Lubricant Analysis Report

Oil Purification Systems

North America: +1-877-277-4921

0	1	2	3	4
NORMAL		ABNORMAL		CRITICAL

Overall report severity based on comments.

Account Information	Component Information	Sample Information
		Completed: 22 Nov 2017

Filter Information	Miscellaneous Information	Product Information
Filter Type: Information Requested Micron Rating: 0		Product Manufacturer: SHELL Product Name: ROTELLA T4 TRIPLE PROTECTION Viscosity Grade: SAE 15W40

Comments	Flagged data does not indicate an immediate need for maintenance action. Continue to observe the trend and monitor equipment and fluid conditions. Coolant indicators (Sodium, Potassium) are at a MODERATE LEVEL; Coolant leaks at this level will most likely not be detectable through normal diagnostics; Suggest MONITORING COOLANT LEVEL closely between samples; Unit hours/miles/kilometers not provided for this sample.

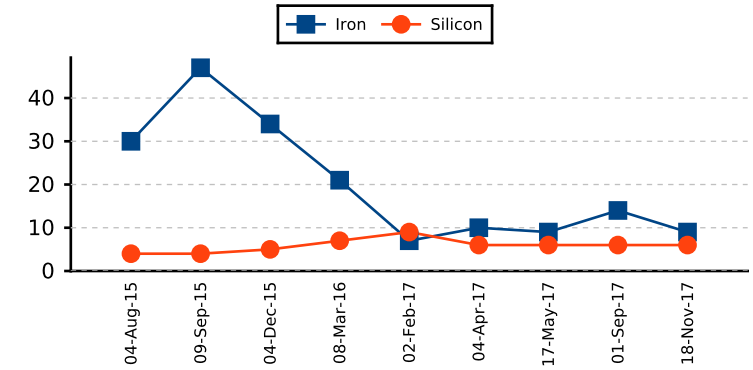
	Wear Metals (ppm)										Contaminant Metals (ppm)			Multi-Source Metals (ppm)						Additive Metals (ppm)				
Sample #	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
5	7	0	0	1	4	4	0	0	0	0	9	22	38	0	10	0	0	0	90	138	2117	0	951	1127
6	10	0	0	1	6	4	1	0	0	0	6	16	60	0	51	1	0	0	48	244	1918	0	894	1112
7	9	0	0	0	5	1	0	0	0	0	6	24	75	0	14	0	0	0	87	65	2597	0	1125	1391
8	14	0	0	1	8	8	0	0	0	0	6	81	87	0	19	1	0	0	48	46	2284	0	959	1228
9	9	0	1	1	6	3	0	0	0	0	6	136	147	0	23	0	0	0	68	19	2384	0	997	1216

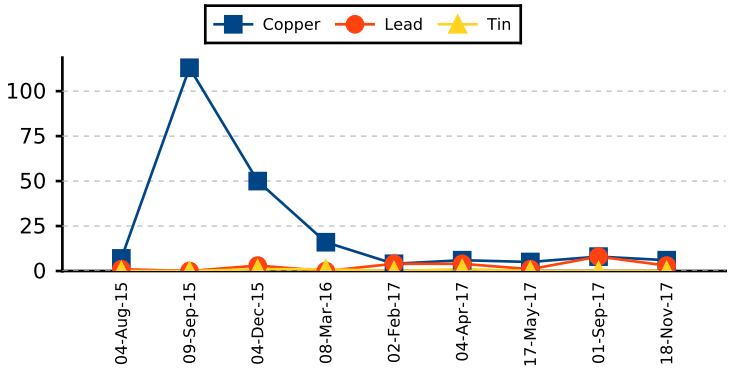
	Sample Information							Contaminants			Fluid Properties					
Sample #	Date Sampled	Date Received	Lube Time mi	Unit Time mi	Lube Change	Lube Added gal	Filter Change	Fuel Dilution % Vol	Soot % Vol	Water % Vol	Viscosity 40°C cSt	Viscosity 100 °C cSt	Acid Number mg KOH/g	Base Number mg KOH/g	Oxidation abs/cm	Nitration abs/0.1 mm
5	02-Feb-2017	03-Feb-2017	0	10000	Yes	0	Yes	0.6 - GC	<.1	<.1 - FTIR		14.5		5.02	18	9
6	04-Apr-2017	11-Apr-2017	15000	15000	Yes	1	Yes	1.1 - GC	<.1	<.1 - FTIR		14.2		5.29	17	9
7	17-May-2017	30-May-2017	17000	780000	Yes	1	Yes	1.2 - GC	0.1 - E2412	<.1 - FTIR		14.8		4.14	16	9
8	01-Sep-2017	06-Sep-2017	21000	810634	Yes	1	Yes	1.1 - GC	0.2 - E2412	<.1 - FTIR		15.3		3.38	19	10
9	18-Nov-2017	21-Nov-2017	15000	0	Yes	1	Yes	1.5 - GC	0.2 - E2412	<.1 - FTIR		15.2		4.15	17	9

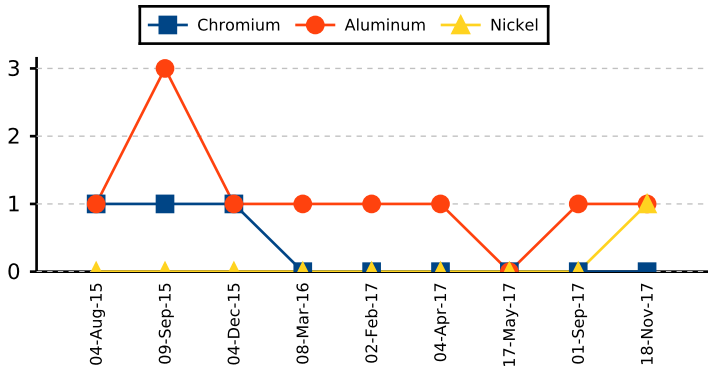
	Particle Count (particles/mL)										Additional Testing
Sample #	ISO Code Based On 4/6/14	> 4 µm	> 6 µm	> 10 µm	> 14 µm	> 21 µm	> 38 µm	> 70 µm	> 100 µm	Test Method	
5	//										
6	//										
7	//										
8	//										
9	//										

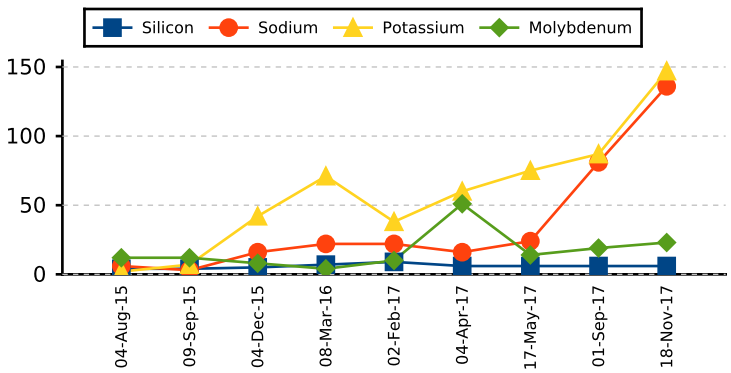
Comments are advisory only and are based on the assumption that the sample and data submitted are valid. Missing fluid or component information limits the evaluation. No warranty is expressed or implied.

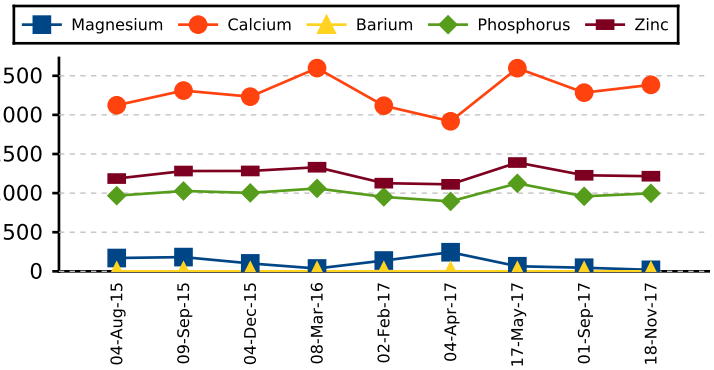
Historical Comments	5	Flagged data does not indicate an immediate need for maintenance action. Continue to observe the trend and monitor equipment and fluid conditions. Potassium is at a MINOR LEVEL; Potassium sources: coolant (antifreeze), lube additive or supplement, solder flux, coating on new bearings, rust preventive coating, or environmental. Flagged additive levels are different than what should be present for the lubricant identified for this component. This does not imply that the lubricant does not meet proper API, SAE, or ISO classifications. LUBRICANT TIME was not provided for this sample. Lubricant and filter change acknowledged.
	6	Flagged data does not indicate an immediate need for maintenance action. Continue to observe the trend and monitor equipment and fluid conditions. MODERATE POTASSIUM level could be a coolant indicator; Coolant leaks at this level will most likely not be detectable through normal diagnostics; Suggest MONITORING COOLANT LEVEL closely between samples; Flagged additive levels are higher than expected for the lubricant that is identified (This does not imply that the lubricant does not meet proper API, SAE or ISO classifications.). Lubricant and filter change acknowledged.
	7	Flagged data does not indicate an immediate need for maintenance action. Continue to observe the trend and monitor equipment and fluid conditions. MODERATE POTASSIUM level could be a coolant indicator; Coolant leaks at this level will most likely not be detectable through normal diagnostics; Suggest MONITORING COOLANT LEVEL closely between samples; FLAGGED ADDITIVE levels indicate slight LUBE MIXING; Lubricant and filter change acknowledged. Your note was taken into consideration. Please contact the Data Analysis Department to discuss these results.
	8	Flagged data does not indicate an immediate need for maintenance action. Continue to observe the trend and monitor equipment and fluid conditions. Coolant indicators (Sodium, Potassium) are at a MODERATE LEVEL; Coolant leaks at this level will most likely not be detectable through normal diagnostics; Suggest MONITORING COOLANT LEVEL closely between samples; LEAD is at a MINOR LEVEL and may be OVERLAY METAL from MAIN/ROD BEARINGS; Boron is slightly low for this lubricant. Boron levels may naturally decline with use so this is not a cause for concern. Lubricant and filter change acknowledged. Your note was taken into consideration.

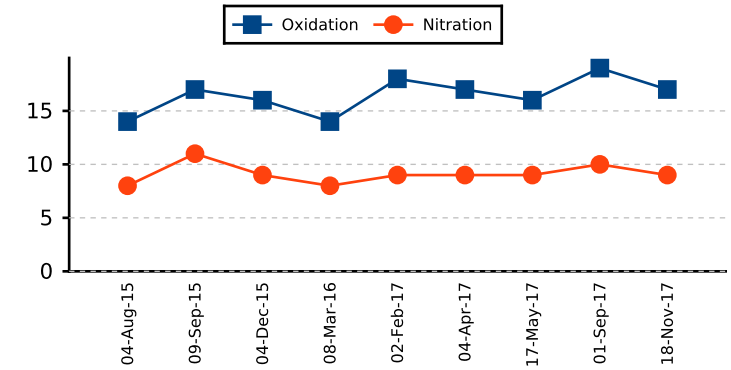

Iron
Silicon
40
30
20
10
0
04-Aug-15
09-Sep-15
04-Dec-15
08-Mar-16
02-Feb-17
04-Apr-17
17-May-17
01-Sep-17
18-Nov-17

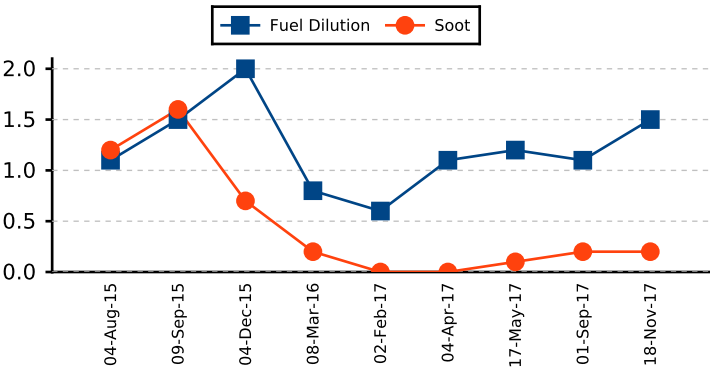

Copper
Lead
Tin
100
75
50
25
0
04-Aug-15
09-Sep-15
04-Dec-15
08-Mar-16
02-Feb-17
04-Apr-17
17-May-17
01-Sep-17
18-Nov-17

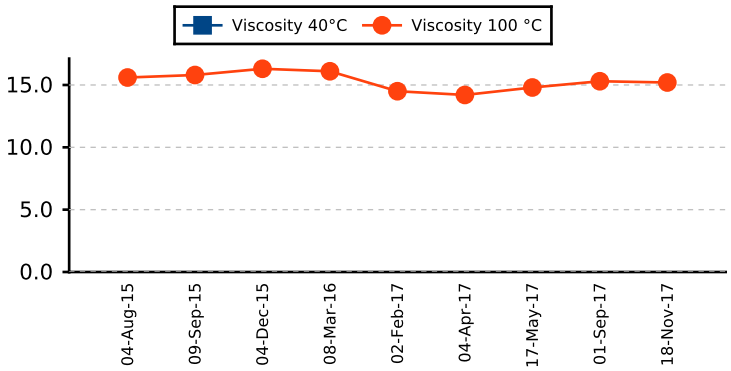

Chromium
Aluminum
Nickel
3
2
1
0
04-Aug-15
09-Sep-15
04-Dec-15
08-Mar-16
02-Feb-17
04-Apr-17
17-May-17
01-Sep-17
18-Nov-17

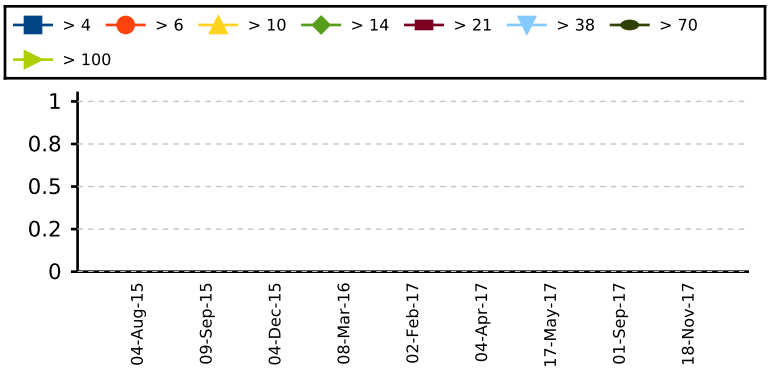

Silicon
Sodium
Potassium
Molybdenum
150
100
50
0
04-Aug-15
09-Sep-15
04-Dec-15
08-Mar-16
02-Feb-17
04-Apr-17
17-May-17
01-Sep-17
18-Nov-17

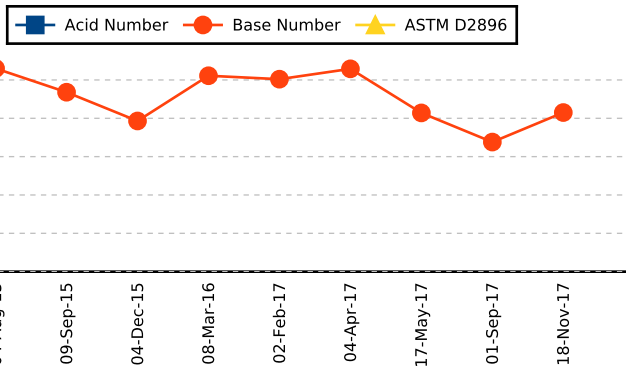

Magnesium
Calcium
Barium
Phosphorus
Zinc
2500
2000
1500
1000
500
0
04-Aug-15
09-Sep-15
04-Dec-15
08-Mar-16
02-Feb-17
04-Apr-17
17-May-17
01-Sep-17
18-Nov-17


Oxidation
Nitration
15
10
5
0
04-Aug-15
09-Sep-15
04-Dec-15
08-Mar-16
02-Feb-17
04-Apr-17
17-May-17
01-Sep-17
18-Nov-17


Fuel Dilution
Soot
2.0
1.5
1.0
0.5
0.0
04-Aug-15
09-Sep-15
04-Dec-15
08-Mar-16
02-Feb-17
04-Apr-17
17-May-17
01-Sep-17
18-Nov-17


Viscosity 40°C
Viscosity 100 °C
15.0
10.0
5.0
0.0
04-Aug-15
09-Sep-15
04-Dec-15
08-Mar-16
02-Feb-17
04-Apr-17
17-May-17
01-Sep-17
18-Nov-17


> 4
> 6
> 10
> 14
> 21
> 38
> 70
> 100
1
0.8
0.5
0.2
0
04-Aug-15
09-Sep-15
04-Dec-15
08-Mar-16
02-Feb-17
04-Apr-17
17-May-17
01-Sep-17
18-Nov-17


Acid Number
Base Number
ASTM D2896
5
4
3
2
1
0
04-Aug-15
09-Sep-15
04-Dec-15
08-Mar-16
02-Feb-17
04-Apr-17
17-May-17
01-Sep-17
18-Nov-17