

## **OIL ANALYSIS REPORT**

### Vessel KAT 022 (SWEEPLINE HYDRAULIC SERVO) Component

**Hydraulic System** SHELL TELLUS 22 (--- GAL)

#### DIAGNOSIS

#### Recommendation

Resample at the next service interval to monitor. NOTE: Please provide information regarding reservoir capacity, filter type and micron rating with next sample.

#### Wear

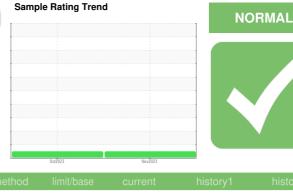
All component wear rates are normal.

#### Contamination

The system cleanliness is acceptable for your target ISO 4406 cleanliness code. The system and fluid cleanliness is acceptable.

#### Fluid Condition

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





			Oct2023	Nov2023		
SAMPLE INFOR	MATION	method	limit/base	current	history1	history2
Sample Number		Client Info		PC0080318	PC0011768	
Sample Date		Client Info		22 Nov 2023	18 Oct 2023	
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	
CONTAMINAT	ION	method	limit/base	current	history1	history2
Water		WC Method	>0.05	NEG	NEG	
WEAR METAL	S	method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185(m)	>20	1	<1	
Chromium	ppm	ASTM D5185(m)	>10	0	0	
Nickel	ppm	ASTM D5185(m)	>10	<1	0	
Titanium	ppm	ASTM D5185(m)		0	0	
Silver	ppm	ASTM D5185(m)		<1	<1	
Aluminum	ppm	ASTM D5185(m)	>10	0	0	
Lead	ppm	ASTM D5185(m)	>20	<1	<1	
Copper	ppm	ASTM D5185(m)	>20	5	1	
Tin	ppm	ASTM D5185(m)	>10	0	0	
Antimony	ppm	ASTM D5185(m)		0	0	
Vanadium	ppm	ASTM D5185(m)		0	0	
Beryllium	ppm	ASTM D5185(m)		0	0	
Cadmium	ppm	ASTM D5185(m)		0	0	
ADDITIVES		method	limit/base	current	history1	history2
ADDITIVES Boron	ppm	method ASTM D5185(m)	limit/base	current <1	history1 <1	history2
	ppm ppm		limit/base			
Boron Barium	ppm	ASTM D5185(m)	limit/base	<1	<1	
Boron		ASTM D5185(m) ASTM D5185(m) ASTM D5185(m)	limit/base	<1 <1	<1 <1	
Boron Barium Molybdenum Manganese	ppm ppm ppm	ASTM D5185(m) ASTM D5185(m)	limit/base	<1 <1 0	<1 <1 0	
Boron Barium Molybdenum	ppm ppm ppm ppm	ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m)		<1 <1 0 0	<1 <1 0 0	
Boron Barium Molybdenum Manganese Magnesium Calcium	ppm ppm ppm ppm ppm	ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m)	11	<1 <1 0 0 9	<1 <1 0 0 8	
Boron Barium Molybdenum Manganese Magnesium	ppm ppm ppm ppm ppm ppm	ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m)	11 35	<1 <1 0 9 34	<1 <1 0 0 8 47	
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus	ppm ppm ppm ppm ppm ppm	ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m)	11 35 259	<1 <1 0 9 34 249	<1 <1 0 0 8 47 262	
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc	ppm ppm ppm ppm ppm ppm	ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m)	11 35 259 270	<1 <1 0 9 34 249 306	<1 <1 0 0 8 47 262 317	
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m)	11 35 259 270	<1 <1 0 9 34 249 306 1325	<1 <1 0 0 8 47 262 317 1461	
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur Lithium	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m)	11 35 259 270 1849	<1 <1 0 9 34 249 306 1325 <1	<1 <1 0 0 8 47 262 317 1461 <1	
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur Lithium CONTAMINAN	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m)	11 35 259 270 1849 limit/base	<1 <ul> <li>&lt;1</li> <li>0</li> <li>0</li> <li>9</li> <li>34</li> <li>249</li> <li>306</li> <li>1325</li> <li>&lt;1</li> </ul>	<1 <1 0 0 8 47 262 317 1461 <1 <b>history1</b> 3	       history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur Lithium CONTAMINAN Silicon	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) ASTM D5185(m) <b>method</b> ASTM D5185(m)	11 35 259 270 1849 limit/base	<1 <1 0 9 34 249 306 1325 <1 <i>current</i>	<1 <1 0 0 8 47 262 317 1461 <1 <i>history1</i>	      history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur Lithium CONTAMINAN Silicon Sodium	ppm ppm ppm ppm ppm ppm ppm ppm ppm <b>T</b> S	ASTM D5185(m) ASTM D5185(m)	11 35 259 270 1849 limit/base >15	<1 <1 0 0 9 34 249 306 1325 <1 Current 10 2	<1 <1 0 0 8 47 262 317 1461 <1 <b>history1</b> 3 <1	      history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur Lithium CONTAMINAN Silicon Sodium Potassium	ppm ppm ppm ppm ppm ppm ppm ppm ppm <b>T</b> S	ASTM D5185(m) ASTM D5185(m)	111 35 259 270 1849 limit/base >15 >20	<1 <1 0 0 9 34 249 306 1325 <1 <i>current</i> 10 2 0	<1 <1 0 0 8 47 262 317 1461 <1 <b>history1</b> 3 <1 0	      history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur Lithium CONTAMINAN Silicon Sodium Potassium	ppm ppm ppm ppm ppm ppm ppm ppm ppm <b>T</b> S	ASTM D5185(m) ASTM D5185(m)	11 35 259 270 1849 Iinit/base >15 >20 Iinit/base >5000	<1 <ul> <li>&lt;1</li> <li>0</li> <li>0</li> <li>9</li> <li>34</li> <li>249</li> <li>306</li> <li>1325</li> <li>&lt;1</li> </ul> Current <ul> <li>10</li> <li>2</li> <li>0</li> <li>current</li> </ul>	<1 <ul> <li>&lt;1</li> <li>0</li> <li>0</li> <li>8</li> <li>47</li> <li>262</li> <li>317</li> <li>1461</li> <li>&lt;1</li> </ul> history1 <ul> <li>3</li> <li>&lt;1</li> <li>0</li> <li>history1</li> </ul>	    history2  history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur Lithium CONTAMINAN Silicon Sodium Potassium FLUID CLEAN Particles >4µm Particles >6µm	ppm ppm ppm ppm ppm ppm ppm ppm ppm <b>T</b> S	ASTM D5185(m) ASTM D5185(m)	11 35 259 270 1849 imit/base >15 >20 imit/base >5000 >1300	<1 <ul> <li>&lt;1</li> <li>0</li> <li>0</li> <li>9</li> <li>34</li> <li>249</li> <li>306</li> <li>1325</li> <li>&lt;1</li> </ul> Current <ul> <li>10</li> <li>2</li> <li>0</li> </ul> Current	<1 <1 0 0 8 47 262 317 1461 <1 <b>history1</b> 3 <1 0 <b>history1</b> 	      history2  history2  history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur Lithium CONTAMINAN Silicon Sodium Potassium FLUID CLEAN Particles >4µm Particles >14µm	ppm ppm ppm ppm ppm ppm ppm ppm ppm <b>T</b> S	ASTM D5185(m) ASTM D7647 ASTM D7647	11 35 259 270 1849 imit/base >15 >20 imit/base >5000 >1300 >160	<1 <1 0 0 9 34 249 306 1325 <1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	<1 <1 0 0 8 47 262 317 1461 <1 <i>history1</i> 3 <1 0 <i>history1</i> 	      history2  history2  history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur Lithium CONTAMINAN Silicon Sodium Potassium FLUID CLEAN Particles >4µm Particles >14µm Particles >21µm	ppm ppm ppm ppm ppm ppm ppm ppm ppm <b>T</b> S	ASTM D5185(m) ASTM D7647 ASTM D7647 ASTM D7647 ASTM D7647	11 35 259 270 1849 270 1849 270 1849 20 20 20 20 20 20 20 20 20 20 20 20 20	<1 <1 0 0 0 9 34 249 306 1325 <1 0 0 0 200 0 0 0 0 0 0 0 0 0 0 0 0 0 0	<1 <1 0 0 8 47 262 317 1461 <1 <b>history1</b> 3 <1 0 <b>history1</b> 	       history2  history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur Lithium CONTAMINAN Silicon Sodium Potassium FLUID CLEAN Particles >4µm Particles >14µm	ppm ppm ppm ppm ppm ppm ppm ppm ppm <b>T</b> S	ASTM D5185(m) ASTM D7647 ASTM D7647	11 35 259 270 1849 215 >15 >20 20 20 20 20 20 20 20 20 20 20 20 20 2	<1 <1 0 0 9 34 249 306 1325 <1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	<1 <1 0 0 8 47 262 317 1461 <1 <b>history1</b> 3 <1 0 <b>history1</b> 	        history2  history2  history2

Submitted By: Stephen Elliott



cSt (100°C) Base

6k

1 ml) satricles (1 ml) 4k 3k

a 2k 211 0k• 0ct18/23

cSt (100°C)

30. Abnor 28

26 (0.0} 24 tSo 22 Base 20 Abnor 18 0ct18/23

6

(1 5k 1) sajo tie 3k ja 2k 2 1k Ok Oct18/23

口筋

# **OIL ANALYSIS REPORT**

7	Viscosity @ 100°C	FLUID DEGRAD	ATION	method	limit/base	current	history1	history2
6 -	AL	Acid Number (AN)	mg KOH/g	ASTM D974*	0.37	0.32		
5-	Abnormal	VISUAL		method	limit/base	current	history1	history2
4	Base	White Metal	scalar	Visual*	NONE	NONE	NONE	
	Abnormal	Yellow Metal	scalar	Visual*	NONE	NONE	NONE	
3.		Precipitate	scalar	Visual*	NONE	NONE	NONE	
2	23	Silt		Visual*	NONE	NONE	NONE	
	0ct18/22 /0v22/23	Debris	scalar	Visual*	NONE	NONE	NONE	
	- 2	Sand/Dirt	scalar	Visual*	NONE	NONE	NONE	
ik -	Particle Trend	Appearance	scalar	Visual*	NORML	NORML	NORML	
ik.	Annonnan 4µm	Odor	scalar	Visual*	NORML	NORML	NORML	
lk -		Emulsified Water	scalar	Visual*	>0.05	NEG	NEG	
k-		Free Water	scalar	Visual*		NEG	NEG	
k-		FLUID PROPE	RTIES	method	limit/base	current	history1	history2
k•		Visc @ 40°C	cSt	ASTM D7279(m)	21.33	22.0	22.6	
k	23	Visc @ 100°C	cSt	ASTM D7279(m)	4.21	5	5	
	0ct18/23 Nov22/23	Viscosity Index (VI)	Scale	ASTM D2270*	99	162	155	
	Viscosity @ 100°C	SAMPLE IMAG	ES	method	limit/base	current	history1	history2
6-	Abnormal Base	Color						no image
3-	00419/3/3	Bottom						no image
	No.	GRAPHS						
	Viscosity @ 40°C	Ferrous Alloys			491,521	Particle Count		т26
0	Abnormal	iron			122,880			+24
8.		5 - nickel			30,720	Severe		-22
6		0						
4.		118/23			Nov22/23 5 (per 1 m	Abnormal		120 4408
2.	Base	Oct1			<u>- 65</u>		•	-20 ISO 4406:1999
8	Abnormal	Non-ferrous Metals	5		Ω.			Clean
0-	0ct18/23 -	copper			o 120 numper 31			14 5
	00	E 5 -			- E 31			-12 6
	Particle Trend	0				8-		-10
ik 1		0ct18/23			Nov22/23	2-		-8
k -	Automma 4µm 6µm				No	ο 4μ 6μ	14μ 21μ	38µ 71µ
k-	μ	Viscosity @ 40°C						Constantine Constantine
k-	1	ų.			0 U.4	Base		
k-		25 - Base			Acid Number (mg K	)		
k•		15			- N N			
lk		0ct18/23			Nov22/23 Aci	0ct18/23		Nov22/23
	0ct18,/23	Octi			Novi	Oct		Novi
	Laboratory Sample No. Laboratory Sample No. Lab Number Unique Number Test Package To discuss this sample report, c Test denoted (*) outside scope Validity of results and interpreta	: 02601824 E : 5694909 E : IND 2 ( Additional Te contact Customer Servit of accreditation, (m) me	Received Diagnost Diagnost Sets: KV1 ce at 1-8 ethod mo	l : 08 l ed : 11 l ician : Kev 00, VI ) 00-268-2131 odified, (e) te	Dec 2023 Dec 2023 rin Marson 1. sted at exter	13 nal lab.	15 Topsail Rd, F	P.O. Box 8190 St. John`s, NL CA A1B 3N4 Chief Engineer