

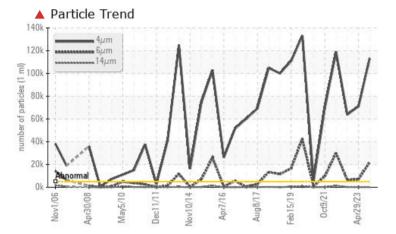
# PROBLEM SUMMARY

Area **1311** Machine Id **ROCK BREAKER HYDRAULIC POWER UNIT** Component

Hydraulic Power Pack

PETRO CANADA HYDREX XV ALL SEASON HYDRAULIC OIL (200 LTR)

## COMPONENT CONDITION SUMMARY



## RECOMMENDATION

Check seals and/or filters for points of contaminant entry. We advise that you check for visible metal particles in the oil. 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 recommend you service the filters on this component. Resample in 30-45 days to monitor this situation.

PROBLEMATIO	C TEST	RESULT	S			
Sample Status				SEVERE	SEVERE	SEVERE
Particles >4µm		ASTM D7647	>5000	<b>113295</b>	<b>A</b> 71134	▲ 63837
Particles >6µm		ASTM D7647	>1300	<b>A</b> 22125	6966	6548
Oil Cleanliness		ISO 4406 (c)	>19/17/14	<b>4/22/15</b>	▲ 23/20/13	▲ 23/20/15
White Metal	scalar	Visual*	NONE	🔺 VLITE	NONE	🔺 VLITE
PrtFilter				-	no image	

Sample Rating Trend

ISO

Customer Id: INCVOS Sample No.: PC0070688 Lab Number: 02620857 Test Package: IND 2



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*To discuss the diagnosis or test data:* Kevin Marson +1 (289)291-4644 x4644 <u>Kevin.Marson@wearcheck.com</u>

*To change component or sample information:* Gloria Gonzalez +1 (289)291-4643 x4643 <u>gloria.gonzalez@wearcheck.com</u>

RECOMMENDE	D ACTIONS			
Action	Status	Date	Done By	Description
Change Filter			?	We recommend you service the filters on this component.
Resample			?	Resample in 30-45 days to monitor this situation.
Check Breathers			?	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.
Check For Visual Metal			?	We advise that you check for visible metal particles in the oil.
Check Seals			?	Check seals and/or filters for points of contaminant entry.

### HISTORICAL DIAGNOSIS

### 29 Apr 2023 Diag: Wes Davis



Check seals and/or filters for points of contaminant entry. 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 recommend you service the filters on this component. Resample in 30-45 days to monitor this situation.All component wear rates are normal. There is a high amount of silt (particulates < 14 microns in size) present in the oil. The AN level is acceptable for this fluid. The oil is still serviceable provided that the contaminant(s) can be reduced to acceptable levels.





VISUAL METAL

Check seals and/or filters for points of contaminant entry. We advise that you check all areas where contaminants can enter the system. 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 perform a filter service, and use off-line filtration to improve the cleanliness of the system fluid. Resample in 30-45 days to monitor this situation. We suspect that the abnormal contaminant(s) is the result of incorrect sampling technique. DISCLAIMER: Interpretation of results is based on the sample as received from the customer. The condition of the sample and the method of sampling cannot be verified.Light concentration of visible metal present. Oil Cleanliness are severely

high. Particles >4 $\mu$ m are severely high. Particles >6 $\mu$ m are abnormally high. Particles >6 $\mu$ m are abnormally high. Particles >6 $\mu$ m are abnormally high. Particles >14 $\mu$ m are notably high. Light concentration of visible dirt/debris present in the oil. The AN level is acceptable for this fluid.

### 12 Jul 2022 Diag: Wes Davis

We advise that you check all areas where contaminants can enter the system. 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. Resample in 30-45 days to monitor this situation.All component wear rates are normal. Particles >6 $\mu$ m are severely high. Particles >4 $\mu$ m are severely high. Oil Cleanliness are severely high. Particles >14 $\mu$ m are abnormally high. Particles >21 $\mu$ m are abnormally high. The AN level is acceptable for this fluid. The oil is still serviceable provided that the contaminant(s) can be reduced to acceptable levels.



view report

view report



# **OIL ANALYSIS REPORT**

Sample Rating Trend

PC0070688

27 Feb 2024

0

0

N/A

SEVERE

NEG

5

0

<1

PC0057680

29 Apr 2023

0

0

N/A

SEVERE

NEG

6

0

0

ISO

PC0040345

08 Feb 2023

0

0

N/A

SEVERE

NEG

7

<1

<1



Area **1311** Machine Id **ROCK BREAKER HYDRAULIC POWER UNIT** Component

Hydraulic Power Pack

PETRO CANADA HYDREX XV ALL SEASON HYDRAULIC OIL (200 LTR)

Sample Number

Sample Date

Machine Age

Oil Changed

Sample Status

CONTAMINATION

WEAR METALS

Oil Age

Water

Iron

Nickel

Silver

Lead Copper Tin Antimony Vanadium Beryllium Cadmium

Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur Lithium

Titanium

Aluminum

**ADDITIVES** 

CONTAMIN

FLUID CLE/ Particles >4µm Particles >6µm Particles >14µm Particles >21µm Particles >38µm

Particles >71µm

**Oil Cleanliness** 

Silicon Sodium Potassium

Chromium

SAMPLE INFORMATION method

vrs

yrs

ppm

ppm

ppm

Client Info

Client Info

**Client Info** 

Client Info

**Client Info** 

WC Method

ASTM D5185(m)

ASTM D5185(m)

ASTM D7647

ASTM D7647 >3

>10

1

0

ASTM D5185(m) >10

>0.1

>20

>10

# DIAGNOSIS

## Recommendation

Check seals and/or filters for points of contaminant entry. We advise that you check for visible metal particles in the oil. 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 recommend you service the filters on this component. Resample in 30-45 days to monitor this situation.

### 📥 Wear

Light concentration of visible metal present.

### Contamination

There is a high amount of silt (particulates < 14 microns in size) present in the oil.

### Fluid Condition

The AN level is acceptable for this fluid. The oil is still serviceable provided that the contaminant(s) can be reduced to acceptable levels.



Report Id: INCVOS [WCAMIS] 02620857 (Generated: 03/11/2024 09:33:26) Rev: 1

	1. 1				÷	
	ppm	ASTM D5185(m)		0	0	<1
	ppm	ASTM D5185(m)		0	0	0
	ppm	ASTM D5185(m)	>10	<1	<1	1
	ppm	ASTM D5185(m)	>10	0	<1	<1
	ppm	ASTM D5185(m)	>75	2	3	3
	ppm	ASTM D5185(m)	>10	0	0	0
	ppm	ASTM D5185(m)		0	<1	0
	ppm	ASTM D5185(m)		0	0	0
	ppm	ASTM D5185(m)		0	0	0
	ppm	ASTM D5185(m)		0	0	0
3		method	limit/base	current	history1	history2
	ppm	ASTM D5185(m)	0	0	<1	<1
	ppm	ASTM D5185(m)	0	0	0	0
	ppm	ASTM D5185(m)	0	0	0	0
	ppm	ASTM D5185(m)	1	0	0	0
	ppm	ASTM D5185(m)	0	<1	<1	<1
	ppm	ASTM D5185(m)	100	92	96	102
	ppm	ASTM D5185(m)	670	591	637	649
	ppm	ASTM D5185(m)	850	735	729	747
	ppm	ASTM D5185(m)	1600	1503	1662	1511
	ppm	ASTM D5185(m)		<1	<1	<1
JAN.	TS	method	limit/base	current	history1	history2
	ppm	ASTM D5185(m)	>20	2	2	2
	ppm	ASTM D5185(m)		<1	<1	<1
	ppm	ASTM D5185(m)	>20	2	<1	<1
ANL	INESS	method	limit/base	current	history1	history2
		ASTM D7647	>5000	<b>113295</b>	▲ 71134	▲ 63837
		ASTM D7647	>1300	<b>A</b> 22125	▲ 6966	▲ 6548
ı		ASTM D7647	>160	248	48	218
ı		ASTM D7647	>40	20	11	43

ISO 4406 (c) >19/17/14 **24/22/15 2**3/20/13 **2**3/20/15 Contact/Location: Robert Feltham - INCVOS

1

0

1

0



Particle Count

Particle Trend

Aav5/1

Acid Number

Apr30/08

nr30/03

Viscosity @ 40°C

Nov

13 12

cSt (100°C)

00

Mav5/1

Viscosity @ 100°C

lec11

Dec11/11

10/14

Apr7/16 ug8/17 15/19

15/19

144

214

491,520 122,880

(E2,000 (a) 30,720 (a) 7,680 (a) 1,920 (a) 1,9 120 30 8

> 140 €<sup>120k</sup>

m [] 100k 80k 60k 40 20 0

Vov1

1.00 (B/HOX E0.6 80.4 Pip 0.20 0.00

# **OIL ANALYSIS REPORT**

VISUALmethodlimit/basecurrenthistory1hWhite MetalscalarVisual*NONEVLITENONENONEVLYellow MetalscalarVisual*NONENONENONENONENOPrecipitatescalarVisual*NONENONENONENONENOSiltscalarVisual*NONENONENONENONODebrisscalarVisual*NONENONENONENOSand/DirtscalarVisual*NONENONENONENOAppearancescalarVisual*NORMLNORMLNORMLNOOdorscalarVisual*NORMLNORMLNORMLNOEmulsified WaterscalarVisual*NORMLNORMLNORMLNOFree WaterscalarVisual*NORMLNEGNEGNEGVisc @ 40°CcStASTM D7279(m)47.946.145.046Viscosity Index (VI)ScaleASTM D7279(m)9.679.28.99	VISUAL       method       limit/base       current       history1         White Metal       scalar       Visual*       NONE       VLITE       NONE       NONE         Yellow Metal       scalar       Visual*       NONE       NONE       NONE       NONE       NONE         Precipitate       scalar       Visual*       NONE       NONE       NONE       NONE       NONE       NONE         Silt       scalar       Visual*       NONE       NORML       NORML       NORML       NORML       NORML			method	limit/base	current	history1	his
White Metal       scalar       Visual*       NONE       VITE       NONE       NONE       VI         Yellow Metal       scalar       Visual*       NONE       NONE       NONE       NONE       NONE       NONE         Precipitate       scalar       Visual*       NONE       NOR       NOR <t< td=""><td>White Metal       scalar       Visual*       NONE       VLITE       NONE       NONE       NONE         Yellow Metal       scalar       Visual*       NONE       NOR       NOR       NOR       NOR       NOR       NOR       NOR       NOR       NORML       NORML       NORML       NORML       NORML       NOR       NOGO       NOS &amp; QOO       NOS &amp; QOO       NOS &amp; QOO       <td< td=""><td>Acid Number (AN)</td><td>mg KOH/g</td><td>ASTM D974*</td><td>0.60</td><td>0.99</td><td>0.71</td><td>0.61</td></td<></td></t<>	White Metal       scalar       Visual*       NONE       VLITE       NONE       NONE       NONE         Yellow Metal       scalar       Visual*       NONE       NOR       NOR       NOR       NOR       NOR       NOR       NOR       NOR       NORML       NORML       NORML       NORML       NORML       NOR       NOGO       NOS & QOO       NOS & QOO       NOS & QOO <td< td=""><td>Acid Number (AN)</td><td>mg KOH/g</td><td>ASTM D974*</td><td>0.60</td><td>0.99</td><td>0.71</td><td>0.61</td></td<>	Acid Number (AN)	mg KOH/g	ASTM D974*	0.60	0.99	0.71	0.61
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Emulsified WaterscalarVisual*>0.1NEGNEGNEGFree WaterscalarVisual*Imit/basecurrenthistory1HVisc @ 40°CcStASTM D7279(m)47.946.145.046Visc @ 100°CcStASTM D7279(m)9.679.28.99Viscosity Index (VI)ScaleASTM D2270*19218618218SAMPLE IMAGESmethodlimit/basecurrenthistory1HColorStartStartStartStartStartStartBottomImit StartImit StartImit StartImit StartImit StartImit StartStartStartStartStartStartStartImit StartImit StartImit StartStartStartStartStartStartImit StartImit StartImit StartImit StartStartStartStartStartStartStartImit StartImit StartImit StartStartStartStartSta	Emulsified Water       scalar       Visual*       >0.1       NEG       NEG       NEG       NEG         Free Water       scalar       Visual*       Imit/base       current       history1         Visc @ 40°C       cSt       ASTM D7279(m)       47.9       46.1       45.0       4         Visc @ 100°C       cSt       ASTM D7279(m)       9.67       9.2       8.9       9         Visco@ito°C       cSt       ASTM D7279(m)       9.67       9.2       8.9       9         Visco@ito°C       cSt       ASTM D7279(m)       9.67       9.2       8.9       9         Visco@ito°C       cSt       ASTM D7279(m)       9.67       9.2       8.9       9         Viscosity Index (VI)       Scale       ASTM D2270°       192       186       182       1         SAMPLE IMAGES       method       limit/base       current       history1         Color         Scale       Scale <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>							
Free WaterscalarVisual*NEGNEGNEGFLUID PROPERTIESmethodlimit/basecurrenthistory1HVisc @ 40°CcStASTM D7279(m)47.946.145.046Visc @ 100°CcStASTM D7279(m)9.679.28.99Viscosity Index (VI)ScaleASTM D2270*19218618218SAMPLE IMAGESmethodlimit/basecurrenthistory1HColorColorImit/baseCurrentImit/baseImit/baseImit/baseImit/baseBottomImit/base	Free Water       scalar       Visual*       NEG       NEG <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>							
FLUID PROPERTIES       method       limit/base       current       history1       h         Visc @ 40°C       cSt       ASTM D7279(m)       47.9       46.1       45.0       46         Visc @ 100°C       cSt       ASTM D7279(m)       9.67       9.2       8.9       9         Viscosity Index (VI)       Scale       ASTM D2270*       192       186       182       18         SAMPLE IMAGES       method       limit/base       current       history1       H         Color	FLUID PROPERTIES       method       limit/base       current       history1         Visc @ 40°C       cSt       ASTM D7279(m)       47.9       46.1       45.0       4         Visc @ 100°C       cSt       ASTM D7279(m)       9.67       9.2       8.9       9         Viscosity Index (VI)       Scale       ASTM D7279(m)       9.67       9.2       186       182       1         SAMPLE IMAGES       method       limit/base       current       history1         Color       Imit/base       current       history1         Bottom       Imit/base       current       history1				>0.1			
Visc @ 40°C       cSt       ASTM D7279(m)       47.9       46.1       45.0       46         Visc @ 100°C       cSt       ASTM D7279(m)       9.67       9.2       8.9       9         Viscosity Index (VI)       Scale       ASTM D2270*       192       186       182       18         SAMPLE IMAGES       method       limit/base       current       history1       r         Color	Visc @ 40°C       cSt       ASTM D7279(m)       47.9       46.1       45.0       4         Visc @ 100°C       cSt       ASTM D7279(m)       9.67       9.2       8.9       9         Viscosity Index (VI)       Scale       ASTM D2270°       192       186       182       1         SAMPLE IMAGES       method       limit/base       current       history1         Color							
Visc @ 100°C         cSt         ASTM D7279(m)         9.67         9.2         8.9         9           Viscosity Index (VI)         Scale         ASTM D2270*         192         186         182         18           SAMPLE IMAGES         method         limit/base         current         history1         H           Color         Imit/base         current         Imit/base         current         Imit/base         Imit/base <t< td=""><td>Visc @ 100°C cSt ASTM D7279(m) 9.67 9.2 8.9 9 Viscosity Index (VI) Scale ASTM D2270* 192 186 182 1 SAMPLE IMAGES method limit/base current history1 Color Bottom</td><td></td><td></td><td>method</td><td>limit/base</td><td>current</td><td>history1</td><td>hi</td></t<>	Visc @ 100°C cSt ASTM D7279(m) 9.67 9.2 8.9 9 Viscosity Index (VI) Scale ASTM D2270* 192 186 182 1 SAMPLE IMAGES method limit/base current history1 Color Bottom			method	limit/base	current	history1	hi
Viscosity Index (VI) Scale ASTM D2270* 192 186 182 18   SAMPLE IMAGES method limit/base current history1 H   Color   Bottom	Viscosity Index (VI)       Scale       ASTM D2270*       192       186       182       1         SAMPLE IMAGES       method       limit/base       current       history1         Color       Imit/base       current       fistory1         Bottom       Imit/base       Imit/base       current       history1							46.
SAMPLE IMAGES method limit/base current history1 <	SAMPLE IMAGES       method       limit/base       current       history1         Color       Imit/base       Imit/base       Imit/base       Imit/base         Bottom       Imit/base       Imit/base       Imit/base       Imit/base	-						
Color Bottom	Color Bottom	Viscosity Index (VI)	Scale	ASTM D2270*	192	186	182	180
Bottom	Bottom	SAMPLE IMAG	ES	method	limit/base	current	history1	hi
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Feb15/19 pr29/23 : WearCheck - C8-1175 Appleby Line, Burlington, ON L7L 5H9 Vale - Voisey's Bay Laboratory CALA Sample No. : PC0070688 Received :08 Mar 2024 Voisey's Bay Mine Site, P.O. Box 7001, Stn. C Happy Valley Lab Number : 02620857 Tested : 11 Mar 2024 Goose Bay, NL ISO 17025:2017 Accredited Laboratory Unique Number : 5745976 Diagnosed : 11 Mar 2024 - Kevin Marson CA A0P 1C0 Test Package : IND 2 (Additional Tests: Bottom, BottomAnalysis, FilterPatch, KV100, PrtFilter, TAN MatorMact: Robert Feltham To discuss this sample report, contact Customer Service at 1-800-268-2131. robert.feltham@vale.com Т: Test denoted (\*) outside scope of accreditation, (m) method modified, (e) tested at external lab. Validity of results and interpretation are based on the sample and information as supplied. F: x:

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