m         >158         4         13         3           Potassium         ppm         ASTM D5185m         >20         <1         2         1           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.5         0.5         0.5           Nitration         Abs/cm         *ASTM D7624         >20         8.5         8.6         8.9           Sulfation         Abs/.1mm         *ASTM D7415         >30         21.0         20.8         20.3           FLUID DEGRADATION   | Magnesium        | ppm      | ASTM D5185m | 450                    | 403                           | 352         | 279         |
| Zinc         ppm         ASTM D5185m         1350         1202         1151         1144           Sulfur         ppm         ASTM D5185m         4250         3560         3319         3145           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         11         11         10           Sodium         ppm         ASTM D5185m         >158         4         13         3           Potassium         ppm         ASTM D5185m         >20         <1         2         1           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.5         0.5         0.5           Nitration         Abs/cm         *ASTM D7624         >20         8.5         8.6         8.9           Sulfation         Abs/.1mm         *ASTM D7415         >30         21.0         20.8         20.3           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm   | Calcium          | ppm      | ASTM D5185m | 3000                   | 1515                          | 1641        | 1601        |
| Sulfur         ppm         ASTM D5185m         4250         3560         3319         3145           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         11         11         10           Sodium         ppm         ASTM D5185m         >158         4         13         3           Potassium         ppm         ASTM D5185m         >20         <1         2         1           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.5         0.5         0.5           Nitration         Abs/cm         *ASTM D7624         >20         8.5         8.6         8.9           Sulfation         Abs/.1mm         *ASTM D7415         >30         21.0         20.8         20.3           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         17.0         17.3         16.9   | Phosphorus       | ppm      |             |                        |                               |             |             |
| CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >25         11         11         10           Sodium         ppm         ASTM D5185m         >158         4         13         3           Potassium         ppm         ASTM D5185m         >20         <1         2         1           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.5         0.5         0.5           Nitration         Abs/cm         *ASTM D7624         >20         8.5         8.6         8.9           Sulfation         Abs/.1mm         *ASTM D7415         >30         21.0         20.8         20.3           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         17.0         17.3         16.9  | -                |          |             |                        | 1202                          |             |             |
| Silicon         ppm         ASTM D5185m         >25         11         11         10           Sodium         ppm         ASTM D5185m         >158         4         13         3           Potassium         ppm         ASTM D5185m         >20         <1  | Sulfur           | ppm      | ASTM D5185m | 4250                   | 3560                          | 3319        | 3145        |
| Sodium         ppm         ASTM D5185m         >158         4         13         3           Potassium         ppm         ASTM D5185m         >20         <1   |                  | 3        | method      | limit/base             | current                       | •           | history2    |
| Potassium         ppm         ASTM D5185m         >20         <1  |                  |          |             |                        |                               |             |             |
| INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         >3         0.5         0.5         0.5           Nitration         Abs/cm         *ASTM D7624         >20         8.5         8.6         8.9           Sulfation         Abs/.1mm         *ASTM D7415         >30         21.0         20.8         20.3           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         17.0         17.3         16.9  |                  | ppm      | ASTM D5185m | >158                   | 4                             | 13          | 3           |
| Soot %         %         *ASTM D7844 >3         0.5         0.5         0.5           Nitration         Abs/cm         *ASTM D7624 >20         8.5         8.6         8.9           Sulfation         Abs/.1mm         *ASTM D7415 >30         21.0         20.8         20.3           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414 >25         17.0         17.3         16.9  | Potassium        | ppm      | ASTM D5185m | >20                    | <1                            | 2           | 1           |
| Nitration         Abs/cm         *ASTM D7624         >20         8.5         8.6         8.9           Sulfation         Abs/.1mm         *ASTM D7415         >30         21.0         20.8         20.3           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         17.0         17.3         16.9  | INFRA-RED        |          | method      | limit/base             | current                       | history1    | history2    |
| Sulfation         Abs/.1mm         *ASTM D7415         >30         21.0         20.8         20.3           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         17.0         17.3         16.9   | Soot %           | %        | *ASTM D7844 | >3                     | 0.5                           |             | 0.5         |
| FLUID DEGRADATION     method     limit/base     current     history1     history2       Oxidation     Abs/.1mm     *ASTM D7414     >25     17.0     17.3     16.9   | Nitration        | Abs/cm   | *ASTM D7624 | >20                    | 8.5                           | 8.6         | 8.9         |
| Oxidation Abs/.1mm *ASTM D7414 >25 <b>17.0</b> 17.3 16.9  | Sulfation        | Abs/.1mm | *ASTM D7415 | >30                    | 21.0                          | 20.8        | 20.3        |
|   | FLUID DEGRADA    | ATION    | method      | limit/base             | current                       | history1    | history2    |
| Base Number (BN)         mg KOH/g         ASTM D2896         8.5         5.6         7.2         7.2  | Oxidation        | Abs/.1mm | *ASTM D7414 | >25                    | 17.0                          | 17.3        | 16.9        |
|   | Base Number (BN) | mg KOH/g | ASTM D2896  | 8.5                    | 5.6                           | 7.2         | 7.2         |



# **OIL ANALYSIS REPORT**



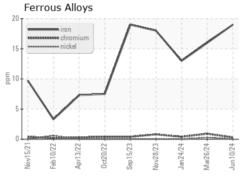


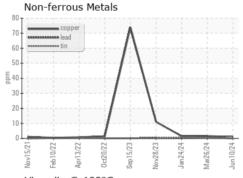


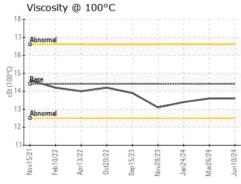
| VISUAL                  |        | method  | limit/base | current | history1 | history2 |
|-------------------------|--------|---------|------------|---------|----------|----------|
| White Metal             | scalar | *Visual | NONE       | NONE    | NONE     | NONE     |
| Yellow Metal            | scalar | *Visual | NONE       | NONE    | NONE     | NONE     |
| Precipitate             | scalar | *Visual | NONE       | NONE    | NONE     | NONE     |
| Silt                    | scalar | *Visual | NONE       | NONE    | NONE     | NONE     |
| Debris                  | scalar | *Visual | NONE       | NONE    | NONE     | NONE     |
| Sand/Dirt               | scalar | *Visual | NONE       | NONE    | NONE     | NONE     |
| Appearance              | scalar | *Visual | NORML      | NORML   | NORML    | NORML    |
| Odor                    | scalar | *Visual | NORML      | NORML   | NORML    | NORML    |
| <b>Emulsified Water</b> | scalar | *Visual | >0.2       | NEG     | NEG      | NEG      |
| Free Water              | scalar | *Visual |            | NEG     | NEG      | NEG      |

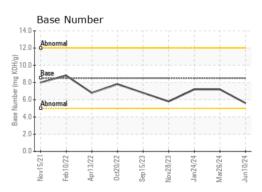
| FLUID PROPERTIES |     | method    |      |      |      | history2 |  |
|------------------|-----|-----------|------|------|------|----------|--|
| Visc @ 100°C     | cSt | ASTM D445 | 14.4 | 13.6 | 13.6 | 13.4     |  |

## **GRAPHS**













Laboratory Sample No.

: HRE0000507 Lab Number : 06213222 Unique Number : 11086086

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 Received : 18 Jun 2024 **Tested** : 19 Jun 2024 Diagnosed

: 19 Jun 2024 - Wes Davis

Test Package : FLEET Certificate 12367 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. Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012)

**TOWN OF CHAPEL HILL** 

6900 MILLHOUSE RD CHAPEL HILL, NC US 27516

Contact: Lisa DePasqua Idepasqua@townofchapelhill.org

T: (919)696-4941