

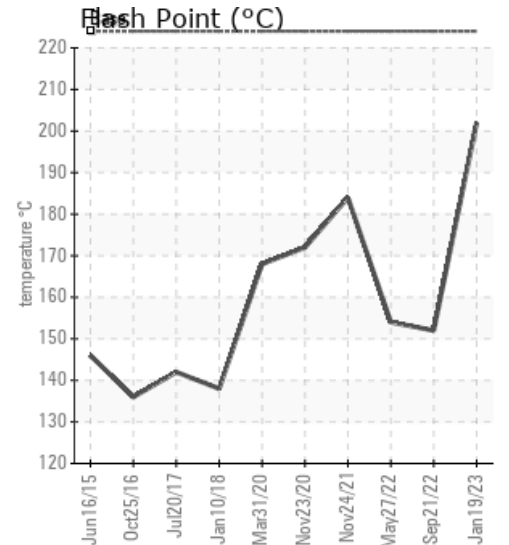
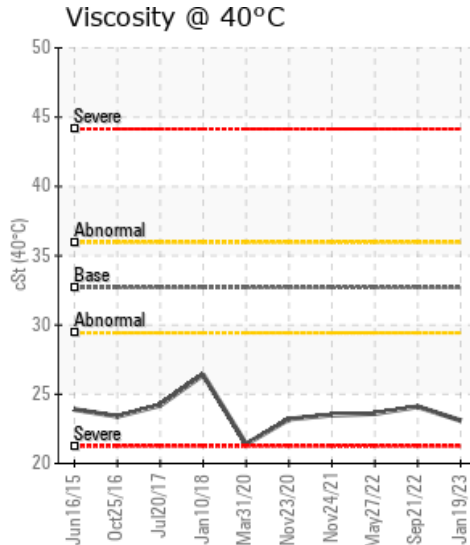
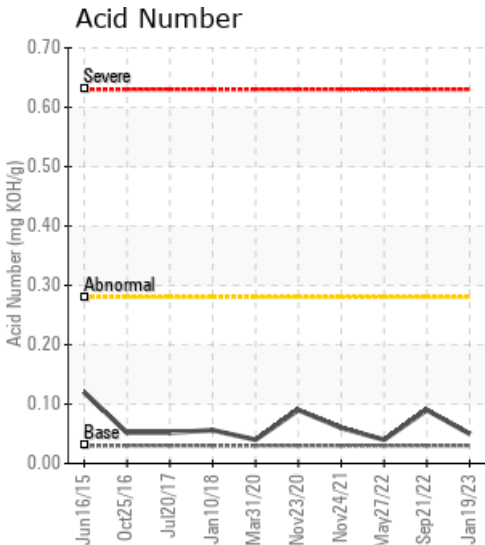
LINE 1/2

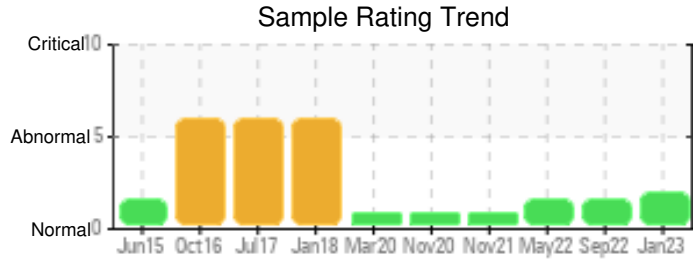
Customer: PTRHTF60002	System Information	Sample Information
BOYNE SMELTERS LTD-RIO TINTO HANDLEY DRIVE QUEENSLAND BOYNE ISLAND, QUE 4680 AU Attn: Heath Mitchell Tel: E-Mail: heath.mitchell@riotinto.com	System Volume: 20000 ltr Bulk Operating Temp: 514F / 268C Heating Source: Blanket: Fluid: PETRO CANADA CALFLO AF Make:	Lab No: 02539379 Analyst: Philip Riley Sample Date: 01/19/23 Received Date: 02/14/23 Completed: 02/21/23 Philip Riley philip.riley@HFSinclair.com

Recommendation: Partial change recovered the flash point as expected, but this is a temporary measure to get to a safe place. There is a lot of sediment in the system and the visco is running low, evidence of cracking and whilst the low boiling point molecules are removed by venting, the other forms of degradation stay behind and will affect the oil. You have pushed back the urgency and should plan a change out in the coming months, including a clean and flush of the system

Comments: Pentane Insolubles levels are severely high. Visc @ 40°C is abnormally low.

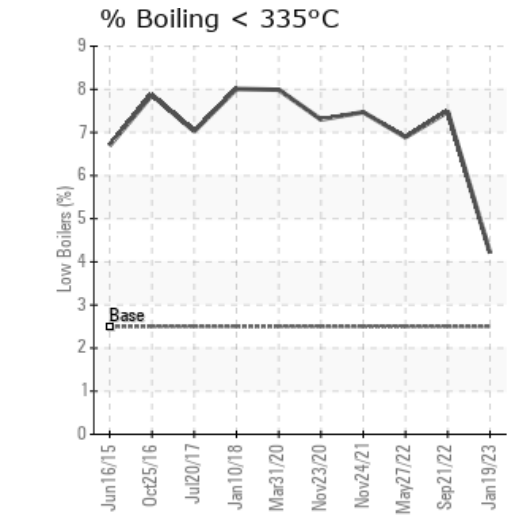
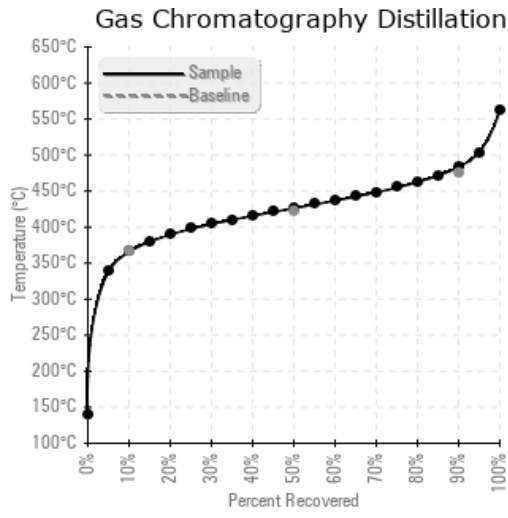
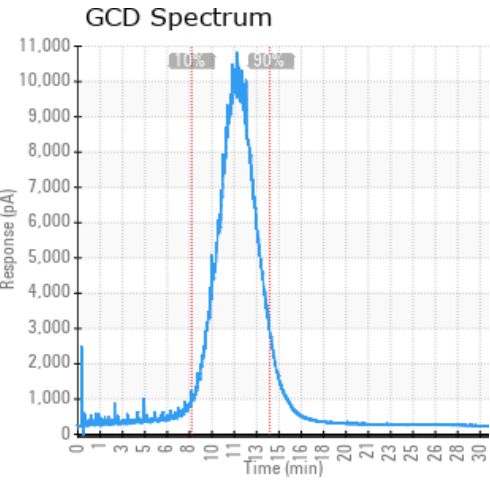
Sample Date	Received Date	Fluid Age	Sample Location	Flash Point (COC)	Water (KF)	Viscosity (40°C)	Acid Number	Solids	GCD 10%	GCD 50%	GCD 90%	GCD % < 335°C
	mm/dd/yy			°F/°C	ppm	cSt	mg/KOH/g	%wt	°F/°C	°F/°C	°F/°C	%
01/19/23	02/14/23	20.0y	HTF Heater	396 / 202	12.0	23.1	0.05	0.937	690 / 366	799 / 426	902 / 484	4.21
09/21/22	10/04/22	30.0y		306 / 152	17.9	24.1	0.09	0.044	658 / 348	789 / 420	895 / 480	7.48
05/27/22	06/07/22	0.0y		309 / 154	15.5	23.6	0.04	0.067	662 / 350	789 / 420	893 / 479	6.89
11/24/21	12/07/21	0.0y		363 / 184	0.1	23.5	0.06	0.052	657 / 347	788 / 420	894 / 479	7.47
11/23/20	12/17/20	30.0y	rtrn near gas burner	342 / 172	20.9	23.2	0.09	0.067	659 / 348	788 / 420	894 / 479	7.30
Baseline Data				435 / 224		32.7	0.03		693 / 367	790 / 421	887 / 475	2.5





Sample Date	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
01/19/23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0
09/21/22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0
05/27/22	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	11	0
11/24/21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0
11/23/20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0
Baseline Data			0	0						0			0	0					0				270	

Elemental analysis results (above) in parts per million (ppm). [10,000 ppm = 1.0%]



Historical Comments	
09/21/22	As per recent discussions, confirms the low flash point and you are doing the right thing on site by a partial change to increase this flash point and work in a safer zone. Change including a clean and flush should be planned for convenient point in coming months. I would resample a day after the partial change is done so you can get a new baseline COC Flash Point is severely low.
05/27/22	Fluid needs attention based on Flash Point at 154C. Unless the flash point can be recovered you need to look to change out this system. Viscosity has also dropped, supporting some form of increase in light molecules. Recommend venting if can be done safely and, allowing the system to settle and re-sampling to see if there has been flash point recovery. If there is little in the way of recovery then you need to work to change this oil based on the flash point COC Flash Point is severely low.
11/24/21	COC Flash Point is low, but improved from the previous sample. Again, there is viscosity drop, and in line with the GCD curve, evidence of fluid cracking (when you link viscosity drop, low flash point, graph). If the system can be safely vented then there is the possibility to recover the flash point and remove the light ends. Conscious this system was changed within the last 12 months, and the results on Line 3 are distinctly different, where the fluid is in very good condition. After venting (if possible), would be interesting to see another sample to see if and how the fluid has recovered somewhat COC Flash Point is marginally low.
11/23/20	COC Flash Point is very low and in line with the viscosity drop showing evidence of thermal cracking of the fluid. This is further supported by the GCD curve which shows clear cracking of the fluid. If the system can be safely vented then there is the possibility to recover the flash point and remove the light ends. If it cannot be safely vented then you need to look towards a potential oil change with clean and flush. The fluid will only deteriorate further without action. The flash point has been lower and recovered and the insolubles and acid number remain low. COC Flash Point is abnormally low.

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