MICROBAC®

January 25, 2017

Carey Gadzala
Microbac - CGL
250 W 84th Drive
Merrillville, IN 46410

Dear Carey Gadzala,

Microbac Laboratories, Inc. Hauser Division completed work order 17A0572 on 1/25/17. Please find the final report on the following pages. Thank you for choosing Microbac Laboratories for your testing needs.

It is our preference to send all reports and invoices electronically when available. If you need any contact information updated or additional contacts added, please communicate your needs to our administrative staff at (720)406-4800 or hauserlabs@microbac.com.

To provide feedback concerning our services, please contact our Quality Department or Trevor Boyce, President of Microbac Laboratories, at trevor.boyce@microbac.com.

Sincerely,

Russell Willacker
Forensics and F/A Manager
Microbac Laboratories, Inc. Hauser Division

TEST REPORT

Ref.: 17A0422 (Microbac CGL)

CLIENT: Microbac CGL
250 W 84th Drive
Merrillville, IN 46410

Attention: Carey Gadzala

SAMPLES: Two samples of oily substances were received on 1/24/2017 for identification. One sample was a light oily residue in a beaker, and the other was a thick, black, oily substance suspended in water. The samples were identified as "17A0422-03" and "17A0422-04", respectively.

TESTING: A specimen of each sample was analyzed by Fourier Transform Infrared (FTIR) spectrometry using a Thermo Nicolet 560 FTIR with a Pike MIRacle Attenuated Total Reflectance (ATR) accessory, according to ASTM E334-01(2013), *Practices for General Techniques of Infrared Microanalysis*. Identification was assisted by comparison to Biorad and/or Hauser-generated infrared spectral libraries.

RESULTS: The IR spectrum of the light, oily 17A0422-03 sample was principally consistent with a mineral oil, as shown in Figure 1.

The IR spectrum of the thick oily 17A0422-04 sample was principally consistent with a mineral oil, as shown in Figure 2.

Per the client's request, the IR spectra are overlaid with the spectrum obtained in the client reference project 17A0253 in Figure 3.

CONCLUSION: Based on sample appearance and FTIR analysis results, the samples are both principally heavy petroleum oil. However, peaks inconsistent with hydrocarbon from approximately 900 cm^{-1} to 600 cm^{-1} may indicated the presence of carbon-chlorine bonds, like a chlorinated hydrocarbon. Testing performed herein was unable to determine if chlorinated hydrocarbons were present.

REPORT WRITTEN BY:

Joel Self
Senior Material Scientist

DATA AND REPORT REVIEWED BY:

Russell Willacker
Forensic and FA Manager

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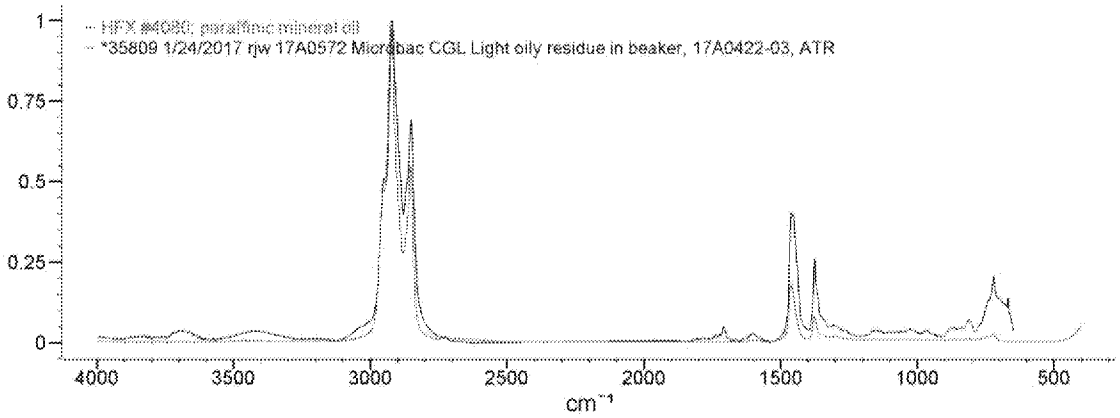

Figure 1. FTIR spectrum of a specimen of the 17A0422-03 sample (black spectrum) compared with a reference spectrum of a mineral oil (orange spectrum).

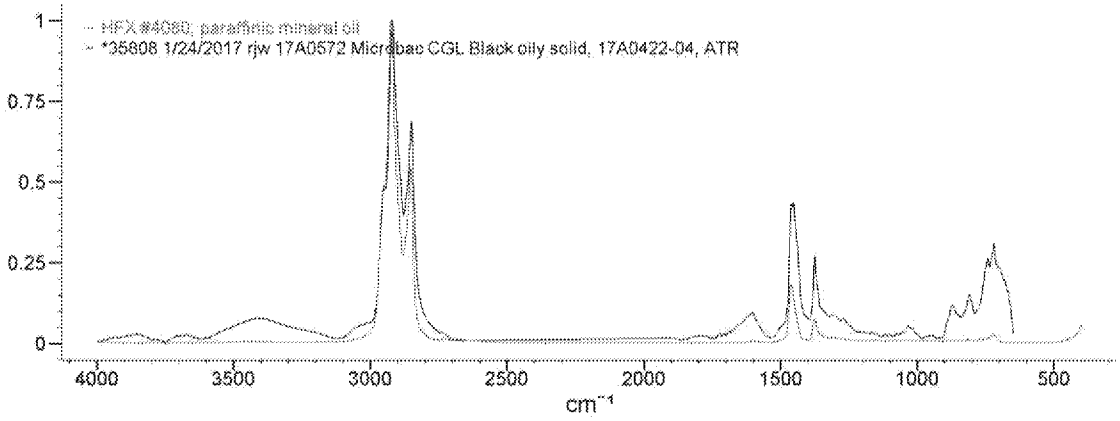

Figure 2. FTIR spectrum of a specimen of the sample (black spectrum) compared with a reference spectrum of a mineral oil (orange spectrum).

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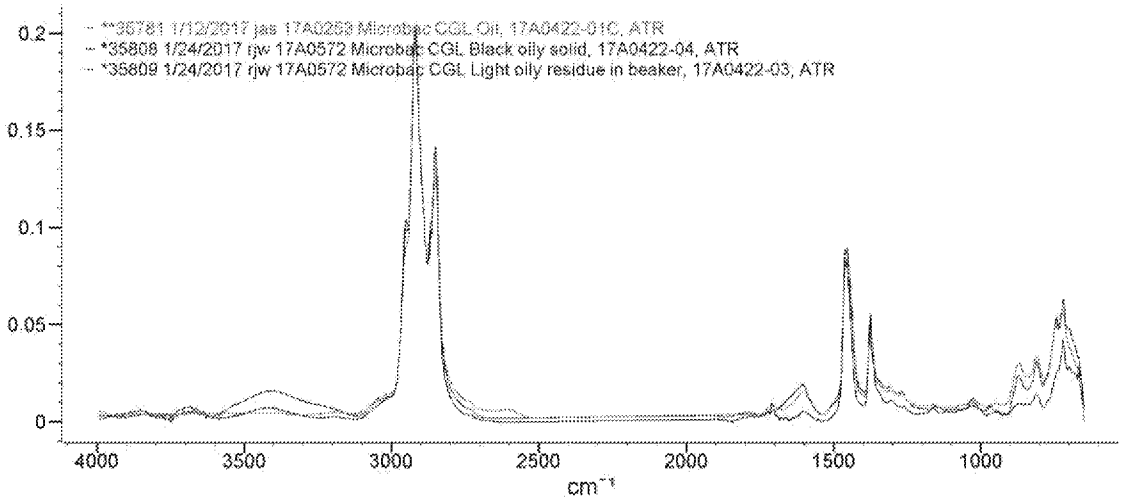

Figure 3. IR spectra of the 17A0422-03 sample (black spectrum) and the 17A0422-04 sample (blue spectrum) overlaid with the IR spectrum of the alkane hydrocarbon from reference project 17A0253 (orange spectrum). The sharp peak at ~700 cm^{-1} may indicate the presence of chlorinated hydrocarbon.

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