

# LIEBHERR

## CONSTRUCTION EQUIPMENT



### [(357697)] LIEBHERR PR766 016664-1421 - Coolant

Sample No: LH0194338

Oil Type: EXTENDED LIFE COOLANT



#### Sample Information

Sample Number	LH0194338	---	---	---
Sample Date	31 Aug 2021	---	---	---
Machine Hours	144	---	---	---
Sample Status	NORMAL	---	---	---

**HEAVY IRON INC**  
 370145 79 STREET EAST  
 ALDERSYDE, AB  
 CA T0L 0A0  
 Contact: Service Manager



#### Coolant Condition

Boron	ppm	138	---	---	---
Phosphorus	ppm	9	---	---	---
Sodium	ppm	2082	---	---	---
Potassium	ppm	1987	---	---	---
Silicon	ppm	9	---	---	---
pH	Scale 0-14	7.91	---	---	---
Reserve Alkalinity	Scale 0-20	6.2	---	---	---
Molybdenum	ppm	230	---	---	---
Nitrites	ppm	640	---	---	---
Percentage Glycol	%	52.0	---	---	---
Freezing Point	°C	-41	---	---	---

T:  
F:

#### Diagnosis

Resample at the next service interval to monitor. The fluid was not specified, however, a fluid match indicates that this fluid is (GENERIC) EXTENDED LIFE COOLANT. Please confirm.

All component wear rates are normal. There is no indication of any contamination in the coolant. The condition of the coolant is acceptable for the time in service.



#### Contamination

Magnesium	ppm	2	---	---	---
Calcium	ppm	4	---	---	---
Coolant Appearance		Clear	---	---	---
Coolant Color		Orange	---	---	---
Sand/Dirt	scalar	NONE	---	---	---
Debris	scalar	NONE	---	---	---
Precipitate	scalar	NONE	---	---	---
Silt	scalar	NONE	---	---	---



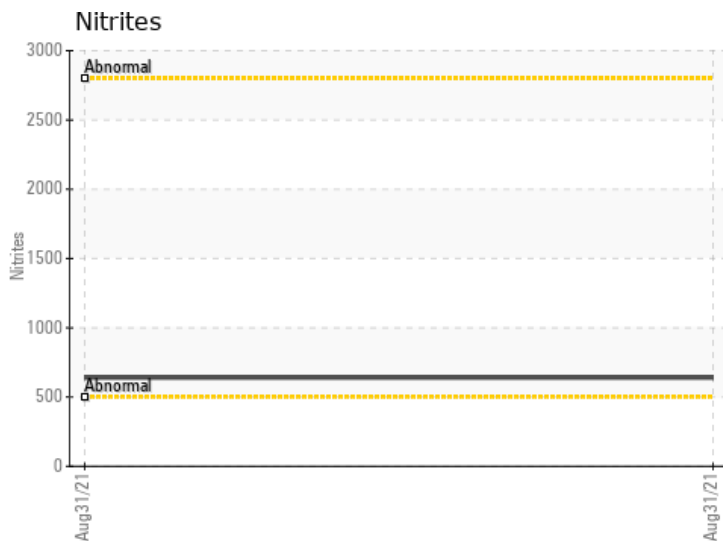
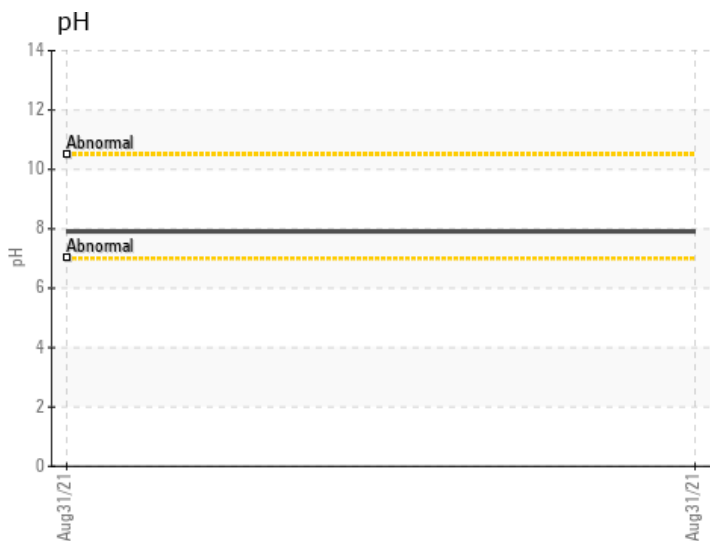
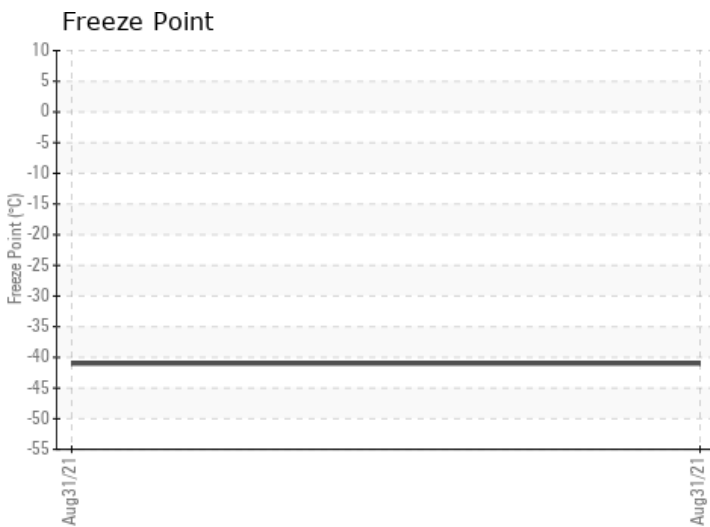
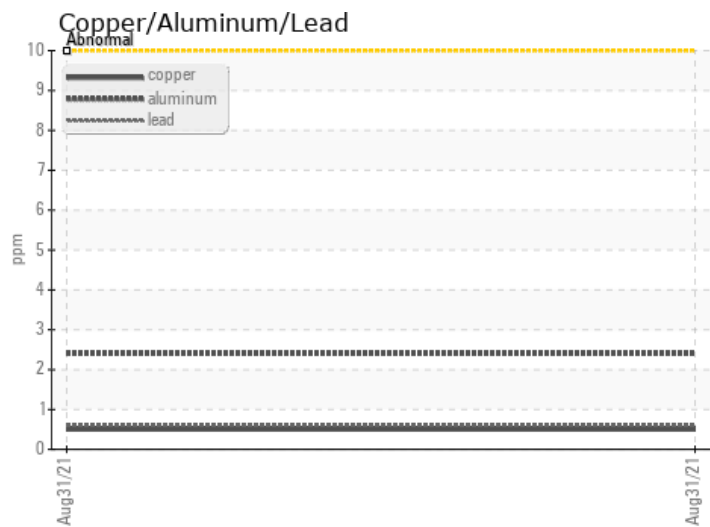
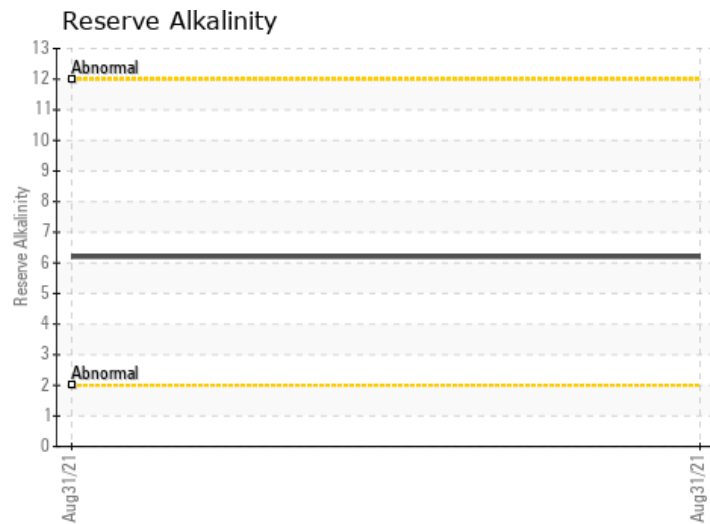
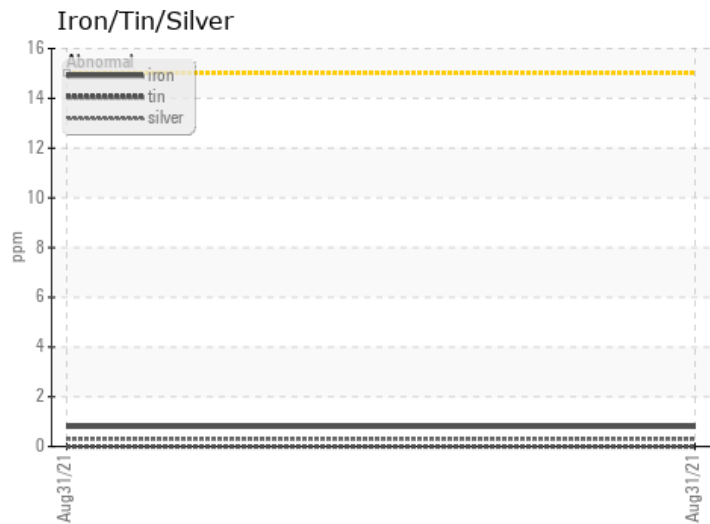
#### Corrosion

Iron	ppm	<1	---	---	---
Aluminum	ppm	2	---	---	---
Copper	ppm	<1	---	---	---
Lead	ppm	<1	---	---	---
Tin	ppm	0	---	---	---

Depot: HEAALD  
 Unique No: 5278218  
 Signed: Wes Davis  
 Report Date: 07 Sep 2021



### Graphs



# LIEBHERR

## CONSTRUCTION EQUIPMENT



### [(357697)] LIEBHERR PR766 016664-1421 - Diesel Engine

Sample No: LH0265147

Oil Type: DIESEL ENGINE OIL SAE 40



#### Sample Information

Sample Number	LH0265147	---	---	---
Sample Date	04 May 2024	---	---	---
Machine Hours	8837	---	---	---
Oil Hours	0	---	---	---
Oil Changed	Not Chngd	---	---	---
Sample Status	NORMAL	---	---	---

**HEAVY IRON INC**  
 370145 79 STREET EAST  
 ALDERSYDE, AB  
 CA T0L 0A0  
 Contact: Service Manager



#### Oil Condition

Visc @ 100°C	cSt	14.0	---	---	---
Oxidation (PA)	%	49	---	---	---

T:  
F:



#### Contamination

Water	%	NEG	---	---	---
Soot %	%	0	---	---	---
Nitration (PA)	%	50	---	---	---
Sulfation (PA)	%	44	---	---	---
Glycol	%	NEG	---	---	---
Fuel	%	<1.0	---	---	---
Silicon	ppm	2	---	---	---
Sodium	ppm	<1	---	---	---
Potassium	ppm	0	---	---	---

#### Diagnosis

Resample at the next service interval to monitor. The fluid was not specified, however, a fluid match indicates that this fluid is (GENERIC) DIESEL ENGINE OIL SAE 40. Please confirm. 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.



#### Wear Metals

Iron	ppm	2	---	---	---
Copper	ppm	112	---	---	---
Lead	ppm	2	---	---	---
Tin	ppm	0	---	---	---
Aluminum	ppm	2	---	---	---
Chromium	ppm	0	---	---	---
Molybdenum	ppm	<1	---	---	---
Nickel	ppm	0	---	---	---
Titanium	ppm	0	---	---	---
Silver	ppm	0	---	---	---
Manganese	ppm	0	---	---	---
Vanadium	ppm	0	---	---	---



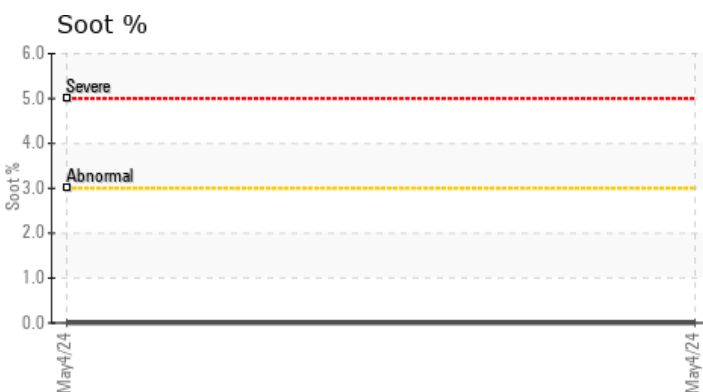
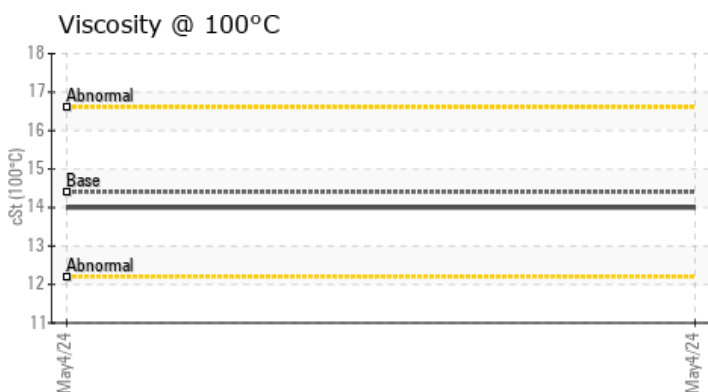
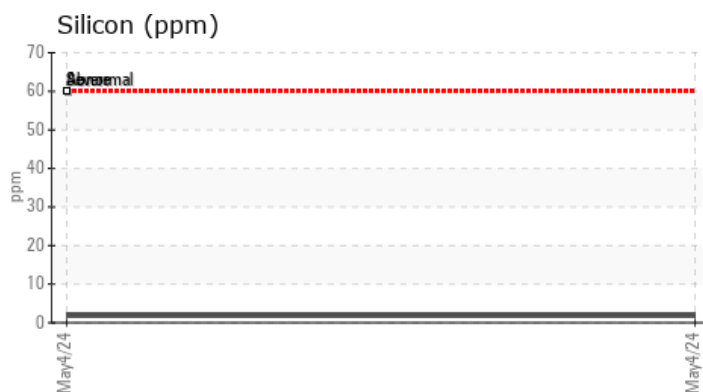
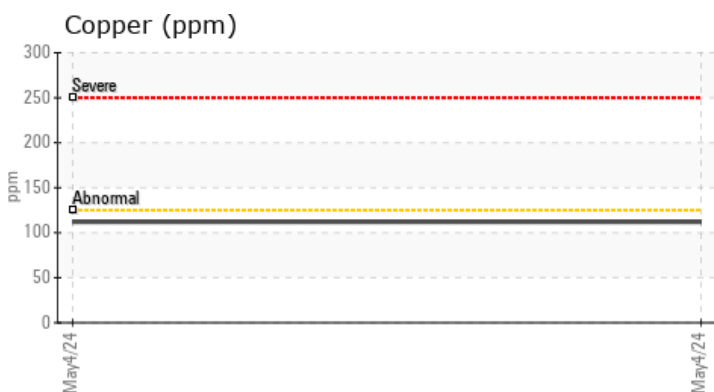
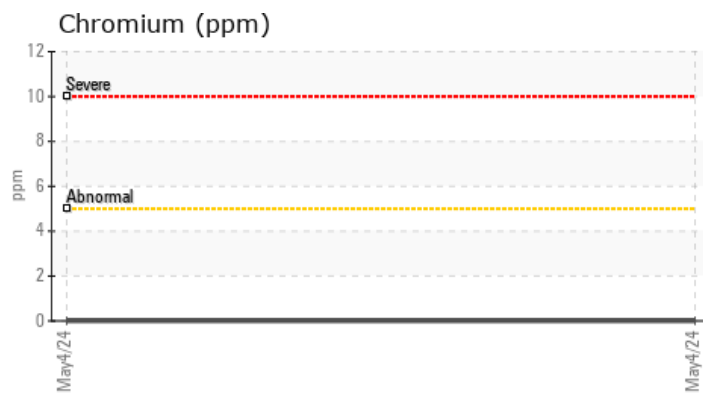
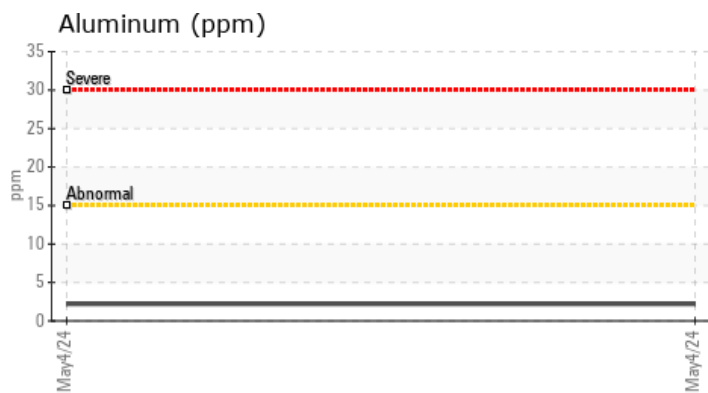
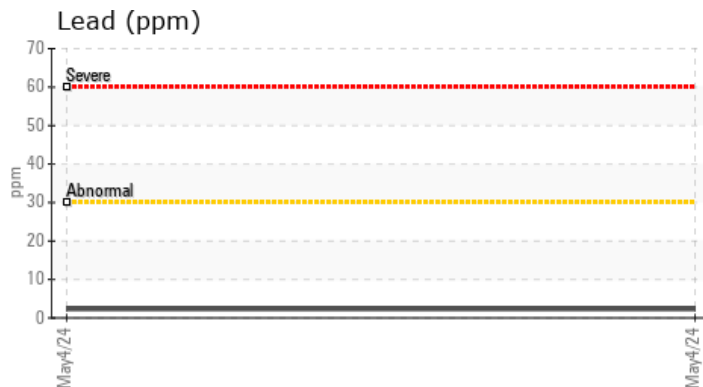
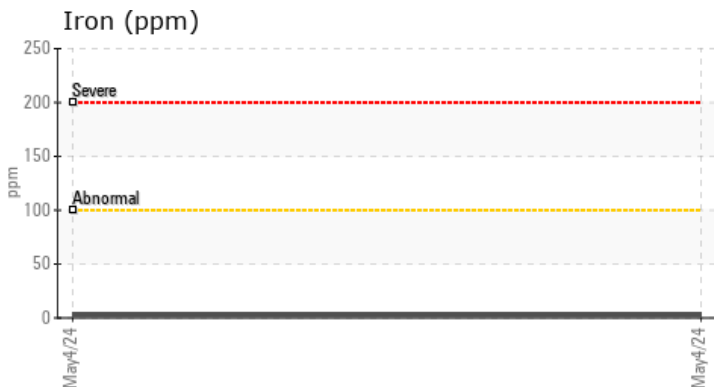
#### Additives

Calcium	ppm	2160	---	---	---
Magnesium	ppm	23	---	---	---
Zinc	ppm	1060	---	---	---
Phosphorus	ppm	941	---	---	---
Barium	ppm	0	---	---	---
Boron	ppm	2	---	---	---

**Depot:** HEAALD  
**Unique No:** 5774558  
**Signed:** Kevin Marson  
**Report Date:** 07 May 2024



### Graphs



# LIEBHERR

## CONSTRUCTION EQUIPMENT



### [(357697)] LIEBHERR PR766 016664-1421 - Diesel Fuel

Sample No: LH0238100

Oil Type: No.1 DIESEL FUEL (ULTRALOW SULPHUR)



#### Sample Information

Sample Number	LH0238100	LH0238094	---	---
Sample Date	07 Apr 2023	21 Jan 2023	---	---
Machine Hours	5906	5306	---	---
Sample Status	SEVERE	NORMAL	---	---

**HEAVY IRON INC**  
 370145 79 STREET EAST  
 ALDERSYDE, AB  
 CA T0L 0A0  
 Contact: Service Manager



#### Fuel Condition

Initial Boiling Point	°C	● 168	---	---	---
10% Distill Point	°C	● 179	---	---	---
20% Distill Point	°C	● 186	---	---	---
30% Distill Point	°C	● 191	---	---	---
40% Distill Point	°C	● 198	---	---	---
50% Distill Point	°C	● 205	---	---	---
60% Distill Point	°C	● 212	---	---	---
70% Distill Point	°C	● 219	---	---	---
80% Distill Point	°C	● 228	---	---	---
90% Distill Point	°C	● 245	---	---	---
Final Boiling Point	°C	● 285	---	---	---
Cetane Index		● 39	---	---	---
API Gravity		● 40	---	---	---
Sulfur	ppm	● 9	● 6	---	---
Visc @ 40°C	cSt	● 1.4	● 2	---	---
Fuel Color	text	Pink	---	---	---

T:  
F:

#### Diagnosis

We advise that you check all areas where contaminants can enter the system. Laboratory test indicate that this fuel is suitable for use and meets all test requirements. We advise that you perform a filter service, and use off-line filtration to improve the cleanliness of the system fluid. The air breather requires service. If unrated, we recommend that you replace with a suitable micron rated and/or desiccant air breather. If rated, we recommend that you service/replace the breather. We advise that you filter this fluid before use. Resample in 30-45 days to monitor this situation. {not applicable} There is a high amount of particulates (2 to 100 microns in size) present in the fuel. The water content is negligible. The fuel is still serviceable provided that the contaminant(s) can be reduced to acceptable levels. All laboratory tests indicate that this sample meets specifications for No.1 ultra-low-sulfur diesel fuel (US EPA/CGSB-3.517-3 type A).



#### Contamination

Water	%	● 0.003	---	---	---
Lead	ppm	● 0	● 0	---	---
Nickel	ppm	● 0	● 0	---	---
Aluminum	ppm	● 0	● 0	---	---
Vanadium	ppm	● 0	● 0	---	---
Silicon	ppm	● <1	● <1	---	---

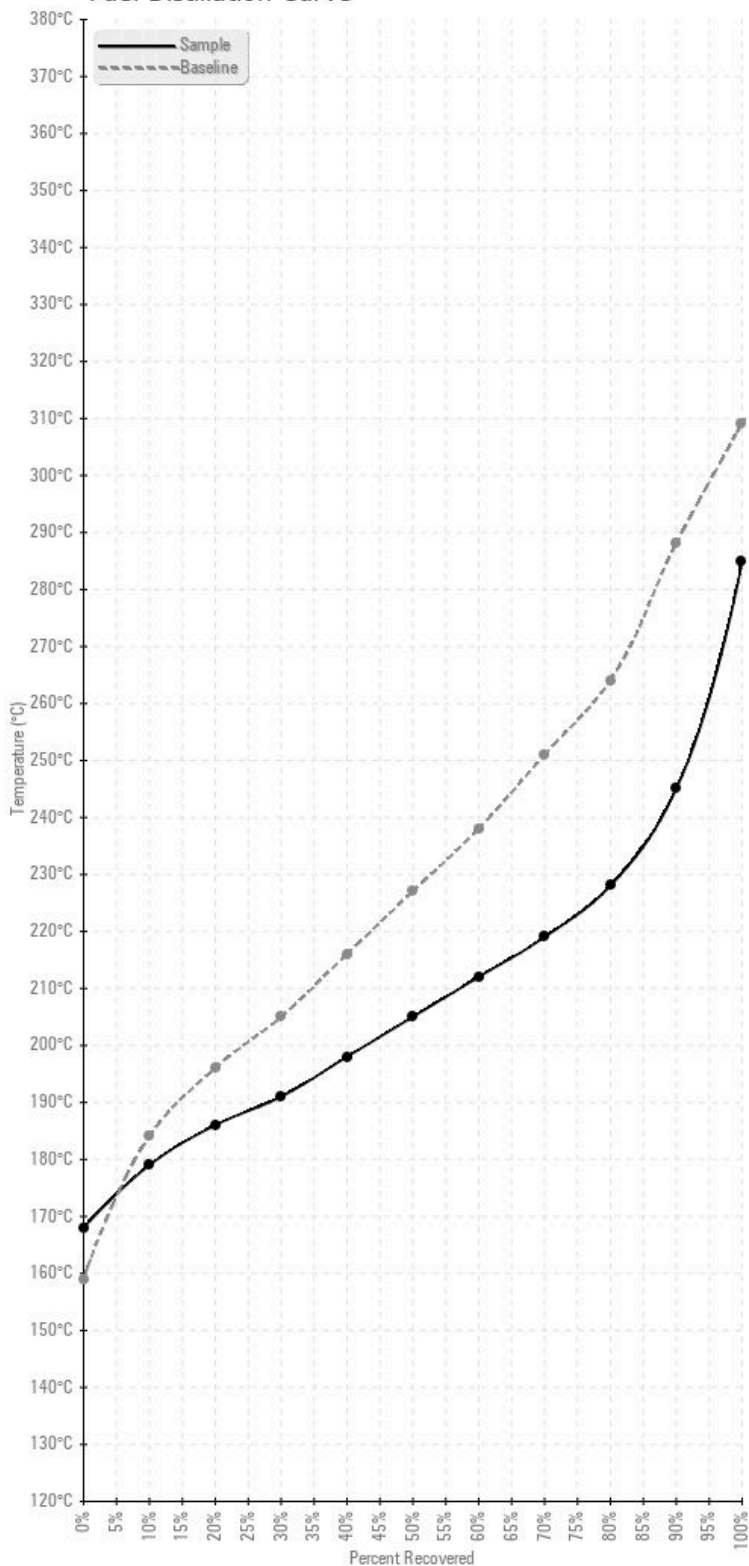
**Depot:** HEAALD  
**Unique No:** 5564565  
**Signed:** Kevin Marson  
**Report Date:** 21 Apr 2023





### Graphs

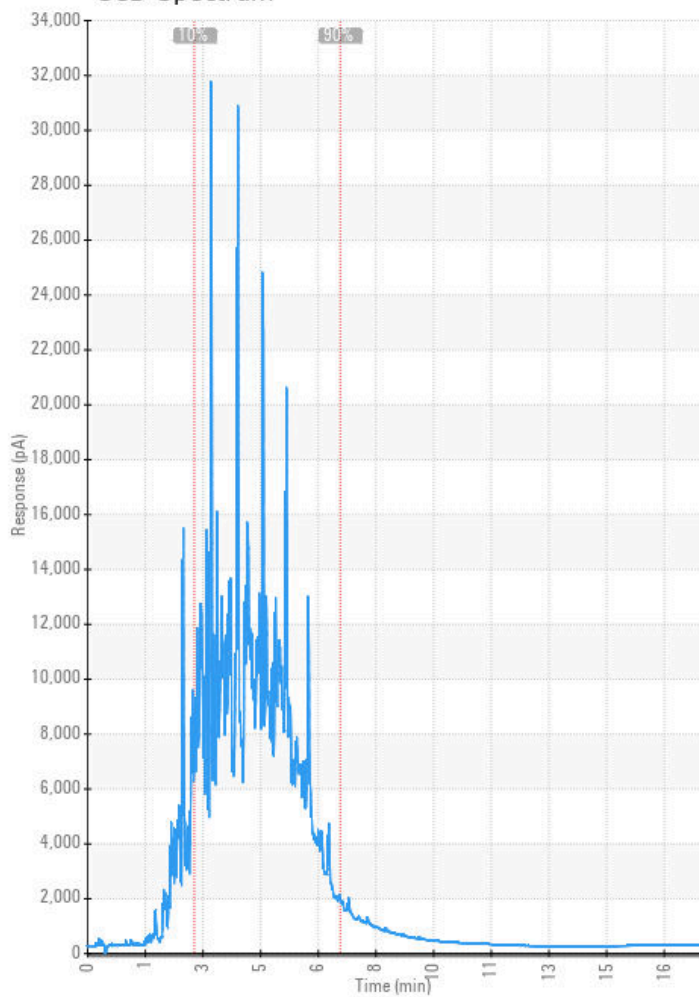
Fuel Distillation Curve



Pensky-Martens Flash Point (°C)



GCD Spectrum



# LIEBHERR

## CONSTRUCTION EQUIPMENT



### [(357 697)] LIEBHERR PR766 016664-1421 - After Water Separator Di

Sample No: LH0238082

Oil Type: No.1 DIESEL FUEL (ULTRALOW SULPHUR)



### Sample Information

Sample Number	LH0238082	---	---	---
Sample Date	07 Apr 2023	---	---	---
Machine Hours	5906	---	---	---
Sample Status	ABNORMAL	---	---	---

**HEAVY IRON INC**  
 370145 79 STREET EAST  
 ALDERSYDE, AB  
 CA T0L 0A0  
 Contact: Service Manager



### Fuel Condition

Initial Boiling Point	°C	168	---	---	---
10% Distill Point	°C	180	---	---	---
20% Distill Point	°C	186	---	---	---
30% Distill Point	°C	191	---	---	---
40% Distill Point	°C	198	---	---	---
50% Distill Point	°C	205	---	---	---
60% Distill Point	°C	212	---	---	---
70% Distill Point	°C	219	---	---	---
80% Distill Point	°C	229	---	---	---
90% Distill Point	°C	245	---	---	---
Final Boiling Point	°C	285	---	---	---
Cetane Index		39	---	---	---
API Gravity		40	---	---	---
Sulfur	ppm	9	---	---	---
Visc @ 40°C	cSt	1.3	---	---	---
Fuel Color	text	Pink	---	---	---

T:  
F:

### Diagnosis

Laboratory test indicate that this fuel is suitable for use and meets all test requirements. We advise that you filter this fluid before use. We recommend you service the filters on this component. We recommend an early resample to monitor this condition. {not applicable} There is a moderate amount of silt (particulates < 14 microns in size) present in the fuel. The water content is negligible. All laboratory tests indicate that this sample meets specifications for No.1 ultra-low-sulfur diesel fuel (US EPA/CGSB-3.517-3 type A). The fuel is still serviceable provided that the contaminant(s) can be reduced to acceptable levels.



### Contamination

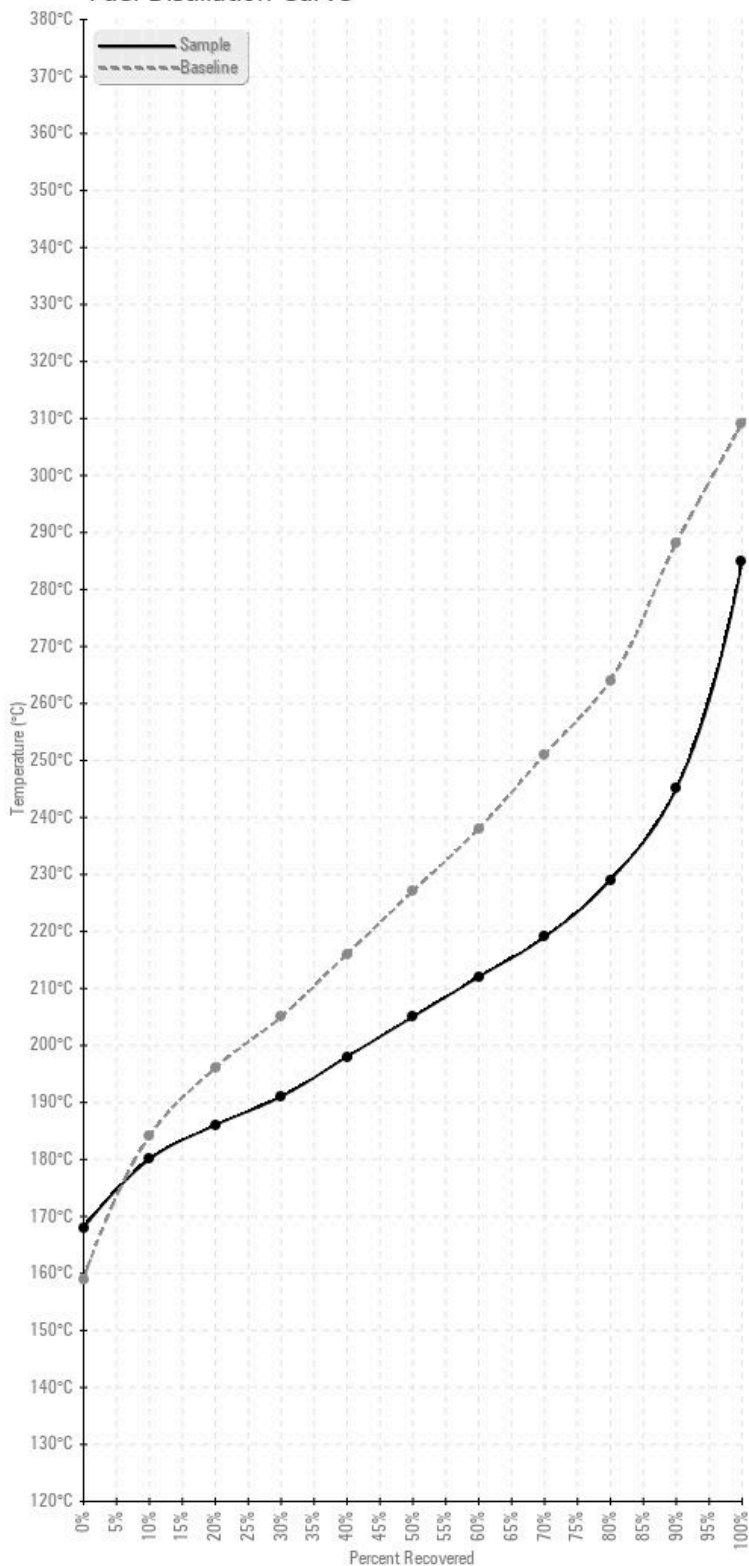
Water	%	0.002	---	---	---
Lead	ppm	0	---	---	---
Nickel	ppm	0	---	---	---
Aluminum	ppm	0	---	---	---
Vanadium	ppm	0	---	---	---
Silicon	ppm	<1	---	---	---

**Depot:** HEAALD  
**Unique No:** 5564563  
**Signed:** Kevin Marson  
**Report Date:** 20 Apr 2023

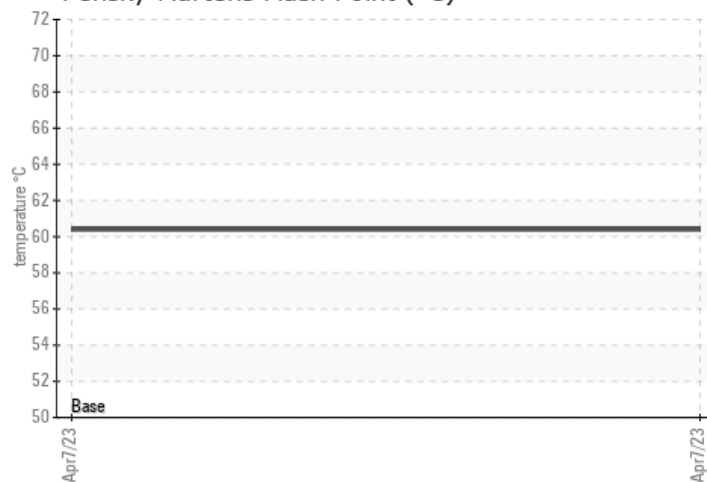


### Graphs

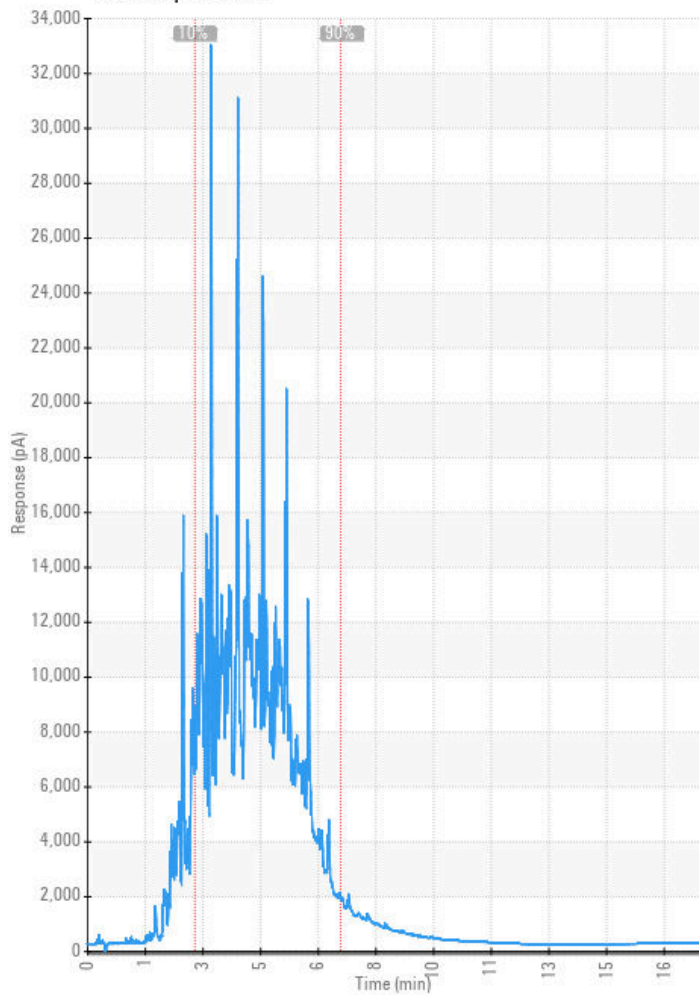
Fuel Distillation Curve



Pensky-Martens Flash Point (°C)



GCD Spectrum





# LIEBHERR

## CONSTRUCTION EQUIPMENT



### [(357697)] LIEBHERR PR766 016664-1421 - After Filtration Dies

Sample No: LH0238099

Oil Type: No.1 DIESEL FUEL (ULTRALOW SULPHUR)



### Sample Information

Sample Number	LH0238099	---	---	---
Sample Date	07 Apr 2023	---	---	---
Machine Hours	5906	---	---	---
Sample Status	ATTENTION	---	---	---

**HEAVY IRON INC**  
 370145 79 STREET EAST  
 ALDERSYDE, AB  
 CA T0L 0A0  
 Contact: Service Manager



### Fuel Condition

Initial Boiling Point	°C	168	---	---	---
10% Distill Point	°C	179	---	---	---
20% Distill Point	°C	186	---	---	---
30% Distill Point	°C	191	---	---	---
40% Distill Point	°C	198	---	---	---
50% Distill Point	°C	205	---	---	---
60% Distill Point	°C	212	---	---	---
70% Distill Point	°C	219	---	---	---
80% Distill Point	°C	229	---	---	---
90% Distill Point	°C	245	---	---	---
Final Boiling Point	°C	285	---	---	---
Cetane Index		39	---	---	---
API Gravity		40	---	---	---
Sulfur	ppm	9	---	---	---
Visc @ 40°C	cSt	1.5	---	---	---
Fuel Color	text	Pink	---	---	---

T:  
F:

### Diagnosis

Laboratory test indicate that this fuel is suitable for use and meets all test requirements. We advise that you filter this fluid before use. We recommend you service the filters on this component. Resample at the next service interval to monitor. {not applicable} There is a light amount of silt (particulates < 14 microns in size) present in the fuel. The water content is negligible. All laboratory tests indicate that this sample meets specifications for No.1 ultra-low-sulfur diesel fuel (US EPA/CGSB-3.517-3 type A).



### Contamination

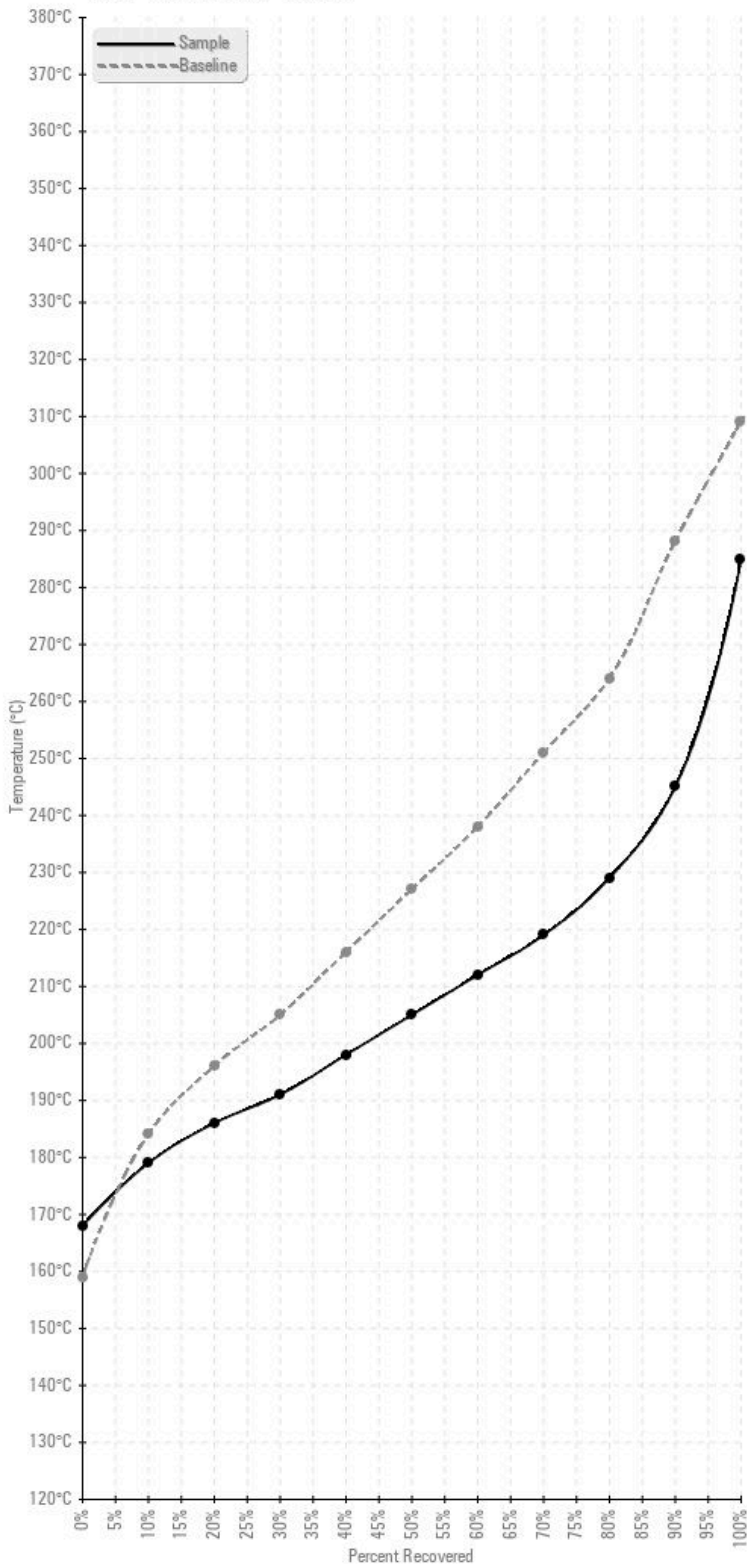
Water	%	0.003	---	---	---
Lead	ppm	0	---	---	---
Nickel	ppm	0	---	---	---
Aluminum	ppm	0	---	---	---
Vanadium	ppm	0	---	---	---
Silicon	ppm	0	---	---	---

**Depot:** HEAALD  
**Unique No:** 5564564  
**Signed:** Kevin Marson  
**Report Date:** 21 Apr 2023

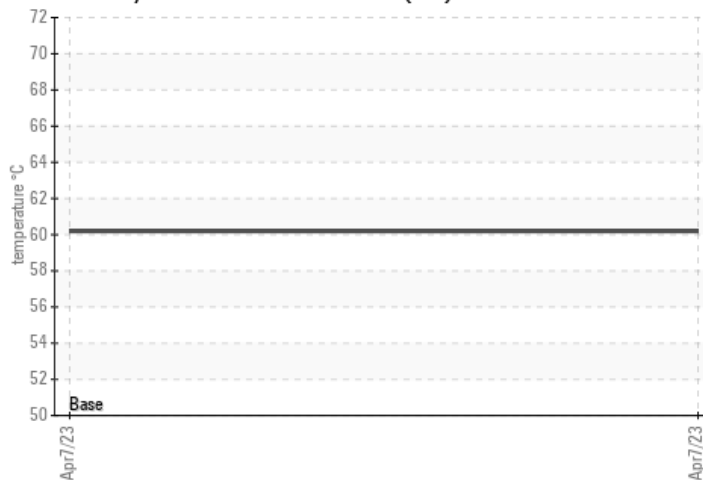


### Graphs

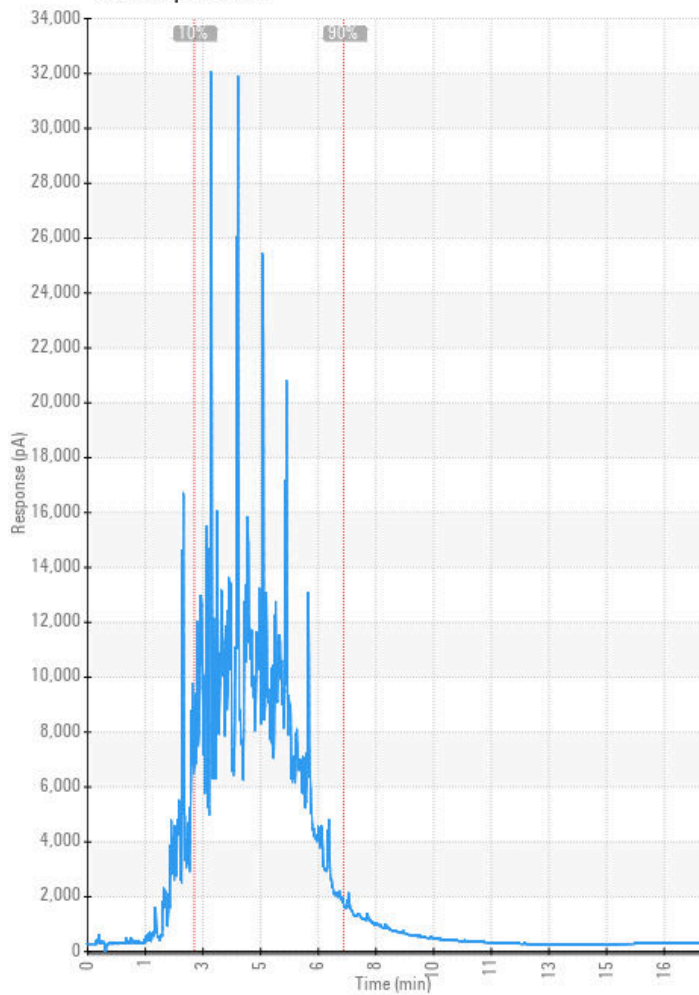
Fuel Distillation Curve



Pensky-Martens Flash Point (°C)



GCD Spectrum



# LIEBHERR

## CONSTRUCTION EQUIPMENT



### [(357697)] LIEBHERR PR766 016664-1421 - Hydraulic System

Sample No: LH0194335

Oil Type: LIEBHERR HYDRAULIC HVI



**HEAVY IRON INC**  
 370145 79 STREET EAST  
 ALDERSYDE, AB  
 CA T0L 0A0  
 Contact: Service Manager



#### Sample Information

Sample Number	LH0194335	---	---	---
Sample Date	06 Sep 2021	---	---	---
Machine Hours	144	---	---	---
Oil Hours	0	---	---	---
Oil Changed	Not Chngd	---	---	---
Sample Status	ATTENTION	---	---	---



#### Oil Condition

Visc @ 40°C	cSt	● 44.3	---	---	---
-------------	-----	--------	-----	-----	-----

T:  
F:



#### Contamination

Water	%	● 0.038	---	---	---
Particles >4µm		● 24470	---	---	---
Particles >6µm		● 2000	---	---	---
Particles >14µm		● 88	---	---	---
ISO 4406:1999 (c)		22/18/14	---	---	---
Silicon	ppm	● 2	---	---	---
Sodium	ppm	● 2	---	---	---
Potassium	ppm	● 2	---	---	---

#### Diagnosis

We recommend you service the filters on this component. Resample at the next service interval to monitor. All component wear rates are normal. There is a light amount of silt (particulates < 14 microns in size) present in the oil. The water content is negligible. The condition of the oil is acceptable for the time in service.



#### Wear Metals

Iron	ppm	● 4	---	---	---
Copper	ppm	● 4	---	---	---
Lead	ppm	● <1	---	---	---
Tin	ppm	● <1	---	---	---
Aluminum	ppm	● <1	---	---	---
Chromium	ppm	● 0	---	---	---
Molybdenum	ppm	● 0	---	---	---
Nickel	ppm	● <1	---	---	---
Titanium	ppm	● 0	---	---	---
Silver	ppm	● <1	---	---	---
Manganese	ppm	● <1	---	---	---
Vanadium	ppm	● 0	---	---	---



#### Additives

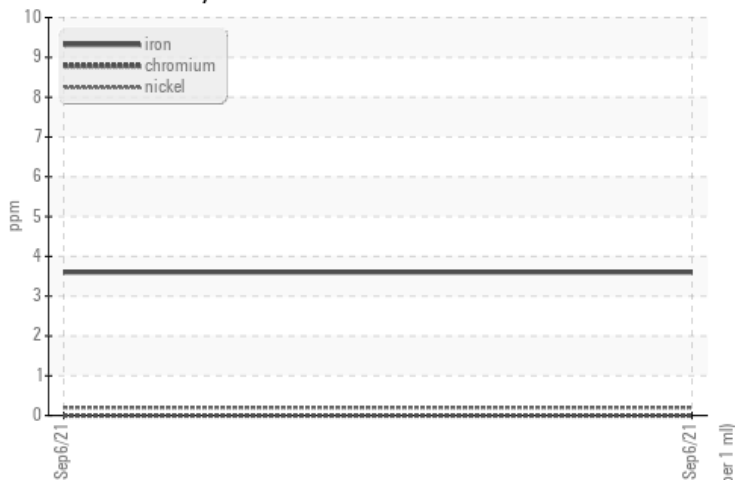
Calcium	ppm	● 1267	---	---	---
Magnesium	ppm	● 7	---	---	---
Zinc	ppm	● 636	---	---	---
Phosphorus	ppm	● 625	---	---	---
Barium	ppm	● 0	---	---	---
Boron	ppm	● 1	---	---	---

**Depot:** HEAALD  
**Unique No:** 5278133  
**Signed:** Wes Davis  
**Report Date:** 08 Sep 2021

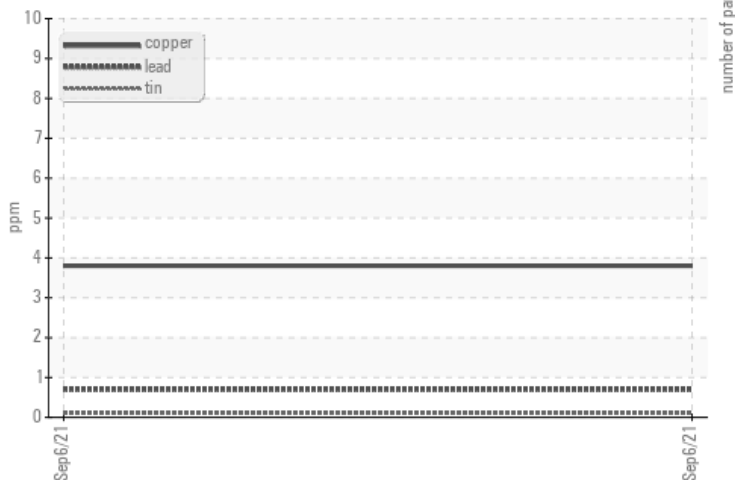


### Graphs

#### Ferrous Alloys



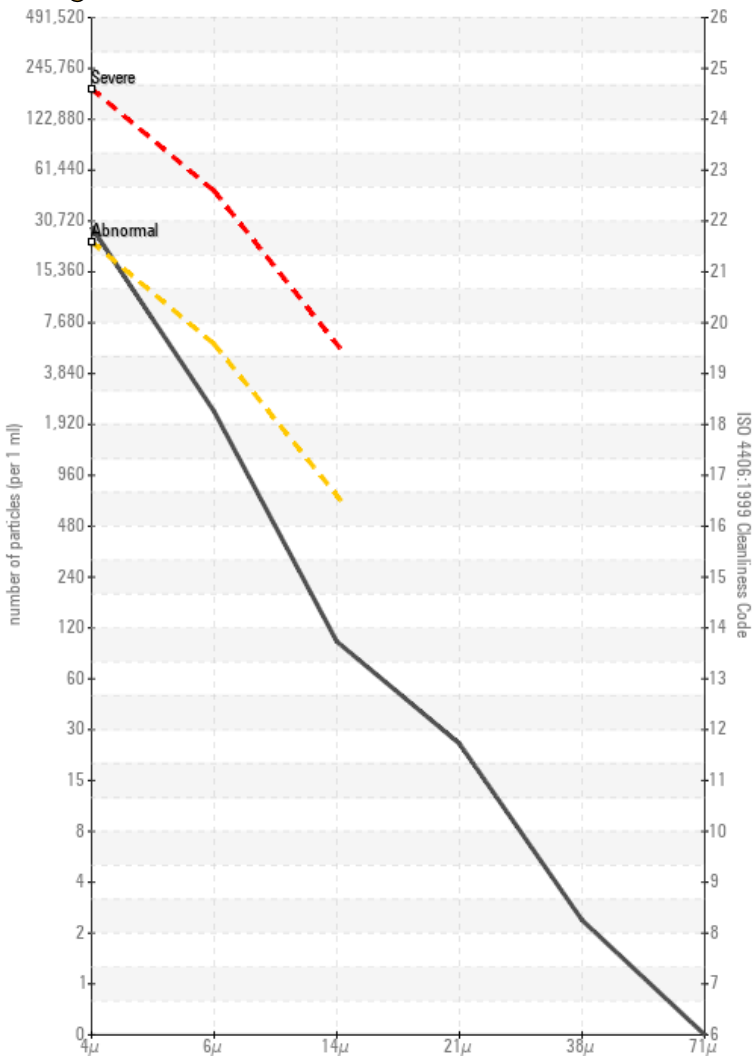
#### Non-ferrous Metals



#### Viscosity @ 40°C



#### Particle Count





# LIEBHERR

## CONSTRUCTION EQUIPMENT



### [(357697)] LIEBHERR PR766 016664-1421 - Left Final Drive

Sample No: LH0194334

Oil Type: LIEBHERR GEAR BASIC 90 LS



#### Sample Information

Sample Number	LH0194334	---	---	---
Sample Date	06 Sep 2021	---	---	---
Machine Hours	144	---	---	---
Oil Hours	0	---	---	---
Oil Changed	Not Chngd	---	---	---
Sample Status	NORMAL	---	---	---

**HEAVY IRON INC**  
 370145 79 STREET EAST  
 ALDERSYDE, AB  
 CA T0L 0A0  
 Contact: Service Manager



#### Oil Condition

Visc @ 40°C	cSt	325	---	---	---
-------------	-----	-----	-----	-----	-----

T:  
F:



#### Contamination

Water	%	NEG	---	---	---
Silicon	ppm	11	---	---	---
Sodium	ppm	5	---	---	---
Potassium	ppm	1	---	---	---

#### Diagnosis

Confirm the source of the lubricant being utilized for top-up/fill. Resample at the next service interval to monitor. All component wear rates are normal. There is no indication of any contamination in the oil. Additive levels indicate the addition of a different brand, or type of oil. Viscosity of sample indicates oil is within SAE 90W140 range, advise investigate. The condition of the oil is acceptable for the time in service.



#### Wear Metals

Iron	ppm	199	---	---	---
Copper	ppm	84	---	---	---
Lead	ppm	4	---	---	---
Tin	ppm	5	---	---	---
Aluminum	ppm	3	---	---	---
Chromium	ppm	2	---	---	---
Molybdenum	ppm	<1	---	---	---
Nickel	ppm	<1	---	---	---
Titanium	ppm	0	---	---	---
Silver	ppm	<1	---	---	---
Manganese	ppm	3	---	---	---
Vanadium	ppm	0	---	---	---



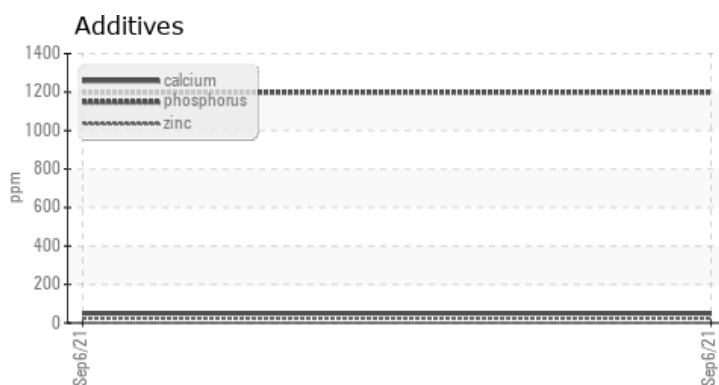
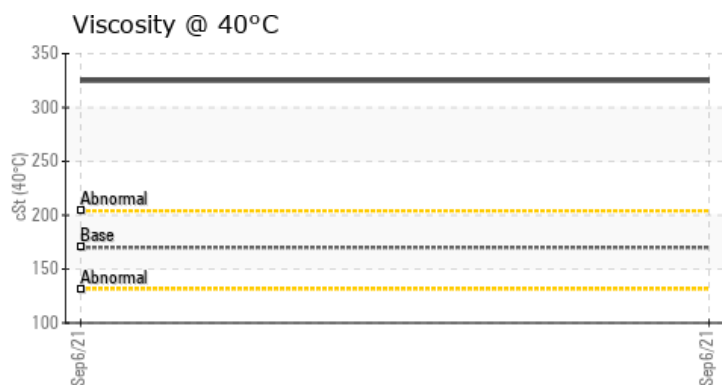
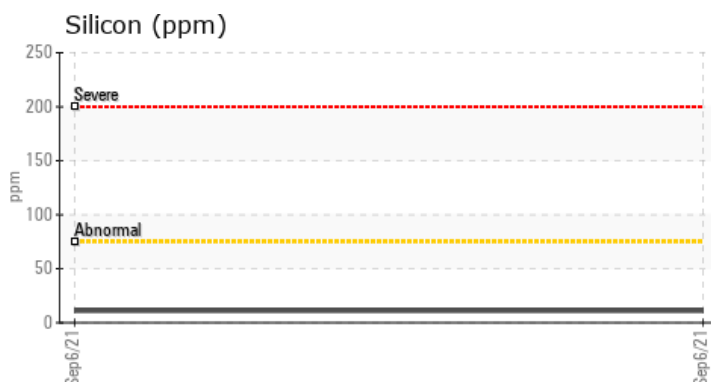
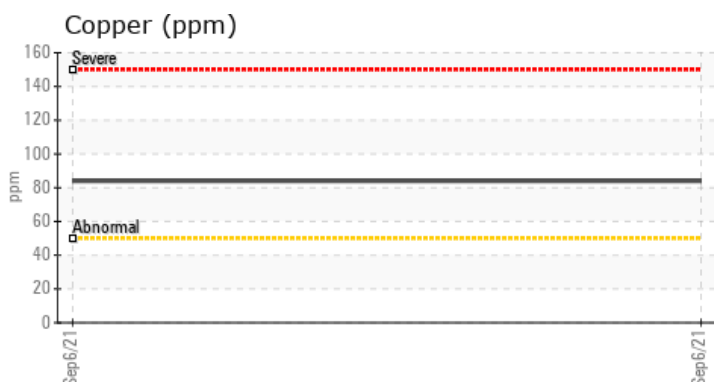
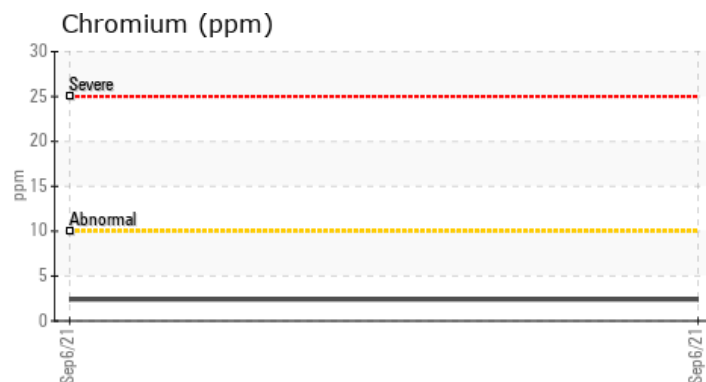
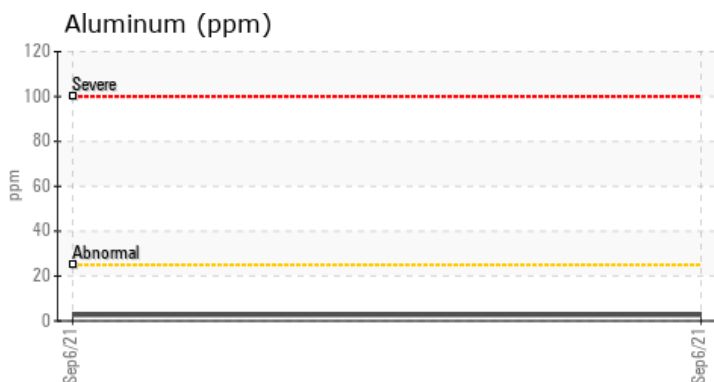
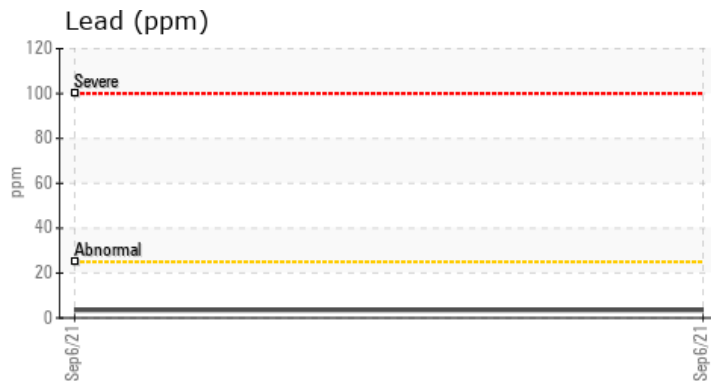
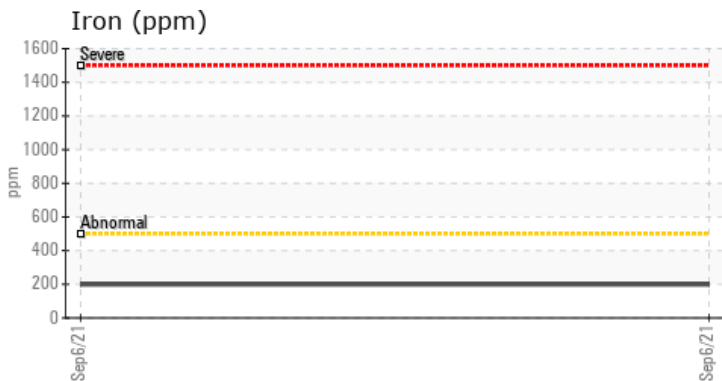
#### Additives

Calcium	ppm	49	---	---	---
Magnesium	ppm	2	---	---	---
Zinc	ppm	23	---	---	---
Phosphorus	ppm	1199	---	---	---
Barium	ppm	80	---	---	---
Boron	ppm	5	---	---	---

**Depot:** HEAALD  
**Unique No:** 5278186  
**Signed:** Kevin Marson  
**Report Date:** 08 Sep 2021



### Graphs



# LIEBHERR

## CONSTRUCTION EQUIPMENT



### [(357697)] LIEBHERR PR766 016664-1421 - Splitter Box

Sample No: LH0194336

Oil Type: LIEBHERR GEAR BASIC 90 LS



#### Sample Information

Sample Number	LH0194336	---	---	---
Sample Date	31 Aug 2021	---	---	---
Machine Hours	144	---	---	---
Oil Hours	0	---	---	---
Oil Changed	Not Chngd	---	---	---
Sample Status	NORMAL	---	---	---

**HEAVY IRON INC**  
 370145 79 STREET EAST  
 ALDERSYDE, AB  
 CA T0L 0A0  
 Contact: Service Manager



#### Oil Condition

Visc @ 40°C	cSt	365	---	---	---
-------------	-----	-----	-----	-----	-----

T:  
F:



#### Contamination

Water	%	NEG	---	---	---
Silicon	ppm	4	---	---	---
Sodium	ppm	6	---	---	---
Potassium	ppm	1	---	---	---

#### Diagnosis

Confirm the source of the lubricant being utilized for top-up/fill. Resample at the next service interval to monitor. All component wear rates are normal. There is no indication of any contamination in the oil. Additive levels indicate the addition of a different brand, or type of oil. Viscosity of sample indicates oil is within SAE 140 range, advise investigate. The condition of the oil is acceptable for the time in service.



#### Wear Metals

Iron	ppm	34	---	---	---
Copper	ppm	10	---	---	---
Lead	ppm	<1	---	---	---
Tin	ppm	<1	---	---	---
Aluminum	ppm	<1	---	---	---
Chromium	ppm	<1	---	---	---
Molybdenum	ppm	<1	---	---	---
Nickel	ppm	<1	---	---	---
Titanium	ppm	0	---	---	---
Silver	ppm	<1	---	---	---
Manganese	ppm	12	---	---	---
Vanadium	ppm	0	---	---	---



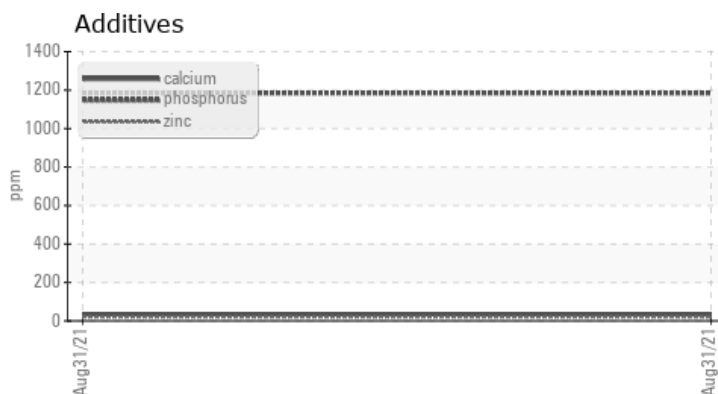
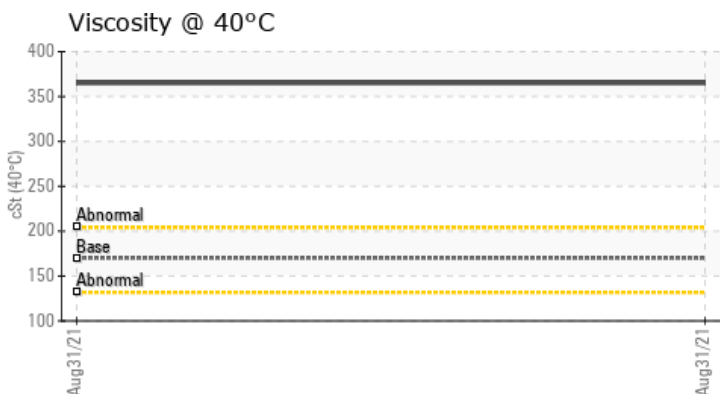
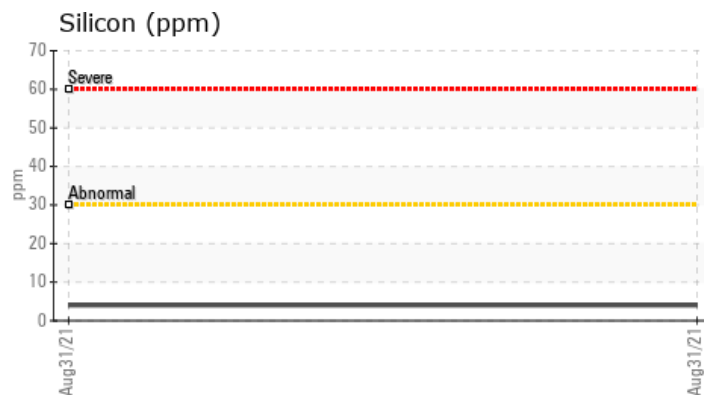
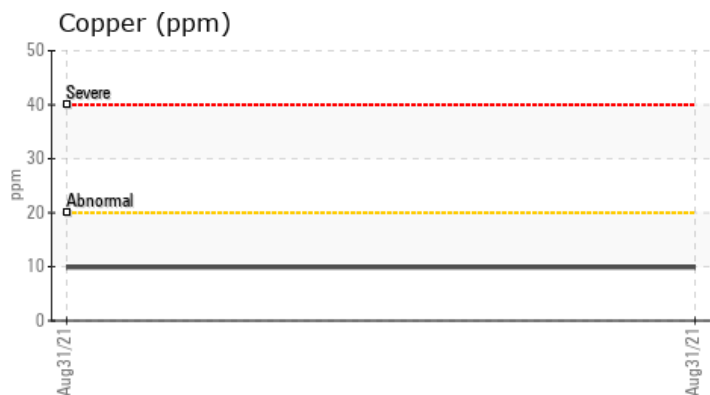
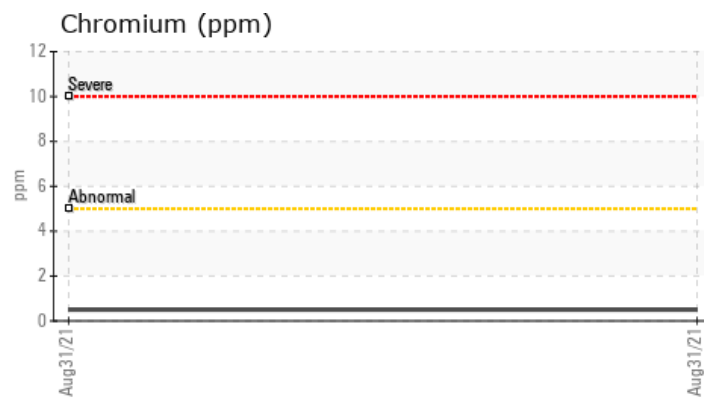
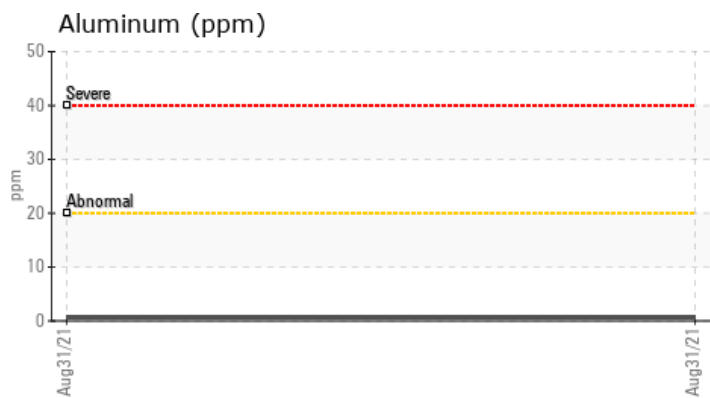
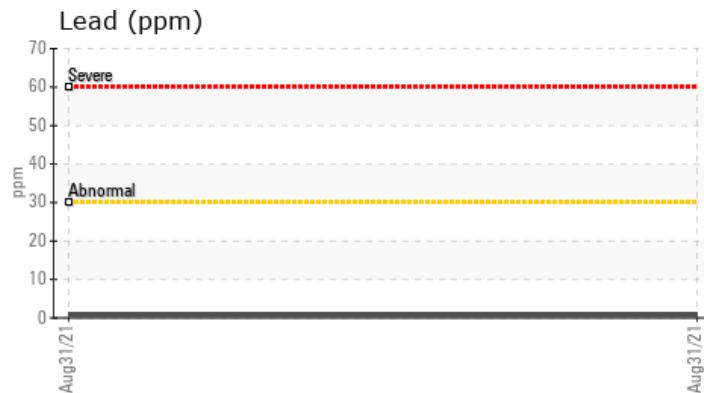
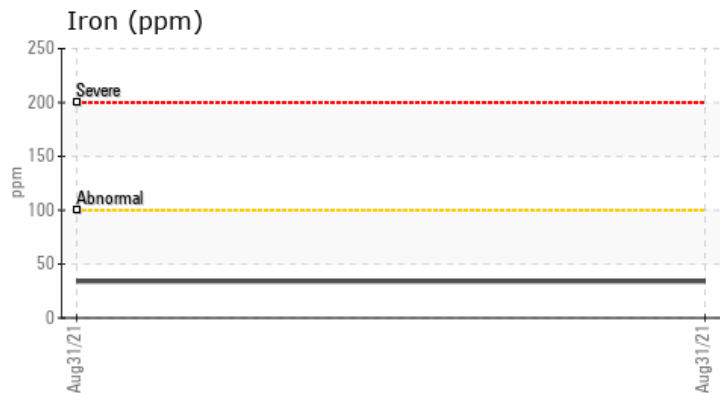
#### Additives

Calcium	ppm	35	---	---	---
Magnesium	ppm	12	---	---	---
Zinc	ppm	21	---	---	---
Phosphorus	ppm	1185	---	---	---
Barium	ppm	<1	---	---	---
Boron	ppm	7	---	---	---

**Depot:** HEAALD  
**Unique No:** 5278185  
**Signed:** Wes Davis  
**Report Date:** 07 Sep 2021



### Graphs





# LIEBHERR

## CONSTRUCTION EQUIPMENT



### [(357697)] LIEBHERR PR766 016664-1421 - Right Final Drive

Sample No: LH0194337

Oil Type: LIEBHERR GEAR BASIC 90 LS



#### Sample Information

Sample Number	LH0194337	---	---	---
Sample Date	06 Sep 2021	---	---	---
Machine Hours	144	---	---	---
Oil Hours	0	---	---	---
Oil Changed	Not Chngd	---	---	---
Sample Status	NORMAL	---	---	---

**HEAVY IRON INC**  
 370145 79 STREET EAST  
 ALDERSYDE, AB  
 CA T0L 0A0  
 Contact: Service Manager



#### Oil Condition

Visc @ 40°C	cSt	338	---	---	---
-------------	-----	-----	-----	-----	-----

T:  
F:



#### Contamination

Water	%	NEG	---	---	---
Silicon	ppm	13	---	---	---
Sodium	ppm	6	---	---	---
Potassium	ppm	1	---	---	---

#### Diagnosis

Confirm the source of the lubricant being utilized for top-up/fill. Resample at the next service interval to monitor. All component wear rates are normal. There is no indication of any contamination in the oil. Additive levels indicate the addition of a different brand, or type of oil. Viscosity of sample indicates oil is within SAE 90W140 range, advise investigate. The condition of the oil is acceptable for the time in service.



#### Wear Metals

Iron	ppm	198	---	---	---
Copper	ppm	81	---	---	---
Lead	ppm	3	---	---	---
Tin	ppm	4	---	---	---
Aluminum	ppm	3	---	---	---
Chromium	ppm	3	---	---	---
Molybdenum	ppm	<1	---	---	---
Nickel	ppm	1	---	---	---
Titanium	ppm	0	---	---	---
Silver	ppm	<1	---	---	---
Manganese	ppm	2	---	---	---
Vanadium	ppm	0	---	---	---



#### Additives

Calcium	ppm	44	---	---	---
Magnesium	ppm	2	---	---	---
Zinc	ppm	22	---	---	---
Phosphorus	ppm	1184	---	---	---
Barium	ppm	47	---	---	---
Boron	ppm	5	---	---	---

**Depot:** HEAALD  
**Unique No:** 5278187  
**Signed:** Kevin Marson  
**Report Date:** 08 Sep 2021



### Graphs

