Send your samples to the laboratory location nearest you.

INDIANAPOLIS
7988 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

ATLANTA
1960 Evergreen Blvd.
Suite 400
Duluth, GA 30096

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

For more information, visit cumminsfiltration.com
What can the MONITOR Fluid Analysis Program Do For You?

- Extend oil drain intervals – Partnering MONITOR Fluid Analysis with Cummins Extended Service Interval technologies maximizes uptime and minimizes maintenance costs.
- Extend equipment life – Monitoring system cleanliness and filtration efficiency gets more out of the equipment you have and can significantly reduce equipment replacement costs.
- Identify minor problems before they become major failures – State-of-the-art fluid analysis identifies dirt, wear particles, fuel dilution and coolant – contaminants that can cause catastrophic failure or significantly shorten equipment life.
- Maximize asset reliability – Testing and analysis expands your Extended Service environment to ensure that units are up, running and making money.
- Increase resale value – Analysis results provide valuable sampling history documentation that can easily justify higher equipment resale values.

Why MONITOR?

High Quality Testing

MONITOR’s independent testing laboratories are ISO 17025 A2LA accredited – the highest level of quality attainable by a testing laboratory backed by the most stringent accrediting body on the industry. This means that your fluid analysis program is supported by a documented quality system you can depend on to deliver superior testing and customer services.

Taking Samples

MONITOR Fluid Analysis will show you how 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 increase company profits.

Fluid analysis is most effective when samples are representative of the typical environmental conditions under which they operate. Dirt, system debris, water and light fuels tend to separate from lubricants and coolants when system temperatures cool. Samples should be taken while the systems are operating under normal conditions or immediately after shutdown while they are still at operating temperature.

Samples should also be taken at regularly scheduled intervals and from the same sampling point each time. Although an equipment manufacturer’s recommendations provide a good starting point for developing preventive maintenance practices, sampling intervals can easily vary. A major consideration for determining sampling frequency is how critical a piece of equipment is to production. Environmental factors are also important, such as hot, dirty operating conditions, short trips with heavy loads and excessive idle times.

### Sampling Equipment and Supplies

<table>
<thead>
<tr>
<th>Description</th>
<th>Part #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vacuum Pump</td>
<td>CC2802</td>
</tr>
<tr>
<td>Probalyzer</td>
<td>3318168S</td>
</tr>
<tr>
<td>Mini-Gauge Plug</td>
<td>3318168S</td>
</tr>
</tbody>
</table>

Analysis kits, sampling equipment and supplies can be ordered online at www.cumminsfiltration.com or by calling 1-800-22FILTER.

### MONITOR Sampling Intervals and Methods

<table>
<thead>
<tr>
<th>Product</th>
<th>Sampling Interval</th>
<th>Suggested Method &amp; Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel Engines-Oil</td>
<td>Monthly or at 250 hours</td>
<td>By sample extraction pump through dipstick retaining tube or sampling valve installed in filter return</td>
</tr>
<tr>
<td>Diesel Engines-Coolant</td>
<td>Quarterly</td>
<td>By vacuum pump through radiator</td>
</tr>
<tr>
<td>Diesel Engines-Fuel</td>
<td>Quarterly</td>
<td>By vacuum pump through gas tank</td>
</tr>
<tr>
<td>Hydraulics</td>
<td>250 – 500 hours</td>
<td>By vacuum pump through oil fill port or system reservoir at mid-level</td>
</tr>
<tr>
<td>Automatic Transmissions</td>
<td>500 hours / 25,000 miles</td>
<td>By vacuum pump through dipstick retaining tube or sampling valve installed in filter return</td>
</tr>
<tr>
<td>Manual Transmissions</td>
<td>750 hours / 50,000 miles</td>
<td>By vacuum pump through oil level plug or dipstick retaining tube</td>
</tr>
</tbody>
</table>
### Oil

<table>
<thead>
<tr>
<th>Purpose</th>
<th>CC2525</th>
<th>CC2527</th>
<th>CC2543</th>
<th>CC2544</th>
<th>CC2891</th>
<th>CC2548</th>
<th>CC36136</th>
<th>CC36135</th>
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<tbody>
<tr>
<td>Basic Engine Analysis</td>
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<td>✔</td>
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<td>✔</td>
</tr>
<tr>
<td>Hydraulic Fluid Analysis</td>
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<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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</tr>
<tr>
<td>Engine Failure Analysis</td>
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<td>✔</td>
<td>✔</td>
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</tr>
<tr>
<td>Engine Analysis</td>
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<td>✔</td>
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<tr>
<td>OPE Oil Drain Analysis</td>
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<tr>
<td>Off-Highway Engine</td>
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<tr>
<td>Fluid Analysis</td>
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</tr>
<tr>
<td>Filter Analysis</td>
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<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>

### MONITOR Coolant Analysis Test Packages

MONITOR Coolant Analysis evaluates metal movement, the corrosive attributes of the coolant and can detect the source of such cooling system problems as combustion gas leaks, electrical ground problems, localized overheating and contamination inside and outside the system.

### Fuel

<table>
<thead>
<tr>
<th>Purpose</th>
<th>CC2850</th>
<th>CC2851</th>
<th>CC2719</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determines fuel’s suitability for use &amp; extends fuel filter life</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Determines # product in bulk storage tanks complies with specifications</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Monitor fuel cleanliness</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>

### MONITOR Fuel Analysis Test Packages

MONITOR Fuel Analysis will determine if the fuel you are using is negatively affecting fuel filter life, premature plugging, or engine performance and loss of power or poor injector performance. Testing fuels in bulk storage tanks will tell you if your fuel meets ASTM D975 #2 diesel fuel specifications.

### Innovative Data Management Solutions

MONITOR Fluid Analysis is fast and accurate. Once your samples have been logged, you can track their progress through the laboratory at [www.trackmysample.com](http://www.trackmysample.com). Your results are available almost immediately after sample processing is complete. The online reporting software, HORIZON®, will then show you how to get the most from your testing and analysis through Management Reports that allow you to affect change in your daily maintenance practices.

- Track time elapsed between the date a sample was taken, the date it was received by the laboratory and the date processing was complete
- Identify units that are — and those that are not — being sampled according to PM schedules
- Always know which units are due to be sampled
- Know which units have been sampled in any given week and the severity of each
- Identify units that are — and those that are not — being sampled according to PM schedules
- Identify equipment problems by make, model and manufacturer
- Use fluid analysis data to determine which units perform best in your application
- Influence future equipment purchasing decisions
- Review and react to your most critical severities first
- Track maintenance recommendations made vs. maintenance action taken
How to Read MONITOR Fluid Analysis Reports

MONITOR fluid analysis produces a wealth of important data and useful recommendations for identifying and correcting the root cause of abnormal conditions. Use the report descriptions and explanations below to better understand your results. Your Cummins Filtration Sales Representative can assist you in effectively utilizing individual test reports as well as the full data management capabilities of the program.

Component ID is each customer’s opportunity to uniquely identify components being tested and their location.

Component 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 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. Properly document your equipment and share this knowledge with your laboratory. Implement a sampling process for every piece of equipment in your fluid analysis program that can be followed consistently each time the unit is sampled.

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.

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

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.

Product Information identifies a lube’s properties and its viscosity and is critical in determining if the right lube is being used.

Data Analysts Initials

Turnaround issues may point to storing samples too long before shipping or shipping service problems. Also noted is testing Date Completed.
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.

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 yellow areas of the report.

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.

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. Phosphorus is used as an extreme pressure additive in gear oils. Phosphorus, along with zinc, are used in anti-wear additives (ZDDP).

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 100 microns. This test is valuable in determining large particle wear in filtered systems.

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 ASTM D 1744 determines the amount of water present. These results appear in the Special Testing section of your report.

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.
Component Registration Forms

A Component Registration Form is included with every sample kit. Fill it out only when sampling a new component for the first time or to notify the laboratory of a change in component and/or fluid information already registered with the laboratory. Complete, up-to-date information ensures that you receive the proper testing and an accurate analysis of the results.

STEP 1
• Fill out the Component Registration Form completely and accurately.
• Use this form only for first-time samples or changes in unit or fluid information previously submitted.
• Include it in the black mailer with the sample jar.

Sample Labels

Complete a sample jar label for every sample submitted to the laboratory. Be sure to fill out all label information completely and accurately to ensure proper testing and accurate, in-depth analysis. Once complete, attach the label to the sample bottle. Fill in the unit’s ID on the removable tracking number sticker located to the right of the sample label and retain for your records.

STEP 2
• Fill out the sample jar label completely and accurately.
• Include all unit and fluid information requested including unit ID, type of component and position, time on both the fluid and the unit and whether or not fluid has been added or changed.
• Attach label to sample jar.
• Complete sample tracking sticker and retain for your records.

NOTE: When you provide the most accurate and complete unit and fluid information, your laboratory can deliver the most accurate and complete results and recommendations.

Sampling and Shipping

Take samples representative of normal operating conditions. Pull samples at regularly scheduled intervals and from the same sampling points each time. Place the labeled sample jar and component registration form, if applicable, in the black mailer provided. Complete the return address label for the laboratory location nearest you and attach it to the black mailer. It is highly recommended that a trackable delivery service be used for shipping samples to the laboratory. Logon to www.trackmysample.com and enter the tracking number just below the barcode to track your sample’s progress once it arrives at the laboratory.

STEP 3
• Take representative samples.
• Complete and attach the return address label to the black mailer.
• Include sample jar and component registration form, if applicable, in black mailer.
• Ship by trackable delivery service such as FedEx or UPS.
• Track sample progress through laboratory at www.trackmysample.com.

Test Reports and Data Management

MONITOR free online reporting option – HORIZON® – is fast, bringing you test results almost immediately after processing is complete. HORIZON’s Management Reports allow you to affect positive changes in your daily maintenance practices by keeping sampling on track, identifying bottlenecks in turnaround time that are costing you money and summarizing unit problems that could influence future purchasing decisions. And control over an extensive host of personal application settings and preferences gives you the power to put the information you need most in front of you first.

STEP 4
• Get test results almost immediately – FREE.
• Affect positive change in your daily maintenance practices.
• Keep sampling schedules on track.
• Identify bottlenecks in sample turnaround time.
• Place the information you need most in front of you first.

NOTE: When you provide the most accurate and complete unit and fluid information, your laboratory can deliver the most accurate and complete results and recommendations.