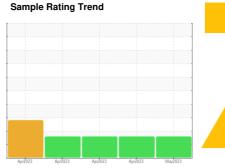


**OIL ANALYSIS REPORT** 

RIG 879 R879-P-01

Component Pump Drive

NOT GIVEN (--- GAL)





## **DIAGNOSIS**

#### Recommendation

We recommend you service the filters on this component if applicable. Resample at the next service interval to monitor. Please specify the brand, type, and viscosity of the oil on your next sample.

### Wear

All component wear rates are normal.

#### Contamination

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

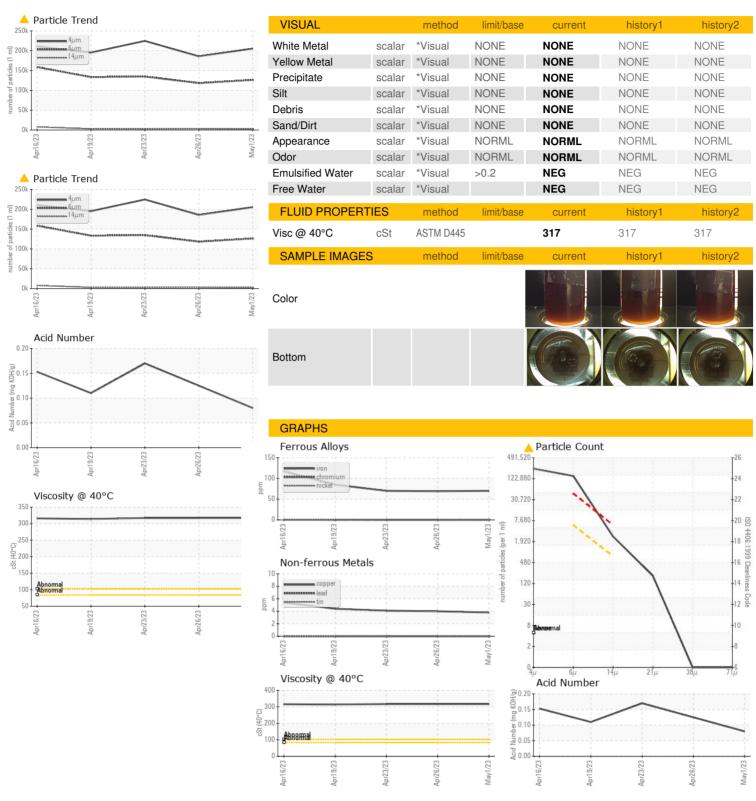
### **Fluid Condition**

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

Sample Number   Client Info   Client Info   Client Info   O1 May 2023   26 Apr 2023   23 Apr 20.			Apr2023	Apr2023	Apr2023 Apr2023	May/2023	
Sample Date   Client Info   45047   45042   45039   45039	SAMPLE INFORM	MATION	method	limit/base	current	history1	history2
Machine Age         days         Client Info         45047         45042         45039           Oil Age         days         Client Info         15         0         0           Oil Changed         Client Info         Not Changd         N/A         N/A           Sample Status         method         limit/base         current         history1         history1           Iron         ppm         ASTM D5185m         >500         70         69         70           Chromium         ppm         ASTM D5185m         >50         0         0         0           Nickel         ppm         ASTM D5185m         0         0         0         0           Silver         ppm         ASTM D5185m         0         0         0         0           Aluminum         ppm         ASTM D5185m         0         0         0         0           Copper         ppm         ASTM D5185m         0         0         0         0           Copper         ppm         ASTM D5185m         0         0         0         0           Caddium         ppm         ASTM D5185m         0         0         0         0           Cadmium <td>Sample Number</td> <td></td> <td>Client Info</td> <td></td> <th>KL0012425</th> <td>KL0012420</td> <td>KL0012418</td>	Sample Number		Client Info		KL0012425	KL0012420	KL0012418
Oil Age         days         Client Info         Not Changed         N/A         N/A           Sample Status         Client Info         Not Changd         N/A         N/A           WEAR METALS         method         limit/base         current         history1         history1           Iron         ppm         ASTM D5185m         >500         70         699         70           Chromium         ppm         ASTM D5185m         >15         0         0         0         0           Nickel         ppm         ASTM D5185m         >10         0         0         0           Alluminum         ppm         ASTM D5185m         0         0         0         0           Alluminum         ppm         ASTM D5185m         0         0         0         0           Alluminum         ppm         ASTM D5185m         0         0         0         0           Lead         ppm         ASTM D5185m         0         0         0         0           Copper         ppm         ASTM D5185m         0         0         0         0           Vanadium         ppm         ASTM D5185m         0         0         0         0	Sample Date		Client Info		01 May 2023	26 Apr 2023	23 Apr 2023
Oil Changed Sample Status	Machine Age	days	Client Info		45047	45042	45039
Sample Status         ABNORMAL         ABRORMAL	Oil Age	days	Client Info		15	0	0
WEAR METALS         method         limit/base         current         history1         history1           Iron         ppm         ASTM D5185m         >500         70         69         70           Chromium         ppm         ASTM D5185m         >15         0         0         0           Nickel         ppm         ASTM D5185m         >10         0         0         0           Silver         ppm         ASTM D5185m         0         0         0         0           Aluminum         ppm         ASTM D5185m         20         9         5         6           Lead         ppm         ASTM D5185m         20         9         5         6           Lead         ppm         ASTM D5185m         0         0         0         0           Copper         ppm         ASTM D5185m         0         0         0         0           Capper         ppm         ASTM D5185m         0         0         0         0           Capper         ppm         ASTM D5185m         0         0         0         0           Capper         ppm         ASTM D5185m         0         0         0         0 <td>Oil Changed</td> <td></td> <td>Client Info</td> <td></td> <th>Not Changd</th> <td>N/A</td> <td>N/A</td>	Oil Changed		Client Info		Not Changd	N/A	N/A
Iron	Sample Status				ABNORMAL	ABNORMAL	ABNORMAL
Chromium         ppm         ASTM D5185m         >15         0         0         0           Nickel         ppm         ASTM D5185m         >10         0         0         0           Titanium         ppm         ASTM D5185m         >10         0         0         0           Silver         ppm         ASTM D5185m         0         0         0         0           Aluminum         ppm         ASTM D5185m         20         9         5         6         6           Lead         ppm         ASTM D5185m         0         0         0         0         0           Copper         ppm         ASTM D5185m         35         4         4         4         4           Tin         ppm         ASTM D5185m         0         0         0         0         0           Cadmium         ppm         ASTM D5185m         0         0         0         0         0           ADDITIVES         method         limit/base         current         history1         history1         history1           Boron         ppm         ASTM D5185m         0         0         0         0         0           Barium<	WEAR METALS		method	limit/base	current	history1	history2
Nickel   ppm   ASTM D5185m   >10   0   0   0   0   0   0   0   0   0	Iron	ppm	ASTM D5185m	>500	70	69	70
Description	Chromium	ppm	ASTM D5185m	>15	0	0	0
Silver	Nickel	ppm	ASTM D5185m	>10	0	0	0
Aluminum ppm ASTM D5185m >20 9 5 6 6 Lead ppm ASTM D5185m >35 4 4 4  Tin ppm ASTM D5185m >4 0 0 0 0  Vanadium ppm ASTM D5185m >0 0 0 0  Cadmium ppm ASTM D5185m >0 0 0 0  Cadmium ppm ASTM D5185m 0 0 0 0  ADDITIVES method limit/base current history1 history  Boron ppm ASTM D5185m 0 0 0 0  Barium ppm ASTM D5185m 0 0 0 0  Barium ppm ASTM D5185m 0 0 0 0  Barium ppm ASTM D5185m 0 0 0 0 0  Barium ppm ASTM D5185m 0 0 0 0 0  Barium ppm ASTM D5185m 0 0 0 0 0  Barium ppm ASTM D5185m 0 0 0 0 0  Magneseum ppm ASTM D5185m 0 0 0 0 0  Magnesium ppm ASTM D5185m 0 0 0 0 0  Magnesium ppm ASTM D5185m 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	Titanium	ppm	ASTM D5185m		0	0	0
Lead         ppm         ASTM D5185m         0         0         0           Copper         ppm         ASTM D5185m         >35         4         4         4           Tin         ppm         ASTM D5185m         >4         0         0         0           Vanadium         ppm         ASTM D5185m         0         0         0         0           Cadmium         ppm         ASTM D5185m         0         0         0         0           ADDITIVES         method         limit/base         current         history1         history1           Boron         ppm         ASTM D5185m         0         0         0         0           Barium         ppm         ASTM D5185m         0         4         4         4           Molybdenum         ppm         ASTM D5185m         11         9         9         9           Magnesium         ppm         ASTM D5185m         9         9         9         9           Calcium         ppm         ASTM D5185m         9         9         9         9         9           Sulfur         ppm         ASTM D5185m         9785         8783         8531         31	Silver	ppm	ASTM D5185m		0	0	0
Copper         ppm         ASTM D5185m         >35         4         4         4           Tin         ppm         ASTM D5185m         >4         0         0         0           Vanadium         ppm         ASTM D5185m         0         0         0           Cadmium         ppm         ASTM D5185m         0         0         0           ADDITIVES         method         limit/base         current         history1         history1           Boron         ppm         ASTM D5185m         0         0         0         0           Barium         ppm         ASTM D5185m         0         4         4         4           Molybdenum         ppm         ASTM D5185m         11         9         9         9           Magnesium         ppm         ASTM D5185m         9         9         9         9           Calcium         ppm         ASTM D5185m         35         31         31         31           Zinc         ppm         ASTM D5185m         35         8783         8531           CONTAMINANTS         method         limit/base         current         history1         history1           Sodium	Aluminum	ppm	ASTM D5185m	>20	9	5	6
Tin ppm ASTM D5185m > 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Lead	ppm	ASTM D5185m		0	0	0
Tin	Copper	ppm	ASTM D5185m	>35	4	4	4
Cadmium         ppm         ASTM D5185m         0         0         0           ADDITIVES         method         limit/base         current         history1         history1           Boron         ppm         ASTM D5185m         0         0         0         0           Barium         ppm         ASTM D5185m         0         4         4           Molybdenum         ppm         ASTM D5185m         11         9         9           Manganese         ppm         ASTM D5185m         9         9         9           Magnesium         ppm         ASTM D5185m         9         9         9           Calcium         ppm         ASTM D5185m         467         465         502           Phosphorus         ppm         ASTM D5185m         35         31         31           Zinc         ppm         ASTM D5185m         9785         8783         8531           CONTAMINANTS         method         limit/base         current         history1         history1           Silicon         ppm         ASTM D5185m         >75         42         38         40           Sodium         ppm         ASTM D5185m         >20         <	Tin	ppm	ASTM D5185m	>4	0	0	0
Cadmium         ppm         ASTM D5185m         0         0         0           ADDITIVES         method         limit/base         current         history1         history1           Boron         ppm         ASTM D5185m         0         0         0           Barium         ppm         ASTM D5185m         0         4         4           Molybdenum         ppm         ASTM D5185m         11         9         9           Manganese         ppm         ASTM D5185m         9         9         9           Magnesium         ppm         ASTM D5185m         9         9         9           Calcium         ppm         ASTM D5185m         35         31         31         31           Phosphorus         ppm         ASTM D5185m         35         31         31         19         19           Sulfur         ppm         ASTM D5185m         9785         8783         8531           CONTAMINANTS         method         limit/base         current         history1         history1           Silicon         ppm         ASTM D5185m         >75         42         38         40           Sodium         ppm         ASTM D5	Vanadium		ASTM D5185m		0	0	0
Boron   ppm   ASTM D5185m   Q	Cadmium				0	0	0
Barium ppm ASTM D5185m 0 4 4 4  Molybdenum ppm ASTM D5185m 11 9 9 9  Manganese ppm ASTM D5185m	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum         ppm         ASTM D5185m         11         9         9           Manganese         ppm         ASTM D5185m         <1	Boron	ppm	ASTM D5185m		0	0	0
Manganese         ppm         ASTM D5185m         <1         0         0           Magnesium         ppm         ASTM D5185m         9         9         9           Calcium         ppm         ASTM D5185m         467         465         502           Phosphorus         ppm         ASTM D5185m         35         31         31           Zinc         ppm         ASTM D5185m         6         19         19           Sulfur         ppm         ASTM D5185m         9785         8783         8531           CONTAMINANTS         method         limit/base         current         history1         history1           Silicon         ppm         ASTM D5185m         >75         42         38         40           Sodium         ppm         ASTM D5185m         >305         259         284           Potassium         ppm         ASTM D5185m         >20         3         4         5           FLUID CLEANLINESS         method         limit/base         current         history1         history1         history1           Particles >6µm         ASTM D7647         >5000         126310         118258         134880           Particles >38µm	Barium	ppm	ASTM D5185m		0	4	4
Manganese         ppm         ASTM D5185m         <1         0         0           Magnesium         ppm         ASTM D5185m         9         9         9           Calcium         ppm         ASTM D5185m         467         465         502           Phosphorus         ppm         ASTM D5185m         35         31         31           Zinc         ppm         ASTM D5185m         6         19         19           Sulfur         ppm         ASTM D5185m         9785         8783         8531           CONTAMINANTS         method         limit/base         current         history1         history1           Silicon         ppm         ASTM D5185m         >75         42         38         40           Sodium         ppm         ASTM D5185m         >75         42         38         40           Sodium         ppm         ASTM D5185m         >305         259         284           Potassium         ppm         ASTM D5185m         >20         3         4         5           FLUID CLEANLINESS         method         limit/base         current         history1         history1           Particles > 6µm         ASTM D7647	Molybdenum	ppm	ASTM D5185m		11	9	9
Magnesium         ppm         ASTM D5185m         9         9         9           Calcium         ppm         ASTM D5185m         467         465         502           Phosphorus         ppm         ASTM D5185m         35         31         31           Zinc         ppm         ASTM D5185m         6         19         19           Sulfur         ppm         ASTM D5185m         9785         8783         8531           CONTAMINANTS         method         limit/base         current         history1         history1           Silicon         ppm         ASTM D5185m         >75         42         38         40           Sodium         ppm         ASTM D5185m         >75         42         38         40           Sodium         ppm         ASTM D5185m         >75         42         38         40           Sodium         ppm         ASTM D5185m         >305         259         284           Potassium         ppm         ASTM D5185m         >20         3         4         5           FLUID CLEANLINESS         method         limit/base         current         history1         history1         history1           Part	Manganese	ppm	ASTM D5185m		<1	0	0
Calcium         ppm         ASTM D5185m         467         465         502           Phosphorus         ppm         ASTM D5185m         35         31         31           Zinc         ppm         ASTM D5185m         6         19         19           Sulfur         ppm         ASTM D5185m         9785         8783         8531           CONTAMINANTS         method         limit/base         current         history1         history1           Silicon         ppm         ASTM D5185m         >75         42         38         40           Sodium         ppm         ASTM D5185m         >75         42         38         40           Sodium         ppm         ASTM D5185m         >20         3         4         5           FLUID CLEANLINESS         method         limit/base         current         history1         history1           Particles >4µm         ASTM D7647         >5000         △ 126310         △ 118258         △ 134880           Particles >21µm         ASTM D7647         >640         △ 2352         △ 3139         △ 2590           Particles >21µm         ASTM D7647         >40         0         3         2	-		ASTM D5185m		9	9	9
Phosphorus         ppm         ASTM D5185m         35         31         31           Zinc         ppm         ASTM D5185m         6         19         19           Sulfur         ppm         ASTM D5185m         9785         8783         8531           CONTAMINANTS         method         limit/base         current         history1         history1           Silicon         ppm         ASTM D5185m         >75         42         38         40           Sodium         ppm         ASTM D5185m         305         259         284           Potassium         ppm         ASTM D5185m         >20         3         4         5           FLUID CLEANLINESS         method         limit/base         current         history1         history1           Particles >4μm         ASTM D7647         >5000         126310         118258         134880           Particles >14μm         ASTM D7647         >640         2352         3139         2590           Particles >21μm         ASTM D7647         >40         178         264         218           Particles >71μm         ASTM D7647         >10         0         0         0           Oil Cleanline			ASTM D5185m		467	465	502
Zinc         ppm         ASTM D5185m         6         19         19           Sulfur         ppm         ASTM D5185m         9785         8783         8531           CONTAMINANTS         method         limit/base         current         history1         history           Silicon         ppm         ASTM D5185m         >75         42         38         40           Sodium         ppm         ASTM D5185m         305         259         284           Potassium         ppm         ASTM D5185m         >20         3         4         5           FLUID CLEANLINESS         method         limit/base         current         history1         history1           Particles >4μm         ASTM D7647         >5000         Δ         126310         Δ         118258         Δ         134880           Particles >21μm         ASTM D7647         >640         Δ         2352         Δ         3139         Δ         2590           Particles >38μm         ASTM D7647         >40         0         3         2         2           Particles >71μm         ASTM D7647         >10         0         0         0         0         0           Oil Cleanliness <td>Phosphorus</td> <td></td> <td>ASTM D5185m</td> <td></td> <th>35</th> <td>31</td> <td>31</td>	Phosphorus		ASTM D5185m		35	31	31
Sulfur         ppm         ASTM D5185m         9785         8783         8531           CONTAMINANTS         method         limit/base         current         history1         history1           Silicon         ppm         ASTM D5185m         >75         42         38         40           Sodium         ppm         ASTM D5185m         305         259         284           Potassium         ppm         ASTM D5185m         >20         3         4         5           FLUID CLEANLINESS         method         limit/base         current         history1         history1         history1           Particles >4μm         ASTM D7647         >5000         Δ 126310         Δ 118258         Δ 134880           Particles >21μm         ASTM D7647         >640         Δ 2352         Δ 3139         Δ 2590           Particles >21μm         ASTM D7647         >160         Δ 178         Δ 264         Δ 218           Particles >71μm         ASTM D7647         >40         0         3         2           Particles >71μm         ASTM D7647         >10         0         0         0           Oil Cleanliness         ISO 4406 (c)         >19/16         Δ 24/18         Δ 24/19			ASTM D5185m				
Silicon       ppm       ASTM D5185m       >75       42       38       40         Sodium       ppm       ASTM D5185m       305       259       284         Potassium       ppm       ASTM D5185m       >20       3       4       5         FLUID CLEANLINESS       method       limit/base       current       history1       history1       history1         Particles >4μm       ASTM D7647       205490       185763       224656         Particles >6μm       ASTM D7647       >5000       126310       118258       134880         Particles >14μm       ASTM D7647       >640       2352       3139       2590         Particles >21μm       ASTM D7647       >160       178       264       218         Particles >38μm       ASTM D7647       >40       0       3       2         Particles >71μm       ASTM D7647       >10       0       0       0         Oil Cleanliness       ISO 4406 (c)       >19/16       24/18       24/19       24/19         FLUID DEGRADATION       method       limit/base       current       history1       history1	-						
Sodium         ppm         ASTM D5185m         305         259         284           Potassium         ppm         ASTM D5185m         >20         3         4         5           FLUID CLEANLINESS         method         limit/base         current         history1         history1           Particles >4μm         ASTM D7647         205490         185763         224656           Particles >6μm         ASTM D7647         >5000         126310         118258         134880           Particles >14μm         ASTM D7647         >640         2352         3139         2590           Particles >21μm         ASTM D7647         >160         178         264         218           Particles >38μm         ASTM D7647         >40         0         3         2           Particles >71μm         ASTM D7647         >10         0         0         0           Oil Cleanliness         ISO 4406 (c)         >19/16         24/18         24/19         24/19           FLUID DEGRADATION         method         limit/base         current         history1         history1	CONTAMINANTS	6	method	limit/base	current	history1	history2
Potassium         ppm         ASTM D5185m         >20         3         4         5           FLUID CLEANLINESS         method         limit/base         current         history1         history1           Particles >4μm         ASTM D7647         205490         185763         224656           Particles >6μm         ASTM D7647         >5000         126310         118258         134880           Particles >14μm         ASTM D7647         >640         2352         3139         2590           Particles >21μm         ASTM D7647         >160         178         264         218           Particles >38μm         ASTM D7647         >40         0         3         2           Particles >71μm         ASTM D7647         >10         0         0         0           Oil Cleanliness         ISO 4406 (c)         >19/16         24/18         24/19         24/19           FLUID DEGRADATION         method         limit/base         current         history1         history1	Silicon	ppm	ASTM D5185m	>75	42	38	40
FLUID CLEANLINESS         method         limit/base         current         history1         history1           Particles >4μm         ASTM D7647         205490         185763         224656           Particles >6μm         ASTM D7647         >5000         126310         118258         134880           Particles >14μm         ASTM D7647         >640         2352         3139         2590           Particles >21μm         ASTM D7647         >160         178         264         218           Particles >38μm         ASTM D7647         >40         0         3         2           Particles >71μm         ASTM D7647         >10         0         0         0           Oil Cleanliness         ISO 4406 (c)         >19/16         24/18         24/19         24/19           FLUID DEGRADATION         method         limit/base         current         history1         history1	Sodium	ppm	ASTM D5185m		305	259	284
Particles >4μm       ASTM D7647       205490       185763       224656         Particles >6μm       ASTM D7647       >5000       126310       118258       134880         Particles >14μm       ASTM D7647       >640       2352       3139       2590         Particles >21μm       ASTM D7647       >160       178       264       218         Particles >38μm       ASTM D7647       >40       0       3       2         Particles >71μm       ASTM D7647       >10       0       0       0         Oil Cleanliness       ISO 4406 (c)       >19/16       24/18       24/19       24/19         FLUID DEGRADATION       method       limit/base       current       history1       history1	Potassium	ppm	ASTM D5185m	>20	3	4	5
Particles >6μm       ASTM D7647       >5000       126310       118258       134880         Particles >14μm       ASTM D7647       >640       2352       3139       2590         Particles >21μm       ASTM D7647       >160       178       264       218         Particles >38μm       ASTM D7647       >40       0       3       2         Particles >71μm       ASTM D7647       >10       0       0       0         Oil Cleanliness       ISO 4406 (c)       >19/16       24/18       24/19       24/19         FLUID DEGRADATION       method       limit/base       current       history1       history1	FLUID CLEANLIN	NESS	method	limit/base	current	history1	history2
Particles >14μm       ASTM D7647       >640       Δ 2352       Δ 3139       Δ 2590         Particles >21μm       ASTM D7647       >160       Δ 178       Δ 264       Δ 218         Particles >38μm       ASTM D7647       >40       0       3       2         Particles >71μm       ASTM D7647       >10       0       0       0         Oil Cleanliness       ISO 4406 (c)       >19/16       Δ 24/18       Δ 24/19       Δ 24/19         FLUID DEGRADATION       method       limit/base       current       history1       history1	Particles >4µm		ASTM D7647		205490	185763	224656
Particles >21μm         ASTM D7647         >160         ▲ 178         ▲ 264         ▲ 218           Particles >38μm         ASTM D7647         >40         0         3         2           Particles >71μm         ASTM D7647         >10         0         0         0           Oil Cleanliness         ISO 4406 (c)         >19/16         ▲ 24/18         ▲ 24/19         ▲ 24/19           FLUID DEGRADATION         method         limit/base         current         history1         history1	Particles >6µm			>5000	<u> </u>	<u>▲</u> 118258	<u>▲</u> 134880
Particles >38μm         ASTM D7647         >40         0         3         2           Particles >71μm         ASTM D7647         >10         0         0         0           Oil Cleanliness         ISO 4406 (c)         >19/16         ▲ 24/18         ▲ 24/19         ▲ 24/19           FLUID DEGRADATION         method         limit/base         current         history1         history1	Particles >14μm		ASTM D7647	>640	<b>2352</b>	<b>△</b> 3139	<u>\$\text{\scale}\$ 2590</u>
Particles >71µm         ASTM D7647         >10         0         0         0           Oil Cleanliness         ISO 4406 (c)         >19/16         ▲ 24/18         ▲ 24/19         ▲ 24/19           FLUID DEGRADATION         method         limit/base         current         history1         history1	Particles >21μm		ASTM D7647	>160	<u> </u>	<u>^</u> 264	<u>^</u> 218
Oil Cleanliness ISO 4406 (c) >19/16	Particles >38µm		ASTM D7647	>40	0	3	2
Oil Cleanliness ISO 4406 (c) >19/16	Particles >71µm		ASTM D7647	>10	0	0	0
			ISO 4406 (c)	>19/16		<b>2</b> 4/19	<b>2</b> 4/19
Acid Number (AN) mg KOH/g ASTM D8045 0.08 0.125 0.17	FLUID DEGRADA	ATION	method	limit/base	current	history1	history2
	Acid Number (AN)	mg KOH/g	ASTM D8045		0.08	0.125	0.17



# OIL ANALYSIS REPORT







Certificate L2367

Laboratory Sample No. Lab Number **Unique Number** 

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

: KL0012425 : 05839202 : 10458005

Received Diagnosed

: 08 May 2023 Diagnostician : Doug Bogart

: 05 May 2023

Test Package : MOB 2 ( Additional Tests: 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)

**PATTERSON - UTI DRILLING** 

9915 WEST INDUSTRIAL MIDLAND, TX

US 79706 Contact: MICHEAL EASTMAN

micheal.eastman@patenergy.com T: (325)716-8686

F: (432)561-9388 Contact/Location: MICHEAL EASTMAN - PATMIDTX