

18419 EUCLID AVENUE
CLEVELAND, OH 44112-1016
(800) 726-5400, FAX (216) 383-9633

CUSTOMER NO.: 18421
UNIT NO.: 5026
DESCRIPTION: ENGINE
END USER: LOCOMOTIVE MANAGER
MONTREAL MAINE & ATLANTIC RR
END USER LOCATION: DERBY, ME 04463

MAKE:
MODEL
OIL BRAND: EXXON
OIL TYPE: DIOL 17RD 40
SERIAL NO.:
FUEL TYPE: DIESEL

NO. COPIES 1

SAMPLE DATA

LAB#	SAMPLE DATE	RECEIPT DATE	TIME ON OIL	TIME ON UNIT
220562	09/07/2005	09/29/2005	10000	500000
141806	06/02/2005	06/22/2005	10000	500000
63239	02/28/2005	03/18/2005	10000	500000

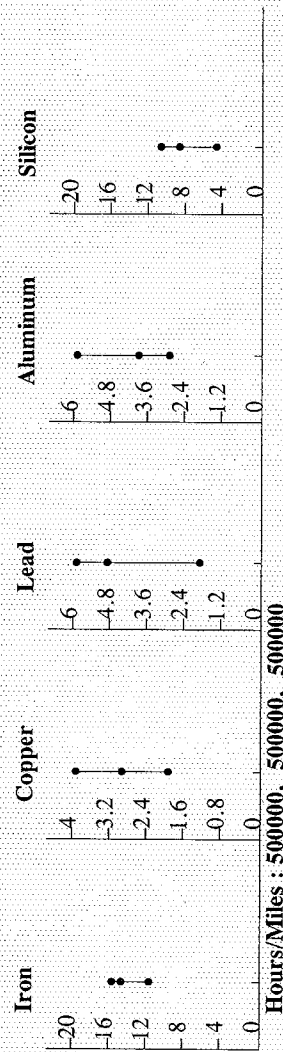
SPECTROCHEMICAL ANALYSIS (ppm)

IRON	CHROMIUM	LEAD	COPPER	TIN	ALUMINUM	NICKEL	SILVER	SILICON	BORON	SODIUM	MAGNESIUM	CALCIUM	BARIUM	PHOSPHORUS	ZINC	MOLYBDENUM	TITANIUM	VANADIUM	POTASSIUM	FUEL (%VOL)	VIS @ 40 C	CS @ 100 C	WATER (%VOL)	SOOT/SOLIDS (%WT)	GLYCOL
12	1	2	2	0	3	0	0	5	1	5	12	4810	0	4	5	113	0	0	0	<1	N/A	15.20	0	1.1	N/A
16	0	5	4	0	4	0	0	9	8	3	32	5782	0	4	2	112	0	0	0	<1	N/A	16.85	0	0.7	N/A
15	0	6	3	0	6	0	0	11	20	0	30	5369	0	5	7	120	0	0	0	<1	N/A	16.67	0	0.3	N/A

ADDITIONAL TESTS

LAB#	TBN
220562	10.05
141806	9.53
63239	11.15

GRAPHICAL ANALYSIS



LAB#

ANALYSIS RECOMMENDATIONS

RESULTS OF TEST PERFORMED INDICATE NO CORRECTIVE ACTION REQUIRED.

Key
A: Abnormal C: Critical

220562

RESULTS OF TEST PERFORMED INDICATE NO CORRECTIVE ACTION REQUIRED.

141806

RESULTS OF TEST PERFORMED INDICATE NO CORRECTIVE ACTION REQUIRED.

63239

ANALYST-MAL

ANALYST-MAL

ANALYST-EBD

LOCOMOTIVE MANAGER
MONTREAL MAINE & ATLANTIC RR
18 B & A AVE
DERBY, ME 04463

THE FOLLOWING INFORMATION HAS BEEN PROVIDED TO ASSIST IN THE INTERPRETATION OF YOUR OIL ANALYSIS.

WEAR METALS

These metals indicate wear on particular components of an individual unit. The particles of these metals will indicate a wear problem on the microscopic level before the problem can be detected by conventional means. The existence of a wear problem is determined not only by absolute values of metals, but more importantly a relative increase or trend in one or more of these metals.

WEAR METAL SOURCES

- Iron ... Cylinders, Gears, Rings, Crankshafts, Liners, Bearings, Housings, Rust.
Chromium ... Roller/Taper Bearing, Rods, Platings.
Lead ... Bearing Overlays, additive in gear oil and gasoline.
Copper ... Friction Plates, Oil Cooler, additive in oil.
Tin ... Bearings, Bushings, Pistons, Platings.
Aluminum ... Bearings, Bushings, Pistons, Blowers, Rotors, Thrust-Washers.
Nickel ... Valves.
Silver ... Bearings, Bushings, Platings.
Manganese ... Trace elements in liners and rings, additive in gasoline.
Titanium ... Trace element.
Vanadium ... Trace element.

CONTAMINANTS

These elements can be an indicator of both internal and external contamination. The source and amount of contamination can be determined by comparison to a previously normal sample or to a new oil reference. Specific tests for some contaminants can supplement the analysis.

CONTAMINANT SOURCES

- Silicon ... Element used to determine the level of airborne dirt and abrasives in the oil (sometimes used as an anti-foam agent).
Boron ... Present in most permanent anti-freeze systems and cooling system inhibitors (sometimes used as an additive).
Sodium ... Present in most permanent anti-freeze systems and cooling system inhibitors (sometimes used as an additive).
Potassium ... Present in most permanent anti-freeze systems and cooling system inhibitors (sometimes used as an additive in gear oil).

WATER AND SEDIMENT

Reports percent water and percent insolubles (ASTM D-91).

GLYCOL

A specific test for the presence of Glycol (Anti-Freeze) in an oil (ASTM D-2982).

ADDITIVES

These elements are blended into the oil in different forms and quantities by the manufacturer. The additive package in an oil will vary depending on the type of oil.

ADDITIVE FUNCTIONS

- Magnesium ... Dispersant/Detergent additive.
Calcium ... Dispersant/Detergent additive.
Barium ... Dispersant/Detergent additive.
Phosphorus ... Anti-Wear additive.
Zinc ... Anti-Wear additive.
Molybdenum ... Anti-Wear additive.

FUEL DILUTION

Unburned fuel in the oil may signal fuel system leaks or incomplete combustion.

FUEL SOOT

A result of incomplete combustion, blow-by. High levels may indicate combustion problems or overextended drain intervals.

VISCOSITY

The kinematic viscosity (ASTM D-445) determined at 40° C and/or 100° C is a measure of the flow rate of an oil in relation to time. This data is used to assign an SAE grade to an oil.

ENGINE OIL VISCOSITY CLASSIFICATION CHART

Table with 2 columns: SAE GRADE, MIN-cst-100° C, MAX-cst. Values: 10W (4.10, 9.29), 20 (5.60, 12.49), 30 (9.30, 16.29), 40 (12.50, 21.89), 50 (16.30, 21.89).

Customer Unit Information

This section of the report lists the identification of the unit sampled, equipment manufacturer, model, oil brand and oil type. This information is supplied by the customer.

Sample Data

Indicates data sample was taken/tested, oil and unit hours/mile. Laboratory identification number to track sample history. In addition, the unit condition of each sample is listed.

Additional Test Results

Reporting of additional test results (e.g. TAN, TBN, oxidation and nitration) not part of spectrochemical tests reported in these sections.

Staveley Services logo and contact info. Customer information box with fields for unit ID, description, location, etc. Sample data table with columns for elements and values. Graphs for Copper, Iron, Silicon, and Vanadium. Key for abnormal and critical results. Analyst and lab info.

Spectrochemical Analysis

Determines component wear, airborne dirt, cooling system contamination, and oil additive concentrations. Information is reported in parts per million (PPM).

Physical Properties

Changes in the physical qualities of the lubricant are determined and evaluated. These changes and the presence of contaminants affecting the properties of lubricants have a direct bearing on its serviceability.

Graphical Analysis

This key section gives the customer an "at a glance" at their unit's wear trend for the last six sample histories. For industrial applications, this section will contain detailed particle count data.

Analysis Recommendations

Our data provides specific information about your equipment. In case of imminent danger to a piece of equipment, the customer is alerted to the emergency by phone or fax.