

Laboratory Locations



Send your samples to the laboratory location nearest you.



INDIANAPOLIS
7898 Zionsville Road
Indianapolis, IN 46268

HOUSTON
10910 W. Sam Houston
Pkwy. N. , Suite 700
Houston, TX 77064-6314

SALT LAKE CITY
3060 W. California Avenue
Suite B
Salt Lake City, UT 84104

EDMONTON
5140 75th Street
Edmonton, AB T6E 6W2
Canada
(For all Canadian customers)



Kawasaki Loaders Early Warning Program



What Can the KLEW Oil Analysis Program Do for You?

- ✓ **Extend oil drain intervals**
- ✓ **Extend equipment life**
- ✓ **Identify minor problems before they become major failures**
- ✓ **Maximize asset reliability**
- ✓ **Increase resale value**



Imagine being able to see exactly what's happening inside an engine, a transmission or a gearbox. Imagine being able to see the damage even extremely minute wear particles and debris can do by simply floating around in the oil circulating within a system. Problems can be found before they become failures and less unscheduled downtime means increased production and profitability.

Regular sampling and TREND analysis – monitoring test data over an extended period of time – will provide the information you need to continually maximize asset reliability and, ultimately, increase company profits. Whether you're a seasoned veteran or a first-time sampler, oil analysis puts you on track for well-managed, cost-effective equipment maintenance programming.



Taking Samples

The Importance of Sampling at Scheduled Intervals

Oil Analysis is most effective as a diagnostic tool when oil samples are extracted and analyzed at predetermined, scheduled intervals. When comparing the most recent analysis to previous test history on a given machine, trends develop which allow the early detection of internal abnormalities. No two machines, even machines of exactly the same type, accumulate contaminants or wear at the same rate.

Sampling Procedures

The component sampled should be brought to operating temperature prior to sampling. This will assure that the insoluble and semi-soluble material is suspended evenly throughout the system. Samples taken from components that have been inactive for long periods of time are not representative.

Samples should always be taken in the same manner and from the same point.

Do not sample a component immediately after an oil change or after a large amount of makeup oil has been added to the system.

Oil Sample Intervals		
Component	Points to Sample	Interval
Transmission/Torque Converter	1	Every 500 Hours
Differentials	2	Every 1,000 Hours
Planetaries (70Z - 135Z)	4	Every 1,000 Hours
Engine	1	Every 250 Hours
Hydraulics	1	Every 1,000 Hours

The above items are the only items included during the extended coverage. This sampling begins during the normal warranty period.

Example:

At 500 hours sample the transmission/torque converter only.

At 1,000 hours sample the transmission/torque converter, front/rear differentials, and each planetary.

At 1,500 hours re-sample the transmission/torque converter only, continuing this frequency until the end of the extended warranty.

Note: For proper oil drain intervals refer to your operation and maintenance manual. Sample the engine every 250 hours and the hydraulics every 1,000 hours (engine and hydraulic sampling are optional for EPTC warranty).

Purchase Test Kits and Supplies at our On-Line Store

Visit our on-line store at www.kawasakiloaders.com, KLEW, to purchase additional test packages and sampling supplies.

Standard Test Package
BM032
Elemental Metals (24) by ICP
Fuel Dilution %*
Soot %*
Viscosity @ 100°C
Water by Crackle

* Test performed on engine samples only.

Taking Representative Samples with a Vacuum Pump

1. Measure length or depth of fill port tube, reservoir or dipstick.
2. Add 6 inches and mark the measurement on the tubing.
3. Cut the tubing 12 inches beyond this mark.
4. Insert tubing into top of vacuum pump and tighten lock ring.
5. Remove sample jar lid and attach jar to bottom of vacuum pump and tighten securely.
6. Insert tubing into fill port, reservoir or dipstick retaining tube only to the mark on the tubing. To avoid drawing settled debris into the sample, do not allow contact between tubing and bottom of reservoir.
7. Push and pull vacuum pump plunger to until sample jar is 3/4 full.
8. When sample reaches shoulder of jar, unscrew jar from pump, replace jar lid and tighten securely.
9. Unscrew pump locking ring, remove tubing and drain excess fluid back into reservoir.
10. Discard tubing after each sample to avoid cross contamination.
11. Complete sample jar label and affix to sample jar.

Component Registration Forms, Equipment Lists, Sample Labels and Mailing Information

Your Kawasaki wheel loader is automatically enrolled in the KLEW Program when your machine is registered with KCMA's Extended Coverage Program.

Standard KLEW Kits and results are supplied free of charge during the Extended Coverage Program.

To extend the KLEW Program after the extended coverage term contact Customer Service at **888-244-8529**.

A Component Registration Form is included with every sample kit and must be used when adding a new component to be sampled for the first time or whenever there is a change in component and/or lube information previously submitted to the lab.

If you need to transfer historical data from a previous lab, simply contact Customer Service and your electronic files can be easily and safely imported directly into the laboratory database.

After taking the sample, fill out the sample bottle label completely and accurately, attach it to the sample bottle and place the bottle inside the black safety shipping container along with the sample's Component Registration Form, if applicable. Complete the mailer return address label and attach it to the shipping container, affix the appropriate postage and mail. It is highly recommended that a trackable mail service always be used for shipping samples to the laboratories. Test results will be available on line at www.Kawasakiloaders.com "KLEW", or e-mailed to recipients as designated when you set up your account.

ACCOUNT REGISTRATION FORM
 00000A00000
 I would like to receive my reports via: E-mail Fax www.trackmysample.com
 I would like my report comments in: English (Default) Spanish French Dutch

Customer (sample source) _____
 Distributor/Sales Rep _____
 Attention _____

Telephone _____
 Email Address _____ Fax Number _____
 Customer's Address _____ City _____
 State/Province _____ Postal Code _____ Country _____



COMPONENT REGISTRATION FORM
 Mandatory for first time component sampling or to make changes. Always use same unit ID on future samples.
 *Account Number (If not available Account Registration Form must be completed)
 KAWASA
 Unit ID _____ Secondary ID _____
 POSITION (if applicable): Left Right Front Rear

UNIT TYPE (check sampled component)

ENGINES: Diesel AA, Other _____
 MOBILE GEAR / BEARING SYSTEM: BBDIF, BBPLT, Planetary, Other _____
 HYDRAULIC: BH
 TRANSMISSION: Auto/Powershift BBAPT, Other _____

Unit Model _____
 Lube Grade: SAE ISO

KCMA Corporation
 BASIC MOBILE
 ACCT# KAWASA

*Required Field
 888-244-8529
www.kawasakiloaders.com

*NEW LUBE REFERENCE
 *TAKEN FROM (CHECK ONE)
 ENGINE OIL
 HYDRAULIC
 TRANSMISSION
 DIFFERENTIAL
 PLANETARY
 OTHER

*POSITION (IF APPLICABLE)
 LEFT RIGHT
 FRONT REAR

Test Reports and Data Interpretation

Test reports will be emailed* directly to you or available online through your laboratory's Internet application, HORIZON® (See Managing Preventive Maintenance with HORIZON®, page 7). The report descriptions and explanations that follow will help you interpret your results. Effectively using test results and recommendations to schedule downtime and productively manage your reliability programming is a vital part of successful preventive maintenance.

*Results can be mailed or faxed at an additional cost. Contact your KLEW Laboratory at 888-244-8529 for details.

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Customer Equipment and Sample Information

The information submitted with a sample is as important to who is reading the report as it is to the analyst interpreting the test results and making recommendations. Know your equipment and share this knowledge with your laboratory. Accurate, thorough and complete lube and equipment information not only allows for in-depth analysis, but can eliminate confusion and the difficulties that can occur when interpreting results.

Unit Type should give as much detail as possible. **What kind** of compressor, gearbox, engine, etc., influences flagging parameters and depth of analysis. Different metallurgies require different lubrication and have great impact on how results are interpreted.

Equipment ID is each customer's opportunity to uniquely identify units being tested and their location.

Application identifies in what type of environment the equipment operates and is useful in determining exposure to possible contaminants.

Make note of the difference between the **Date Sampled** and the **Date Received** by the lab. Turnaround issues may point to storing samples too long before mailing or mail service problems. Also noted is testing **Date Completed**.

Severity Status Levels:
0 Normal.
1 At least one or more items have violated initial flagging points yet are still considered minor.
2 A trend is developing.
3 Simple maintenance and/or diagnostics are recommended.
4 Failure is eminent if maintenance is not performed.

Manufacturer and Model can also identify metallurgies involved as well as the OEM's standard maintenance guidelines and possible wear patterns to expect.

Lube Manufacturer, Type and Grade identify a lube's properties and its viscosity and is critical in determining if the right lube is being used.

Filter Types and their Micron Ratings are important in analyzing particle count-the higher the micron rating, the higher the particle count results.

Sump Capacity identifies the total volume of oil (in gallons) in which wear metals are suspended and is critical to trending wear metal concentrations.

The laboratory at which testing was completed is denoted by an **I** for **Indianapolis**, an **H** for **Houston**, **E** for **Edmonton** and an **S** for **Salt Lake City**. The **Lab #** is assigned to the sample upon entry for processing and should be the reference number used when contacting the lab with questions or concerns.

Data Analysts Initials



Recommendations

A data analyst's job is to explain and, if necessary, recommend actions for rectifying significant changes in the lubricant or the unit's condition. Reviewing comments before looking at the actual test results will provide a road map to the report's most important information. Any actions that need to be taken are listed first in order of severity. Justifications for recommending those actions immediately follow.

0806 0810 9999 UNIT ID 90C4 SECOND ID 530 UNIT TYPE DIFFERENTIAL APPLICATION OFF-HIGHWAY				COMPANY INFORMATION	
ACCOUNT NUMBER DATE SAMPLED DATE RECEIVED DATE COMPLETED		03/18/09 03/30/09 04/22/09		OVERALL SEVERITY OF REPORT based on comments, not individual flags ACTION SUGGESTED	
TRACKING # MANUFACTURER/MODEL LUBE MFR LUBE TYPE - GRADE MICRON RATING FILTER TYPE SUMP CAPACITY HYD SYSTEM PRESSURE FLUID ADDED		KAWASAKI 90ZV CASTROL TRANS-C SAE 50 0 NONE 0.00 10		0 1 2 3 4 NORMAL ABNORMAL CRITICAL	
COMMENTS We suggest that an Analytical Ferrogram be performed to clarify the type of wear and/or contamination that is present; Gear and/or bearing metal is at a SIGNIFICANT LEVEL; Viscosity is SIGNIFICANTLY LOW; Is the grade as identified correct? Please advise; Abrasives (silicon/dirt) are at a MINOR LEVEL; Bushing/Thrust metal is at a MINOR LEVEL; Aluminum is most likely in the form of alumina/silica (Dirt); Lubricant change acknowledged;		FLUID ANALYSIS REPORT - 888-244-8529		LAB # 126500 LOCATION I ANALYST RNF	
WEAR METALS PPM CHROMIUM COPPER LEAD TITANIUM VANADIUM SODIUM POTASSIUM SILICON MOLYBDENUM ANTIMONY MANGANESE LITHIUM BORON MAGNESIUM CALCIUM BARIUM PHOSPHORUS ZINC		CONTAMINANT METALS - PPM SODIUM POTASSIUM SILICON MOLYBDENUM ANTIMONY MANGANESE LITHIUM BORON MAGNESIUM CALCIUM BARIUM PHOSPHORUS ZINC		MULTI-SOURCE METALS - PPM MANGANESE LITHIUM BORON MAGNESIUM CALCIUM BARIUM PHOSPHORUS ZINC	

Highlighted results denote test the analyst has flagged because they exceed preset warning parameters and warrant closer examination or require action.

Elemental Analysis

Elemental Analysis, or Spectroscopy, identifies the type and amount of wear particles, contamination and oil additives. Determining metal content can alert you to the type and severity of wear occurring in the unit. Measurements are expressed in parts per million (ppm).

Combinations of these **Wear Metals** can identify components within the machine that are wearing. Knowing what metal a unit is made of can greatly influence an analyst's recommendations and determine the value of elemental analysis.

Knowledge of the environmental conditions under which a unit operates can explain varying levels of **Contaminant Metals**. Excessive levels of dust and dirt can be abrasive and accelerate wear.

Additive and Multi-Source Metals may turn up in test results for a variety of reasons. Molybdenum, antimony and boron are additives in some oils. Magnesium, calcium and barium are often used in detergent/dispersant additives. Phosphorous is used as an extreme pressure additive in gear oils. Phosphorous, along with zinc, are used in anti-wear additives (ZDDP).

SAMP #	WEAR METALS PPM										CONTAMINANT METALS - PPM				MULTI-SOURCE METALS - PPM					ADDITIVE METALS PPM				
	IRON	CHROMIUM	NICKEL	ALUMINUM	COPPER	LEAD	TITANIUM	VANADIUM	SODIUM	POTASSIUM	SILICON	SODIUM	POTASSIUM	SILICON	MOLYBDENUM	ANTIMONY	MANGANESE	LITHIUM	BORON	MAGNESIUM	CALCIUM	BARIUM	PHOSPHORUS	ZINC
1	250	2	1	1	52	1	0	0	0	0	14	4	1	0	0	0	3	0	66	11	573	2	642	1167
2	155	0	0	1	5	0	0	0	0	0	4	13	0	0	0	0	1	0	2	14	2010	0	1099	782
3	948	1	0	2	20	0	0	1	0	0	12	19	1	0	0	0	9	3	5	26	2407	0	1667	1161

Test Data

Test results are listed according to age of the sample—oldest to most recent, top to bottom—so that trends are apparent. Significant changes are flagged and printed in the gray areas of the report.

Samples are listed by **Date Received** in the lab-oldest first. They are also assigned a **Lab Number** for easy internal tracking. Important to also note is whether or not the **Lube** has been **Changed** since the last sample was taken.

Viscosity measures a lubricant's resistance to flow at temperature and is considered it's most important physical property. Depending on lube grade, it is tested at 40 and/or 100 degrees Centigrade and reported in Centistokes.

SAMP #	DATE SAMPLED	UNIT TIME	LUBE CHG	FILT CHG	FUEL GC	SOOT Vol.	WATER Hot Plate	VIS 40C CS	VIS 100C CS	TAN Total Acid	TBN Total Base	I-R OXIDA	I-R NITRA	ISO CODE	4 MICRON	6 MICRON	10 MICRON	14 MICRON	21 MICRON	38 MICRON	70 MICRON	100 MICRON	
																							DATE RECEIVED
1	N/A	4109	U	U			0.10		14.7														
2	08/07/08	7087	U	U			<.1		14.5														
3	03/18/09	9041	Y	N			<.1		13.3														

Fuel and Soot are reported in % of volume. High fuel dilution decreases unit load capacity. Excessive soot is a sign of reduced combustion efficiency. (only on engine oil samples)

Water in oil decreases lubricity, prevents additives from working and furthers oxidation. Its presence can be determined by crackle or FTIR and is reported in % of volume. Water by Karl Fischer determines the **amount** of water present. These results appear in the Special Testing section of your report.

The **ISO Code** is an index number that represents a range of particles within a specific micron range, i.e., 4, 6, 14. Each class designates a range of measured particles per one ml of sample. The particle count is a cumulative range between 4 and 6 microns. This test is valuable in determining large particle wear in filtered systems.

Special testing is often done when additional, or more specific information is needed. This data is reported in the Test Report section.

Managing Preventive Maintenance with HORIZON®

You now have a wealth of information at your fingertips about the condition of both your equipment and the lubricants you are using. But it means nothing if you can't put it to work for you.

Log on to HORIZON® to maximize your information's value. HORIZON® is fast, easy and can put you on track for total oil analysis program management with problem summary reports, turnaround tracking and sample scheduling – data mining capability that gives you the power to make maintenance decisions that make a difference.