

PROBLEM SUMMARY

Sample Rating Trend

VISCOSITY

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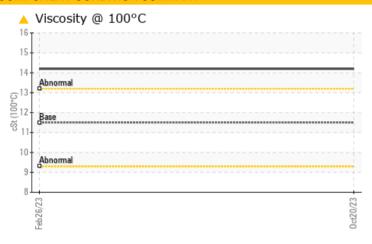
ASRI-TRL-HTR-0006 ASRI-TRL-HTR-0006

Component

Circulating System

SAE 0W30 (12 GAL)

COMPONENT CONDITION SUMMARY



RECOMMENDATION

Oil and filter change at the time of sampling has been noted. Resample at the next service interval to monitor.

PROBLEMATIC TEST RESULTS		
Sample Status	ATTENTION	ATTENT

 Sample Status
 ATTENTION
 ATTENTION
 --

 Visc @ 100°C
 cSt
 ASTM D445
 11.5
 ▲ 14.2
 ▲ 14.2
 --

Customer Id: BPEMPU Sample No.: HLC0002555 Lab Number: 05993787 Test Package: IND 2



To manage this report scan the QR code

To discuss the diagnosis or test data: Sean Felton +1 919-379-4092 sfelton@wearcheckusa.com

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

RECOMMENDED	ACTIONS			
Action	Status	Date	Done By	Description
Change Fluid			?	Oil and filter change at the time of sampling has been noted.
Change Filter			?	Oil and filter change at the time of sampling has been noted.

HISTORICAL DIAGNOSIS

26 Feb 2023 Diag: Jonathan Hester

VISCOSITY



Oil and filter change at the time of sampling has been noted. Resample at the next service interval to monitor. All component wear rates are normal. There is no indication of any contamination in the oil. The oil viscosity is higher than normal. The BN result indicates that there is suitable alkalinity remaining in the oil. Confirm oil type.





OIL ANALYSIS REPORT

Sample Rating Trend

VISCOSITY

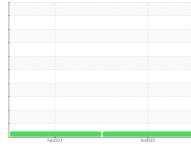
Machine Id

ASRI-TRL-HTR-0006 ASRI-TRL-HTR-0006

Component

Circulating System

SAE 0W30 (12 GAL)





Recommendation

Oil and filter change at the time of sampling has been noted. Resample at the next service interval to monitor.

Wear

All component wear rates are normal.

Contamination

There is no indication of any contamination in the oil.

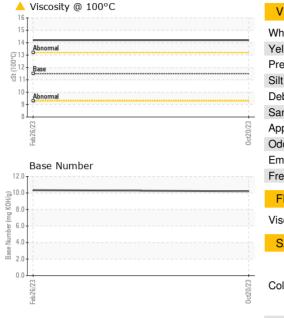
Fluid Condition

The oil viscosity is higher than normal. The BN result indicates that there is suitable alkalinity remaining in the oil. Confirm oil type.

Sample Number Client Info HLC0002555 HLC0002182				Feb 2023	0ct2023		
Sample Date	SAMPLE INFORM	IATION	method	limit/base	current	history1	history2
Machine Age hrs Client Info 71846 68769	Sample Number		Client Info		HLC0002555	HLC0002182	
Oil Age hrs Client Info 3077 3000 Oil Changed Client Info Changed Changed Sample Status method limit/base current history1 hi Iron ppm ASTM D5185m 2 4 Chromium ppm ASTM D5185m 0 <1 Nickel ppm ASTM D5185m 0 0 Nickel ppm ASTM D5185m 0 0 Silver ppm ASTM D5185m 0 0 Aluminum ppm ASTM D5185m 0 1 2 Aluminum ppm ASTM D5185m 0 1 Lead ppm ASTM D5185m 0 1 Copper ppm ASTM D5185m 0 0 Vanadium ppm ASTM D5185m 0 0 <	Sample Date		Client Info		20 Oct 2023	26 Feb 2023	
Client Info	Machine Age	hrs	Client Info		71846	68769	
WEAR METALS method limit/base current history1 hi Iron ppm ASTM D5185m 2 4 Chromium ppm ASTM D5185m 0 <1	Oil Age	hrs	Client Info		3077	3000	
WEAR METALS method limit/base current history1 hi Iron ppm ASTM D5185m 2 4 Chromium ppm ASTM D5185m 0 <1	Oil Changed		Client Info		Changed	Changed	
Iron	Sample Status				ATTENTION	ATTENTION	
Chromium	WEAR METALS		method	limit/base	current	history1	history2
Nickel	Iron	ppm	ASTM D5185m		2	4	
Titanium ppm ASTM D5185m <1 <1	Chromium	ppm	ASTM D5185m		0	<1	
Silver	Nickel	ppm	ASTM D5185m		0	0	
Aluminum ppm ASTM D5185m 1 2 Lead ppm ASTM D5185m 0 1 Copper ppm ASTM D5185m 0 0 Tin ppm ASTM D5185m 0 0 Vanadium ppm ASTM D5185m 0 0 Vanadium ppm ASTM D5185m 0 0 Cadmium ppm ASTM D5185m 0 0 ADDITIVES method limit/base current history1 hi Boron ppm ASTM D5185m 0 0 Boron ppm ASTM D5185m 0 0 Molybdenum ppm ASTM D5185m 2 20	Titanium	ppm	ASTM D5185m		<1	<1	
Lead	Silver	ppm	ASTM D5185m		0	0	
Copper ppm ASTM D5185m 0 0	Aluminum	ppm	ASTM D5185m		1	2	
Tin ppm ASTM D5185m 0 <1 Vanadium ppm ASTM D5185m 0 0 Cadmium ppm ASTM D5185m 0 0 ADDITIVES method limit/base current history1 hi Boron ppm ASTM D5185m 100 135 Barium ppm ASTM D5185m 0 0 Molybdenum ppm ASTM D5185m 2 20 Manganese ppm ASTM D5185m 723 740 Magnesium ppm ASTM D5185m 749 692 Calcium ppm ASTM D5185m 749 692 Phosphorus ppm ASTM D5185m 810 887 Sulfur ppm ASTM D5185m 2966 3345 CONTAMINANTS method limit/base current history1	Lead	ppm	ASTM D5185m		0	1	
Vanadium ppm ASTM D5185m 0 0	Copper	ppm	ASTM D5185m		0	0	
Cadmium ppm ASTM D5185m 0 0 ADDITIVES method limit/base current history1 hi Boron ppm ASTM D5185m 100 135 Barium ppm ASTM D5185m 0 0 Molybdenum ppm ASTM D5185m 2 20 Manganese ppm ASTM D5185m 0 1 Magnesium ppm ASTM D5185m 723 740 Calcium ppm ASTM D5185m 1348 1409 Phosphorus ppm ASTM D5185m 749 692 Zinc ppm ASTM D5185m 810 887 Sulfur ppm ASTM D5185m 2966 3345 CONTAMINANTS method limit/base current history1 hi Silicon ppm ASTM D5185m >12 3	Tin	ppm	ASTM D5185m		0	<1	
ADDITIVES method limit/base current history1 hi Boron ppm ASTM D5185m 100 135 Barium ppm ASTM D5185m 0 0 Molybdenum ppm ASTM D5185m 2 20 Manganese ppm ASTM D5185m 0 1 Magnesium ppm ASTM D5185m 723 740 Calcium ppm ASTM D5185m 1348 1409 Phosphorus ppm ASTM D5185m 749 692 Zinc ppm ASTM D5185m 810 887 Sulfur ppm ASTM D5185m 2966 3345 CONTAMINANTS method limit/base current history1 hi Silicon ppm ASTM D5185m >12 3 2 Potassium ppm ASTM D5185m >20	Vanadium	ppm	ASTM D5185m		0	0	
Boron	Cadmium	ppm	ASTM D5185m		0	0	
Barium ppm ASTM D5185m 0 0 Molybdenum ppm ASTM D5185m 2 20 Manganese ppm ASTM D5185m 0 1 Magnesium ppm ASTM D5185m 723 740 Calcium ppm ASTM D5185m 1348 1409 Phosphorus ppm ASTM D5185m 749 692 Zinc ppm ASTM D5185m 810 887 Sulfur ppm ASTM D5185m 2966 3345 CONTAMINANTS method limit/base current history1 hi Silicon ppm ASTM D5185m >12 3 2 Sodium ppm ASTM D5185m >20 4 4 INFRA-RED method limit/base current history1 hi Soot % % *ASTM D7844 0.1	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum ppm ASTM D5185m 2 20 Manganese ppm ASTM D5185m 0 1 Magnesium ppm ASTM D5185m 723 740 Calcium ppm ASTM D5185m 1348 1409 Phosphorus ppm ASTM D5185m 749 692 Zinc ppm ASTM D5185m 810 887 Sulfur ppm ASTM D5185m 2966 3345 CONTAMINANTS method limit/base current history1 hi Silicon ppm ASTM D5185m >12 3 2 Sodium ppm ASTM D5185m >12 3 2 INFRA-RED method limit/base current history1 hi Soot % % *ASTM D7844 0.1 0.1 Nitration Abs/cm *ASTM D7624	Boron	ppm	ASTM D5185m		100	135	
Manganese ppm ASTM D5185m 0 1 Magnesium ppm ASTM D5185m 723 740 Calcium ppm ASTM D5185m 1348 1409 Phosphorus ppm ASTM D5185m 749 692 Zinc ppm ASTM D5185m 810 887 Sulfur ppm ASTM D5185m 2966 3345 CONTAMINANTS method limit/base current history1 hi Silicon ppm ASTM D5185m >12 3 2 Sodium ppm ASTM D5185m >12 3 2 Potassium ppm ASTM D5185m >20 4 4 INFRA-RED method limit/base current history1 hi Soot % % *ASTM D7844 0.1 0.1 Nitration Abs/cm *ASTM D76	Barium	ppm	ASTM D5185m		0	0	
Magnesium ppm ASTM D5185m 723 740 Calcium ppm ASTM D5185m 1348 1409 Phosphorus ppm ASTM D5185m 749 692 Zinc ppm ASTM D5185m 810 887 Sulfur ppm ASTM D5185m 2966 3345 CONTAMINANTS method limit/base current history1 hi Silicon ppm ASTM D5185m 4 5 Sodium ppm ASTM D5185m >12 3 2 Potassium ppm ASTM D5185m >20 4 4 INFRA-RED method limit/base current history1 hi Soot % % *ASTM D7844 0.1 0.1 Nitration Abs/cm *ASTM D7624 7.9 7.9 Sulfation Abs/.1mm *ASTM D7415	Molybdenum	ppm	ASTM D5185m		2	20	
Calcium ppm ASTM D5185m 1348 1409 Phosphorus ppm ASTM D5185m 749 692 Zinc ppm ASTM D5185m 810 887 Sulfur ppm ASTM D5185m 2966 3345 CONTAMINANTS method limit/base current history1 hi Silicon ppm ASTM D5185m 4 5 Sodium ppm ASTM D5185m >12 3 2 Potassium ppm ASTM D5185m >20 4 4 INFRA-RED method limit/base current history1 hi Soot % % *ASTM D7844 0.1 0.1 Nitration Abs/cm *ASTM D7624 7.9 7.9 Sulfation Abs/.1mm *ASTM D7415 18.0 18.7	Manganese	ppm	ASTM D5185m		0	1	
Phosphorus ppm ASTM D5185m 749 692 Zinc ppm ASTM D5185m 810 887 Sulfur ppm ASTM D5185m 2966 3345 CONTAMINANTS method limit/base current history1 hi Silicon ppm ASTM D5185m 4 5 Sodium ppm ASTM D5185m >12 3 2 Potassium ppm ASTM D5185m >20 4 4 INFRA-RED method limit/base current history1 hi Soot % "ASTM D7844 0.1 0.1 Nitration Abs/cm "ASTM D7624 7.9 7.9 Sulfation Abs/.1mm "ASTM D7415 18.0 18.7	Magnesium	ppm	ASTM D5185m		723	740	
Zinc ppm ASTM D5185m 810 887 Sulfur ppm ASTM D5185m 2966 3345 CONTAMINANTS method limit/base current history1 hi Silicon ppm ASTM D5185m 4 5 Sodium ppm ASTM D5185m >12 3 2 Potassium ppm ASTM D5185m >20 4 4 INFRA-RED method limit/base current history1 hi Soot % "ASTM D7844 0.1 0.1 Nitration Abs/cm "ASTM D7624 7.9 7.9 Sulfation Abs/.1mm "ASTM D7415 18.0 18.7	Calcium	ppm	ASTM D5185m		1348	1409	
Sulfur ppm ASTM D5185m 2966 3345 CONTAMINANTS method limit/base current history1 hi Silicon ppm ASTM D5185m 4 5 Sodium ppm ASTM D5185m >12 3 2 Potassium ppm ASTM D5185m >20 4 4 INFRA-RED method limit/base current history1 hi Soot % % *ASTM D7844 0.1 0.1 Nitration Abs/cm *ASTM D7624 7.9 7.9 Sulfation Abs/.1mm *ASTM D7415 18.0 18.7	Phosphorus	ppm	ASTM D5185m		749	692	
CONTAMINANTS method limit/base current history1 hi Silicon ppm ASTM D5185m 4 5 Sodium ppm ASTM D5185m >12 3 2 Potassium ppm ASTM D5185m >20 4 4 INFRA-RED method limit/base current history1 hi Soot % % *ASTM D7844 0.1 0.1 Nitration Abs/cm *ASTM D7624 7.9 7.9 Sulfation Abs/.1mm *ASTM D7415 18.0 18.7	Zinc	ppm	ASTM D5185m		810	887	
Silicon ppm ASTM D5185m 4 5 Sodium ppm ASTM D5185m >12 3 2 Potassium ppm ASTM D5185m >20 4 4 INFRA-RED method limit/base current history1 hi Soot % % *ASTM D7844 0.1 0.1 Nitration Abs/cm *ASTM D7624 7.9 7.9 Sulfation Abs/.1mm *ASTM D7415 18.0 18.7	Sulfur	ppm	ASTM D5185m		2966	3345	
Sodium ppm ASTM D5185m >12 3 2 Potassium ppm ASTM D5185m >20 4 4 INFRA-RED method limit/base current history1 hi Soot % % *ASTM D7844 0.1 0.1 Nitration Abs/cm *ASTM D7624 7.9 7.9 Sulfation Abs/.1mm *ASTM D7415 18.0 18.7	CONTAMINANTS		method	limit/base	current	history1	history2
Potassium ppm ASTM D5185m >20 4 4 INFRA-RED method limit/base current history1 hi Soot % % *ASTM D7844 0.1 0.1 Nitration Abs/cm *ASTM D7624 7.9 7.9 Sulfation Abs/.1mm *ASTM D7415 18.0 18.7	Silicon	ppm	ASTM D5185m		4	5	
INFRA-RED method limit/base current history1 hi Soot % % *ASTM D7844 0.1 0.1 Nitration Abs/cm *ASTM D7624 7.9 7.9 Sulfation Abs/.1mm *ASTM D7415 18.0 18.7	Sodium	ppm	ASTM D5185m	>12	3	2	
Soot % % *ASTM D7844 0.1 0.1 Nitration Abs/cm *ASTM D7624 7.9 7.9 Sulfation Abs/.1mm *ASTM D7415 18.0 18.7	Potassium	ppm	ASTM D5185m	>20	4	4	
Nitration Abs/cm *ASTM D7624 7.9 7.9 Sulfation Abs/.1mm *ASTM D7415 18.0 18.7	INFRA-RED		method	limit/base	current	history1	history2
Sulfation Abs/.1mm *ASTM D7415 18.0 18.7	Soot %	%	*ASTM D7844		0.1	0.1	
Sulfation Abs/.1mm *ASTM D7415 18.0 18.7	Nitration	Abs/cm	*ASTM D7624		7.9	7.9	
FLUID DEGRADATION method limit/base current history1 hi	Sulfation	Abs/.1mm					
	FLUID DEGRADA	TION	method	limit/base	current	history1	history2
Oxidation Abs/.1mm *ASTM D7414 12.4 12.7	Oxidation	Abs/.1mm	*ASTM D7414		12.4	12.7	
Base Number (BN) mg KOH/g ASTM D2896 10.21 10.34		mg KOH/a				10.34	



OIL ANALYSIS REPORT



VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE	
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	
Precipitate	scalar	*Visual	NONE	NONE	NONE	
Silt	scalar	*Visual	NONE	NONE	NONE	
Debris	scalar	*Visual	NONE	NONE	NONE	
Sand/Dirt	scalar	*Visual	NONE	NONE	NONE	
Appearance	scalar	*Visual	NORML	NORML	NORML	
Odor	scalar	*Visual	NORML	NORML	NORML	
Emulsified Water	scalar	*Visual		NEG	NEG	
Free Water	scalar	*Visual		NEG	NEG	
FLUID PROPERT	IES	method	limit/base	current	history1	history2
Visc @ 100°C	cSt	ASTM D445	11.5	<u>▲</u> 14.2	▲ 14.2	
SAMPLE IMAGES	3	method	limit/base	current	history1	history2
Color				no image	no image	no image

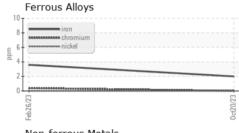
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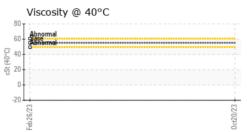
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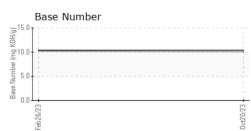
GRAPHS

Bottom



10	Non-terrous metals	
	copper i	
mdd	- vacanament (I)	
d .	1	
	A.4.4.5.5.0.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4	
	Feb26/23.	







Laboratory Sample No. Lab Number

: 05993787 Unique Number : 10722147

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 : HLC0002555 Received

Diagnosed : 01 Nov 2023

Diagnostician : Sean Felton Test Package : IND 2 (Additional Tests: FT-IR, KV100, PrtCount, TBN)

: 30 Oct 2023

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)

HILCORP EXPLORATION ALASKA - MILNE POINT

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