LEAP Analysis Program
300 Bailey Ave. Fort Worth, TX 76107
817.916.3200 www.le-inc.com

Lubricant Analysis Report

800-537-7683

0	1	2	3	4
NORMAL		ABNORMAL		CRITICAL

Overall report severity based on comments.

Account Information		Component Information		Sample Information	
Account Number:	593000-0157-0000	Component ID:	X535D E	Tracking Number:	11337J01653
Company Name:	LUBRICATION TECHNOLOGIES	Secondary ID:		Lab Number:	I-846166
Contact:		Component Type:	DIESEL ENGINE	Lab Location:	Indianapolis
Address:	120 BOSWORTH STREET WEST SPRINGFIELD, MA 01089 US	Manufacturer:	BMW	Data Analyst:	JUK
		Model:	X535D	Sampled:	30-Jun-2012
		Application:	AUTOMOTIVE	Received:	19-Jul-2012
Phone Number:	413-788-5823	Sump Capacity:	2 gal	Completed:	20-Jul-2012

Filter Information		Miscellaneous Information		Product Information	
Filter Type:	FULLFLOW	Miscellaneous:		Product Manufacturer:	CASTROL
Micron Rating:	15			Product Name:	
				Viscosity Grade:	SAE 5W30

Comments	Flagged data does not indicate an immediate need for maintenance action. Continue to observe the trend and monitor equipment and fluid conditions. FUEL DILUTION is at a MINOR LEVEL; FUEL DILUTION possibly caused by excessive idling; Base Number is SLIGHTLY LOW.

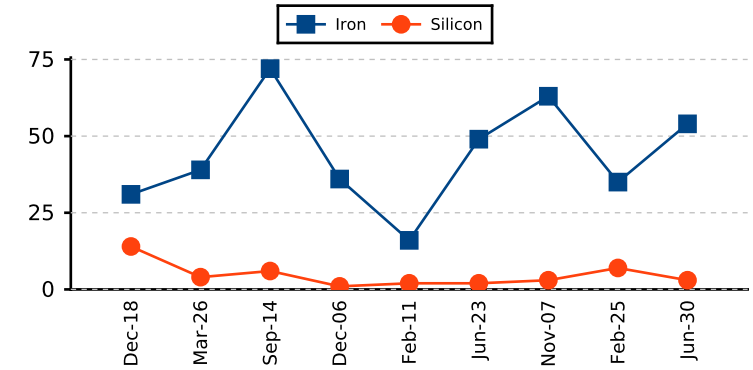
	Wear Metals (ppm)										Contaminant Metals (ppm)			Multi-Source Metals (ppm)						Additive Metals (ppm)				
Sample #	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorous	Zinc
9	54	2	2	7	4	0	2	0	0	0	3	2	5	0	0	0	2	0	1	0	1947	2	761	806
8	35	1	0	9	4	0	1	0	0	0	7	0	8	1	0	0	2	0	4	13	1907	1	765	841
7	63	2	0	18	7	1	0	0	0	0	3	3	8	1	1	1	3	0	0	22	1718	0	648	741
6	49	2	0	15	5	0	0	0	0	0	2	2	10	0	1	0	3	1	1	29	1835	0	676	705
5	16	0	0	10	3	0	0	0	0	0	2	0	3	0	3	1	1	0	0	6	1691	0	647	730
4	36	1	0	12	5	2	0	0	0	0	1	1	13	0	0	0	3	0	0	7	1747	0	671	733

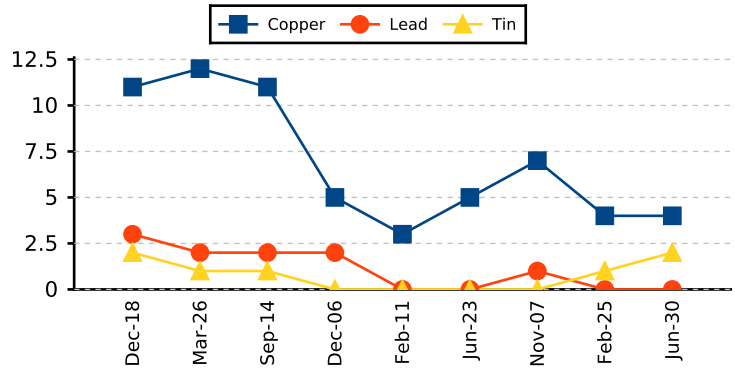
	Sample Information							Contaminants			Fluid Properties					
Sample #	Date Sampled	Date Received	Lube Time mi	Unit Time mi	Lube Change	Lube Added	Filter Change	Fuel Dilution % Vol	Soot % Vol	Water % Vol	Viscosity 40°C cSt	Viscosity 100 °C cSt	Acid Number mg KOH/g	Base Number mg KOH/g	Oxidation abs/cm	Nitration abs/0.1 mm
9	30-Jun-2012	19-Jul-2012	8762	66085	Yes		Yes	2.3 - GC	0.3 - FTIR	<.1 - FTIR		12.3		2.70		
8	25-Feb-2012	22-Mar-2012	7381	52323	Yes		Yes	<1 - Estimate	0.2 - FTIR	<.1 - FTIR		11.8				
7	07-Nov-2011	28-Nov-2011	9126	49942	Yes		Yes	<1 - Estimate	0.3 - FTIR	<.1 - FTIR		12.0				
6	23-Jun-2011	29-Jun-2011	9579	40816	Yes		Yes	4.1 - GC	0.2 - FTIR	<.1 - FTIR		11.9		2.70		
5	11-Feb-2011	02-Mar-2011	4951	31237	Yes		Yes	<1 - GC	<.1 - FTIR	<.1 - FTIR		11.7		4.29		
4	06-Dec-2010	20-Dec-2010	4939	26289	Unk		Unk	2.3 - GC	0.1 - FTIR	<.1 - FTIR		11.9		3.78		

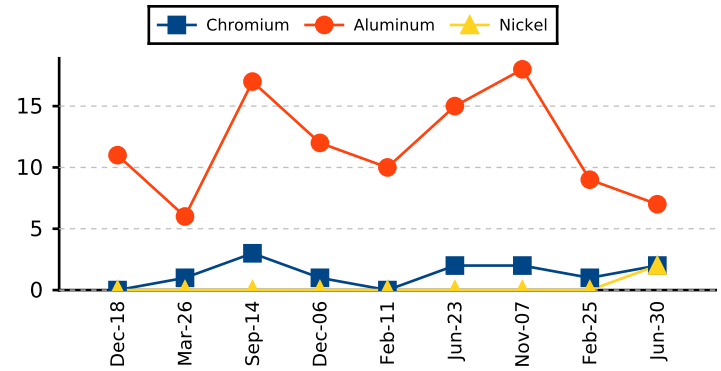
	Particle Count (particles/mL)										Additional Testing		
Sample #	ISO Code Based On 4/6/14	> 4 µm	> 6 µm	> 10 µm	> 14 µm	> 21 µm	> 38 µm	> 70 µm	> 100 µm	Test Method	DR Ferro Large Counts	DR Ferro Small Counts	Particle Quantifier Index
9	//												
8	//										90	77	13
7	//												
6	//												
5	//												
4	//												

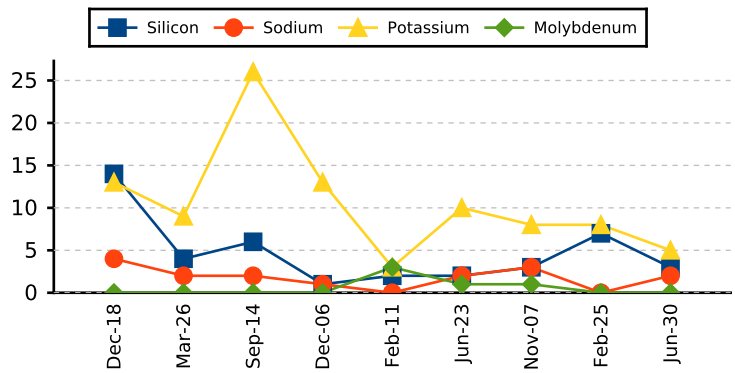
expressed or implied.

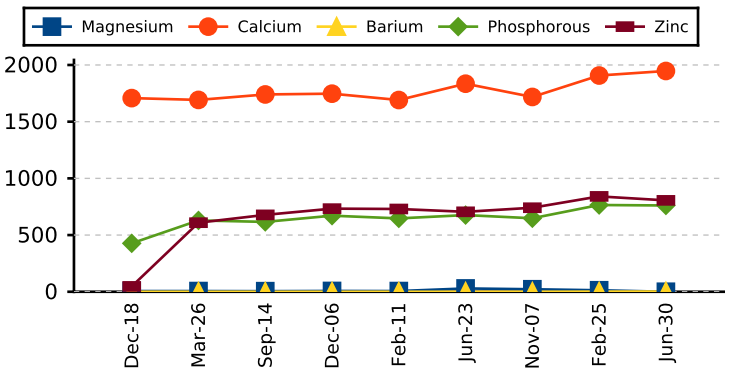
Historical Comments	8	Data indicates no abnormal findings. Resample at normal interval. Lubricant and filter change acknowledged;
	7	Data indicates no abnormal findings. Resample at normal interval. Lubricant and filter change acknowledged;
	6	Flagged data does not indicate an immediate need for maintenance action. Continue to observe the trend and monitor equipment and fluid conditions. FUEL DILUTION is at a MODERATE LEVEL; FUEL DILUTION possibly caused by excessive idling; Base Number is SLIGHTLY LOW. In order to properly compare data to the right standards, we need manufacturer and model of the unit, and the manufacturer, type and grade of the lubricant; Lubricant and filter change acknowledged;
	5	Data indicates no abnormal findings. Resample at normal interval. Lubricant and filter change acknowledged;
	4	Flagged data does not indicate an immediate need for maintenance action. Continue to observe the trend and monitor equipment and fluid conditions. FUEL DILUTION is at a MINOR LEVEL; FUEL DILUTION possibly caused by excessive idling; Base Number is SLIGHTLY LOW. In order to properly compare data to the right standards, we need manufacturer and model of the unit, and the manufacturer, type and grade of the lubricant;

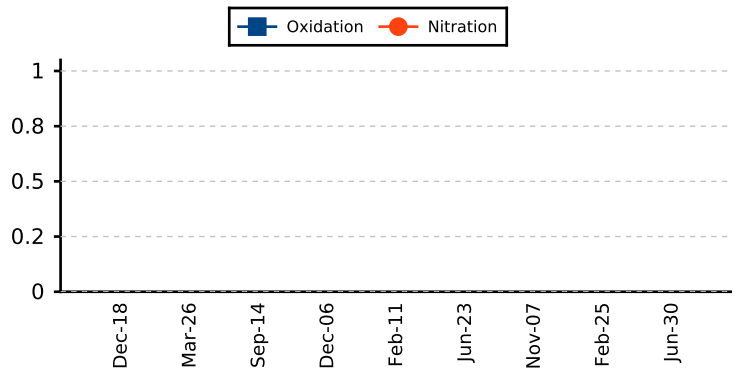

Iron
Silicon
75
50
25
0
Dec-18
Mar-26
Sep-14
Dec-06
Feb-11
Jun-23
Nov-07
Feb-25
Jun-30

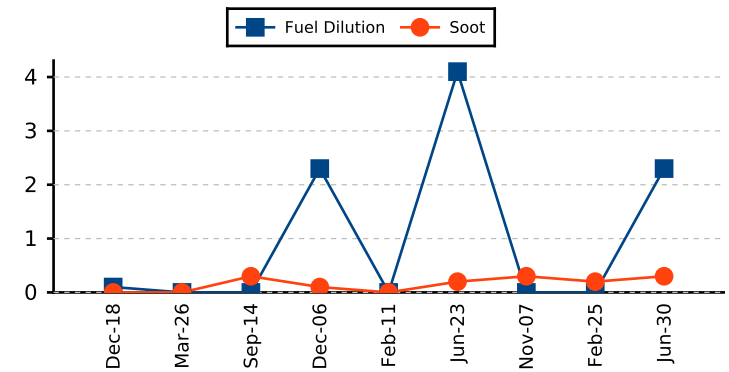

Copper
Lead
Tin
12.5
10
7.5
5
2.5
0
Dec-18
Mar-26
Sep-14
Dec-06
Feb-11
Jun-23
Nov-07
Feb-25
Jun-30

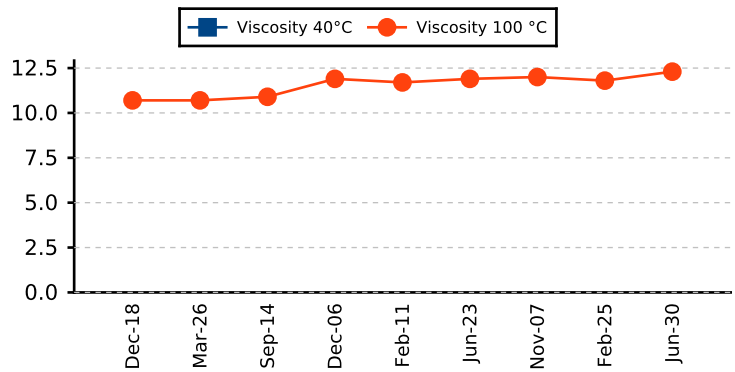

Chromium
Aluminum
Nickel
15
10
5
0
Dec-18
Mar-26
Sep-14
Dec-06
Feb-11
Jun-23
Nov-07
Feb-25
Jun-30

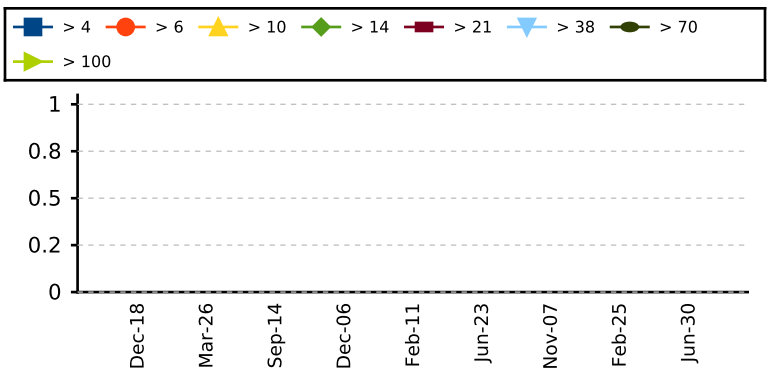

Silicon
Sodium
Potassium
Molybdenum
25
20
15
10
5
0
Dec-18
Mar-26
Sep-14
Dec-06
Feb-11
Jun-23
Nov-07
Feb-25
Jun-30

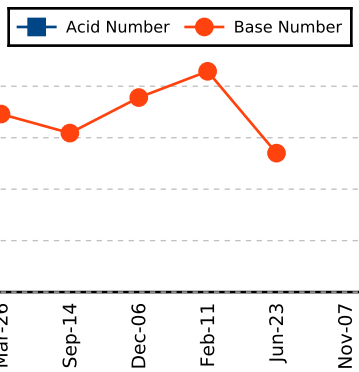

Magnesium
Calcium
Barium
Phosphorous
Zinc
2000
1500
1000
500
0
Dec-18
Mar-26
Sep-14
Dec-06
Feb-11
Jun-23
Nov-07
Feb-25
Jun-30


Oxidation
Nitration
1
0.8
0.5
0.2
0
Dec-18
Mar-26
Sep-14
Dec-06
Feb-11
Jun-23
Nov-07
Feb-25
Jun-30


Fuel Dilution
Soot
4
3
2
1
0
Dec-18
Mar-26
Sep-14
Dec-06
Feb-11
Jun-23
Nov-07
Feb-25
Jun-30


Viscosity 40°C
Viscosity 100 °C
12.5
10.0
7.5
5.0
2.5
0.0
Dec-18
Mar-26
Sep-14
Dec-06
Feb-11
Jun-23
Nov-07
Feb-25
Jun-30


> 4
> 6
> 10
> 14
> 21
> 38
> 70
> 100
1
0.8
0.5
0.2
0
Dec-18
Mar-26
Sep-14
Dec-06
Feb-11
Jun-23
Nov-07
Feb-25
Jun-30


Acid Number
Base Number
4
3
2
1
0
Dec-18
Mar-26
Sep-14
Dec-06
Feb-11
Jun-23
Nov-07
Feb-25
Jun-30