

LIEBHERR LH50M 124550-1216

Component Diesel Engine

PETRO CANADA 10W40 (--- GAL)

RECOMMENDATION

The oil change at the time of sampling has been noted. Resample at the next service interval to monitor. No other corrective action is recommended at this time.

WEAR	
All	 

All component wear rates are normal.

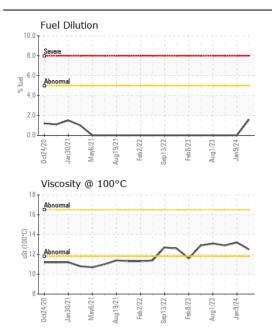
## CONTAMINATION

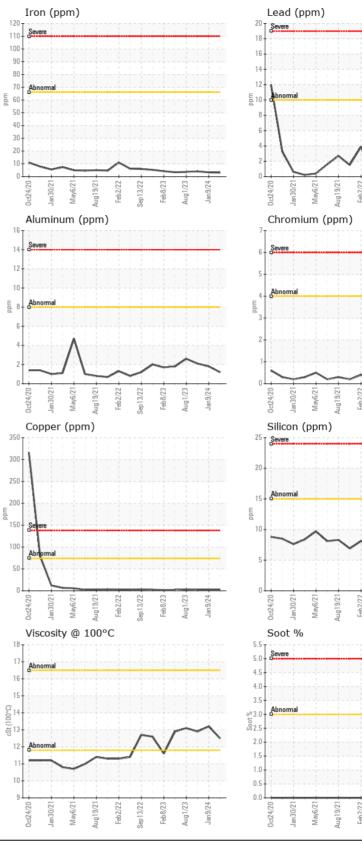
Light fuel dilution occurring. No other contaminants were detected in the oil.

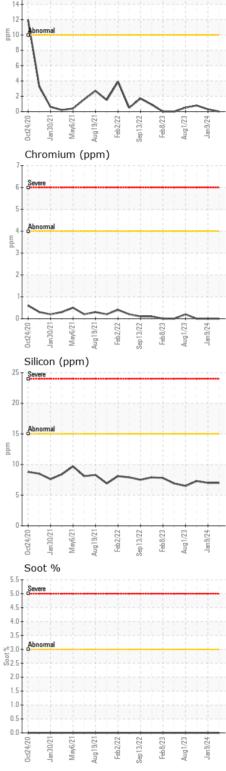
## FLUID CONDITION

The condition of the oil is acceptable for the time in service.

Sample DateClient Info04 Mar 202409 Jan 202427 Sep 202Machine AgehrsClient Info140181377212565Oil AgehrsClient Info000Filter AgehrsClient InfoChangedChangedChangedFilter ChangedClient InfoN/AN/AN/AN/ASample StatusClient InfoN/AN/AN/AN/ASample StatusStim D5185(m)>66334IronppmASTMD5185(m)>44000NickelppmASTMD5185(m)>4000NickelppmASTMD5185(m)>300-1AluminumppmASTMD5185(m)>300-1AluminumppmASTMD5185(m)>100-1-1CopperppmASTMD5185(m)>10000VanadiumppmASTMD5185(m)>4000VanadiumppmASTMD5185(m)>16.6-1.0-1.0VatarQQ<1<14-1Fuel%ASTMD5185(m)>20<1.6-1.0SiliconppmASTMD5185(m)>20<1.6<1.0VatarQQ<1<1.6<1.0<1.0SiliconppmASTMD5185(m)>20<1.6<1.0<1.0SiliconppmASTMD5185(m)>20 <t< th=""><th><b>-</b>)</th><th></th><th></th><th></th><th></th><th></th><th></th></t<>	<b>-</b> )						
Sample DateClient Info04 Mar 202409 Jan 202427 Sep 202Machine AgehrsClient Info140181377212565Oil AgehrsClient Info000Filter AgehrsClient InfoChangedChangedChangedFilter ChangedClient InfoN/AN/AN/AN/ASample StatusClient InfoN/AN/AN/AN/ASample StatusStim D5185(m)>66334IronppmASTMD5185(m)>44000NickelppmASTMD5185(m)>4000NickelppmASTMD5185(m)>300-1AluminumppmASTMD5185(m)>300-1AluminumppmASTMD5185(m)>100-1-1CopperppmASTMD5185(m)>10000VanadiumppmASTMD5185(m)>4000VanadiumppmASTMD5185(m)>16.6-1.0-1.0VatarQQ<1<14-1Fuel%ASTMD5185(m)>20<1.6-1.0SiliconppmASTMD5185(m)>20<1.6<1.0VatarQQ<1<1.6<1.0<1.0SiliconppmASTMD5185(m)>20<1.6<1.0<1.0SiliconppmASTMD5185(m)>20 <t< th=""><th>Test</th><th>UOM</th><th>Method</th><th>Limit/Abn</th><th>Current</th><th>History1</th><th>History2</th></t<>	Test	UOM	Method	Limit/Abn	Current	History1	History2
Machine AgehrsClient IntoI40181377212565Oil AgehrsClient Info000Filter AgehrsClient InfoChangedChangedChangedFilter Changed1Client InfoN/AN/AN/ASample StatusNORMALNORMALNORMALNORMALIronppmASTMD5186(m)>66334ChromiumppmASTMD5186(m)>4000NickelppmASTMD5186(m)>4000SilverppmASTMD5186(m)>300<1AluminumppmASTMD5186(m)>300<1AgentASTMD5186(m)>100<1<1CopperppmASTMD5186(m)>10000VanadiumppmASTMD5186(m)>16<1.000VanadiumppmASTMD5186(m)>20<1<1.010VanadiumppmASTMD5186(m)>20<1<1.00VanadiumppmASTMD5186(m)>20<1<1.00VanadiumppmASTMD5186(m)>20<1<1.00VanadiumppmASTMD5186(m)<1.6<1.0<1.00VanadiumppmASTMD5186(m)<1.6<1.0<1.00VanadiumppmASTMD5186(m)<1.6<1.0<1.00Silicon	Sample Number		Client Info		LH0278733	LH0278894	LH0270140
Oil AgehrsClient Info000Filter AgehrsClient Info000Oil ChangedClient InfoN/AN/AN/AN/ASample StatusClient InfoN/AN/ANORMALNORMALIronppmASTMD5185(m)>663340NickelppmASTMD5185(m)>40000NickelppmASTMD5185(m)>40000SilverppmASTMD5185(m)>30001AluminumppmASTMD5185(m)>100<100GopperppmASTMD5185(m)>100000VanadiumppmASTMD5185(m)>16<1.000SiliconppmASTMD5185(m)>20<1<1.000SiliconppmASTMD5185(m)>20<1.6<1.0<1.00VanadiumppmASTMD5185(m)>20<1.6<1.0<1.000SiliconppmASTMD5185(m)>20<1.6<1.0<1.000<	Sample Date		Client Info		04 Mar 2024	09 Jan 2024	27 Sep 2023
Filter Age OihrsClient InfoOOOOOil ChangedClient InfoKhangedChangedChangedChangedChangedChangedFilter ChangedClient InfoN/AN/AN/AN/AN/AN/AN/ASample StatusNORMALNORMALNORMALNORMALNORMALNORMALIronppmASTM D5186(m)>40000NickelppmASTM D5186(m)>40000SilverppmASTM D5186(m)>300<11AluminumppmASTM D5186(m)>300<11CopperppmASTM D5186(m)>742221TinppmASTM D5186(m)>157777PotassiumppmASTM D5186(m)>157777PotassiumppmASTM D5186(m)>20<1<1.0<1.011WaterWC Method>.0.2NEGNEGNEGNEGNEGNEGSodi %%ASTM D5186(m)>207.78.58.551.6<1.0<1.0111111111111111111111111111111111111 </th <th>Machine Age</th> <th>hrs</th> <th>Client Info</th> <th></th> <th>14018</th> <th>13772</th> <th>12565</th>	Machine Age	hrs	Client Info		14018	13772	12565
Oil ChangedClient InfoChangedChangedChangedChangedFilter ChangedClient InfoN/AN/AN/AN/AN/ASample StatusNORMALNORMALNORMALNORMALNORMALIronppmASTM D5186/m>4000NickelppmASTM D5186/m>4000NickelppmASTM D5186/m>4000SilverppmASTM D5186/m>300<1AluminumppmASTM D5186/m>300<1AluminumppmASTM D5186/m>100<1<1CopperppmASTM D5186/m>10000VanadiumppmASTM D5186/m>15777PotassiumppmASTM D5185/m>20<1<1.0<1.0WaterWC Method>0.2NEGNEGNEGNEGSoti %a%aASTM D7624'>207.78.58.5SulfationAbs/cmASTM D5185/m>0000NitrationAbs/cmASTM D5185/m>0000Soti %a%aASTM D5185/m>20REGNEGNEGSoti %a%bASTM D5185/m>20REGNEGNEGSoti %a%bASTM D5185/m>0000NitrationAbs/cmASTM D5185/m20REG	Oil Age	hrs	Client Info		0	0	0
Filter Changed Sample Status Client Info N/A N/A N/A N/A   Iron ppm ASTM DS185(m) >66 3 3 4   Chromium ppm ASTM DS185(m) >4 0 0 0   Nickel ppm ASTM DS185(m) >4 0 0 0   Titanium ppm ASTM DS185(m) >3 0 0 0   Aluminum ppm ASTM DS185(m) >3 0 0 1   Aluminum ppm ASTM DS185(m) >10 0 <1 2   Lead ppm ASTM DS185(m) >10 0 <1 2   Tin ppm ASTM DS185(m) >10 0 0 0   Vanadium ppm ASTM DS185(m) >15 7 7 7   Potassium ppm ASTM DS185(m) >20 <1 4 4   Fuel % ASTM DT585(m) >20 16 <	Filter Age	hrs	Client Info		0	0	0
Sample StatusNORMALNORMALNORMALNORMALIronppmASTM DS185(m)>66334ChromiumppmASTM DS185(m)>4000NickelppmASTM DS185(m)>4000TitaniumppmASTM DS185(m)>300-1AluminumppmASTM DS185(m)>300-1AluminumppmASTM DS185(m)>6122LeadppmASTM DS185(m)>74222TinppmASTM DS185(m)>74222TinppmASTM DS185(m)>74000VanadiumppmASTM DS185(m)>15777PotassiumppmASTM DS185(m)>20<1<14Fuel%ASTM DS185(m)>20<1<14Fuel%ASTM DS185(m)>20<16<1.0<1.0Waterwc MethodNEGNEGNEGNEGGlycolWC MethodNEGNEGNEGNEGSoot %%ASTM D7824'>207.78.58.5SulfationAbs/imASTM D5185(m)<222<12BoronppmASTM D5185(m)>00<11MolybdenumppmASTM D5185(m)<222<12ManganeseppmASTM D5185(m)	Oil Changed		Client Info		Changed	Changed	Changed
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Chromium ppm ASTM D5185(m) >4 0 0 0   Nickel ppm ASTM D5185(m) >4 0 <1 0   Titanium ppm ASTM D5185(m) >3 0 0 <1   Aluminum ppm ASTM D5185(m) >3 0 0 <1   Aluminum ppm ASTM D5185(m) >3 0 0 <1 <1   Copper ppm ASTM D5185(m) >10 0 <1 <1 <1   Copper ppm ASTM D5185(m) >10 0 0 0 0   Vanadium ppm ASTM D5185(m) >14 0 0 0 0   Silicon ppm ASTM D5185(m) >20 <1 <1 4   Fuel % ASTM D793* >5 1.6 <1.0 <1.0   Water WC Method >0.2 NEG NEG NEG   Soto % % ASTM	Sample Status				NORMAL	NORMAL	NORMAL
Chromium ppm ASTM D5185(m) >4 0 0 0   Nickel ppm ASTM D5185(m) >4 0 <1 0   Titanium ppm ASTM D5185(m) >3 0 0 <1   Aluminum ppm ASTM D5185(m) >3 0 0 <1   Aluminum ppm ASTM D5185(m) >3 0 0 <1 <1   Copper ppm ASTM D5185(m) >10 0 <1 <1 <1   Copper ppm ASTM D5185(m) >10 0 0 0 0   Vanadium ppm ASTM D5185(m) >14 0 0 0 0   Silicon ppm ASTM D5185(m) >20 <1 <1 4   Fuel % ASTM D793* >5 1.6 <1.0 <1.0   Water WC Method >0.2 NEG NEG NEG   Soto % % ASTM	Iron		AQTM D5185(m)	<u>~66</u>	2	2	л
Nickel pm ASTM D5185(m) >4 0 <1	-		( )			-	
Titanium ppm ASTM D5185(m) S0 0 0   Silver ppm ASTM D5185(m) >3 0 0 <1   Aluminum ppm ASTM D5185(m) >8 1 2 2   Lead ppm ASTM D5185(m) >10 0 <1 <1   Copper ppm ASTM D5185(m) >74 2 2 2   Tin ppm ASTM D5185(m) >4 0 0 0   Vanadium ppm ASTM D5185(m) >15 7 7 7   Potassium ppm ASTM D5185(m) >20 <1 <1 4   Fuel % ASTM D5185(m) >20 <1 <1 4   Fuel % ASTM D5185(m) >20 <1 <1 4   Fuel % ASTM D5185(m) >20 <16 <1.0 <1.0   Water WC Method >0.2 NEG NEG NEG <td< th=""><th></th><th></th><th>· /</th><th></th><th></th><th>-</th><th></th></td<>			· /			-	
Silver ppm ASTM D5185(m) >3 0 0 <1			( )	>4			
Aluminum ppm ASTM D5185(m) >8 1 2 2   Lead ppm ASTM D5185(m) >10 0 <1 <1   Copper ppm ASTM D5185(m) >10 0 <1 <1   Copper ppm ASTM D5185(m) >4 0 0 0   Vanadium ppm ASTM D5185(m) >4 0 0 0   Silicon ppm ASTM D5185(m) >15 7 7 7   Potassium ppm ASTM D5185(m) >15 7 7 7   Potassium ppm ASTM D5185(m) >20 <1 <1 4   Fuel % ASTM D7593* >5 1.6 <1.0 <1.0   Water WC Method >0.2 NEG NEG NEG   Soot % % ASTM D7624* >30 0 0 0   Nitration Abs/:m ASTM D5185(m) >20 7.7 8.5 <th></th> <td></td> <td></td> <td>0</td> <th></th> <td></td> <td></td>				0			
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Vanadium ppm ASTM D5185(m) >15 0 0 0   Silicon ppm ASTM D5185(m) >15 7 7 7   Potassium ppm ASTM D5185(m) >20 <1 <1 4   Fuel % ASTM D5185(m) >20 <1 <1.0 <1.0   Water Q WC Method >0.2 NEG NEG NEG   Glycol WC Method >0.2 NEG NEG NEG S   Soot % % ASTM D784* >3 0 0 0   Nitration Abs/cm ASTM D784* >3 0 0 0   Nitration Abs/rim ASTM D7624* >20 7.7 8.5 8.5   Sulfation Abs/rim ASTM D7152* >30 18.9 19.6 20.5   Emulsified Water scalar Visual* >0.2 NEG NEG NEG   Sodium ppm ASTM D5185(m) <							
Silicon ppm ASTM D5185(m) >15 7 7 7   Potassium ppm ASTM D5185(m) >20 <1 <1 4   Fuel % ASTM D5185(m) >20 <1 <1 4   Fuel % ASTM D7593* >5 1.6 <1.0 <1.0   Water WC Method >0.2 NEG NEG NEG   Glycol WC Method >0.2 NEG NEG NEG NEG   Soot % % ASTM D7844* >3 0 0 0   Nitration Abs/rm ASTM D7644* >3 0 0 0   Sulfation Abs/rm ASTM D7141* >30 18.9 19.6 20.5   Emulsified Water scalar Visual* >0.2 NEG NEG NEG   Sodium ppm ASTM D5185(m) >20 2 1 2   Barium ppm ASTM D5185(m) >20			( )	>4			
Potassium ppm ASTM D5185(m) >20 <1	Vanadium	ppm	ASTM D5185(m)		0	0	0
Fuel % ASTM D7593* >5 1.6 <1.0	Silicon	ppm	ASTM D5185(m)	>15	7	7	7
Water WC Method >0.2 NEG NEG NEG   Glycol WC Method NEG NEG NEG   Soot % % ASTM D7844* >3 0 0 0   Nitration Abs/cm ASTM D7624* >20 7.7 8.5 8.5   Sulfation Abs/.1mm ASTM D7415* >30 18.9 19.6 20.5   Emulsified Water scalar Visual* >0.2 NEG NEG NEG   Sodium ppm ASTM D5185(m) >20 18.9 19.6 20.5   Emulsified Water scalar Visual* >0.2 NEG NEG NEG   Sodium ppm ASTM D5185(m) >20 2 1 2   Boron ppm ASTM D5185(m) >0 0 <11 2   Molybdenum ppm ASTM D5185(m) 0 0 0 0   Manganese ppm ASTM D5185(m) 1015 943 <	Potassium	ppm	ASTM D5185(m)	>20	<1	<1	4
GlycolWC MethodNEGNEGNEGSoot %%ASTM D7844*>3000NitrationAbs/cmASTM D7624*>207.78.58.5SulfationAbs/lmASTM D7624*>3018.919.620.5Emulsified WaterscalarVisual*>0.2NEGNEGNEGSodiumppmASTM D5185(m)>20212BoronppmASTM D5185(m)>2022<1BariumppmASTM D5185(m)<00<1MolybdenumppmASTM D5185(m)<00<1ManganeseppmASTM D5185(m)<000MagnesiumppmASTM D5185(m)<093611291066PhosphorusppmASTM D5185(m)<1004986959ZincppmASTM D5185(m)<116511671198SulfurppmASTM D5185(m)<16.417.318.6	Fuel	%	ASTM D7593*	>5	1.6	<1.0	<1.0
Soot % % ASTM D7844* >3 0 0 0   Nitration Abs/cm ASTM D7624* >20 7.7 8.5 8.5   Sulfation Abs/.1mm ASTM D7415* >30 18.9 19.6 20.5   Emulsified Water scalar Visual* >0.2 NEG NEG NEG   Sodium ppm ASTM D5185(m) >20 2 1 2   Boron ppm ASTM D5185(m) >20 2 1 2   Barium ppm ASTM D5185(m) 0 0 <11 2   Molybdenum ppm ASTM D5185(m) 0 0 <11 2   Manganese ppm ASTM D5185(m) 0 0 0 0   Magnesium ppm ASTM D5185(m) 1015 943 982 2   Calcium ppm ASTM D5185(m) 936 1129 1066   Phosphorus ppm ASTM D5185(m) 1165 </th <th>Water</th> <th></th> <th>WC Method</th> <th>&gt;0.2</th> <th>NEG</th> <th>NEG</th> <th>NEG</th>	Water		WC Method	>0.2	NEG	NEG	NEG
Nitration Abs/cm ASTM D7624* >20 7.7 8.5 8.5   Sulfation Abs/.tm ASTM D7624* >30 18.9 19.6 20.5   Emulsified Water scalar Visual* >0.2 NEG NEG NEG   Sodium ppm ASTM D5185(m) >20 2 1 2   Boron ppm ASTM D5185(m) >20 2 2 <1	Glycol		WC Method		NEG	NEG	NEG
Sulfation Abs/.tmm ASTM D7415* >30 18.9 19.6 20.5   Emulsified Water scalar Visual* >0.2 NEG NEG NEG   Sodium ppm ASTM D5185(m) >20 2 1 2   Boron ppm ASTM D5185(m) >20 2 2 <1   Barium ppm ASTM D5185(m)  0 0 <1   Molybdenum ppm ASTM D5185(m)  58 56 59   Manganese ppm ASTM D5185(m)  0 0 0   Magnesium ppm ASTM D5185(m)  936 1129 1066   Phosphorus ppm ASTM D5185(m)  1004 986 959   Zinc ppm ASTM D5185(m)  1165 1167 1198   Sulfur ppm ASTM D5185(m)  2842 2624 2387   Oxidation Abs/.tmm ASTM D741	Soot %	%	ASTM D7844*	>3	0	0	0
Emulsified WaterscalarVisual*>0.2NEGNEGNEGSodiumppmASTM D5185(m)>20212BoronppmASTM D5185(m) $<$ 222<1BariumppmASTM D5185(m) $<$ 00<1MolybdenumppmASTM D5185(m) $<$ 585659ManganeseppmASTM D5185(m) $<$ 000MagnesiumppmASTM D5185(m) $<$ 1015943982CalciumppmASTM D5185(m) $<$ 93611291066PhosphorusppmASTM D5185(m) $<$ 1004986959ZincppmASTM D5185(m) $<$ 116511671198SulfurppmASTM D5185(m) $<$ 284226242387OxidationAbs/.tmmASTM D7414*>2516.417.318.6	Nitration	Abs/cm	ASTM D7624*	>20	7.7	8.5	8.5
SodiumppmASTM D5185(m) >20212BoronppmASTM D5185(m) $\sim$ 2022<	Sulfation	Abs/.1mm	ASTM D7415*	>30	18.9	19.6	20.5
Boron ppm ASTM D5185(m) 22 2 <1	Emulsified Water	scalar	Visual*	>0.2	NEG	NEG	NEG
Barium ppm ASTM D5185(m) 0 0 <1	Sodium	ppm	ASTM D5185(m)	>20	2	1	2
Molybdenum ppm ASTM D5185(m) 58 56 59   Manganese ppm ASTM D5185(m) 0 0 0   Magnesium ppm ASTM D5185(m) 1015 943 982   Calcium ppm ASTM D5185(m) 936 1129 1066   Phosphorus ppm ASTM D5185(m) 1004 986 959   Zinc ppm ASTM D5185(m) 1165 1167 1198   Sulfur ppm ASTM D5185(m) 28422 2624 2387   Oxidation Abs/.1mm ASTM D7414*<>25 16.4 17.3 18.6	Boron	ppm	ASTM D5185(m)		22	2	<1
Manganese ppm ASTM D5185(m) 0 0 0   Magnesium ppm ASTM D5185(m) 1015 943 982   Calcium ppm ASTM D5185(m) 936 1129 1066   Phosphorus ppm ASTM D5185(m) 1004 986 959   Zinc ppm ASTM D5185(m) 1165 1167 1198   Sulfur ppm ASTM D5185(m) 2842 2624 2387   Oxidation Abs/.1mm ASTM D7414*<>25 16.4 17.3 18.6	Barium	ppm	ASTM D5185(m)		0	0	<1
Magnesium ppm ASTM D5185(m) 1015 943 982   Calcium ppm ASTM D5185(m) 936 1129 1066   Phosphorus ppm ASTM D5185(m) 1004 986 959   Zinc ppm ASTM D5185(m) 1165 1167 1198   Sulfur ppm ASTM D5185(m) 2842 2624 2387   Oxidation Abs/.1mm ASTM D7414*<>25 16.4 17.3 18.6	Molybdenum	ppm	ASTM D5185(m)		58	56	59
Calcium ppm ASTM D5185(m) 936 1129 1066   Phosphorus ppm ASTM D5185(m) 1004 986 959   Zinc ppm ASTM D5185(m) 1165 1167 1198   Sulfur ppm ASTM D5185(m) 2842 2624 2387   Oxidation Abs/.1mm ASTM D7414* >25 16.4 17.3 18.6	Manganese	ppm	ASTM D5185(m)		0	0	0
Phosphorus ppm ASTM D5185(m) 1004 986 959   Zinc ppm ASTM D5185(m) 1165 1167 1198   Sulfur ppm ASTM D5185(m) 2842 2624 2387   Oxidation Abs/.1mm ASTM D7414*<>25 16.4 17.3 18.6	Magnesium	ppm	ASTM D5185(m)		1015	943	982
Zinc ppm ASTM D5185(m) 1165 1167 1198   Sulfur ppm ASTM D5185(m) 2842 2624 2387   Oxidation Abs/.1mm ASTM D7414* >25 16.4 17.3 18.6	Calcium	ppm	ASTM D5185(m)		936	1129	1066
Sulfur ppm ASTM D5185(m) 2842 2624 2387   Oxidation Abs/.1mm ASTM D7414* >25 16.4 17.3 18.6	Phosphorus	ppm	ASTM D5185(m)		1004	986	959
Sulfur ppm ASTM D5185(m) 2842 2624 2387   Oxidation Abs/.1mm ASTM D7414* >25 16.4 17.3 18.6		ppm				1167	1198
Oxidation Abs/.1mm ASTM D7414* >25 16.4 17.3 18.6	Sulfur						
				>25			
	Visc @ 100°C	cSt	ASTM D7279(m)		12.5	13.2	12.9







: WearCheck - C8-1175 Appleby Line, Burlington, ON L7L 5H9 COMBINED METAL INDUSTRIES-PUBLIC YARD Laboratory CALA Sample No. : LH0278733 Received :07 Mar 2024 129 FENMAR DR E Lab Number : 02620417 : 11 Mar 2024 TORONTO, ON Tested ISO 17025:2017 Accredited Laboratory : 11 Mar 2024 - Kevin Marson CA M9L 1M7 Unique Number : 5737527 Diagnosed Test Package : MOB 1 (Additional Tests: FUELDILUTION, PercentFuel) Contact: Greg Sacher To discuss this sample report, contact Customer Service at 1-800-268-2131. gsacher@combinedmetal.com T: (416)642-7262 Test denoted (\*) outside scope of accreditation, (m) method modified, (e) tested at external lab. F: x: Validity of results and interpretation are based on the sample and information as supplied.