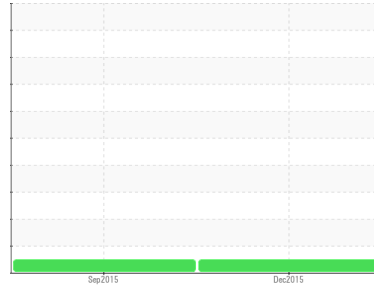# OIL ANALYSIS REPORT

Hilcorp Alaska, LLC

Sample Rating Trend

NORMAL

Machine Id
A MAIN SEAL OIL
Component
Lube System
Fluid
R&O OIL ISO 32 (--- GAL)

DIAGNOSIS

Recommendation
Resample at the next service interval to monitor.

Wear
All component wear rates are normal.

Contamination
MPC (Membrane Patch Calorimetery) test indicates acceptable levels of varnish present. There is no indication of any contamination in the component. The amount and size of particulates present in the system is acceptable.

Fluid Condition
The AN level is acceptable for this fluid. Linear Sweep Voltammetry (RULER – ASTM D6971) testing indicates normal levels of anti-oxidants present in the oil. The condition of the oil is suitable for further service.

SAMPLE INFORMATION

	method	limit/base	current	history1	history2
Sample Number	Client Info		**HLCI2230217**	HLCI2291464	---
Sample Date	Client Info		**22 Dec 2015**	30 Sep 2015	---
Machine Age	hrs	Client Info	**0**	0	---
Oil Age	hrs	Client Info	**0**	0	---
Oil Changed	Client Info		**N/A**	N/A	---
Sample Status			**NORMAL**	NORMAL	---

WEAR METALS

	method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m	>20	**0**	0	---
Chromium	ppm	ASTM D5185m	>20	**0**	0	---
Nickel	ppm	ASTM D5185m	>20	**0**	0	---
Titanium	ppm	ASTM D5185m		**0**	0	---
Silver	ppm	ASTM D5185m		**0**	0	---
Aluminum	ppm	ASTM D5185m	>20	**0**	0	---
Lead	ppm	ASTM D5185m	>20	**0**	0	---
Copper	ppm	ASTM D5185m	>20	**0**	0	---
Tin	ppm	ASTM D5185m	>20	**2**	0	---
Antimony	ppm	ASTM D5185m		**0**	0	---
Vanadium	ppm	ASTM D5185m		**0**	0	---
Cadmium	ppm	ASTM D5185m		**0**	0	---

ADDITIVES

	method	limit/base	current	history1	history2
Boron	ppm	ASTM D5185m	5	**0**	0	---
Barium	ppm	ASTM D5185m	5	**0**	0	---
Molybdenum	ppm	ASTM D5185m	5	**0**	0	---
Manganese	ppm	ASTM D5185m		**0**	0	---
Magnesium	ppm	ASTM D5185m	5	**<1**	0	---
Calcium	ppm	ASTM D5185m	5	**0**	0	---
Phosphorus	ppm	ASTM D5185m	100	**22**	12	---
Zinc	ppm	ASTM D5185m	25	**0**	0	---
Sulfur	ppm	ASTM D5185m	1500	**1043**	793	---

CONTAMINANTS

	method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185m	>15	**<1**	<1	---
Sodium	ppm	ASTM D5185m		**1**	0	---
Potassium	ppm	ASTM D5185m	>20	**0**	<1	---
Water	%	ASTM D6304	>0.05	**NEG**	NEG	---

FLUID CLEANLINESS

	method	limit/base	current	history1	history2
Particles >4µm		ASTM D7647	>10000	**529**	2776	---
Particles >6µm		ASTM D7647	>1300	**64**	986	---
Particles >14µm		ASTM D7647	>160	**7**	118	---
Particles >21µm		ASTM D7647	>40	**2**	33	---
Particles >38µm		ASTM D7647	>10	**0**	6	---
Particles >71µm		ASTM D7647	>3	**0**	1	---
Oil Cleanliness		ISO 4406 (c)	>20/17/14	**16/13/10**	19/17/14	---

OIL ANALYSIS REPORT

Hilcorp Alaska, LLC

Remaining Life (RULER)

A01 (%)
A02 (%)
A03 (%)
Severe

Particle Count

Severe
Abnormal

Acid Number

Abnormal
Base
Abnormal

Viscosity @ 40°C

Abnormal
Base
Abnormal

Particle Trend

4μm
6μm
14μm
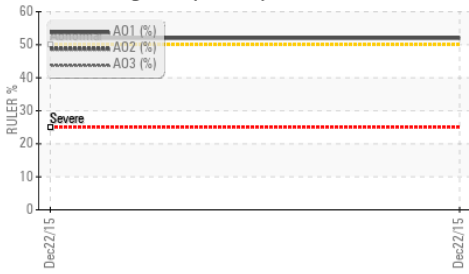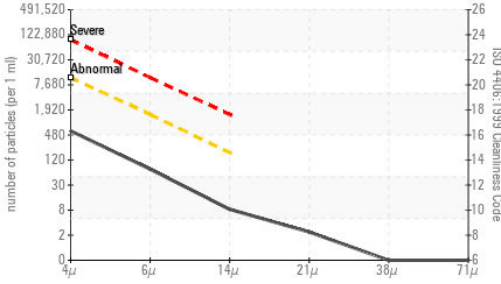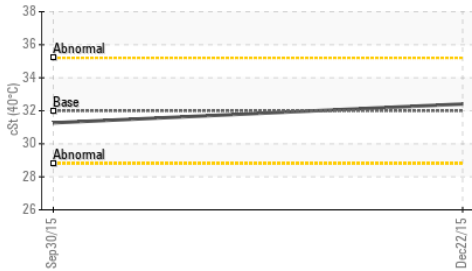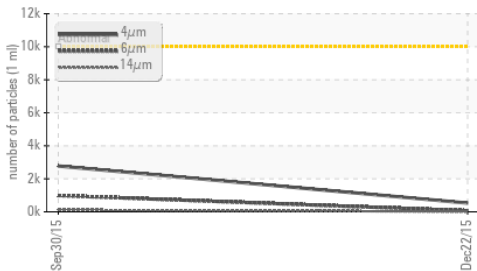
FLUID DEGRADATION		method	limit/base	current	history1	history2
Acid Number (AN)	mg KOH/g	ASTM D8045	0.08	**0.066**	0.068	---
Anti-Oxidant 1	%	ASTM D6971	<25	**52**	---	---
MPC Varnish Potential	Scale	ASTM D7843	>15	**22**	---	---

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	>0.05	**NEG**	NEG	---
Free Water	scalar	*Visual		**NEG**	NEG	---

FLUID PROPERTIES		method	limit/base	current	history1	history2
Visc @ 40°C	cSt	ASTM D445	32	**32.41**	31.27	---

SAMPLE IMAGES	method	limit/base	current	history1	history2
Color				no image	no image
Bottom				no image	no image
MPC				no image	no image

Remaining Useful Life (RULER)

MPC (Varnish Test)

This page left intentionally blank