Texas Forensic Science Commission

Justice Through Science

FINAL REPORT ON COMPLAINT NO. 20.60 CANTU, GERARD (ARMSTRONG FORENSIC LABS; SEIZED DRUGS)

July 16, 2021

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I. COMMISSION BACKGROUND AND JURISDICTION

A. History and Membership

The Texas Legislature created the Forensic Science Commission ("Commission") during the 79th Legislative Session in 2005 with the passage of HB-1068. The Act amended the Code of Criminal Procedure to add Article 38.01, which describes the composition and authority of the Commission.[1] During subsequent legislative sessions, the Texas Legislature further amended the Code of Criminal Procedure to clarify and expand the Commission's jurisdictional responsibilities and authority.[2]

The Commission has nine members appointed by the Governor of Texas.[3] Seven of the nine commissioners are scientists or medical doctors and two are attorneys (one prosecutor nominated by the Texas District and County Attorney's Association and one criminal defense attorney nominated by the Texas Criminal Defense Lawyer's Association).[4] The Commission's Presiding Officer is Jeffrey Barnard, MD. Dr. Barnard is the Chief Medical Examiner of Dallas County and Manager of the Southwestern Institute of Forensic Sciences in Dallas.

B. Investigations of Professional Negligence and Misconduct

Texas law requires the Commission to "investigate, in a timely manner, any allegation of professional negligence or professional misconduct that would substantially affect the integrity of the results of a forensic analysis conducted by a crime laboratory."[5]

The term "forensic analysis" is defined as a medical, chemical, toxicological, ballistic, or other examination or test performed on physical evidence, including DNA evidence, for the

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[1] TEX. CODE CRIM. PROC. art. 38.01
[2] *See e.g.*, Acts 2013, 83rd Leg. ch. 782 (S.B. 1238) §§ 1-4 (2013); Acts 2015, 84th Leg. ch. 1276 (S.B. 1287) §§ 1-7 (2015); TEX. CODE CRIM. PROC. art 38.01 § 4-a(b).
[3] *Id.* § 3.
[4] *Id.*
[5] TEX. CODE CRIM. PROC. art. 38.01 § 4(a)(3).

purpose of determining the connection of the evidence to a criminal action.[6] The statute excludes certain types of analyses from the "forensic analysis" definition, such as latent fingerprint analysis, a breath test specimen, and the portion of an autopsy conducted by a medical examiner or licensed physician.[7] The statute does not define the terms "professional negligence" and "professional misconduct." The Commission has defined those terms in its administrative rules.[8]

C. Accreditation Jurisdiction

The Code of Criminal Procedure prohibits forensic analysis from being admitted in criminal cases if the crime laboratory conducting the analysis is not accredited by the Commission.[9]

The term "crime laboratory" includes a public or private laboratory or other entity that conducts a forensic analysis.[10] As part of its accreditation authority, the Commission may establish minimum standards relating to timely production of forensic analysis; validate or approve specific forensic methods or methodologies; and establish procedures, policies and practices to improve the quality of forensic analysis in the state.[11] The commission is permitted, at any reasonable time, to enter and inspect the premises or audit the records, reports, procedures, or other quality assurance matters of a crime laboratory that is accredited.[12]

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[6] TEX. CODE CRIM. PROC. art. § 38.35(a)(4).
[7] For complete list of statutory exclusions see TEX. CODE CRIM. PROC. art. 38.35 (a)(4)(A)-(F) and (f).
[8] "Professional misconduct" means the forensic analyst or crime laboratory, through a material act or omission, deliberately failed to follow the standard of practice that an ordinary forensic analyst or crime laboratory would have followed, and the deliberate act or omission would substantially affect the integrity of the results of a forensic analysis. An act or omission was deliberate if the forensic analyst or crime laboratory was aware of and consciously disregarded an accepted standard of practice required for a forensic analysis. "Professional negligence" means the forensic analyst or crime laboratory, through a material act or omission, negligently failed to follow the standard of practice that an ordinary forensic analyst or crime laboratory would have followed, and the negligent act or omission would substantially affect the integrity of the results of a forensic analysis. An act or omission was negligent if the forensic analyst or crime laboratory should have been but was not aware of an accepted standard of practice. 37 Tex. Admin. Code § 651.302 (7) and (8) (2020).
[9] TEX. CODE CRIM. PROC. art. 38.35 §(d)(1).
[10] TEX. CODE CRIM. PROC. art. 38.35 §(a)(1).
[11] TEX. CODE CRIM. PROC. art. 38.01 § 4-d(b-1).
[12] *Id.* at § 4-d(d).

D. Jurisdiction Applicable to this Complaint

The forensic discipline discussed in this final investigative report—Seized Drugs Analysis—is subject to the Commission's jurisdiction. Armstrong Forensic Laboratory, Inc. ("Armstrong"), is a laboratory accredited by the Commission and the ANSI-ASQ National Accreditation Board ("ANAB") under the International Organization for Standardization accreditation standard ("ISO") 17025.[13]

E. Limitations of this Report

The Commission's authority contains important statutory limitations. For example, no finding by the Commission constitutes a comment upon the guilt or innocence of any individual.[14] The Commission's written reports are not admissible in civil or criminal action.[15] The Commission has no authority to subpoena documents or testimony. The information the Commission receives during any investigation is dependent on the willingness of stakeholders to submit relevant documents and respond to questions posed. The information gathered in this report has not been subject to the standards for admission of evidence in a courtroom. For example, no individual testified under oath, was limited by either the Texas or Federal Rules of Evidence (*e.g.*, against the admission of hearsay) or was subject to cross-examination under a judge's supervision.

II. SUMMARY OF COMPLAINT

A. Complaint Background

On November 2, 2020, Webb County Assistant Public Defender Gerard A. Cantu (Complainant) filed a complaint with the Commission alleging various problems with Armstrong's use of Gas Chromatography with Dual Flame Ionization Detection ("GC-FID") to quantify the

[13] *See*, http://www.txcourts.gov/fsc/accreditation/ for a list of accredited laboratories.
[14] TEX. CODE CRIM. PROC. art. 38.01 § 4(g) (2019).
[15] *Id.* at § 11 (2019).

concentration of delta-9 Tetrahydrocannabinol ("delta-9 THC") in five plant material samples seized from Complainant's client at a United States Border Patrol checkpoint on March 18, 2017.[16]

In February 2020, the Webb County District Attorney's Office retained Armstrong for the purpose of analyzing the seized plant material. On March 4, 2020, Armstrong reported that the concentration of delta-9 THC and related measurement uncertainty for the five plant exhibits was as follows: 3.02% (± 0.25%); 2.02% (± 0.16%); 2.28% (± 0.18%); 3.13% (± 0.25%); and 1.82% (± 0.15%).[17] Armstrong also reported that the method used for the quantitative analysis was GC-FID.[18]

Upon receiving the laboratory report, the Complainant noted the reported results were close to the statutory cutoff for distinguishing hemp from marihuana (0.3%). The Webb County Public Defender's Office retained Dr. Kevin Shrug, Shimadzu Distinguished Professor of Analytical Chemistry from the University of Texas at Arlington, for assistance with understanding and analyzing the data. Dr. Shug identified a list of alleged problems with the methodology, which the Complainant outlined in his submission to the Commission.

At its January 29, 2021 quarterly meeting, the Commission voted to form an investigative panel ("Panel") to assist the Commission in determining whether Complainant's allegations are supported by available data and related documentation. The Panel includes Patrick Buzzini, Ph.D., Jasmine Drake, Ph.D. and Sarah Kerrigan Ph.D.

[16] (*See,* Exhibit A).
[17] *Id.*
[18] (*See* Exhibit C).

B. Distinguishing Marihuana from Hemp in Forensic Laboratories

1) The Legalization of Hemp

On December 20, 2018, the Agriculture Improvement Act of 2018 legalized the industrial production of hemp nationwide while simultaneously removing hemp from the Controlled Substances Act. Hemp was reclassified as an agricultural product and the United States Department of Agriculture (USDA) was charged with publishing regulations governing the industry. The legislation delegated to states and Indian tribes through their departments of agriculture the broad authority to regulate and limit the production and sale of hemp products within their borders.

Under the Texas Hemp Bill (HB-1325) and many similar bills adopted in state legislatures around the country, marihuana and tetrahydrocannabinol, or THC (excluding the limited THC in hemp), remain illegal substances. THC is the predominant chemical component that induces the "high" effect. What changed under Texas law, similar to the federal legislation, is that "hemp" is now *excluded from* the definition of "controlled substance" and "marihuana."[19]

Hemp and marihuana both come from the cannabis plant. Different parts of the plant have different delta-9 THC concentrations and various factors may impact whether a particular plant sample exceeds the statutory delta-9 THC limit of 0.3%. For example, if a hemp farmer waits too long to harvest, the delta-9 THC in the crop may exceed the legal threshold. Before hemp was legalized, laboratories reported a positive result if cannabinoids were present. When no cannabinoids were detected, the laboratory reported no controlled substance. The laboratories were

[19] Hemp is defined as "the plant *Cannabis sativa* L. and any part of that plant, including the seeds of the plant and all derivatives, extracts, cannabinoids, isomers, acids, salts of isomers, whether growing or not, with a delta-9 tetrahydrocannabinol concentration of not more than 0.3 percent on a dry weight basis."

not required to *quantitate* delta-9 THC, i.e., to *identify the amount of delta-9 THC* as distinguished from other cannabinoids.

2) Gas Chromatography-Flame Ionization Detection for Quantitation

The method employed by Armstrong to quantitate the amount of delta-9 THC in the plant material at issue in this complaint is Flame Ionization Detection (FID), a gas chromatography (GC) detection method. An FID uses a hydrogen-burning flame that is placed at the end of the chromatographic column, which decomposes gaseous organic compounds as they enter the flame. It is a commonly used method among forensic laboratories. For example, the proficiency test provider Collaborative Testing Services, Inc. Forensic Testing Project Marihuana Identification and THC Quantitation Test No. 19-503 reported 27 participants that quantitated delta-9 THC. Fifty-two percent of those who participated in the test used GC-FID for quantitation. CTS Test No. 20-503 had 75 participants (n=75) with 27% using GC-FID for quantitation of delta-9 THC.

C. Allegations

The following describes each allegation submitted by the Complainant and Armstrong's response:

ALLEGATION 1: *Armstrong did not report sample storage conditions.*

Armstrong's Response: Armstrong took possession of the evidence on February 24, 2020, and initiated analysis on February 27, 2020. Sample storage conditions in the laboratory were at room temperature in a secured evidence locker with controlled access. Neither the timeline nor the storage conditions would have affected the delta-9 THC concentration.

ALLEGATION 2: *The solvents Armstrong used for extraction may not allow a quantitative extraction of the acid forms.*

Armstrong's Response: Extraction efficiencies for delta-9 THC and THC-A are highly dependent on numerous factors including solvent polarity, temperature, sample particle size, extraction time, and agitation. An extraction efficiency less than 100% would result in detecting less delta-9 THC than what was detected in the analyses.

ALLEGATION 3: *There is no indication that Armstrong performed a full or partial validation after modifications were made to the instrument such as changing septum, syringe and liner.*

Armstrong's Response: The laboratory validated the methodology before issuing any quantitative results. Armstrong's quality control procedures re-validate the method with each batch. Should the quality control acceptance criteria not be met, results are not reported. If routine maintenance such as changing the septum, syringe, or liner were to impact the reliability of the analysis, it would be immediately identified and corrected.

ALLEGATION 4: *Armstrong ran the samples in duplicates not triplicates. No blanks were run between samples.*

Armstrong's Response: There are no legal or accreditation requirements that analysis must be run in triplicate or that blanks be run between samples. For every analysis performed, duplicate results are obtained due to the use of dual column chromatography. To evaluate reproducibility, replicate (duplicate) preparations are made of one sample in each analytical batch.

In the batch that is the subject of this complaint, one of the subject items was analyzed in duplicate. All four (4) results of the replicate analysis (i.e., two preparations analyzed by dual column chromatography) are in agreement within the reported measurement uncertainty.

In all cases, Armstrong reports the replicate results with the lowest concentration of delta-9 THC. The most conservative result is always reported, to provide the benefit of the doubt to the defendant. Multiple blank samples are analyzed throughout the batch. Blanks are analyzed following the reference standards and also after an analysis of samples. No carryover was observed in this analysis.

ALLEGATION 5: *Armstrong ran the standard on July 3, 2019, seven months before the laboratory received the samples.*

Armstrong's Response: The instrument calibration was conducted on November 1, 2019 and verified in the quality control data for the sample batch analyzed on February 28, 2020. Reference standards of delta-9 THC are always run with each analytical batch, concurrently with the reference sample.

ALLEGATION 6: *There were shifted retention times between the standard & samples.*

Armstrong's Response: There were no significant shifts in the retention times between the standards and samples. The retention times for analyte delta-9 THC for the analytical sequence batch containing the quality control sample and questioned samples are provided in a table attached to Exhibit _ of this report. There was less than one second deviation in the batch on Signal 1. On the second column/detector (Signal 2), no retention time deviation was observed. The retention time variation for the batch was negligible, and is well within the normal tolerances for gas chromatography analyses.

ALLEGATION 7: *According to the batch information, Armstrong ran Sample 5 once with no replicates.*

Armstrong's Response: This observation is incorrect. Replicate results for Sample 5 were obtained via dual column gas chromatography.

ALLEGATION 8: *There is a large concentration gap between the standards 0.4 and 4.00 used to perform the calibration curve.*

Armstrong's Response: The calibration scheme was carefully chosen to have the greatest accuracy for samples at the decision point. To have greater accuracy in the analysis at the critical concentration, six low calibrators were utilized and one high calibrator was utilized to establish linearity.

The typical preparation procedure for plant material utilizes a 0.5 gram sample extracted with 40 milliliters of solvent. Under these conditions, a sample containing 0.3% delta-9 THC would exhibit a response near 40 µg/mL. The 40 µg/mL calibrator was bracketed by three lower calibrators and three higher calibrators.

ALLEGATION 9: *The data provided do not show accuracy (quality control samples).*

ALLEGATION 10: *The data provided do not show precision.*

ALLEGATION 11: *The data provided do not include carryover analysis.*

Armstrong's Response to Allegations 9, 10 & 11: Armstrong's quality control process includes initial calibration verification, second source verification, laboratory control spike with duplicate, and assorted blanks. Precision and reproducibility are demonstrated with these data. The blank samples analyzed in the batch verify that no carryover is occurring.

ALLEGATION 12: *Armstrong should have reported conversion of natural constituents such as tetrahydrocannabinolic acid (THCA) into THC, under the analytical conditions used. The data provided do not show conversion efficiency.*

Armstrong's Response: The conversion efficiency was evaluated during initial method validation. A low conversion efficiency will benefit the defendant by reducing the concentration of delta-9 THC, if THCA is present in the sample. This observation does not benefit the defendant and would not change the interpretation of whether the evidence was hemp or marihuana based on the statutory cutoff.

ALLEGATION 13: *Both the chromatographic system and analytical conditions applied must be validated as to ensure complete decarboxylation, without causing decomposition of delta-9 THC. These data are not shown.*

Armstrong's Response: The decarboxylation of THCA was evaluated during initial method validation. Certified reference standards of delta-9 THC from multiple sources were used in the analyses. No thermal degradation was observed in any of the analyses.

If complete decarboxylation of THCA to delta-9 THC does not occur, it will only bias the results in defendant's favor. This observation does not benefit the defendant and does not change the interpretation of whether the evidence was hemp or marihuana.

ALLEGATION 14: *There is no indication of what inlet liner Armstrong used. Conversion of delta-9 THCA-A to delta-9 THC (total content assays) is influenced by the type of inlet liner used and inlet temperature.*

Armstrong's Response: The possibility of conversion of THCA to delta-9 THC based on inlet liner type would not change the interpretation of whether the evidence was hemp or marihuana in this case based on the quantitation percentages and the statutory cutoff.

ALLEGATION 15: The presence of other peaks in the chromatogram may suggest oxidation of THC resulting in the process of decarboxylation not proceeding in a quantitative manner.

Armstrong's Response: The presence of additional peaks in the sample chromatograms is expected, due to the presence of other cannabinoids that naturally occur in Cannabis Sativa L. Any decarboxylation of THCA-A will only cause a decreased concentration of delta-9 THC detected.

ALLEGATION 16: *The data do not show interference analysis and resolution of volatiles. The detector used (FID) does not have the ability to determine if other compounds are co-eluting with delta-9 THC which could cause an overestimation of the concentration of this compound.*

Armstrong's Response: The use of two chromatographic columns with different polarities (substrates) is designed to eliminate interference from possible co-elution. In every analysis, the lowest concentration of delta-9 THC is reported, to provide the benefit of the doubt to the defendant.

ALLEGATION 17: *The data do not show peak integration.*

Armstrong's Response: All samples, calibrators, and quality control standards are processed and integrated using the same parameters.

ALLEGATION 18: *Armstrong did not provide standard operating procedures detailing sample preparation and data treatment.*

Armstrong's Response: The SOP documenting sample preparation and data treatment was provided with the production in the litigation.

ALLEGATION 19: *The data are missing chromatograms of standards and QCs run on the same day as the samples.*

Armstrong's Response: The laboratory provided the analytical results for the sample batch quality control, including initial calibration verification, laboratory control spikes, second source verification and blanks.

D. ANAB Review

When the Commission received this complaint, ANAB was in the process of reviewing another related complaint filed with ANAB by Benson Varghese, a criminal defense attorney from Tarrant County. In light of ANAB's parallel review, Commission staff forwarded this complaint to ANAB for their consideration. Some of the conclusions reached by ANAB during the review of the Varghese complaint are relevant here. They include the following:

1. The use of GC-FID has support in the published scientific literature as a reliable technique for the quantitation of delta-9 THC and other cannabinoids. GC-FID is a technique commonly used for this analysis by forensic science service providers.[20]

2. Based on the overall analytical scheme used for identification of marihuana and quantitation of delta-9 THC and review of method validation records, records of ongoing method use, and performance in both the NIST CannaQAP Interlaboratory Comparison and the Collaborative Testing Services, Inc. proficiency test, *method specificity is appropriate*.

3. Based on a review of method validation records, records of ongoing method use and performance in both the NIST CannaQAP Interlaboratory Comparison and the Collaborative Testing Services, Inc. proficiency test, *method accuracy is supported*.

III. COMMISSION INVESTIGATION

A. Initial Review by Investigative Panel

The Panel initially reviewed the following items in investigating this matter: relevant reports and case files; the initial response from Armstrong[21] including method validation data for its GC-FID; the batch list including the subject case samples and analytical data for calibrators and

[20] Collaborative Testing Services, Inc. Forensic Testing Project Marihuana Identification and THC Quantitation Test No. 19-503 had 27 participants quantitate delta-9 THC with 52% of them using GC-FID for quantitation in this proficiency test. CTS 20-503 had an increased number of participants (n=75) with 27% using GC-FID for quantitation of delta-9 THC.
[21] (*See,* Exhibit C).

controls associated with the subject batch; and documentation concerning ANAB's method validation review responsive to the parallel Varghese complaint filed with ANAB.

On March 11, 2021, the Panel reviewed the information provided by Armstrong with the goal of assessing the rigor of Armstrong's validation and determining whether Armstrong demonstrated through the validation process that none of the potentially coeluting species (*e.g.,* CBD, CBC, CBG, delta-8 THC) cause interference. The initial validation data provided by Armstrong did not contain sufficient detail to make this assessment. The validation summary did not specify which compounds were evaluated for the interference and linear range of the assay. It also did not include the number of replicates run, or at what concentration they were run to achieve the reported precision of 1.6%. It was also unclear from the information provided whether any actual plant matrix was included as part of the validation.

Panel members requested the following in a March 23, 2021 letter to Armstrong:[22]

1. The batch list for the GC-FID run(s) that included the case samples referenced in the complaint (previously provided).

2. Complete analytical (instrument) data for the calibrators and controls (positive and negative) for the batch or batches in which the case evidentiary samples were process.

3. A list of compounds (including other cannabinoids) that were evaluated in the specificity/interference study as part of method validation.

4. The number of replicates analyzed as referenced in the "specificity" section of the procedure validation summary,

5. The approximate timeframe during which ANAB reviewed the method validation that is the subject of the complaint; and

6. A description of the information provided to ANAB during their method validation review and a copy of the actual (instrument) data provided.

Armstrong provided materials responsive to the request on April 7, 2021.

[22] (*See,* Exhibit D).

B. Investigative Panel Review of Materials Responsive to its March 23, 2021 Letter

The Panel reviewed the supplemental materials responsive to their March 23, 2021 request provided by Armstrong, including a letter response.[23] Relevant information includes the following:

- Armstrong has evaluated the specificity against numerous cannabinoids including: cannabidiol (CBD), cannabigerol (CBG), cannabidiolic Acid (CBDA), cannabinol (CBN), delta-9 tetrahydrocannabinol (delta-9 THC), cannabichromene (CBC), tetrahydrocannabinolic acid-A (THCA-A), and delta-8 tetrahydrocannabinol (delta-8 THC).

- Armstrong has observed no naturally occurring cannabinoids with retention times similar to delta-9 THC under the analytical conditions. Samples containing high levels of other tetrahydrocannabinols (*e.g.,* delta-8 THC) are always analyzed by GC/MS to confirm the identification of delta-9 THC.

- The precise number of samples and standards analyzed during the method development process is unknown. The word "replicate" used in the specificity section of the validation summary is a reference to replicate (duplicate) results achieved with each analysis through the use of the dual-column GC-FID system. Each analysis is simultaneously performed using two columns with different (stationary phase) chemistries. The concentrations are determined by independent calibration of each detector and the concentrations observed in the sample analyses are consistent between the two channels, within the reported measurement uncertainty.

IV. FINDINGS

A. Findings Regarding Method Validation Review

The Commission agrees with ANAB's general findings regarding the use of GC-FID for quantitation of delta-9 THC and other cannabinoids. Although FID is less specific than other detectors (e.g. mass spectrometry or MS), the method has support in the published scientific literature as a reliable technique and is commonly used by forensic science service providers nationwide.

[23] (*See,* Exhibit E).

Many of the issues cited by the Complainant's expert are unfounded and would in fact *lower* the THC concentration to the defendant's benefit as Armstrong indicated in its response. Others allegations lacked scientific merit or were not generally accepted as appropriate quality measures. An example would be the suggestion that the laboratory perform a validation after routine preventive maintenance.

Non-specific detectors do have some limitations for the analysis of unknowns. However, they are widely used in regulatory testing and for quantitative analysis. Interferences must be carefully evaluated, and additional safeguards (such as multiple GC columns) are often utilized in a forensic setting. Armstrong demonstrated through its validation data that none of the commonly encountered cannabinoids in plant material caused interference in a way that would raise questions regarding the validity and reliability of the reported delta-9 THC quantitation results. After reviewing the data including follow-up information requested as described above, the Commission concurs with ANAB's conclusion that Armstrong's GC-FID method accuracy is supported and method specificity is appropriate.

The Complainant raised questions regarding the storage conditions of the plant material. The storage conditions as described by Armstrong were in compliance with accepted standards for the discipline and the type of evidence in question. However, it should be noted that the Commission's jurisdiction is over crime laboratories. The plant material did not arrive at the laboratory until approximately three years after it was confiscated at the Border Control checkpoint. The Commission has no information regarding the storage conditions or evidence handling practices in the three-year period before the material arrived at the laboratory.

B. Marihuana Potency

The Commission appreciates the Complainant's concern that the quantitation results in this case were close to the statutory cutoff for distinguishing hemp from marihuana. The National Institute on Drug Abuse (NIDA) conducts regular analyses to monitor the potency of cannabis products distributed in the illegal marihuana marketplace in the United States. Samples are submitted to NIDA for analysis by the Drug Enforcement Agency (DEA) as well as state and local law enforcement agencies. The following table provides the average percentage delta-9 THC and CBD potency of cannabis samples analyzed from 2016-2019:[24]

Year	**THC %**	**CBD %**
2016	11.52	0.18
2017	14.26	0.14
2018	15.07	0.29
2018	14.35	0.24

The experience of crime laboratories in Texas is consistent with the data shown in this table. Because most confiscated marihuana averages a THC concentration well above 10%, some laboratories have an administrative policy of not reporting a sample as positive for marihuana unless the THC concentration exceeds an amount above the 0.3% statutory threshold. For example, the United States Army Crime Laboratory has adopted an administrative cutoff for its hemp/marihuana differentiation method at 4%. Other laboratories have set administrative thresholds for hemp/marihuana differentiation at 1% or 2%.

[24] https://www.drugabuse.gov/drug-topics/marijuana/marijuana-potency

It is not uncommon to find CBD products (including plant material) that have a THC concentration slightly higher than the legal threshold for hemp. As previously stated, the simple decision of a farmer to harvest plant material too late may yield THC concentrations that exceed the statutory cutoff. While this information is commonly known within the forensic community, it is far less obvious to lawyers and judges but could be helpful in the assessment of the best course of action when considering criminal prosecution.

C. No Finding of Professional Negligence or Misconduct

"Professional Misconduct" means the forensic analyst or crime laboratory, through a material act or omission, deliberately failed to follow a standard of practice that an ordinary forensic analyst or crime laboratory would have followed, and the deliberate act or omission would substantially affect the integrity of the results of a forensic analysis. An act or omission was deliberate if the forensic analyst or crime laboratory was aware of and consciously disregarded an accepted standard of practice.[25] The Commission finds no evidence of professional misconduct by Armstrong.

"Professional negligence" means the forensic analyst or crime laboratory, through a material act or omission, negligently failed to follow the standard of practice that an ordinary forensic analyst or crime laboratory would have followed, and the negligent act or omission would substantially affect the integrity of the results of a forensic analysis. An act or omission was negligent if the forensic analyst or crime laboratory should have been but was not aware of an accepted standard of practice. The Commission finds no evidence of professional negligence by Armstrong.

[25] 37 Tex. Admin. Code §651.302(7) (2020).

V. RECOMMENDATIONS

The Commission often requests information from laboratories related to the scope and parameters of their internal validation studies. These data are essential to the expeditious evaluation of issues raised in a complaint. The Commission encourages Armstrong and all laboratories to maintain comprehensive validation documents that summarize the scope and parameters of internal validation efforts. These documents should be sufficiently detailed, comprehensive and organized to allow another qualified scientist, with proper training and expertise, to understand the validation study and evaluate the data generated.

EXHIBIT A

The Form 'FSC Complaint' was submitted

noreply <noreply@txcourts.gov>
Fri 11/6/2020 1:57 PM
To: FSC Information <Info@fsc.texas.gov>

3 attachments (16 MB)
thc_lab_report.pdf; armstrong_discovery.pdf; issues_found.pdf;

Form Results

Name
Gerard A. Cantu, Attorney at Law

Street Address
1110 Washington Street, Suite 102;

City
Laredo

State
Texas

Zip Code
78040

Email
gecantu@webbcountytx.gov

Home Phone
9565234108

Individual / Laboratory
Armstrong Forensic Laboratory, Inc.

Street Address
330 Loch'n Green Trail;

City
Arlington

State
Texas

Zip Code
76012-3458

Date of Examination, Analysis, or Report
02/27/2020

Type(s) of Forensic Analysis
Seized Drugs
Toxicology - Blood Alcohol

Laboratory Case Number
C0FR02175-1

Is the forensic analysis associated with any law enforcement investigation, prosecution or criminal litigation?
Yes

Full Name
Kevin A. Schug

Street Address
Schug Analytical, LLC
2415 Taylor St.;

City
Southlake

State
Texas

Zip Code
76092

Daytime Phone
8172017680

Write a brief statement of the event(s), acts or omissions that are the subject of the complaint.
On or about 2/24/20, Armstrong Forensic Laboratories was hired by the Webb County District Attorney's Office to analyze the concentration of Delta-9 tetrahydrocannabinol on 5 samples of plant material seized at a Border Patrol checkpoint. After receiving the results I retained an expert, Kevin Schug, to help me analyze the data. I requested additional discovery to understand the methodology used by Armstrong Forensic Laboratory, Inc. After reviewing all available data, it was determined that there are issues with the methodology used by Armstrong Laboratory, Inc. for determining the concentration of delta-9 tetrahydrocannabinol (delta-9 THC) in the plant material submitted (See attachment 3 for a detailed list of issues). ;

Attachment 1
thc_lab_report.pdf

Attachment 2
armstrong_discovery.pdf

Attachment 3
issues_found.pdf

Certification
I so certify.

Signature
Gerard A. Cantu

EXHIBIT B

Armstrong
Forensic Laboratory, Inc.
330 Loch'n Green Trail Arlington, Texas 76012-3458
817-275-2691 Fax: 817-275-1883

Andrew T. Armstrong, PhD
Marion K. Armstrong, MSPH, MBA, CIH
Kelly L. Wouters, PhD
Karen M. Deiss, BS

Laboratory Report for Controlled Substances

Evidence Released By:	Webb County District Attorney's Office	Date Received:	02/24/2020
Evidence Released To:	**Armstrong Forensic Laboratory, Inc.**	Lab File No:	**C0FR02175-1**
PD Report Number:	M6-17-0080	Date of Offense:	03/18/2017
Defendant's Name/DOB:	[redacted]	No. of Items:	5
Submitted:	1 Evidence Bag	Type of Items:	Solid

Laboratory ID	Agency Item	Analysis Requested	Evidence Description
C0-02175A-001A	1-B	Controlled Substance and Concentration	Plastic bag labeled "1B" containing a green, leafy, plant material
C0-02175A-002A	1-C	Controlled Substance and Concentration	Plastic bag labeled "1C" containing a green, leafy, plant material
C0-02175A-003A	1-D	Controlled Substance and Concentration	Plastic bag labeled "1D" containing a green, leafy, plant material
C0-02175A-004A	1-E	Controlled Substance and Concentration	Plastic bag labeled "1E" containing a green, leafy, plant material
C0-02175A-005A	1-F	Controlled Substance and Concentration	Plastic bag labeled "1F" containing a green, leafy, plant material

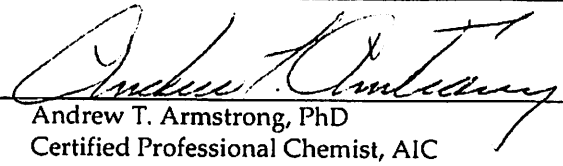
Lab Number:	C0-02175A-001A	**Type:** Solid	*Weight of evidence on receipt:*	0.25 ounces ± 0.01 ounce	
			Weight of evidence at completed analysis:	0.21 ounces ± 0.01 ounce	
Requested Analysis	Results	Identification	Method of Analysis	Analytical Technique	Date of Analysis
Controlled Substance	Positive	*Cannabis sativa* L.	Macroscopical Examination	Cat. B	02/27/2020
	Positive	*Cannabis sativa* L.	Microscopical Examination	Cat. B	02/27/2020
Concentration	3.02% ± 0.25%	delta-9 Tetrahydrocannabinol	Dual Column GC-FID	Cat. B/Cat. B	02/27/2020

Lab Number:	C0-02175A-002A	**Type:** Solid	*Weight of evidence on receipt:*	0.35 ounces ± 0.01 ounce	
			Weight of evidence at completed analysis:	0.32 ounces ± 0.01 ounce	
Requested Analysis	Results	Identification	Method of Analysis	Analytical Technique	Date of Analysis
Controlled Substance	Positive	*Cannabis sativa* L.	Macroscopical Examination	Cat. B	02/27/2020
	Positive	*Cannabis sativa* L.	Microscopical Examination	Cat. B	02/27/2020
Concentration	2.02% ± 0.16%	delta-9 Tetrahydrocannabinol	Dual Column GC-FID	Cat. B/Cat. B	02/27/2020

Lab Number:	C0-02175A-003A	**Type:** Solid	*Weight of evidence on receipt:*	0.23 ounces ± 0.01 ounce	
			Weight of evidence at completed analysis:	0.21 ounces ± 0.01 ounce	
Requested Analysis	Results	Identification	Method of Analysis	Analytical Technique	Date of Analysis
Controlled Substance	Positive	*Cannabis sativa* L.	Macroscopical Examination	Cat. B	02/27/2020
	Positive	*Cannabis sativa* L.	Microscopical Examination	Cat. B	02/27/2020
Concentration	2.28% ± 0.18%	delta-9 Tetrahydrocannabinol	Dual Column GC-FID	Cat. B/Cat. B	02/27/2020

Lab Number:	C0-02175A-004A	**Type:** Solid	*Weight of evidence on receipt:*	0.31 ounces ± 0.01 ounce	
			Weight of evidence at completed analysis:	0.28 ounces ± 0.01 ounce	
Requested Analysis	Results	Identification	Method of Analysis	Analytical Technique	Date of Analysis
Controlled Substance	Positive	*Cannabis sativa* L.	Macroscopical Examination	Cat. B	02/27/2020
	Positive	*Cannabis sativa* L.	Microscopical Examination	Cat. B	02/27/2020
Concentration	3.13% ± 0.25%	delta-9 Tetrahydrocannabinol	Dual Column GC-FID	Cat. B/Cat. B	02/27/2020

Lab Number:	C0-02175A-005A	**Type:** Solid	*Weight of evidence on receipt:*	0.21 ounces ± 0.01 ounce	
			Weight of evidence at completed analysis:	0.19 ounces ± 0.01 ounce	
Requested Analysis	Results	Identification	Method of Analysis	Analytical Technique	Date of Analysis
Controlled Substance	Positive	*Cannabis sativa* L.	Macroscopical Examination	Cat. B	02/27/2020
	Positive	*Cannabis sativa* L.	Microscopical Examination	Cat. B	02/27/2020
Concentration	1.82% ± 0.15%	delta-9 Tetrahydrocannabinol	Dual Column GC-FID	Cat. B/Cat. B	02/27/2020



03/04/2020
Date

Andrew T. Armstrong, PhD
Certified Professional Chemist, AIC
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Texas Forensic Analyst License #0000011
ANAB, Certificate ALI-037-T

Evaluations for drugs of abuse are done by High Resolution Capillary Column Gas Chromatography/Mass Spectrometry (GC/MS), Gas Chromatography-Flame Ionization Detector (GC-FID) and/or Attenuated Total Reflectance-Fourier Transform Infrared Spectroscopy (ATR-FTIR) against a defined target analyte list (TAL). This combination of analytical techniques will detect and identify a broad range of drugs of abuse. They will not, however, detect all controlled substances. The uncertainty values reported represent an expanded uncertainty estimate at the 95.45% level of confidence.

Armstrong Forensic Laboratory, Inc. (Armstrong) is accredited through ANAB and the Texas Forensic Science Commission for criminal casework in the disciplines of Controlled Substances; Toxicology in the category of Blood Alcohol; and Trace Evidence in the categories of Paint, Fibers & Textiles, Fire Debris, and General Physical & Chemical Analysis. Unless noted otherwise, all work performed on this case was in accordance with these requirements and Armstrong's standard operating procedures.

EXHIBIT C

Armstrong
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330 Loch'n Green Trail Arlington, Texas 76012-3458
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Marion K. Armstrong, MSPH, MBA, CIH
Kelly L. Wouters, PhD
Karen M. Deiss, BS

January 13, 2021

Texas Forensic Science Commission Complaint Response
TFSC Case Number 20.60

On November 12, 2020, Armstrong Forensic Laboratory, Inc. (Armstrong) was notified by the Texas Forensic Science Commission of a complaint made against the laboratory. The complaint pertains to Armstrong file number C0FR02175, for which a Laboratory Report was issued on March 4, 2020.

Quantitative Analysis of Delta-9 THC in the Scientific Community

The instrumental method used by Armstrong to quantity the levels of Delta-9 Tetrahydrocannabinol (Delta-9 THC) in this case is Dual Column Gas Chromatography - Flame Ionization Detector (Dual Column GC-FID). There are numerous references in the scientific literature confirming that GC-FID is a recognized, reliable, and accepted technique for performing quantitative analysis of Delta-9 THC. Some examples noted by Armstrong are listed below.

- GC-FID is one of the "Recommended Methods for the Identification and Analysis of Cannabis and Cannabis Products" in documentation published by the United Nations Office on Drugs and Crime; UNODC, Recommended Methods for the Identification and Analysis of Cannabis and Cannabis Products; United Nations; 2009.
- The quantitation of THC is performed by GC-FID in the peer reviewed article "A contribution to the improvement of accuracy in the quantitation of THC"; *Forensic Science International*; 101 (1999) 1-8.
- GC-FID is used to determine the primary active constituents in Cannabis preparations, as published in *Analytica Chimica Acta* 468 (2002) 245–254.
- The potency of D9-THC is measured using dual-column GC-FID, as published in the Journal of Forensic Science; *J Forensic Sci*, September 2010, Vol. 55, No. 5.
- The concentrations of Delta-9 THC in cannabis are also measured by dual column GC-FID in the study published in *European Archives of Psychiatry and Clinical Neuroscience* (2019) 269:5–15.
- In the journal *Addiction Biology*, (June 2005) 10, 171 - 180, GC-FID is used to measure the concentrations of Delta-9 THC in cannabis. In this study, some samples were analyzed by both GC-FID and GC/MS. The authors report that these results never deviated by more than 5%.
- In the reference book chapter "Gas Chromatography in Forensic Chemistry: Cannabinoids Content in Marijuana Leaves (Cannabis sativa L.) from Colombia", the authors analyzed extracts by GC-FID, GC/MS, and GC-MS with Selected Ion Monitoring (SIM). It is reported that the detection by GC-FID showed the lowest variation, so the authors decided to use GC-FID for quantitative analysis of cannabinoids. N.M. Florian-Ramírez, W.F. Garzón-Méndez and F. Parada-Alfonso (2012). "Gas Chromatography in Forensic Chemistry: Cannabinoids Content in Marijuana Leaves (Cannabis sativa L.) from Colombia", *Gas Chromatography - Biochemicals, Narcotics and Essential Oils*, Dr. Bekir Salih (Ed.).

In the CTS Proficiency Test Summary Report for THC Quantitation (Test No. 19-503), GC-FID was the most common analytical method used for quantitation. It is reported that 52% of the study participants used GC-FID for the analysis. For comparison, only 22% of the participants used GC/MS. Clearly, the scientific community supports the use of GC-FID for quantitative analysis of Delta-9 THC.

TFSC Complaint Case Number 20.60

A Daubert hearing was conducted in this case on September 23, 2020. Dr. Andrew Armstrong provided testimony to the court in association with this challenge. As a result of this hearing, the Judge placed no restrictions on the trial testimony. [State of Texas v. [redacted]; In the 406th Judicial District Court of Webb County, TX; Cause Number 2017CRM00 1034 D4; September 23, 2020]

The TFSC complaint was filed by Mr. Gerard Cantu with the Webb County Public Defender's Office. Armstrong's file documentation. as requested, was provided to Mr. Cantu on or about August 28, 2020. According to the complaint documentation, Mr. Cantu retained Dr. Kevin Schug to review the data and documentation. It is not clear from the documentation provided whether Dr. Schug reviewed the data before or after the Daubert hearing.

A list of purported "issues" with Armstrong's methodology has been provided in association with this complaint. In general, each of the issues are either incorrect or irrelevant with respect to the identification of Marihuana. Each of the items listed in the complaint are discussed below. For reference, Armstrong's case file documentation for the subject analysis is provided as Appendix A, Bates numbered 000001 through 000041.

- Sample storage conditions not reported.

The storage conditions are room temperature in a secured evidence locker with controlled access. Armstrong's evidence storage area is inspected regularly by outside assessors in accordance with Armstrong's ANAB accreditation. In this case, storage time at the laboratory prior to testing was minimal. The evidence was received on February 24, 2020, and the analysis was initiated on February 27, 2020. The sample storage conditions did not affect the concentration of Delta-9 THC in the subject items.

- Solvents used for extraction may not allow a quantitative extraction of the acid forms.

Extraction efficiencies for Delta-9 THC and THCA-A are highly dependent on numerous factors including solvent polarity, temperature, sample particle size, extraction time, and agitation. The extraction procedure includes drying and sonication. Solvent selection is based on the published scientific literature. It must be noted an extraction efficiency less than 100% will only bias the results in the defendant's favor. The suggestion that the extraction scheme is not quantitative would only mean that evidence actually contains more Delta-9 THC than what was detected in the analyses. This "issue" does not benefit the defendant and does not change the interpretation of whether the evidence is hemp or marihuana.

- There is no indication that full or partial validation was performed after modifications were made to the instrument such as changing septum, syringe, and liner.

Armstrong validated the methodology prior to issuing any quantitative results. Importantly, Armstrong's quality control procedures re-validate the method with every analytical batch.

All batches of samples are accompanied by Initial and Continuing Calibration Verifications (ICV/CCV), Method Blanks (carried through the extraction process), Laboratory Control Samples and Laboratory Control Sample Duplicates (LCS/LCSD) (carried through the extraction process), and analysis of a Delta-9 THC Solution at 10mg/mL (Std 2 Level) prepared from a second source. Should the quality control acceptance criteria not be met, as specified in the SOP, the results are not reported. If necessary, appropriate corrective steps, such as recalibration, are taken.

These quality control checks ensure that all components of the analytical system are function within the appropriate specifications. If any routine maintenance (such as changing the septum, syringe, or liner) impacted the reliability of the analysis, it would be immediately identified and corrected due to Armstrong's quality control procedures. The quality control documentation is included in each case file, and is found in the subject case in Appendix A, Bates numbers 000031 through 000034.

- Samples were run in duplicates not triplicates. No blanks were run between samples.

There is no accreditation requirement or instruction in HB 1325 for the analysis of triplicate samples, nor the analysis of blanks between every sample. For every analysis performed by Armstrong, duplicate results are obtained, as a result of the use of dual column gas chromatography. In addition, to evaluate reproducibility, replicate (duplicate) preparations are made of one sample in each analytical batch.

In this batch, one of the subject items was analyzed in duplicate. All four (4) results of the replicate analyses (i.e., two preparations analyzed by dual column chromatography) are in agreement within the measurement uncertainty.

In all cases, Armstrong reports the replicate result with the lowest concentration of Delta-9 THC. The most conservative result is always reported, to provide the benefit of the doubt to the defendant.

Multiple blank samples are analyzed throughout the batch. Blanks are analyzed following the reference standards and also after the analysis of samples. No carry over is observed in this analysis. The results of the blank analyses are provided in the case file (Appendix A, Bates numbers 000031 through 000034).

- The standard shown was run on 07/03/2019, seven months before receiving the samples (02/24/2020).

Armstrong is unable to verify this statement. It is noted the instrument calibration was conducted on November 1, 2019 and verified in the quality control data for the sample batch analyzed on February 28, 2020. Reference standards of Delta-9 THC are always run with each analytical bath, concurrently with the case samples.

- Shifted retention time between the standard and samples.

There are no significant shifts in the retention times between the standards and samples. The retention times for analyte Delta-9 THC for the analytical sequence batch containing the quality control sample and the questioned samples is provided in the following table. A retention time difference of 0.01 minutes is equal to 0.6 seconds. There is less than one second deviation in the retention time throughout the batch on Signal 1. On the second column/detector (Signal 2), no retention time deviation is observed. The retention time variation for the batch is negligible, and is well within the normal tolerances for gas chromatography analyses.

Retention Time Table			
Batch/Sample	Sig 1	Sig 2	Item
200228A-2	6.02	4.31	Initial CCV
200228A-3	6.01	4.31	Second Source (STD-2)
200228A-4	6.01	4.31	LCS
200228A-5	6.02	4.31	LCSD
200228A-12	6.02	4.31	C0-02175A-001A
200228A-11	6.01	4.31	C0-02175A-001A (dup)
200228A-13	6.02	4.31	C0-02175A-002A
200228A-14	6.01	4.31	C0-02175A-003A
200228A-15	6.02	4.31	C0-02175A-004A
200228A-16	6.01	4.31	C0-02175A-005A
200228A-53	6.01	4.31	Closing CCV
Average	Average = 6.015 ± 0.005	Average = 4.31 ± 0.00	

- Sample 5 seems to have been analyzed only once with no replicated according to the batch information.

This "issue" is incorrect. Replicate results for Sample 5 were obtained via dual column gas chromatography. Please refer to the previous discussion about replicate analyses.

- There is a big concentration gap between the standards 0.4 and 4.00 used to perform the calibration curve.

The calibration scheme was carefully chosen to have the greatest accuracy for samples at the decision point. To have greater accuracy in the analysis at the critical concentration, six low calibrators are utilized and one high calibrator to establish linearity.

The typical preparation procedure for plant material utilizes a 0.5 gram sample extracted with 40 milliliters of solvent. Under these conditions, a sample containing 0.3% Delta-9 tetrahydrocannabinol would exhibit a response near 40 µg/mL. The 40 µg/mL calibrator is bracketed by three lower calibrators and three higher calibrators.

- Accuracy (Quality control samples) not shown.
- Precision not shown.
- Carry-over analysis not shown.

The quality control results are documented in the produced case file, Bates 000031 through 000034. The quality control includes initial calibration verification, second source verification, laboratory control spike with duplicate, and assorted blanks. Precision and reproducibility are demonstrated with this data. The blank samples analyzed in the batch verify that no carry over is occurring.

- The conversion of natural constituents, such as tetrahydrocannabinolic acid (THCA) into THC, under the analytical conditions used, should be reported. What is the conversion efficiency?

The conversion efficiency was evaluated during initial method validation. A low conversion efficiency will benefit the defendant by reducing the detected concentration of Delta-9 THC, if THCA is present in the sample. This "issue" does not benefit the defendant and does not change the interpretation of whether the evidence is hemp or marihuana.

- Both the chromatographic system in use and analytical conditions applied must be validated as to ensure complete decarboxylation, without causing decomposition of D-9-THC. This data is not shown.

If complete decarboxylation of THCA to Delta-9 THC does not occur, it will only bias the results in the defendant's favor. The decarboxylation of THCA was evaluated during initial method validation. This "issue" does not benefit the defendant and does not change the interpretation of whether the evidence is hemp or marihuana.

Certified reference standards of Delta-9 THC from multiple sources are used in the analyses. No thermal degradation has been observed in any of the analyses.

- No indication about what liner was used. Conversion of D-9-THCA-A to D-9-THC (total content assays) is influenced by the type of inlet liner used and inlet temperature.

Please see above. The conversion of THCA to Delta-9 THC does not change the interpretation of whether the evidence is hemp or marihuana in this case. This "issue" does not benefit the defendant.

- Presence of other peaks in the chromatogram. The presence of these peaks may suggest oxidation of THC and thus that the process of decarboxylation does not proceed in a quantitative manner.

The presence of additional peaks in the sample chromatograms are expected, due to the presence of other cannabinoids that naturally occur in *Cannabis Sativa* L. Again, any decarboxylation of THCA-A will only cause an increase of concentration of Delta-9 THC detected.

- Interference analysis and resolution of volatiles is not shown. The detector used (FID) does not have the ability to determine if other compounds are co-eluting with D-9-THC which could cause an overestimation of the concentration of this compound.

The use of two chromatographic columns with different polarities (substrates) is designed to eliminate interference from possible co-elution. In every analysis, the lowest concentration of Delta-9 THC is reported, to provide the benefit of the doubt to the defendant.

- Peak integration is not shown.

All samples, calibrators, and quality control standards are processed and integrated using the same parameters.

- Missing SOP documents detailing sample preparation and data treatment.

The SOP provided, 3.26.011, Delta-9 THC Concentration by GC-FID, documents sample preparation on pages 7, 8, 9, and 10. Data treatment is outlined on pages 10 and 11. The SOP was provided with the document production, and it is attached here, as Appendix B.

- Missing chromatograms of standards and QCs run the same day as samples.

The analytical results for the sample batch quality control, including initial calibration verification laboratory control spikes, second source verification and blanks, are provided in the case file, Bates 000031 through 000034.

Should you have any questions or need additional data or documentation, please do not hesitate to contact us.

Respectfully submitted,
Armstrong Forensic Laboratory, Inc.

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Laboratory Director
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Texas Forensic Analyst License #0000008
ANAB, Certificate FT-0293

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Certified Professional Chemist, AIC
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Texas Forensic Analyst License #0000011

EXHIBIT D

TEXAS FORENSIC
SCIENCE COMMISSION
Justice Through Science
1700 North Congress Ave., Suite 445
Austin, Texas 78701

March 23, 2021

Via email to kwouters@aflab.com

Kelly L. Wouters, Ph.D.
Armstrong Forensic Laboratory, Inc.
330 Loch'n Green Trail
Arlington, Texas 76102

RE: Forensic Science Commission Complaint #20.60 Cantu, Gerard (Armstrong; Seized Drugs)

Dear Dr. Wouters:

Pursuant to its investigation in the matter referenced above, the Commission requests the following:

1) The batch list for the GC-FID run(s) that included the case samples referenced in the complaint;
2) Complete analytical (instrument) data for the calibrators and controls (positive and negative) for the batch or batches in which the case evidentiary samples were processed;
3) A list of compounds (including other cannabinoids) that were evaluated in the specificity/interference study as part of method validation;
4) Specify the number of replicates analyzed as referenced in the "specificity" section of the procedure validation summary;
5) The approximate timeframe during which ANAB reviewed the method validation that is the subject of the complaint; and
6) A description of the information provided to ANAB during their method validation review and a copy of the actual (instrument) data provided.

If you have any questions about the requested information, please feel free to contact me directly via email at leigh.tomlin@fsc.texas.gov or via telephone at (512) 936-0661.

Respectfully,

Leigh M. Tomlin

Leigh M. Tomlin
Associate General Counsel

EXHIBIT E

Armstrong
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330 Loch'n Green Trail Arlington, Texas 76012-3458
817-275-2691 Fax: 817-275-1883

Andrew T. Armstrong, PhD
Marion K. Armstrong, MSPH, MBA, CIH
Kelly L. Wouters, PhD
Karen M. Deiss, BS

April 7, 2021

RE: Forensic Science Commission Complaint #20.60 Cantu, Gerard (Armstrong; Seized Drugs)

In association with the above referenced complaint, Armstrong has been requested to provide the following information.

1) The batch list for the GC-FID run(s) that included the case samples referenced in the complaint;

The batch list which includes the subject case samples is provided as Attachment A. This information can also be found in the documents provided to the Texas Forensic Science Commission with Armstrong's response on January 13, 2021. The batch list is documented on Bates pages 000032 and 000033 of "Appendix A - C0-02175-1 File Production".

2) Complete analytical (instrument) data for the calibrators and controls (positive and negative) for the batch or batches in which the case evidentiary samples were processed;

The requested analytical data is provided as Attachment B. The file contains the chromatograms for the Calibrators and Controls associated with subject batch.

3) A list of compounds (including other cannabinoids) that were evaluated in the specificity/interference study as part of method validation;

Armstrong has evaluated the specificity against numerous cannabinoids including: Cannabidiol (CBD), Cannabigerol (CBG), Cannabidiolic Acid (CBDA), Cannabinol (CBN), Delta-9 Tetrahydrocannbinol (Delta-9 THC), Cannabichromene (CBC), THCA-A, and Delta-8 Tetrahydrocannabinol (Delta-8 THC).

Armstrong has observed no naturally occurring cannabinoids with retention times similar to delta-9 THC under the analytical conditions. Samples containing high levels of other tetrahydrocannabinols (e.g., Delta-8 THC) are always analyzed by GC/MS to confirm the identification of Delta-9 THC.

4) Specify the number of replicates analyzed as referenced in the "specificity" section of the procedure validation summary;

The precise number of samples and standards analyzed during the method development process is unknown. The word "replicate" used in the specificity section of the validation summary is a reference to replicate (duplicate) results achieved with each analysis through the use of the dual-column GC-FID system. The GC-FID analysis is performed where each analysis is simultaneously performed using two columns with different chemistries. The concentrations are determined by independent calibration of each detector and the concentrations observed in the sample analyses are consistent between the two channels, within the measurement uncertainty.

5) The approximate timeframe during which ANAB reviewed the method validation that is the subject of the complaint; and

Armstrong provided ANAB with the first set of requested documents and data on November 13, 2020. Additional documents and data were submitted to ANAB at various times during the review period. The ANAB review was completed on March 4, 2021.

6) A description of the information provided to ANAB during their method validation review and a copy of the actual (instrument) data provided.

Copies of all documents and data provided to ANAB are provided with this response.

Respectfully submitted,
ARMSTRONG FORENSIC LABORATORY, INC.

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