Houston Forensic Science Center

INTEROFFICE MEMO

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From: Corissa Rodgers, M.S., Supervisor – Toxicology

Corissa L. Rodgers, M.S. Digitally signed by Corissa L. Rodgers, M.S. Date: 2021.01.08 17:39:03 -06'00'

cc: Dayong Lee, Ph.D., Manager – Toxicology

Dayong Lee Digitally signed by Dayong Lee Date: 2021.01.09 13:04:36 -06'00'

Date: January 8, 2021

Re: Updates to alcohol analysis workflow

1. **Headspace instrument computers replaced, and remote data access capability introduced**
   The Toxicology section utilizes two headspace gas chromatographs for the analysis of blood and liquid samples for alcohol and other volatiles, Headspace 2 and Headspace 3. During the week of December 21, 2020, the instrument computers were upgraded to newer systems and the software and firmware versions were updated. Further, as part of a multi-section effort, Agilent Technologies connected Headspace 2 and 3 to a HFSC network which allows for remote access to the data on the instruments via the data management software called OpenLab ECM. The continued capability of the instruments to produce acceptable quantitative results was demonstrated in verification studies "Verification_HS-2_2020-12-30" and "Verification_HS-3_2020-12-30". These studies can be accessed on the HFSC eDiscovery Records Warehouse (https://records.hfscdiscovery.org/). Headspace 2 and 3 were approved to resume alcohol analysis casework on December 30, 2020.

2. **Method parameter updates for alcohol analysis**
   As part of the instrument computer upgrades, the acquisition method VOLATILES.M was rebuilt on the new instrument computers. The method parameters were replicated from VOLATILES.M, though the updated software caused slight changes in a few parameters. Differences between the previously approved method and the updated method are summarized in the table below. As demonstrated in "Verification_HS-2_2020-12-30" and "Verification_HS-3_2020-12-30" approved on December 30, 2020, these parameter changes did not alter the ability of the instruments to produce reliable and accurate results.

Method Parameter	*Previous,* approved for casework on August 10, 2016 (Headspace 2) May 17, 2016 (Headspace 3)	*Updated,* approved for casework on December 30, 2020
Total Flow	82.363 mL/min	80 mL/min
Control Mode	N/A (no such parameter)	Constant Flow on Column 1, Constant Pressure on Column 2 (resulting in equal flow and pressure as previous)
Carrier Gas Flow Correction	Does not affect Makeup or Fuel Flow	Constant Makeup and Fuel Flow
Column 2 Post Run*	10 psi	Headspace 2: 24.899 psi Headspace 3: 10 psi
Signal #3 and #4	Test Plot	None
Signal Specific Integration Event Table "Event_FID1A"	Headspace 2: 3.10 area reject at 1.30 min Headspace 3: 3.60 area reject at 1.10 min	None
Signal Specific Integration Event Table "Event_FID2B"	Headspace 2: 2.96 area reject at 1.18 min Headspace 3: 3.40 area reject at 1.20 min	None

*While included in the method printout, this parameter is controlled by the Oven Post Run settings. Because there is no time program for a post run, the associated temperatures and pressures are not applicable. Therefore, even though the pressure appears on the method printout, it is not used in our acquisition.

3. **Revisions made to laboratory forms LAB-51, LAB-67, LAB-86, and LAB-108 (effective January 4, 2021)**
The alcohol analysis data review and batch paperwork compilation process routinely completed by the Toxicology section utilizes an Excel workbook that combines four separate controlled laboratory forms: LAB-51, Volatile Confirmation Worksheet; LAB-67, Volatile Batch QC Data; LAB-86, Volatile Analysis Summary; and LAB-108, Supplemental Volatile Confirmation Worksheet. Significant revisions were made to LAB-86; this section will describe the major changes that go into effect January 4, 2021.

   In previous versions of LAB-86, percent difference between each aliquot of sample and the average was calculated using the following formula below, where "Avg" is the average of two separate case preparation values, "Alq1" is the value from the first preparation, and "Alq2" is the value from the second preparation:

   [MAX(Avg or Alq1)-MIN(Avg or Alq1)]/MIN(Avg or Alq1)*100
   [MAX(Avg or Alq2)-MIN(Avg or Alq2)]/MIN(Avg or Alq2)*100

   Though the formula provides a conservative calculation of percent difference, a more accurate calculation is obtained by the following formula, which uses the average as the reference value and more closely represents the intent of the case specimen acceptance criteria described in the Toxicology Analytical Manual v.3.4, section 23.10.6:

   (Avg-Alq1)/Avg*100 or **(Avg-Alq2)/Avg*100**

   Thus, alcohol batches which included the previous versions of LAB-86 may have incorrectly led to a higher percent difference than the true value in the columns labeled "% Difference (FID1 & Average)". This had no impact on the reporting of casework results because the formula resulted in a higher estimate, and therefore could cause an acceptable sample to fail to meet acceptance criteria but not the reverse.

Similarly, in previous versions of LAB-86, percent difference between the values obtained on FID1 and FID2 in a single aliquot was calculated using the following formula:

[MAX(FID1 or FID2)-MIN(FID1 or FID2)]/MIN(FID1 or FID2)*100

Because the FID1 value is used for reporting and FID2 value is used to verify the FID1 value only and is not included in the calculation of the reported value, the FID1 value will be used as the reference in the new revision. The percent difference between FID1 and FID2 will now be calculated using the following:

(FID1-FID2)/FID1*100

Again, alcohol batches which included previous versions of LAB-86 may have incorrectly led to a higher percent difference between the FID values than the true value in the column labeled “% Difference (FID1 & FID2)”. This had no impact on the reporting of casework results because while the formula may have resulted in a higher estimate, it could cause an acceptable sample to fail to meet acceptance criteria but not the reverse.