How to Read the POLARIS Oil Analysis Report

Reading an oil analysis report can be an overwhelming and sometimes seemingly impossible task without an understanding of the basic fundamentals for interpreting laboratory results and recommendations. Referring to the report descriptions and explanations below will help you better understand your results and, ultimately, better manage a productive, cost-saving reliability program.

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 information 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.
- **Application** identifies in what type of environment the equipment operates and is useful in determining exposure to possible contaminants.
- **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** identifies 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.
- **Lube Time** is how long the oil has been used. **Unit Time** is the age of the equipment and **Lube Added** is how much oil has been added since the last sample was taken.

**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 not performed.

Occasionally, a test result can violate the S4 excursion level. But, if there is no supporting data or a clear indicator of what is actually happening within the unit, maintenance action may not be recommended. Customer may be asked to investigate all possible contamination sources, shorten sampling intervals, or simply monitor the situation very closely.

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.

Customer Account Number

The laboratory at which testing was completed is denoted by an I for Indianapolis and an H for Houston. The following Lab # is assigned to the sample upon entry for processing and should be the reference number used when notifying the lab with questions or concerns.
**Recommendations**

A data analyst’s job is to explain and, if necessary, recommend actions for rectifying significant changes in a unit’s condition. Reviewing comments before looking at the actual test results will provide a roadmap 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.

**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). Consult the POLARIS Wear Metals Guide at www.polarislabs.com for a quick reference to possible wear metal sources.

**FLUID ANALYSIS REPORT - 877-808-3750**

<table>
<thead>
<tr>
<th>WEAR METALS</th>
<th>CONTAMINANT METALS</th>
<th>MULTI-SOURCE METALS</th>
<th>ADDITIVE METALS</th>
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</thead>
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<tr>
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<td>2 9 4 0 1 0 0 3 7 55 2 322 365</td>
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Numbers with “carets” printed below them denote test results the analyst has flagged because they exceed pre-set warning parameters and warrant closer examination or require action.

Check for source of water contamination. Water is at a SEVERE LEVEL; Lubricant change is suggested if not done at sampling time; Particle count precluded or invalid due to water contamination; Copper is at a MODERATE LEVEL; COPPER sources in hydraulic systems can be from BUSHING/THRUST metal, LUBE COOLER metal (as applicable); PISTON SHOE metal (as applicable); TOTAL ACID NUMBER has increased; Flagged data has been rechecked and confirmed.

**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 (ZDP).
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.

Special Testing
Special testing is often done when additional, or more specific, information is needed. For example, an Analytical Ferrograph might be requested when a ferrous metal larger than 5 microns has been detected by Direct Read Ferrography. The AF can determine actual size of the particle, its composition—iron, copper, etc.—and the type of wear it's creating—rubbing, sliding, cutting, etc. Additional special testing could include, Water by Karl Fischer and RPVOT (Rotating Pressure Vessel Oxidation Test).

Summary
At POLARIS, our data analysts place a wealth of information at your disposal. We provide timely, accurate reporting through our free Internet service, HORIZON. COMPASS, our PC-based data management software, makes that information work for you. Make a habit of reading your analysis reports regularly. Know your equipment and share as much information with your laboratory as possible. Understanding your reports and being able to utilize analysis results to schedule downtime and productively manage your reliability programming, is a vital part of successful predictive and preventative maintenance.