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ISO 17025 Chemical Testing Accredited

Official Test Report

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Project 14.999

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Contamination Analysis

This report contains the results of the contamination analysis of coolant samples submitted by Jane Smith on 8/29/14.

LCM Sample ID	Client Sample ID	Results
14.999-01	Diesel Engine Coolant X123	**Percent Particulates:** 0.0057% by wt. Black **XRF:** **Particulate:** Al, S, K, Fe, Cu, Zn **Solute:** Al, P, S, Cl, K, Mo **FTIR:** **Coolant:** Water, traces of Hydrocarbon Lubricant/Fuel **Particulate:** Carbon, Hydrocarbon Lubricant/Fuel **Solute:** Dipotassium Phosphate

Comment

Tests reveal typical coolant additives and wear metals. Also present is a hydrocarbon and a large amount of carbon (soot) consistent with contamination with diesel exhaust products.

Particulate

A portion of the sample was filtered through a 1.2µm pore cellulose nitrate filter. A large amount of soot can be seen on the filter locations shown in Figure 1. The particulate was analyzed by XRF revealing some coolant additives as well as low levels of wear metals including iron, copper and zinc (see Figure 2). FTIR of the particulate showed the presence of a hydrocarbon, possibly a grease or unburned fuel. Also visible in the FTIR spectrum is the characteristic baseline drift caused by high levels of carbon in the sample (Figure 3).

Solute

A portion of the sample was dried leaving particulate and crystallized coolant additives in the sampling container. XRF and FTIR revealed the material to be a close match for Dipotassium Phosphate, a

common pH buffer used in coolants (Figures 4 and 5). XRF also suggests the presence of Molybdenum Disulfide lubricant.

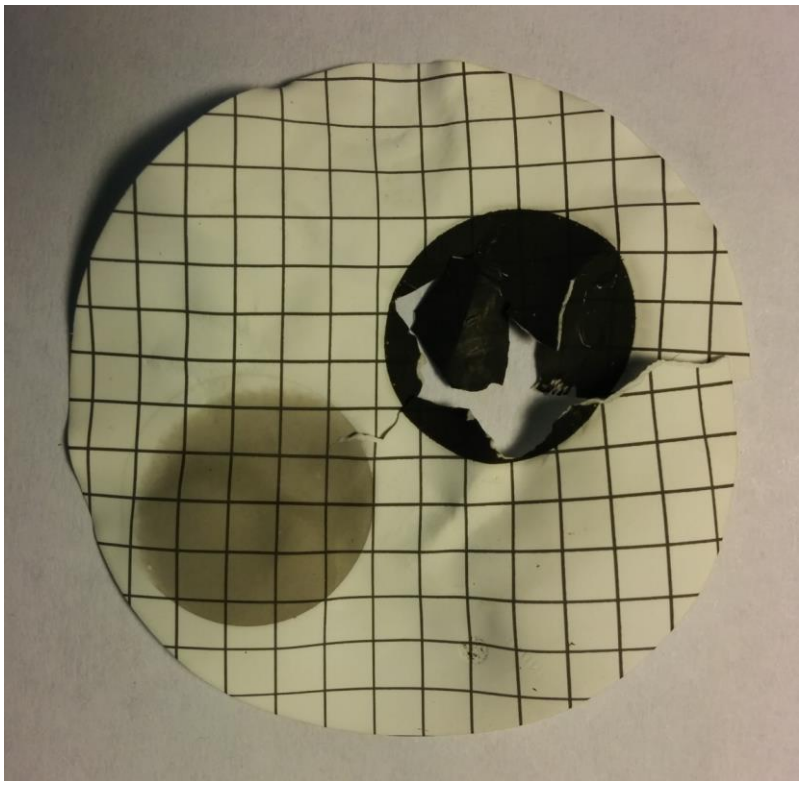

Figure1: Particulate on Filtration Membrane. High amounts of soot present in the sample. Membrane was torn in the process of capturing FTIR.

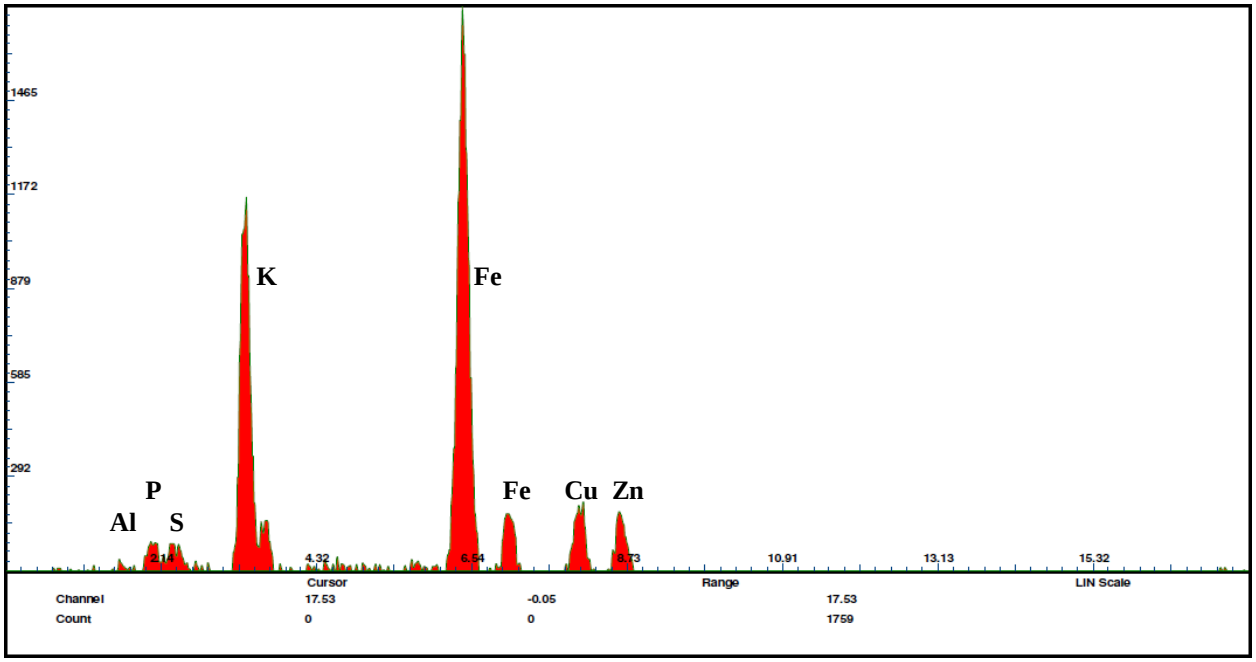

Figure 2: Particulate XRF. Wear metals and additives measured in the particulate.

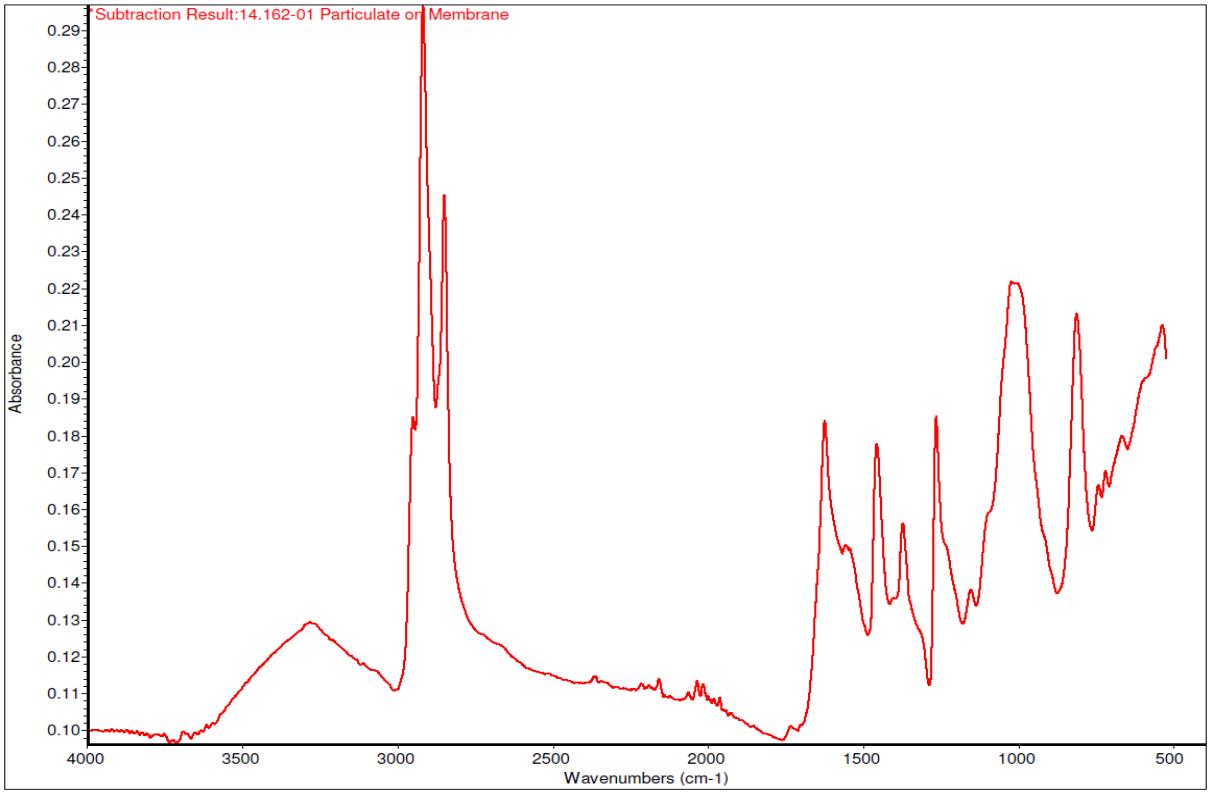

Figure 3: Particulate FTIR. Upward trending baseline below 1500 cm^{-1} is characteristic of elemental carbon (soot). Large peaks around 2800 cm^{-1} indicate the presence of a hydrocarbon possibly oil, grease or fuel.

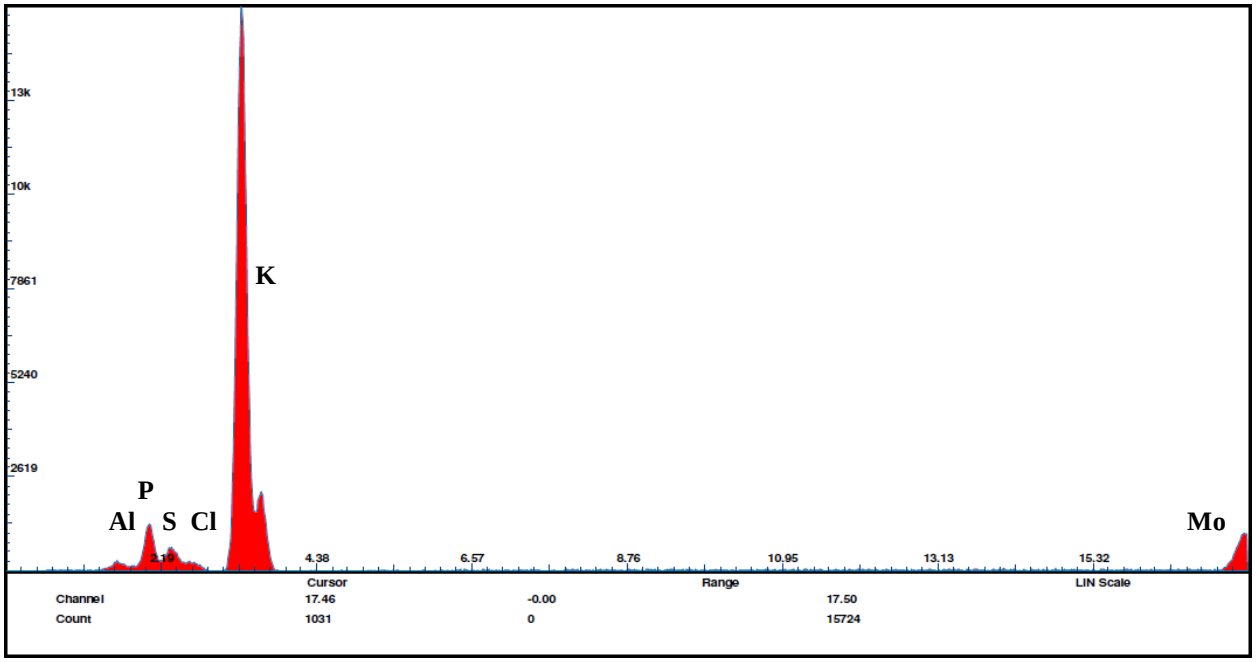

Figure 4: Solute XRF. Solute shows the presence of multiple coolant additive elements, mainly potassium, molybdenum, phosphorous and sulfur.

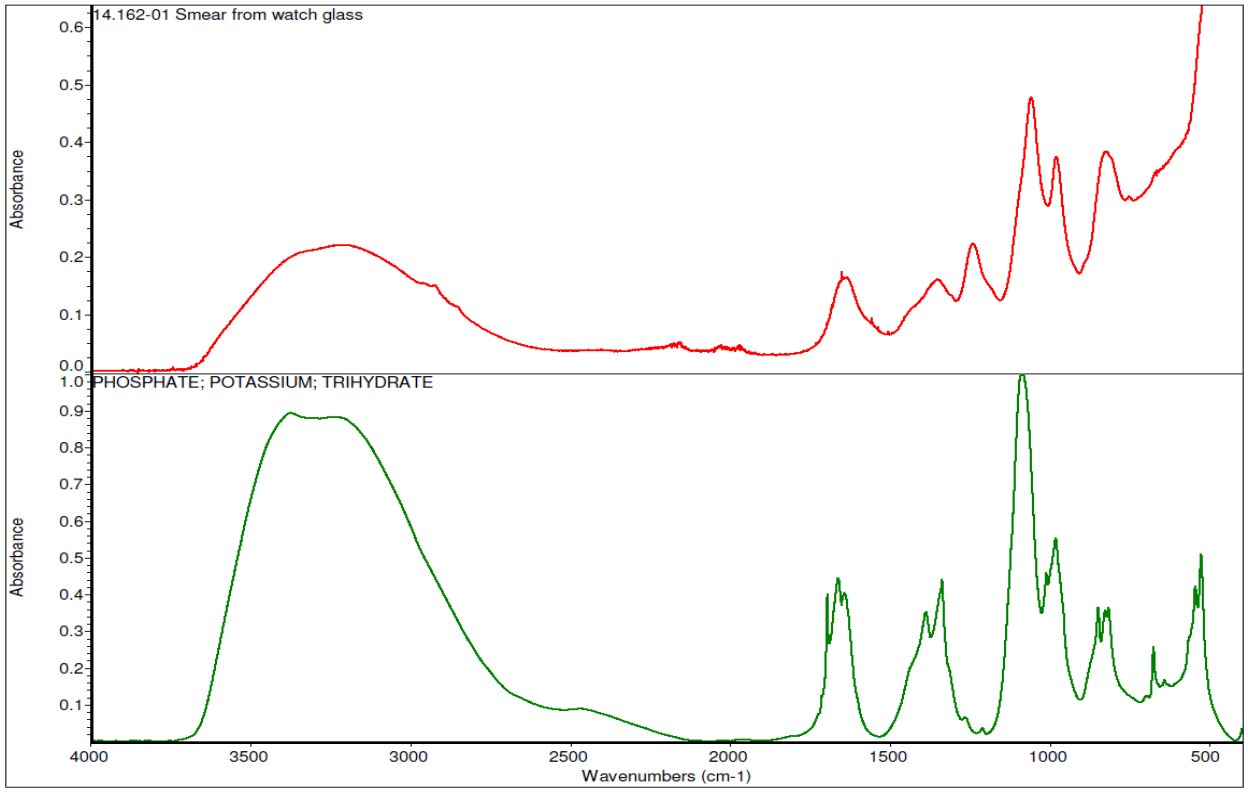

Figure 4: Solute FTIR. Solute infrared absorbance is a close match to Potassium Phosphate, a common pH buffer in coolants.

The results presented in this report relate only to the samples tested.

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