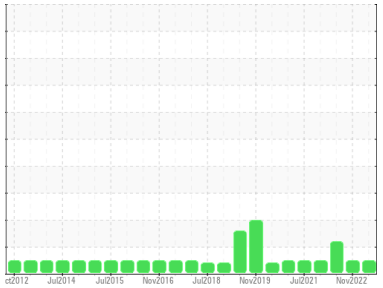
# OIL ANALYSIS REPORT

Sample Rating Trend



NORMAL

Area
**HIGHLAND [600380502]**
Machine Id
**24WEA80816**
Component
**Wind Turbine Gearbox**
Fluid
**MOBIL XMP 320 (--- LTR)**

## DIAGNOSIS

**Recommendation**
Resample at the next service interval to monitor.

**Wear**
All component wear rates are normal.

**Contamination**
The amount and size of particulates present in the system are acceptable. There is no indication of any contamination in the oil.

**Fluid Condition**
The AN level is acceptable for this fluid. The condition of the oil is suitable for further service.

| SAMPLE INFORMATION | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Sample Number | | Client Info | | **NX05928191** | NX05700286 | NX05602753 |
| Sample Date | | Client Info | | **23 May 2023** | 04 Nov 2022 | 30 Jun 2022 |
| Machine Age | mths | Client Info | | **0** | 0 | 0 |
| Oil Age | mths | Client Info | | **0** | 0 | 0 |
| Oil Changed | | Client Info | | **N/A** | N/A | N/A |
| Sample Status | | | | **NORMAL** | NORMAL | ABNORMAL |

| WEAR METALS | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| PQ | | ASTM D8184 | >80 | **14** | 7 | 16 |
| Iron | ppm | ASTM D5185m | >150 | **100** | 58 | 57 |
| Chromium | ppm | ASTM D5185m | >5 | **<1** | <1 | 0 |
| Nickel | ppm | ASTM D5185m | >10 | **0** | 0 | <1 |
| Titanium | ppm | ASTM D5185m | >10 | **0** | 0 | 0 |
| Silver | ppm | ASTM D5185m | | **0** | 0 | <1 |
| Aluminum | ppm | ASTM D5185m | >10 | **0** | 0 | <1 |
| Lead | ppm | ASTM D5185m | >20 | **0** | 0 | 0 |
| Copper | ppm | ASTM D5185m | >50 | **2** | 1 | <1 |
| Tin | ppm | ASTM D5185m | >10 | **0** | 0 | <1 |
| Antimony | ppm | ASTM D5185m | >5 | **---** | --- | --- |
| Vanadium | ppm | ASTM D5185m | | **0** | 0 | 0 |
| Cadmium | ppm | ASTM D5185m | | **0** | 0 | 0 |

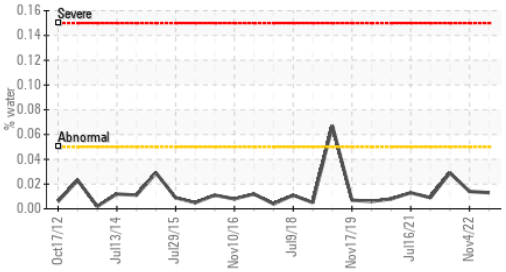
| ADDITIVES | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Boron | ppm | ASTM D5185m | | **0** | 0 | <1 |
| Barium | ppm | ASTM D5185m | | **0** | 0 | 0 |
| Molybdenum | ppm | ASTM D5185m | | **3** | 9 | 1 |
| Manganese | ppm | ASTM D5185m | | **1** | <1 | <1 |
| Magnesium | ppm | ASTM D5185m | | **<1** | 0 | 0 |
| Calcium | ppm | ASTM D5185m | | **3** | 20 | 0 |
| Phosphorus | ppm | ASTM D5185m | 315 | **377** | 300 | 271 |
| Zinc | ppm | ASTM D5185m | | **15** | 6 | 7 |
| Sulfur | ppm | ASTM D5185m | | **14602** | 11400 | 10180 |

| CONTAMINANTS | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Silicon | ppm | ASTM D5185m | >50 | **<1** | 0 | 0 |
| Sodium | ppm | ASTM D5185m | >20 | **0** | 0 | 0 |
| Potassium | ppm | ASTM D5185m | >20 | **0** | 0 | 0 |
| Water | % | ASTM D6304 | >0.05 | **0.013** | 0.014 | 0.029 |
| ppm Water | ppm | ASTM D6304 | >500 | **135.1** | 144.0 | 290.7 |

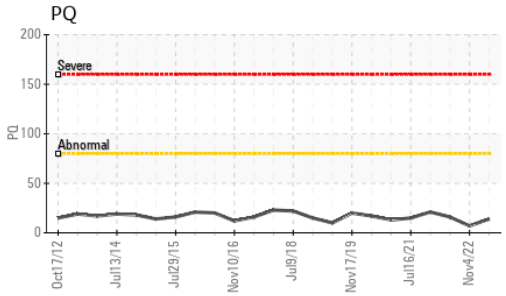
| FLUID CLEANLINESS | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Particles >4µm | | ASTM D7647 | | **14572** | 2072 | 40313 |
| Particles >6µm | | ASTM D7647 | >2500 | **2285** | 439 | ▲ 17360 |
| Particles >14µm | | ASTM D7647 | >320 | **121** | 15 | ▲ 850 |
| Particles >21µm | | ASTM D7647 | >80 | **23** | 5 | 41 |
| Particles >38µm | | ASTM D7647 | >20 | **0** | 1 | 4 |
| Particles >71µm | | ASTM D7647 | >4 | **0** | 0 | 1 |
| Oil Cleanliness | | ISO 4406 (c) | >--/18/15 | **21/18/14** | 18/16/11 | ▲ 23/21/17 |

# OIL ANALYSIS REPORT

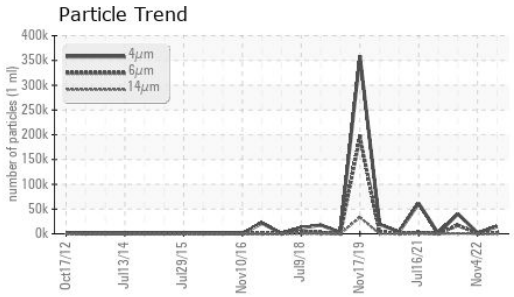
Water



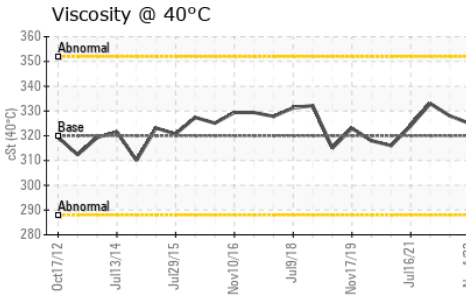

PQ



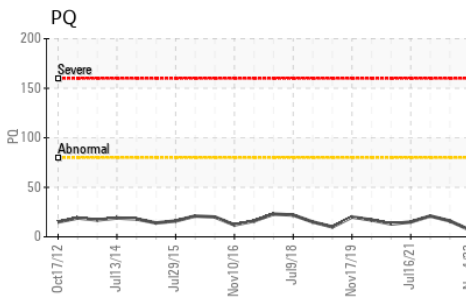

Particle Trend




Viscosity @ 40°C




PQ

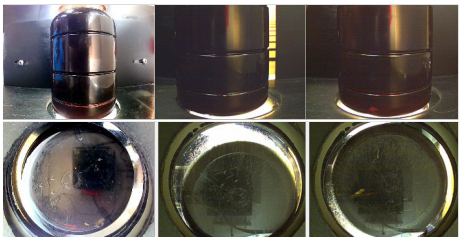



| FLUID DEGRADATION | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Acid Number (AN) | mg KOH/g | ASTM D8045 | | **1.24** | 1.22 | 1.07 |

| VISUAL | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| White Metal | scalar | *Visual | NONE | **LIGHT** | 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** | VLITE | LIGHT |
| Sand/Dirt | scalar | *Visual | NONE | **NONE** | NONE | NONE |
| Appearance | scalar | *Visual | NORML | **NORML** | NORML | NORML |
| Odor | scalar | *Visual | NORML | **NORML** | NORML | NORML |
| Emulsified Water | scalar | *Visual | >0.05 | **NEG** | NEG | NEG |
| Free Water | scalar | *Visual | | **NEG** | NEG | NEG |

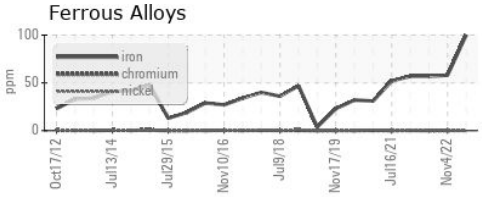
| FLUID PROPERTIES | | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|---|
| Visc @ 40°C | cSt | ASTM D445 | 320 | **333** | 325 | 328 |

| SAMPLE IMAGES | method | limit/base | current | history1 | history2 |
|---|---|---|---|---|---|
| Color | | | | | |
| Bottom | | | | | |

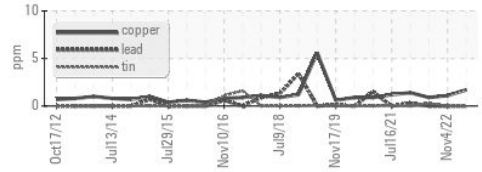


## GRAPHS

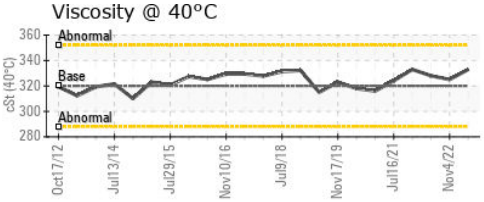
Ferrous Alloys



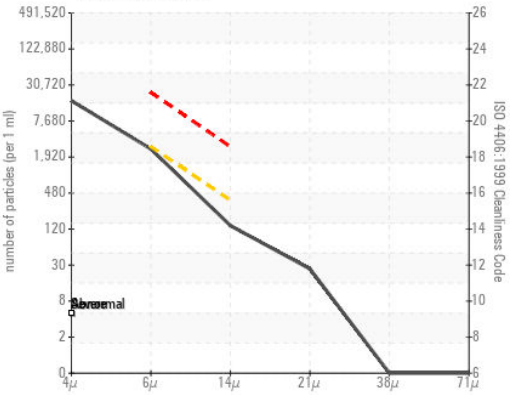

Non-ferrous Metals



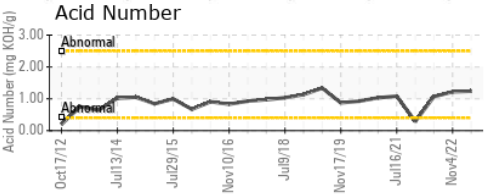

Viscosity @ 40°C




Particle Count




Acid Number




Certificate L2367

**Laboratory** : WearCheck USA - 501 Madison Ave., Cary, NC 27513
**Sample No.** : NX05928191 **Received** : 18 Aug 2023
**Lab Number** : 05928191 **Diagnosed** : 21 Aug 2023
**Unique Number** : 10608138 **Diagnostician** : Don Baldridge
**Test Package** : IND 2 ( Additional Tests: KF, PQ, PrtCount )

*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)*

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