M E M O R A N D U M

TO: Mayor and Council Members

FROM: Rey Arellano, Assistant City Manager

DATE: October 2, 2020

SUBJECT: Update Regarding Activities to Address APD DNA Lab Audit Recommendations

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On October 19, 2017 Council approved staff's recommendation to engage the Quattrone Center for the Fair Administration of Justice, University of Pennsylvania to address the findings of the Texas Forensic Science Commission's (TFSC) *Final Audit Report for Austin Police Department Forensic Services Division DNA Section* (Audit Report); assist with addressing the Audit Report recommendations as well as evaluating the impacts of the Audit Report findings to DNA evidence in criminal cases in Travis County; and research and identify options and best practices for appropriate DNA lab testing services for the Austin-Travis County area going forward. The purpose of this memo is to transmit the results of the Quattrone Center's engagement, "The Austin Police Department DNA Laboratory, 2010-2015: Looking Back to Move Forward" (see Attachment (1)).

Background

In the summer of 2016, the Texas Forensics Science Commission conducted an audit of the Austin Police Department Forensic Services Division DNA Lab. The audit found a number of serious issues, including the following, which resulted in the Police Chief suspending DNA Lab operations:

- Use of protocols by the lab that were not generally accepted by the scientific community
- Internal policies that could have allowed confirmation bias in data interpretation
- A likely instance of DNA contamination
- Use of expired materials related to testing

The City, in partnership with Travis County, took several steps to address the short-term and long-term needs created by the lab closure. On March 23, 2017, Council approved an Interlocal Agreement ("DNA Interlocal Agreement") with the County that established the respective roles

and responsibilities of each entity in addressing the DNA Lab issues. In order to provide an interim solution for the testing of DNA evidence, the City entered into an Interlocal Agreement with the Texas Department of Public Safety to assume staffing and operations responsibility for the DNA Lab facility, in addition to utilizing private contracts.

Among the implications of the DNA Lab closure were its impact on past, current, and future criminal cases processed by the County criminal justice system. The County, as described in the DNA Interlocal Agreement, took the lead in March 2017 on the legal review of the DNA Lab audit issues through the Travis County District Attorney (DA) and Capital Area Private Defender Service (CAPDS). The Travis County Commissioners Court approved additional staffing for the DA's Office as well as approved funding for CAPDS to conduct defense reviews. In addition, the City was awarded a grant by the National Institute of Justice (NIJ) that provided an attorney and investigator for CAPDS, a part time attorney for the DA's Office, and made funds available for the possible retesting of DNA evidence. The City also entered into an interlocal agreement with the University of North Texas Health Science Center to provide scientific review of cases identified by the Legal Review.

A stakeholder Workgroup was established to find consensus regarding next steps for addressing the impacts related to the DNA Lab audit. The group is co-chaired by Assistant City Manager Rey Arellano and the Travis County Justice Planning Executive, Roger Jefferies. Stakeholders in the Workgroup assisted with determining the requirements for a third party-led "look back/look forward review" as directed by the DNA Interlocal Agreement. Council subsequently approved staff's request to enter into a contract with the University of Pennsylvania's Quattrone Center for the Fair Administration of Justice to conduct the study. Quattrone has completed their study and the final report is attached. The Travis County Judge and the City Manager also appointed an Advisory Panel of community members to provide feedback to the co-project managers during the course of the study, including feedback on the options to provide future permanent DNA lab capability for the community. The Advisory Panel met periodically over the course of this process and has been provided the final report by Quattrone for their review and comment. (See Attachment (2) for a listing of the participants on the Workgroup and the Advisory Panel.)

Quattrone Report "The Austin Police Department DNA Laboratory, 2010-2015: Looking Back to Move Forward"

To complete the "look back" review, Quattrone followed their prescribed process to analyze the failures of the DNA Lab, identify contributing factors to its failures, and build consensus recommendations on how a high-quality lab should operate. Their process included gathering and analyzing relevant documents; interviewing stakeholders and, local and national subject matter experts; drafting and building consensus with the Workgroup on recommendations for a

new, high-quality lab; and summarizing and publishing their findings in the attached Report. They identified 57 contributing factors to the DNA Lab's failures and provided 87 recommendations that address the issues and will contribute to high quality operations in any future DNA lab facility. It will be important for a DNA lab going forward to be *independent*, *accurate and reliable*, *transparent*, and *efficient*.

In support of the "look-forward" process, Quattrone and the Workgroup studied high-quality DNA laboratories that spanned representative governance structures across the country. The labs were located within law enforcement (Philadelphia); or independent of law enforcement and reporting to other local government entities (Washington D.C. and New York City); or completely independent and operating as a local government corporation (Houston). Quattrone presented examples where labs of each structure type operated well or experienced significant issues.

The Workgroup developed a listing of possible lab options, then narrowed the list to the following options:

- Reconstitute the DNA Lab within APD
- Create a new DNA Lab run by the City, independent of APD
- Form a local government corporation to provide DNA lab services
- Enter into an interlocal agreement between the City and County for DNA lab services

Note that the fourth option is dependent on choosing one of the first three options. The Report documents the Workgroup's discussion of the benefits and challenges of each option, as well as what would make an option successful.

Quattrone provided their best professional research and perspectives on what a high-quality DNA lab should look like both in our discussions and documented in the Report. The Report does not dictate the precise organizational structure needed for a high-quality DNA lab for Austin/Travis County as it is possible to achieve quality and independence within a variety of structures. Additionally, factors such as cost, timing, level of effort and other community factors were not covered in the Report. Community leaders should incorporate community factors along with the Report's recommendations in order to determine the appropriate DNA lab governance structure.

It should be noted that while the Workgroup found consensus on all of the report's recommendations, two entities representing the legal defense community – Capital Area Private Defender Service and the Austin Criminal Defense Lawyers Association – expressed some concerns with Quattrone's process. After several months of discussions over the contested content with Quattrone and the DA's Office, the final Report addressed a majority of

legal defense representatives' suggestions. The remaining issues are documented in a letter and included with this memo (Attachment (3)).

Next Steps

The DNA Interlocal Agreement has two main components: (1) the look back/look forward review, the results of which are presented with this memo; and (2) a legal materiality review of criminal cases where the conviction may have been impacted by failures in the DNA lab. The materiality review is currently being worked on by the forensics team within the Capital Area Private Defender Service.

With regard to DNA lab services, staff will incorporate further evaluation of the identified DNA lab options in the Reimagining Pubic Safety effort. As an example, the FY21 Budget included moving the budget of certain APD units, including the Forensic Science Bureau, into a "Decouple Fund" with the intent of staff examining whether the unit could be managed outside of APD. DNA lab services will be included in this evaluation.

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cc: Spencer Cronk, City Manager
CMO Executive Team
Chief Brian Manley, Austin Police Chief
Chief of Staff Troy Gay, Austin Police Department
Dr. Dana Kadavy, Executive Director, APD Forensic Science Bureau

Attachments:

(1) "The Austin Police Department DNA Laboratory, 2010-2015: Looking Back to Move Forward"
(2) DNA Lab Project Stakeholders
(3) ACDLA, CAPDS letter dated August 14, 2020

THE AUSTIN POLICE DEPARTMENT DNA LABORATORY, 2010 – 2015:

LOOKING BACK TO MOVE FOWARD

Report of the Quattrone Center for the
Fair Administration of Justice

University of Pennsylvania Carey Law School

September, 2020

QUATTRONE CENTER
for the Fair Administration of Justice

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Executive Summary

This report summarizes a review by the Quattrone Center for the Fair Administration of Justice at the University of Pennsylvania Carey School of Law ("Quattrone Center") of the issues identified by the Texas Forensic Science Commission ("TFSC") in a 2016 audit (the "TFSC Audit") of the Austin Police Department ("APD" or "the Department") Forensic Services Division DNA Section Laboratory ("DNA Laboratory"). Our goal was to advise a broadly diverse set of organizations and individual stakeholders what acts, omissions, management, cultural, and environmental conditions allowed significant quality issues to repeatedly occur in the APD DNA Laboratory, to occur without the awareness of the larger Austin criminal justice community, and to continue for an extended period of time despite passing multiple accreditation reviews and external and internal quality audits between 2010 and 2015. In doing so, we sought to help the stakeholder group learn from the past and generate recommendations that would allow for the creation of a new DNA laboratory in Austin that would not repeat the errors of the past, and that will function as a more reliable, accurate, and efficient high-quality DNA laboratory going forward.

The Quattrone Center's review identified 57 contributing factors and conditions that worked together to create an environment where errors occurred and persisted without appropriate oversight or correction. From these, we have worked with the stakeholder group to propose 87 consensus recommendations for a new DNA laboratory that we feel will provide substantial improvements while ensuring that the laboratory exemplifies the independence, transparency, flexibility, and efficiency needed to serve the needs of the people of Austin. These contributing factors, environmental conditions, and recommendations follow.

1. Background

On May 27 - 28 and June 6, 2016, the TFSC conducted an audit of the APD DNA Laboratory.[1] On July 8, 2016, the TFSC published the results of that audit (the "TFSC Audit") in its Final Audit Report for Austin Police Department Forensic Services Division DNA Section ("TFSC Audit Report"), which provided a detailed account of inadequacies identified by the TFSC in the DNA Laboratory's methods for interpreting DNA mixture samples and related internal validation, as well as insufficient resolution of certain contamination incidents, and other issues.[2]

The TFSC Audit stemmed from a statewide review of DNA mixture interpretation protocols and sample casework involving the use of a particular statistical method—the Combined Probability of Inclusion (CPI). Confusion regarding proper application of the CPI has been prevalent in the forensic DNA community since at least 2005.[3] When the TFSC reviewed Texas laboratory approaches to DNA mixture interpretation using CPI,

[1] Letter from Texas Forensic Science Commission regarding the Recent Assessment of Austin Police Department Forensic DNA Laboratory to Chief Acevedo and District Attorney Lehmberg, June 10, 2016.
[2] TFSC Audit Report, pp. 1-32.
[3] See, e.g., Butler, J. M., Kline, M. C., & Coble, M. D. (2018). NIST interlaboratory studies involving DNA mixtures (MIX05 and MIX13): variation observed and lessons learned. Forensic Science International: Genetics, 37, 81-94. https://www.fsigenetics.com/article/S1872-4973(18)30248-5/fulltext

many common issues emerged. Once those issues were identified for laboratory management in forensic DNA laboratories throughout Texas, laboratories accepted the feedback, amended their existing protocols, and reviewed past cases as needed to guard against miscarriages of justice.

The APD DNA Laboratory's approach to mixture interpretation and the statewide review was different from other Texas laboratories in two important ways. First, the APD DNA Laboratory was unique among laboratories in Texas in using a "Quantification-Based Stochastic Threshold," or QBST, in its analysis of DNA mixtures, samples containing biological material from more than one individual. This means that the DNA Laboratory used the quantity of DNA instead of peak height as a tool to assess stochastic effects[4] in a mixture. This procedure was simply ineffective for mixtures, as described later in this report.

Second, when the TFSC pointed out the inadequacy of the method to the APD DNA Laboratory during the statewide review, its expectation was that the DNA Laboratory would acknowledge the issue and correct it by validating an appropriate stochastic threshold. Instead, the APD DNA Technical Leader refused to acknowledge that the approach was unfit for its designated purpose. The TFSC was left questioning whether the Technical Leader fully understood the scientific principles behind the observation that the method was flawed but refused to acknowledge the shortcoming, or whether he truly did not appreciate the insufficiency of the approach and potential repercussions in forensic casework. Either explanation was unacceptable considering the importance of accurate DNA analysis to the fair administration of justice. Add to this a subsequent incident identified by the Travis County DA's office in which an APD DNA analyst could not explain why she made certain choices in a case for which she was set to testify in court, and the TFSC decided the most prudent course would be to conduct a special onsite review of the APD DNA Lab outside of the traditional audit and assessment cycle performed by the Laboratory's national accrediting body, the ANSI National Accreditation Board ("ANAB").

On June 13, 2016, after reviewing the TFSC Audit Report, APD leadership informed ANAB of its decision to cease all casework conducted at the DNA Laboratory until the Department and the citizens of Austin could be confident in the Laboratory's quality, precision and accuracy.[5]

2. Collaborative Review Process

Since the APD Laboratory ceased casework in June 2016, Austin and Travis County officials and the criminal justice community have taken a series of steps to better understand the issues and address the errors that occurred in the APD DNA Lab and the impact these errors may have had on criminal cases. One such step occurred in February 2018, when the City of Austin engaged the Quattrone Center to identify factors and

[4] The Merriam Webster Dictionary defines "stochastic" as "random" or "involving chance or probability." Thus, a stochastic effect is one created randomly by the DNA analysis process, as opposed to an accurate evaluation of the biological material being analyzed. "Stochastic." *Merriam-Webster.com Dictionary*, Merriam-Webster, https://www.merriam-webster.com/dictionary/stochastic. Accessed 4 May. 2020. Stochastic effects such as allelic drop-out, allelic drop-in, peak height imbalance or elevated stutter peaks do not render a DNA test invalid, but they must be considered by well-trained DNA Analysts when evaluating and characterizing a DNA analysis.

[5] *See* Letter from Chief Acevedo to Pam Bordner, Vice President of ASCLD/LAB, June 13, 2016; *see also* Memorandum from Diana Morales to Bill Gibbens and ASCLD/LAB, June 13, 2016.

conditions existing between 2010 and 2015 that contributed to the quality assurance issues and errors identified in the TFSC Audit Report, and to help explain how these issues and errors were able to evade detection despite numerous internal and external audits, accreditation reviews, and a diligent and caring community of criminal justice professionals, including prosecutors, defense attorneys, and judges as well as the TFSC itself.[6,7] Quattrone was also asked to provide information to a multi-agency and community stakeholder group ("Austin Stakeholder Group" or "ASG") regarding how legal communities and other stakeholders can better recognize and respond to DNA laboratory issues. Finally, Quattrone was asked to provide guidance regarding the design and implementation of a future DNA laboratory in Austin, one that would provide high-quality, reliable, and accurate DNA testing and related services.

With these goals in mind, Quattrone reviewed thousands of pages of documents, including policies, procedures, memoranda and other correspondence, audit reports, contamination logs, and other documents related to the issues set forth in the TFSC Audit Report that the Travis County DA's Office made available to the defense bar and others with a need for access, as well as other documents provided by various stakeholder organizations and/or individuals that had contact with the DNA Laboratory between 2010-2015. From these documents and discussions with the Stakeholders, the Quattrone Center created a list of potential interviewees who had been involved with the APD DNA Laboratory between 2010 and 2015. Quattrone and some of its affiliated subject matter experts conducted over 40 interviews between August of 2018 and May of 2019.[8]

Upon completion of the interviews, Quattrone began drafting the report and developing contributing factors and recommendations that it presented to the Austin Stakeholder Group, which provided feedback. This report is a product of this work. The report is organized in three sections: 1) a chronology of key events; 2) factors that contributed to the closure of the APD DNA Laboratory (with contributing factors and recommendations); and 3) a multi-stakeholder model for promoting more effective responses to laboratory errors and other problems that arise in DNA laboratories.

3. Observations

The Quattrone Center's review supports the high-level conclusions the TFSC Audit Report made plain. A wide range of errors were committed by DNA Analysts working in the APD DNA Laboratory. In addition, the overall culture of quality and oversight in the DNA Laboratory left much room for improvement. The review did not attempt to detect new or additional errors—though additional concerns have been identified during a

[6] The Quattrone Center was not engaged to review specific cases that may have been affected by the issues identified by the TFSC audit. This review, and the recommendations it contains, is limited to the systems, protocols, procedures, and individual acts that allowed errors to occur, rather than the potential effects any error may have had on a specific criminal case.
[7] In addition to address some of the issues described in the Audit Report, the City of Austin and Austin Stakeholder Group asked the Quattrone Center to review the circumstances leading to the disruption of service to a freezer within the DNA laboratory in 2016, causing potential damage to thousands of DNA samples in the custody of the APD.
[8] Quattrone interviewed members of the Austin Police Department, DNA analysts and managers, members of the Travis County District Attorney's Office, the Texas Department of Public Safety, the TFSC, and other city related entities. In addition, Quattrone interviewed representatives from a laboratory accreditation board. Quattrone also interviewed representatives from the District of Columbia Department of Forensic Science, the Houston Forensic Science Center, the New York City Medical Examiner's Office, and the Philadelphia Police Department Office of Forensic Science.

parallel review of DNA mixture cases being conducted by the University of North Texas Health Science Center/Center for Human Identification (CHI). A list of problematic issues in casework identified by the CHI as of May 1, 2020 is attached as Appendix H.

The quality issues in the APD DNA Laboratory resulted from a complex matrix of acts, omissions, management decisions, organizational and system structures, and environmental circumstances that combined to allow quality issues to emerge and persist over time and challenged the ability of other stakeholders in the system to identify those errors. The 57 contributing factors we have identified are grouped in the following subject areas:

- Overarching leadership and supervision inadequacies;
- Poor understanding of SWGDAM guidelines leading to flawed adoption of a stochastic threshold for mixtures based on the quantity of input DNA rather than peak height measured in relative fluorescence units;
- Inadequate and incomplete validation studies;
- Insufficient depth of quality personnel as evidenced by severe organizational weaknesses that emerged during technical leader's sick leave;
- Insufficiently robust quality system as demonstrated by incomplete responses to quality complaints;
- Ineffective and opaque responses to contamination events, including poor corrective actions to reduce the incidents of contamination over time;
- Improper and inconsistent ways of addressing deviations from protocol, and challenges with DNA analysts following SOPs and established methodologies;
- The use of equipment or supplies in ways that are not supported by the manufacturer's guidance without documented validation studies to ensure that no reduction in accuracy or quality results;
- Factors contributing to the outage (and delayed disclosure) of a freezer in which thousands of biological samples collected in criminal cases had been stored, subjecting the samples to a risk of decomposition;
- In addition, we have included some additional recommendations made by the Austin Stakeholder Group to enhance the next DNA laboratory in Austin.

We have included some additional recommendations made by the Austin Stakeholder Group to enhance the next DNA laboratory in Austin.

In addition to the contributing factors described above, all of which concern the actions or inactions of APD, there were certain external conditions that allowed the shortcomings in the laboratory to persist undetected. A critically important example is the failure of oversight due to the patchwork system of regulatory organizations that govern not just the APD DNA laboratory, but all forensic DNA laboratories in the United States. The APD DNA Lab was subjected to 17 different assessments and audits pursuant to standards developed by

national bodies such as ANAB (formerly ASCLD/LAB)[9] and the Federal Bureau of Investigation's Quality Assurance Standards (QAS). Remarkably, none of these periodic audits or assessments identified any significant nonconformities.

A second environmental condition was the fact that the adversarial system used to adjudicate criminal cases involving DNA analyses did not function as an effective check on any of the issues identified in this Report. This should come as little surprise, as lawyers and judges are not scientists and are not part of the traditional system of quality assurance for DNA laboratories. Criminal justice stakeholders in Travis County held the reasonable expectation that they should be able to trust the laboratory's DNA analysis, especially when referring to typical casework as opposed to new, novel or highly subjective techniques that may flag the need for an admissibility hearing.

As the Honorable Harry T. Edwards noted in 2014 when reflecting on the work of the landmark 2009 NAS Report:

> When our Committee issued its Report, I heard a number of very smart people suggest that… judges would limit the admissibility of forensic evidence and issue seminal decisions that would result in dramatic reforms of the forensic disciplines. I did not believe it then, and I do not believe it now. Absent meaningful action by scientists and forensic analysts, the courts will continue to admit forensic evidence in criminal trials, without regard to its scientific validity and reliability. Why? Because precedent supports this practice.

Judge Edwards' observation is especially true in the area of DNA analysis, widely perceived as the "gold standard" among forensic disciplines and regularly admitted without challenge. Notwithstanding the divergent expectations and inherent tensions between science and the law, lawyers and judges handling criminal cases involving DNA can and should serve an important role as critical consumers of the scientific information that is admitted to our courts. Several recommendations in this Report seek to create an environment in which lawyers and judges work more closely with the forensic DNA laboratory, with advisory panels designed to educate the legal community about: (a) DNA analysis itself; (b) the inner workings of the DNA laboratory; and (c) the risk of error in the DNA laboratory in being proactive need to be more proactive in understanding scientific issues in the future. The panels will also help the DNA laboratory become more educated about the needs of the legal system for transparency and information disclosure and dissemination needed to protect the rights of both the community and the accused.

4. DNA Laboratory 2.0: Model for the Future

The final section of this report entitled "Where Should We Go from Here?" sets forth recommendations for a high-quality DNA laboratory that emerged from stakeholder meetings. Ultimately, the qualities that the Austin

[9] ASCLD/LAB was the accrediting organization for the Forensic Science Division in 2005, 2010, and 2015. ANAB acquired ASCLD/LAB in April 2016, and was the accrediting body overseeing the APD Forensic Science Division when the APD decided to stop active casework at the DNA Laboratory. ANAB also engaged in its own root cause analysis of the factors leading up to the APD DNA Laboratory suspension/closure.

Stakeholder Group focused on as necessary for any laboratory handling DNA or other biological samples for use in the criminal justice process are:

1. Independence
2. Accuracy and Reliability
3. Transparency; and
4. Efficiency

This Report does not dictate the precise organizational structure needed for a high-quality DNA laboratory as it is possible to achieve quality and independence within a variety of structures. Rather, it makes observations about what clearly does not work based on the history of the APD DNA Laboratory and other laboratories, as well as suggestions on models that have proven effective in other contexts.

Philosophical Approach

The Quattrone Center is a nationally recognized expert on the use of Root Cause Analysis (RCA) in criminal justice contexts. The City of Austin retained the Quattrone Center to guide the Austin Stakeholder Group through a process designed to:

1. Understand the myriad factors that contributed to the issues identified in the TFSC Audit Report; and
2. Recommend improvements to the DNA Laboratory and the criminal justice system in Austin that will enhance the scientific assessment, reporting, and management of DNA evidence, and ensure the accuracy of DNA analysis used in the investigation and adjudication of criminal cases in Austin.

Forensic science laboratories are complex human organizations within a similarly complex criminal justice system. Like all human systems, these laboratories are fallible. Perfection, while always the goal, is likely unattainable. At the same time, evidence has shown that risks in a system can be minimized. Responsible and professional forensic scientists should consistently strive to be "high-reliability organizations," maintaining a culture of constant self-monitoring and self-improvement and learning from error.[11] This is true regardless of the organization's history of error, since

> [a]dverse events, like the number of adverse events, are poor indicators of the general safety of a system… Safe organizations can still have bad adverse events, whereas unsafe systems can escape them for long periods. Furthermore, progress creates new risk that is difficult to anticipate but is a feature of new procedures and technologies.[12]

[11] Different terms may be used for unplanned and/or unintended occurrences in human systems, including adverse events, errors/omissions, mistakes, and nonconformities, etc., including "error," "mistake," "accident," "adverse event," "nonconformity," and others. We use these terms to describe unplanned and/or unintended occurrences in the laboratory as well as departures from policies, protocols or procedures, and note that any of the above can occur as a result of well-intended behavior and may include, but do not necessarily implicate malfeasant behavior or misconduct.

[12] Barach P, Berwick DM. Patient safety and the reliability of health care systems. Ann Intern Med 2003, 138(12):997-8, using the health care term "adverse event" to define an unintended outcome. The forensic science community often use the ISO 9000-defined term "nonconformity," which encompasses any deviation from a policy or procedure regardless of its impact.

One established method of learning from errors is RCA. RCA is a systematic method of evaluating the environmental, systemic and other cause(s) of an error in ways that enable the modification of a system to prevent similar errors from occurring in the future. It is a set of steps that are taken to "identify, detect the cause and successfully rectify the issues that have been experienced in any field of manufacturing or servicing systems… [and] is designed for use in investigating and categorizing the root causes of events with safety, health, environmental, quality, reliability and production impacts."[13]

RCA is an accepted tool used to improve the quality of forensic laboratories in the United States and abroad. Forensic laboratories like the APD Forensic Science Services unit, which since 2015 has been accredited under a program that adheres to the ISO/IEC 17025 General Requirements for the competence of testing and calibration laboratories, are required to "establish a policy and a procedure and shall designate appropriate authorities for implementing corrective action when nonconforming work or departures from the policies and procedures in the management system or technical operations have been identified." [14]

"Corrective actions" are potential solutions that eliminate or minimize the risk of repeating the nonconforming work or departure from policies and procedures. Within an accredited forensic laboratory, corrective action is a requirement when any error or nonconformity is identified.[15] To establish the best corrective actions, as required by ISO 17025, an investigation should be initiated to determine the root cause(s) of the situation or condition. ISO 17025 also requires laboratories to establish procedures to identify needed improvements and potential sources of nonconformities.[16] This proactive process is termed "preventive action" and it can also be satisfied through an RCA to identify the best solutions to prevent or minimize the chance of nonconformity from occurring. Thus, event reviews using principles of RCA are critical to the creation and implementation of useful corrective actions in response to errors or quality concerns within a forensic laboratory.

RCA has been used productively not only throughout the healthcare industry (including in clinical and toxicology laboratories as well as surgical and other settings), but also in aviation, manufacturing and other quality-minded industries to conduct event reviews that lead to actionable change of policies and procedures to reduce the occurrence of nonconformities. The goal of RCA is to learn from errors and to implement proactive change in order to reduce further similar events that might compromise the integrity of laboratory services.

This goal may also be understood as a goal that is applicable to a well-functioning forensic laboratory. Texas has adopted the Code of Professional Responsibility for Forensic Analysts and Crime Laboratory Management Subject to the Jurisdiction of the Texas Forensic Science Commission ("Code"), which articulates a balance between recognizing the complexities of human systems and behaviors and promoting a culture of

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[13] Tomic B, Brkic VS. Effective root cause analysis and corrective action process. Journal of Engineering Management and Competitiveness, Vol. 1, No. ½, 2011, 16-20, available at http://www.tfzr.rs/jemc/files/V1N1-22011-04.pdf.

[14] ISO/IEC 17025:2005(E) (hereafter, ISO 17025), General requirements for the competence of testing and calibration laboratories, Section 4.11.2 Cause Analysis. "The procedure for corrective action shall start with an investigation to determine the root cause(s) of the problem."

[15] Id.

[16] ISO 17025, Section 4.11.3 Selection and implementation of corrective actions, "Where corrective action is needed, the laboratory shall identify potential corrective actions. It shall select and implement the action(s) most likely to eliminate the problem and to prevent recurrence."

accountability and transparency.[18] The Code provides mandatory requirements for forensic analysts and also requires management to "[e]ncourage a quality-focused culture that embraces transparency, accountability and continuing education while resisting individual blame or scapegoating."[19] Thus, while promoting education and professional development, management must also promote transparency by, for example, implementing case retention and management policies and systems that ensure that all records and other information created and relied upon are properly maintained.[20] Similarly, accountability involves clear communication and documentation: management should, among other things, establish clear communication and reporting systems through which analysts may report adverse events to management and "make timely and full disclosure to the Texas Forensic Science Commission of any non-conformance that may rise to the level of professional negligence or professional misconduct."[21]

These principles guided the Austin Stakeholder Group, a broad-based group of criminal justice and community stakeholders, in a review of the APD DNA Laboratory's quality issues between 2010 and 2015, the time period set forth in the TFSC Audit Report. The review attempted to accurately balance personal accountability with environmental, cultural, management and other circumstances that also contribute to undesired outcomes.

In this review we sought to look backwards in order to look forwards, understanding how quality issues arose in the APD DNA Laboratory so that we could generate precise recommendations that would be likely to improve environments and practices in ways that will reduce the recurrence of the mistakes identified in the TFSC Audit Report. Our goal was not to punish or find blame with any individual or agency, but rather to understand how the system could both allow the quality and accuracy issues identified in cases handled by the APD DNA Laboratory, and fail to detect issues with quality and accuracy over an extended period of time despite regular accreditation visits and internal and external audits between 2010 and 2015.

Chronology of Key Events

Creation and Early Years of the APD DNA Laboratory (2004 – 2010)

Forensic DNA analysis found wide adoption in the mid-to-late 1990s, as European countries, including the United Kingdom, launched national DNA databases. The United States joined this trend in 1998 with the FBI's national CODIS (Combined DNA Index System) database.

In early 2004, APD initiated its DNA Laboratory within its existing Forensic Science Services unit (See Figure 1 below) and hired former employees of the DPS Austin DNA Laboratory.[22] The DNA Laboratory's inaugural

[18] Code of Professional Responsibility for Forensic Analysts and Crime Laboratory Management Subject to the Jurisdiction of the Texas Forensic Science Commission, §651.219 effective May 16, 2018, 43 TexReg 3106.
[19] Id. at (c) 1.
[20] *Id.* at (c) 3.
[21] *Id.* at (c) (4), (5).
[22] *See, e.g.,* Cassie Carradine CV, Diana Morales CV, Cecily Hamilton CV.

Forensic DNA Section Supervisor had previously held the position of Technical Leader at the Austin DPS office, and assumed the role of Technical Leader at the APD DNA Laboratory as well.[23] ("Technical Leader" is a formal position with specific responsibilities for managing the scientific activities of the DNA Laboratory required by FBI QAS).[24]

As shown in Figure 1 and Figure 2 below, the DNA Section Supervisor and Technical Lead reported to existing APD lab management, including the Forensic Science Services Manager, who oversaw various forensic initiatives across the various services provided by the lab (e.g., fingerprint analysis, ballistics analysis, toxicology testing, etc.), and the Technical Services Manager, who reported to the Chief of Field Support Services and served as the sworn unit liaison[25] between the Forensics Department and the rest of the APD.[26, 27] Although the Forensic Science Service Manager and the Technical Services Manager oversaw the DNA Laboratory, neither was a trained scientist, and neither had any expertise in DNA analysis.[28]

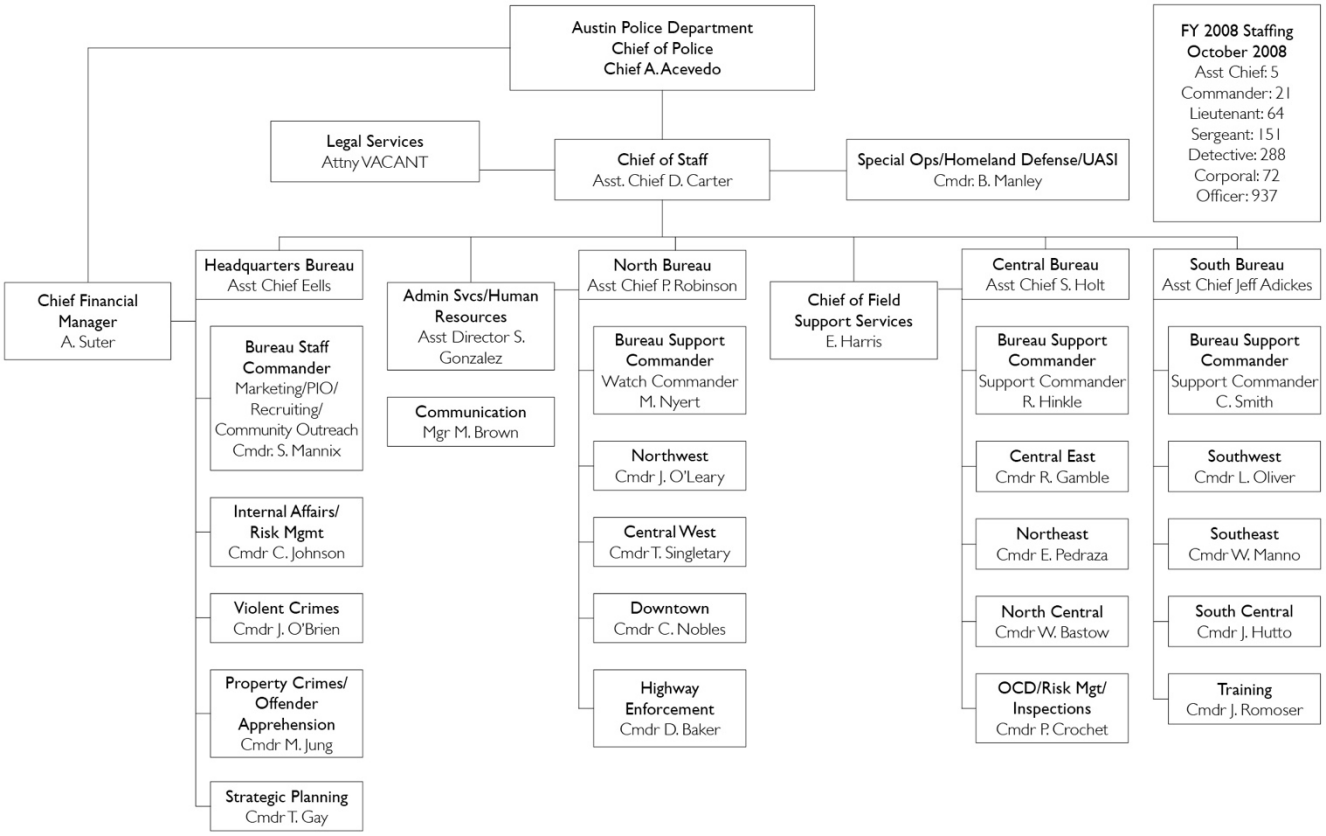

Figure 1. Austin Police Department Organizational Chart, FY 2008.

[23] Id.
[24] Quality Assurance Standards For Forensic DNA Testing Laboratories, Section 5.2 and throughout, accessed at https://www.fbi.gov/file-repository/quality-assurance-standards-for-forensic-dna-testing-laboratories.pdf/view.
[25] At a high level, police officers can be separated into "sworn" and "unsworn" officers. Sworn officers are those that have sworn an oath to support the Constitution of the United States, their state, and the laws of the agency's jurisdiction; they have attended the police academy and have the ability to carry a firearm and a badge and the power to arrest. Non-sworn positions have not taken this oath, and these positions are commonly made up of laboratory personnel and management, crime scene technicians, criminal analysts, etc. This is sometimes used as shorthand to illustrate the line between members of a police department whose responsibility is community safety as opposed to individuals with other primary obligations (e.g., the analysis of DNA to support an investigation being conducted by sworn officers). See, e.g., https://golawenforcement.com/articles/sworn-vs-un-sworn-which-police-career-path-is-right-for-you/
[26] Interview.
[27] *See* SDNA-II-B-05 DNA Section Organizational Chart.
[28] *Id.* at 12.

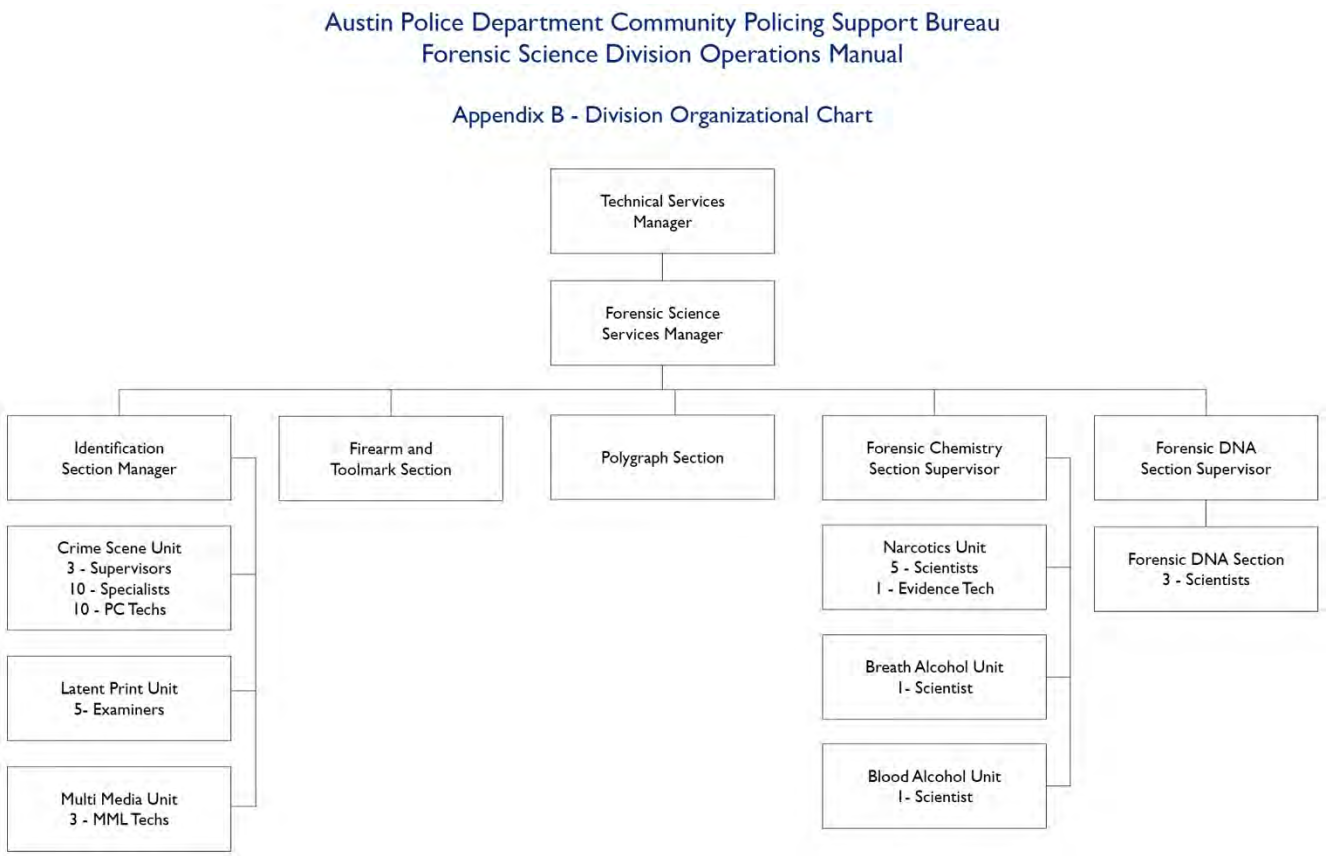

Figure 2. APD Forensic Science Services Unit Organizational Chart, 2005

Under the circumstances, with DNA analysis as a relatively new and quickly evolving area of forensic analysis, an apparently experienced and credentialed Technical Leader who had been the Technical Leader at the DPS DNA laboratory,[29] and management that lacked experience conducting DNA analyses and managing a DNA laboratory, the Technical Leader was given wide authority to implement standards, policies, procedures, and practices within the laboratory with minimal oversight.[30]

The Technical Leader utilized her prior training and experience at DPS as a baseline for the implementation of similar practices and standard operating procedures (SOPs) within APD's new Laboratory.[31] Several of the DNA analysts she hired at the APD Laboratory had previously worked at the Austin DPS DNA Laboratory, and thus both policies and protocols as well as experience and training of the APD DNA Analysts were based upon previous DPS training policies and procedures.[32]

[29] Cassie Carradine CV. Carradine served as Technical Leader in the Austin branch of the Texas Department of Public Safety from July 2001 through October 2003, and also served as the Assistant DNA Supervisor for the last year of that period.
[30] Interview with APD DNA Laboratory personnel.
[31] Interview with TFSC personnel.
[32] See, e.g., Diana Morales CV; Kim Clement CV; Hamilton, C., "Critical Issues Within the APD DNA Laboratory," February 11, 2010.

Investigating an Early Report of APD DNA Laboratory Concerns (2010)

In February, 2010, an APD DNA Laboratory analyst registered a series of complaints about the APD DNA Laboratory to APD leadership, including allegations of a hostile work environment, supervisory issues, and other issues.[33] APD responded to the allegations by conducting an internal investigation overseen by an Assistant Chief of Police with participation from the APD Chief of Field Operations, the Forensic Services Manager, the crime laboratory Quality Assurance Manager, and an APD HR Supervisor.[34] No individuals with scientific DNA expertise participated in the investigation. To do so would have required engaging a consultant from outside APD, as such experience resided only with the Technical Leader. The investigation team "decided that a written complaint would be requested from [the complainant] so that [complainant's] concerns were clear to those investigating the claims."[35]

On February 15, 2010, the complainant submitted a 25-page complaint entitled "Critical Issues within the APD DNA Laboratory," expressing several concerns about personnel and quality assurance issues.[36] The complainant alleged a hostile work environment, intimidation, harassment, poor communication and poor management. The complainant also alleged gaps and inadequacies regarding training of new DNA Analysts, flaws and delays in technical reviews performed by other DNA Analysts, and alleged that one of the then-current DNA Analysts had been given assistance in passing competency testing.[37]

APD assigned a team of individuals to investigate the issues alleged in the complaint.[38] Written statements responsive to the allegations set forth in the complaint were provided by the other four APD DNA Analysts employed at the time between February 26, 2010 and March 3, 2010.[39]

On March 22, 2010, the police department issued a memorandum setting forth the results of its investigation.[40] This report outlined 40 separate issues raised in the complaint, providing detailed responses for each issue.[41] Overall, the memo found the complaint lacked merit, rebutting the personnel complaints that the Complainant had lodged and concluding that "the quality issues have been investigated and there is no proof that these allegations have any validity."[42] The investigation did not find any merit in the allegation that an APD DNA Analyst had received inappropriate assistance in passing competency testing, and the Analyst in question was permitted to continue performing casework in the DNA laboratory.[43]

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[33] "Austin Police Department DNA Laboratory Investigation Investigative Report Dated March 22, 2010, Forwarded to District Attorney's Office June 24, 2010," at 1-2.
[34] *See* Memorandum from Bill Gibbens to Sean Mannix and Ed Harris, dated March 22, 2010 regarding Investigation Results-Critical Issues within the APD DNA Laboratory.
[35] Id. at 1.
[36] Summary of APD's DNA Laboratory Investigative Report, at 1.
[37] Id.
[38] Id.
[39] Id.
[40] See Memorandum from Bill Gibbens to Sean Mannix and Ed Harris, dated March 22, 2010 regarding Investigation Results-Critical Issues within the APD DNA Laboratory.
[41] Id.
[42] Id.
[43] Id.

Implementing the Quantification-Based Stochastic Threshold (QBST) (2010)

The analysis of forensic DNA samples, like all science, is a continuously evolving field. In particular, while evaluation and identification of mixtures has always been a part of DNA analysis, clarifying and interpreting mixtures has evolved considerably since 2004, when the APD DNA Laboratory was established. The ability of DNA analysts to detect multiple contributors of DNA in a sample and to distribute the various alleles seen in the sample to individual profiles has developed over time, and the issue became more delicate and complicated as DNA analysis increased in sensitivity. Detection capabilities improved even with small amounts of DNA, and law enforcement agencies began submitting evidentiary samples requiring extraction and interpretation of "touch" or "trace" levels of DNA (e.g., firearms, doorknobs, etc.)

While many of the APD DNA Laboratory's protocols and practices were adapted from protocols and practices in use at DPS in 2004, protocols or practices related to the interpretation and analysis of DNA mixtures were inadequate and reflective of a larger issue: the lack of a generally accepted method to interpret mixtures. Many forensic laboratories analyzed complex mixtures using different methods of interpretation.[44] As complex mixture evidence became increasingly relied upon in criminal cases, there was a pressing need for guidance.[45]

To help DNA laboratories across the country, the FBI's Scientific Working Group for DNA Analysis Methods (SWGDAM) published Guidelines for Autosomal STR Typing by Forensic DNA Testing Laboratories in January, 2010.[46] These Guidelines were borne out of a multi-year process led by a "mixture interpretation subcommittee,"[47] and focused on two-person mixtures.[48] The Guidelines acknowledged that they were not necessarily appropriate for all mixture samples:

> Some aspects of these guidelines may be applicable to low level DNA samples. However, this document is not intended to address the interpretation of analytical results from enhanced low template DNA techniques.[49]

Immediately after SWGDAM published its 2010 Guidelines, the Technical Leader in the APD DNA Laboratory developed a quantitation-based stochastic threshold ("QBST") for the assessment of drop out (a

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[44] The scientific literature on these issues dates back to at least, 2001. *See* Carl Ladd, Henry C. Lee, Nicholas Yang, Frederick R. Bieber, Interpretation of Complex Forensic DNA Mixtures, 42 CROATIAN MEDICAL JOURNAL, 244 (2001); Mark W. Perlin, *Scientific Validation of Mixture Interpretation Methods*, 4, 5 (2006) ("Different laboratories use different methods of mixture interpretation protocol on the same data often derive different STR profiles… [Therefore] DNA interpretation experts have not validated the reliability of their mixture interpretation methods, or the reliability of how these methods are applied to STR data. … DNA mixture evidence currently fails the general acceptance test of both *Frye* and *Daubert*, since there are no generally accepted methods for interpreting mixed stains."); Dr. John M. Butler, Mixture Interpretation, National Institute of. *Standards* and Technology Houston DNA Training Workshop (2007). Attempts to clarify key concepts in mixture interpretation was published by Drs. Bieber, Buckleton, Budowle, Butler and Coble in 2016. Frederick Bieber, John Buckleton, Bruce Budowle, John Butler, and Michael Coble, *Evaluation of Forensic DNA Mixture Evidence: Protocol for Evaluation, Interpretation, and Statistical Calculations Using the Combined Probability of Inclusion* (2016).

[45] In 2010, 89% of samples seen in laboratories were either single-source or two-person mixtures. See Butler, JM, Historical Background and Issues with Attempting to Address the Stochastic Effects via Quantitation Threshold, December 1, 2016 at 1.

[46] SWGDAM Guidelines, available at http://www.forensicdna.com/assets/swgdam_2010.pdf

[47] Id.

[48] Coble, M. A Basic Overview of Probabilistic Genotyping. NIST Forensic Sciences Webcast May 28, 2014, accessible at https://www.nist.gov/sites/default/files/documents/forensics/Coble-Mixture_Webcast-ProbGenotyping_intro.pdf

[49] SWGDAM Guidelines, introduction.

common stochastic effect resulting from the amplification of small amounts of DNA).[50] Unlike other techniques used to identify stochastic effects, the QBST used "the estimated quantity of input DNA into the amplification reaction as the primary method for determining potential stochastic effects such as allele dropout and did not account for allele stacking/sharing, stutter contribution, etc…. Using a quant-based ST to determine potential stochastic effects in DNA mixtures is neither scientifically valid nor supported by the forensic DNA community."[51] Indeed, scientific papers had been published prior to the APD DNA Laboratory's adoption of the QBST 2010 that emphasized the need to rely on peak height.[52]

The APD DNA Laboratory's use of the QBST as a tool for mixture analysis appears to have been unique. We are unaware of any other laboratory in the United States that took this approach to DNA mixture analysis. Instead, the accepted method of assessing drop out of alleles in mixtures during the time period in question was based on peak height as indicated by Relative Fluorescence Units ("RFUs").[53]

After using the QBST to determine if the DNA profile met the required quantity of amplified DNA cut-off, the Laboratory used a statistical calculation called the Combined Probability of Inclusion (CPI) when reporting the inclusion of any individuals to a mixed DNA profile. The CPI value approximates the proportion of random individuals unrelated to a true contributor in the DNA mixture who would be expected to be included as possible contributors to the DNA mixture from the random population. CPI was a method that had been known and used for DNA mixtures in 2010; however, challenges were observed with different implementations of CPI in labs around the country.[54]

Like all methodologies deployed in a forensic laboratory, quality standards required conducting validation studies - "the process of extensive and rigorous evaluation of DNA methods before acceptance for routine use"[55] - on a stochastic threshold before it could be deployed on actual casework.[56] Validation studies were necessary to establish the threshold above which an analyst could have confidence that all DNA data were present, and that no alleles had dropped out at any of the loci in the evidentiary profile.[57]

The Technical Leader conducted validation studies on the QBST, completing them on April 26, 2010,the same day that an ASCLD/LAB accreditation review that included the requirements of the FBI QAS was initiated.[58] ASCLD/LAB and QAS assessors reportedly reviewed the QBST validation study but did not highlight or

[50] A detailed technical discussion of stochastic effects and the problems with the Quantitation-Based Stochastic Threshold is set forth in the TFSC Audit Report, pp. 7 - 15.
[51] TFSC Audit Report, at 12-13.
[52] *See*, e.g., Budowle, B., Onorato, A. J., Callaghan, T. F., Manna, A. D., Gross, A. M., Guerrieri, R. A., ... & McClure, D. L. (2009). Mixture interpretation: defining the relevant features for guidelines for the assessment of mixed DNA profiles in forensic casework. *Journal of Forensic Sciences*, 54(4), 810-821 at 811; Moretti, T. R., Baumstark, A. L., Defenbaugh, D. A., Keys, K. M., Smerick, J. B., & Budowle, B. (2001). Validation of short tandem repeats (STRs) for forensic usage: performance testing of fluorescent multiplex STR systems and analysis of authentic and simulated forensic samples. *Journal of Forensic Science*, 46(3), 647-660 at 656.
[53] S*ee* Butler, above fn 44.
[54] See, e.g., Perlin, M. Inclusion probability for DNA mixtures is a subjective one-sided match statistic unrelated to identification information, *Journal of Pathology Informatics* 2015; 6:59.
[55] John M. Butler, *Fundamentals of Forensic DNA Typing*, 466 (2010).
[56] See, e.g., FBI QAS Section 3.1.1.6 (effective September 1, 2011).
[57] See QAS section 8.1 ("[t]he laboratory shall use validated methodologies for DNA analyses.").
[58] TFSC Audit Report, Exhibit I Section 2. See also DNA Unit QAS or ASCLD/Lab Audit History

report any problems or concerns with the validations studies in terms of their quantity or quality. Their review and approval enabled the QBST to be used within the APD Laboratory.[59]

Notwithstanding the ASCLD/LAB review, subsequent reviews[60] of the studies done to validate the QBST found substantial deficits in their scope and execution – but importantly, once a validation study was reviewed and "approved" for its intended use, QAS did not require additional review of the validation stud(ies) unless and until new validation studies were completed.[61]

While individual DNA Analysts reported to the TFSC during the Audit Report that they had raised concerns about apparent stochastic effects appearing in mixture analyses with the Technical Leader,[62] it was not until the TFSC audit and subsequent review that the problems were recognized outside the DNA Laboratory.

Additional Issues with QBST: The Shift from Pro/CO to Fusion Amplification Kits (2013)

As DNA technology and assay sensitivity evolved, it was becoming possible to analyze smaller amounts of DNA from a wider range of samples than previously accepted by laboratories. New amplification kits and instruments were available to assist DNA analysts in amplifying DNA samples that would previously have been untestable, increasing the utility of DNA in police investigations. In 2013, the APD Laboratory Technical Leader transitioned the amplification kits used by the DNA Laboratory to analyze DNA samples from the Profiler Plus/COfiler amplification kits in place when the QBST was implemented to the "Fusion" amplification kit made by Promega. [63]

The implementation of Fusion created increased risks of stochastic effects due to the significant decrease in DNA needed for amplification. Profiler Plus/COfiler functioned optimally when the sample amplified was greater than 1-2 ng, while the Fusion amplification kit could work with a much smaller amount of DNA (0.25 – 0.5 ng), thus increasing the risk of stochastic effects occurring with low-template samples, especially those with mixtures of DNA.[64, 65] As a result, the risk of interpretation error was increased.

Second, the Technical Leader elected to implement Fusion using 30 amplification cycles to generate the DNA profile that would be analyzed rather than the 28 cycles used for previous kits. At the time, Promega's guidance to laboratories implementing Fusion included a 30-cycle amplification within its range of acceptable implementations.[66] Over time, however, most laboratories that implemented Fusion elected to use a 28- or 29-

[59] 2010 QAS Audit.
[60] TFSC Audit Report, at 14; Van Daal, A. Report on the APD DNA Laboratory, January 22, 2017.
[61] Id.
[62] Id.
[63] 2013 DRAFT Developmental Validation of the PowerPlex Fusion System.pdf.
[64] Fusion user's manual, p. 6, available online at https://www.promega.com/-/media/files/resources/protocols/technical-manuals/101/powerplex-fusion-system-protocol.pdf?la=en
[65] See Memorandum from Cassie Carradine to Bill Gibbens regarding Stochastic Threshold for Mixture, dated May 1, 2014, at 1.
[66] Fusion user's manual.

cycle implementation, as their validation studies and experience showed fewer stochastic effects generated in the 28-cycle than in the 30-cycle implementation.[67]

Technical Leader Transition (June 2014)

In June 2014, the APD DNA Laboratory's first Technical Leader resigned and a new Technical Leader was hired.[68] While the new Technical Leader had some experience in forensic casework DNA testing laboratories, that experience (from stints at the Texas Department of Public Safety and at the Charlotte (N.C.) Police Department) had ended in 2001, 13 years prior to joining the APD DNA Laboratory. His roles since 2001 – managing a databasing unit in a private DNA testing laboratory and handling customer complaints for a provider of forensic testing supplies and instruments – did little to provide experience in or awareness of the downstream requirements of evidence and disclosure necessary to meet the needs of prosecutors, defense attorneys and judges adjudicating criminal cases.[69] Thus, while his management and technical background appeared impressive, he may have been unprepared in some regards for the APD DNA Laboratory and its specific needs.

APD DNA Analysts Quattrone spoke with felt that the Technical Leader's role conducting DNA analysis at a private laboratory[70] had given him an up-to-date understanding of new and emerging DNA analysis capabilities and techniques, which was an important asset for the APD DNA Laboratory. The Technical Leader appears to have understood the scientific issues with testing DNA mixtures (though he had not used the CPI calculation at prior labs)[71] and quickly realized the challenges of doing so using the methodologies then in place in the APD DNA Laboratory setting. On November 24, 2014, the Technical Leader sent a memo to the Manager of Forensic Science Services that included a section entitled "Software to Improve Testing of Mixture Samples." In that memo, the Technical Leader stated:

a. A large percentage of our DNA samples contain mixed samples of DNA from multiple individuals. Interpretation on these samples is extremely difficult and our current method is outdated and results in inconclusive results and/or DNA statistics that are not as accurate as they could be.
b. A NIST Study last year found that people using our method incorrectly interpreted a mixture of four individuals. There is software available that will help automate DNA mixture interpretation and help make mixture interpretation more consistent among analysts. I would like to purchase and validate this software in 2015. http://strmix.esr.ci.nz/[72]

The Technical Leader was not the only one to identify mixture interpretation as a risk for the APD in 2014; in fact, several APD DNA Analysts reported to the Technical Leader that they were observing what they believed

[67] Id. at 27.
[68] See, e.g., Annual Report – DNA, January 9, 2015.
[69] Statement of Qualifications Dec 2014.doc
[70] Id.
[71] Email J. Sailus to FORENS-DNA listserv, August 5, 2015, 3:01 p.m.
[72] Memorandum, J. Sailus to B. Gibbens "DNA Section Update – Past and Future," November 24, 2014.

were stochastic effects in their DNA amplifications.[73] In addition, the Technical Leader was aware that the APD DNA Laboratory's implementation of Fusion in a 30-cycle amplification created an increased risk of stochastic effects, and the Technical Leader expressed an interest in moving the DNA Laboratory to the more widely accepted 28-cycle implementation.[74]

Of course, these changes could not be made overnight. To ensure accuracy and reliability, the Technical Leader needed to conduct or oversee validation tests that would enable the APD DNA Laboratory to make the suggested changes. In February 2015, the Technical Leader proposed to APD laboratory management that the DNA Laboratory complete a preliminary validation to move from a manual interpretation of data generated using the Fusion amplification kits to the STRmix probabilistic genotyping software. Probabilistic genotyping is now in common use in many forensic DNA testing laboratories throughout the United States and other countries, and this implementation would have assisted with the evaluation and interpretation of DNA profile data, eliminating the use of and need for the QBST.

The TFSC Investigation and Resistance to Changing the QBST

While the Technical Lead was positioning the APD DNA Laboratory to move to probabilistic genotyping, the forensic community outside Austin was engrossed by two issues involving the interpretation of DNA mixtures.

On April 30, 2015, the Director of Washington, D.C.'s Department of Forensic Sciences resigned, along with the laboratory's chief scientist and its senior manager for DNA testing, amid a finding from the DNA laboratory's accrediting agency that the D.C. laboratory was "using inadequate procedures."[75] The finding focused on the methods used by the D.C. laboratory to analyze DNA samples with mixtures of DNA – that is, DNA samples that had genetic material from more than one individual.

Alarmed by the possibility that forensic DNA laboratories in Texas might have been using the same outdated and potentially inaccurate methods that had been used in Washington, D.C., the Texas Forensic Science Commission (TFSC) began investigating the issue along with Dr. Bruce Budowle of the University of North Texas and other national experts in DNA testing.

In addition, in May 2015, the FBI notified the public that it had identified and corrected certain errors in its population allele frequencies, which were the result of human error in data entry and technologic limitations of the time.[76] The FBI's notification suggested that the changes should impact only a few cases, with minimal impact on statistical frequencies reported,[77] and APD sent a letter to APD DNA Laboratory customers in August of 2015 informing them of the issue and offering to recalculate cases upon request from a court.[78]

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[73] TFSC Audit Report, pp. 13, 15
[74] 2015 Trio Fusion IDX STRmix Validation Plan 060515.
[75] Alexander, K. and Zauzmer, J. "Director of D.C.'s embattled DNA lab resigns after suspension of testing," Washington Post, April 30, 2015.
[76] Audit Report, p. 5.
[77] Memorandum from J. Sailus to Austin Police DNA Customers, 8/5/2015, re: Technical Analysis of the Impact of the FBI DNA Database Discrepancies on the APD DNA Laboratory.
[78] Letter A. Acevedo to Austin Police Department – DNA Laboratory Customers, August 5, 2015.

On August 21, 2015, the TFSC issued a letter entitled "Unintended Effects of FBI Database Corrections on Assessment of DNA Mixture Interpretations in Texas"[79] informing the Texas legal community and laboratories throughout the state of the FBI Database errors and their potential implication on DNA calculations. The letter directed members of the Texas legal community to request that DNA laboratories issue new reports on DNA cases by using "current and proper mixture interpretation protocols." The letter further stated,

> The forensic DNA community has been aware of substantial variance in mixture interpretation among laboratories since at least 2005… Though NIST did not expressly flag which interpretation approaches were considered scientifically acceptable and which were not as a result of the study, it has made significant efforts to improve the integrity and reliability of DNA mixture interpretation through various national training initiatives. These efforts have ultimately worked their way into revised standard operating procedures at laboratories, including laboratories in Texas… **[W]e know there is variation among laboratories in Texas and nationwide, including differences in standards for calculation of CPI that could be considered scientifically acceptable. However, we also know based on a recent audit of the Department of Forensic Sciences ("DFS") in Washington, DC that some of the "variation" simply does not fall within the range of scientifically acceptable interpretation. This finding does not mean laboratories or individual analysts did anything wrong intentionally or even knew the approaches fell outside the bounds of scientific acceptability, but rather the community has progressed over time in its ability to understand and implement this complex area of DNA interpretation appropriately.**

(emphasis added).[80] The TFSC clarified its view about what was a proper mixture interpretation protocol in a follow-on document,[81] and TFSC General Counsel Lynn Garcia asked labs throughout Texas to provide their mixture interpretation protocols to assist the TFSC in ensuring that all Texas labs were using, or were moving towards, proper mixture interpretation techniques.[82]

The TFSC informed all labs, including the APD DNA Laboratory, that they would need to ensure that their procedures for mixture interpretation using CPI conformed with SWGDAM Guidelines. While the new Technical Leader had indicated a desire to move away from the QBST, at this time, the APD DNA Laboratory was still using the same process to evaluate DNA mixtures and provide statistical calculations that had been established in 2010: the QBST in conjunction with the CPI.

While the improper use of the CPI was a matter of concern throughout the state, it was particularly troubling as it was being used in the Austin DNA Laboratory. First, CPI should only be used in instances when there is no allelic "drop-out" at each locus used for comparison and as a basis to include an individual as a possible contributor. However, the QBST was inadequate to assist an analyst in correctly assessing whether drop-out had

[79] Unintended Effects of FBI Database Corrections on Assessment of DNA Mixture Interpretation.
[80] Letter from V. Di Maio to Members of the Texas Criminal Justice Community, August 21, 2015.
[81] Texas Forensic Science Commission Clarification Regarding the Term "Current and Proper Mixture Interpretation Protocols."
[82] Email from Lynn Garcia, "DNA Mixture Case Lists," 10/7/2015.

occurred, creating the potential for the incorrect inclusion of a locus in the process of the comparison and statistical calculation, leading to the potential for reporting an incorrect CPI value in some cases.[83, 84]

In addition, the use of CPI is problematic if analysts are calculating it "by deciding whether a locus would be used for statistical calculations depending upon the alleles observed in the known profile (whether suspect or victim)," the method used by the APD DNA Analysts.[85] This approach, known as a suspect-driven approach, informed and could potentially bias analysts' evaluation of the evidence.

The appropriate process would be to review the evidentiary profile, identify those loci suitable for interpretation, and compare the known profiles to the evidentiary profile. If the alleles present in the known profile drive the interpretation, the analyst may attempt to "fit" the suspect or other known profile of interest into the evidentiary profile. This may bias the analysis, causing the analyst to ignore or discount contradictory data in the evidentiary profile that could support alternate explanations. Concerns regarding suspect-driven interpretation are magnified if analysts in a forensic laboratory within a police department "identify" with the investigational role by virtue of their employment.[86]

As noted above, the APD DNA Technical Leader in 2015 had stated internally a desire to move away from the use of the QBST and the CPI statistical calculation, and DNA Analysts in the laboratory at the time stated a willingness to modify their use of the CPI in line with the guidance of the TFSC and national experts (e.g., Drs. Budowle, Butler and others). Aware of the testing and validation work needed to implement the changes proposed by the TFSC, however, the Technical Leader was hesitant to embrace an "interim" solution[87] and instead proposed moving the DNA Laboratory forward to probabilistic genotyping and a statistical method called "Likelihood Ratios" (LR).[88] While this approach was scientifically sound, it failed to account for current casework being done using the QBST method, and did not account for any prior cases that might have been negatively affected by its improper application, which would have to be re-evaluated using an appropriate scientific process.

Faced with this dilemma, the Technical Leader decided to defend the APD DNA Laboratory's existing methodology. He advocated for moving "forward" to probabilistic genotyping and avoiding the interim step of adapting the CPI on current and prior cases. To support his case, the Technical Leader argued that the QBST was an acceptable methodology supported by the SWGDAM Guidelines. On October 16, 2015, as part of a large email group conversation about the protocols that TFSC would consider acceptable as "current and proper," the Technical Leader cited the SWGDAM Guidelines and stated "SWGDAM allows for a quant

[83] This issue had been identified in the scientific literature in late 2010 but not corrected in the APD DNA Laboratory. See, e.g., Curran, J. M. & Buckleton, J. (2010). Inclusion probabilities and dropout. *Journal of forensic sciences*, 55(5), 1171-1173.
[84] For additional technical details on this topic, see Audit Report pp. 15-16.
[85] TFSC Audit Report, at 15.
[86] In at least one instance a Technical Leader of the APD DNA Laboratory appeared to have allowed an unproven theory of guilt advanced by APD investigators to impact her testing strategy. See email from C. Carradine to B. Mills, RE: Question ore sending 3 samples to DPS lab for additional analysis, November 19, 2009, 7:10 p.m.
[87] Email J. Sailus to FORENS-DNA listserv "RE: Help with CPI," August 5, 2015, 3:01 p.m.
[88] Id.

based [stochastic threshold]. Is it the position of the TFSC that only RFU based STs are acceptable and not quant based STs?"[89]

The Technical Leader's argument pointed to a plain reading of the SWGDAM Guidelines, the relevant section of which stated:

> 3.2.2. If a stochastic threshold based on peak height is not used in the evaluation of DNA typing results, the laboratory must establish alternative criteria **(e.g., quantitation values or use of a probabilistic genotype approach)** for addressing potential stochastic amplification. The criteria must be supported by empirical data and internal validation and must be documented in the standard operating procedures.[90] (Emphasis added).

National experts in DNA Analysis did not share the Technical Leader's view that the QBST was a suitable method for DNA mixture interpretation. The TFSC, supported by Drs. Budowle and Butler, replied that "quantitation values provide only a general level of protection against stochastic effects, and are primarily beneficial for good quality single-source samples. CE peak heights are the best way to assess stochastic effects."[91]

The Technical Leader correctly interpreted this as a rejection of the QBST in place at the APD DNA Laboratory, and he sent an email to APD Forensic Science Services unit management and APD DNA Laboratory staff:

> Based on this, none of our protocols since 2004, including the ones we use today, will be acceptable to the TFSC. And there is no current way scientifically to go back and apply what they are asking for regarding stochastic effects. It requires entirely different studies than what [the prior Technical Leader] did. Their method can't be arbitrarily applied without significant effort and expense on our end and delay to our goal of moving on to a new system.
>
> So pretty much all of our current request for reports may have to go out saying that we cannot comply with these standards until our new software comes online.
>
> We will discuss more of our options next week but it seems our only short term option may be to send data out for external review and recalculation by an external method rather than shutting down the lab all together. I am exploring this more next week.[92]

The Technical Leader was faced with two difficult options: either suspend casework at the APD DNA Laboratory while conducting a review of all mixture cases that might have been impacted by the QBST, or continue to advocate for the continued use of the QBST in open defiance of the TFSC's mandate. He chose the second course, stating that standard practice in the forensic community was not to re-review older cases if the

[89] Email, J. Sailus, "RE: List of Criteria for Protocol Review," October 16, 2015, 3:01 p.m.
[90] 2010 SWGDAM Interpretation Guidelines for Autosomal STR Typing, section 3.2.2.
[91] Email, L. Garcia to J. Sailus August 16, 2015.
[92] Email, J. Sailus to DNA Staff, B. Gibbens and T. Arnold, October 16, 2015.

change to protocols was "voluntary." Thus, he opted to produce an "information only" report that would allow for selective recalculation of statistics where appropriate, as opposed to the universal re-review of cases that could be required by the TFSC.[93]

At this crucial moment in the conversations between the TFSC and the APD DNA Laboratory, life intervened. The Technical Leader went on an extended sick leave, leaving the conversation about how to handle older mixture DNA cases unsettled and putting the APD DNA Laboratory's transition to STRmix probabilistic genotyping in limbo.

Appointing an Interim Technical Leader (November 2015)

When the Technical Leader went on sick leave in November, 2015, the APD DNA Laboratory was left without a Technical Leader, a requirement for compliance with FBI QAS.[94] The unexpected nature of the leave and the FBI QAS requirement that the Technical Leader possess a master's degree or higher level of education[95] severely limited the options available to the APD crime laboratory management in identifying a suitable replacement Technical Leader. Because the Technical Leader was still an employee, APD human resources (HR) rules prevented APD from hiring a permanent replacement for the Technical Leader position, even if it had wanted to. In addition, only one APD DNA Analyst possessed the necessary academic credentials to satisfy the QAS requirements for the position.[96] This Analyst had been the source of a number of errors within the lab, and had been roundly criticized by the employee who filed the HR/Quality complaint in 2010 (though the APD investigation did not find those criticisms to be credible). In addition, the Analyst was not well versed on the contentious issues involving DNA mixture interpretation. She had not been working with the Technical Leader on the transition away from the QBST, or the validation studies to move to STRmix and probabilistic genotyping. Thus, the Analyst was not an ideal candidate for the role. Under the circumstances, however, as the lone DNA Analyst with a master's degree, she was appointed Interim Technical Leader on November 10, 2015.[97]

Freezer Malfunction (March 2016)

On March 14, 2016, an APD DNA Analyst discovered that Freezer 5, one of the freezers used by the DNA Laboratory to store samples used in casework, was warm.[98] The Analyst informed the Interim Technical Leader of this issue. [99] Once the Interim Technical Leader confirmed the freezer was warm, she informed the General Maintenance Manager of the problem.[100] The General Maintenance Manager started the backup cooling unit

[93] Memo J. Sailus to DNA Staff, B. Gibbens and T. Arnold, October 19, 2015.
[94] FBI QAS for Forensic DNA Testing Laboratories, sec. 4.1.2, accessible at https://www.fbi.gov/file-repository/quality-assurance-standards-for-forensic-dna-testing-laboratories.pdf/view.
[95] See QAS section 5.2.1.
[96] Email B. Gibbens to D. Morales, November 10, 2015.
[97] Email from B. Gibbens to Arnold, Tony; Morales, Diana; Morris, Elizabeth; Gil, Alejandra; McKenna, Claire; Clement, Kimberly; Rahman, Elizabeth RE: Interim Technical Leader, November 10, 2015, 8:00 a.m.
[98] Memorandum D. Morales to A. Arnold re: Freezer 5 outage and repair, March 17, 2016.
[99] Id.
[100] Id.

inside the freezer and assessed the problem, determining that the condenser unit on the rooftop had a Freon leak.[101] The condenser was fixed the same day and the Interim Technical Leader sought to have the condenser replaced.[102] By that evening, Freezer 5 was again functioning within its normal temperature parameters.[103]

An investigation conducted by the Interim Technical Leader determined that Freezer 5 was out of the appropriate temperature range from March 8 to March 14, 2016, rising to a temperature of 28°C, outside the normal temperature range of -5 °C to -25 °C.[104] A backup cooling unit existed inside the freezer, but it required a manual start-up and did not automatically start when the temperature rose. The freezer had been equipped with an alert paging system designed to notify key APD DNA Laboratory personnel when the temperature went outside of the freezer's normal temperature range; however, the pager system had failed to notify APD DNA personnel.[105] A brief investigation by the vendor of the paging system discovered that the paging system controller had been overloaded, causing the pager system to malfunction and not to send pages when the temperature had risen outside acceptable limits. In addition, manual checks of the freezer's temperature had not been conducted as scheduled.[106]

On March 17, 2016, the Interim Technical Leader sent a memo regarding this incident to the Quality Assurance Manager of the APD Forensic Science Services unit, as well as to the Laboratory Manager and the DNA staff.[107] The Interim Technical Leader notified them of the freezer outage and the efforts to bring the freezer back within acceptable parameters, and then attempted to advise the QA Manager and the Laboratory Manager on how best to proceed with notifying other criminal justice stakeholders. In a memo that was reviewed, edited and approved by the Laboratory Manager,[108] she wrote:

> There are hundreds of evidence samples stored in freezer 5. Samples types include; evidence just collected, evidence being screened for biological material, evidence being DNA tested, and evidence pending analysis. Although it would be possible to determine the number of samples stored in freezer 5 during the impacted time frame, there is no way to determine if any samples have been compromised. Each case is independent of any other sample and the impact on that particular sample is unknown. It is not uncommon to perform DNA testing on a sample and not get a DNA profile. The lack of a DNA profile cannot be used to make the determination of whether or not the sample was impacted by the freezer 5 outage. **For this reason I do not believe that customer notifications need to take place at this time. If in the future the laboratory determines that a sample has been affected by this incident, the customer will be notified and all necessary documentation will take place.**

[101] Id.
[102] Id.
[103] Id. at 2.
[104] Id.
[105] Id.
[106] Id.
[107] Id.
[108] A blacklined version of the memo showing edits by Laboratory Bill Gibbens was attached to an email he sent to Diana Morales entitled "Memo-f5.docx" Sent March 24, 2016 at 9:41. In the email, Gibbens noted "It will be going upstairs so I wanted to make it as easily understandable as possible." The assessment of the need for disclosure was drafted by Morales but was clearly reviewed and not corrected by Gibbens.

(Emphasis added). The APD Forensic Science Services unit did not inform anyone outside of the APD DNA Laboratory, not even the Travis County District Attorney's Office, of the freezer outage, though APD leadership was aware of the outage and immediately approved the purchase of the new condenser.

The freezer outage remained unknown to the larger community until the fall of 2016, when an APD DNA Analyst responding to defense attorney cross-examination in a sexual assault trial revealed the temporary outage of the freezer. A subsequent review of the samples in the freezer revealed that the freezer had untested material from cases that had been resolved as well as material for then-current cases under investigation or in the process of adjudication. No degradation of DNA stored in the freezer has been identified as of the date of this writing, and the District Attorney's Office added information about the freezer outage to an online file that was made accessible to the defense bar.

Brief Return of Technical Leader from Sick Leave (April 2016)

The Technical Leader returned from his sick leave to resume his position in April, 2016 after a five-month leave.[109] The Technical Leader continued to lobby for a transition to probabilistic genotyping, telling APD Laboratory management that "we are anticipating the launch of the new system for DNA casework… in July of 2016" and proposing a process for older CPI cases with the TFSC.[110] Sadly, his return was brief; the Technical Leader passed away on April 16, 2016 and the former Interim Technical Leader was reappointed to the role.

The Interim Technical Leader lacked the technical experience to continue the studies to validate the new STRmix probabilistic genotyping software. The Interim Technical Leader sent a request to the Texas forensic science community seeking assistance in completing these validation studies in late April 2016,[111] but the studies were never completed.

Protocol Deviations and Other Laboratory Issues (May 2016)

In the spring of 2016, the ongoing discussions between the TFSC and the APD DNA Laboratory regarding the QBST and appropriate statistical calculations had caused heightened scrutiny of ongoing cases involving DNA evidence from the APD DNA Laboratory, and Travis County ADAs were reviewing pending cases to ensure they did not present evidence that was inaccurate. On May 4, 2016, two Travis County Assistant District Attorneys (ADAs) became aware of potential issues involving the QBST in a pending case for which the Analyst was scheduled to present testimony in the case on the same day.

The error identified was in a calculation involving the quantity of DNA from the evidence sample that had been amplified, which indicated incorrectly that the amount of DNA amplified was above the QBST and therefore,

[109] See, e.g., Memo J. Sailus "DNA Laboratory Plan Highlights for 2016 for DNA Casework," April 5, 2016
[110] Id.
[111] Email D. Morales, April 19, 2016.

the profile could be interpreted. The Analyst's calculation error had not been identified by the DNA Laboratory's standard technical review[112] or by the Technical Leader in the Laboratory. The DNA profile data obtained had been interpreted, compared and reported by the Laboratory based on that erroneous calculation. Seeking clarification, the two ADAs went to the courthouse and questioned the lead Analyst outside the courtroom where she had been waiting to testify in support of the report.

The Analyst was unable to explain to the ADAs how she had been able to interpret a profile using an amount of DNA that was below the permitted threshold, an inability that persisted even after she consulted by phone with the DNA Analyst who had performed the technical review of the case.

The ADAs declined to use the Analyst or the report as evidence in the case, and they scheduled a subsequent meeting with the Analyst to better understand how this issue had occurred. In subsequent discussions the Analyst put forward different rationales for the analysis, including pointing to a deviation from protocol that was approved by the Technical Leader as a justification for the analysis. In that conversation, however, it became clear that the protocol deviation that was approved (reporting the major contributor profile without including one locus that did not meet the requirements in the laboratory protocol for reporting a major contributor profile) was different from the calculation error that the Analyst had identified when questioned by the ADAs (creating a profile with too small an amount of DNA). The Analyst also explained to them that they had been confused by the question that was being asked outside the courtroom and that had resulted in her answering incorrectly at the time.

The TFSC Audit (Late May and Early June 2016)

The TFSC conducted an audit of the APD DNA Laboratory in late May and early June 2016. The audit was conducted by Lynn Garcia, General Counsel of the TFSC; Dr. Bruce Budowle of the University of North Texas, and Jody Koehler, the Technical Leader of the Texas Department of Public Safety (DPS) DNA Laboratory in Austin (acting as an agent of ASCLD/LAB, the APD Laboratory's accrediting body).

The findings of the TFSC audit review team were published on July 8, 2016.[113] The Audit Report identified issues specific to the APD DNA Lab in regard to DNA mixture interpretation:

- The APD DNA Lab established and continued to use a quantification-based stochastic threshold (QBST);[114]
- Validation studies were incomplete and inadequate, lacking data to support the use of the quant-based threshold;[115]

[112] A technical review is a standard procedure in which a second analyst reviews the work of the primary analyst to ensure accuracy and appropriate protocols have been followed. Thus, the technical reviewer should have been able to replicate the Analyst's work prior to approving the analysis, and should have been able to refresh the lead Analyst's recollection of the process used.
[113] TFSC Audit Report, front cover.
[114] *Id.* at 12-14
[115] *Id.* at 14-15.

- CPI decisions made by the DNA analysts were driven by the known profile (suspect or victim);[116] and
- APD DNA Lab analysts deviated from protocols and procedures.[117]

The Audit Report also discussed leadership and training issues that existed within the lab,[118] and concerns regarding the utility of external accreditation and audit reviews, given the reliance of laboratory staff and criminal justice stakeholders on accreditation as an indication that the quality of the Laboratory's work was sound.[119] The report also detailed some specific examples of contamination events and the use of an acid phosphatase (AP) reagent outside of the manufacturer's instruction.[120]

Suspension of the APD DNA Laboratory (June 2016)

In response to the TFSC Audit Report, APD leadership decided to suspend the DNA Laboratory's active casework on June 13, 2016. APD leadership and lab management then engaged in an evaluation and discussion with multiple stakeholders, including the TFSC, to determine the most effective path forward to meet the casework and investigational and adjudicatory needs of the APD and the City of Austin. APD leadership hoped to address the issues raised in the Audit Report by retraining the existing team of APD DNA Analysts, regaining the trust of the TFSC and the DNA Laboratory's accrediting body, and resuming casework activities as quickly as possible. To do this, APD and the Austin branch of the Texas Department of Public Safety (DPS) agreed that DPS would contribute personnel from its DNA laboratory to re-train the APD DNA Laboratory analysts in high-quality serology and DNA laboratory procedures.

From July to December 2016, DPS employees provided training assistance to the APD DNA Laboratory Analysts.[121] On December 2, 2016, the DPS Laboratory Manager sent an email to the leadership of the DPS DNA laboratory in Austin citing a litany of challenges and requesting that "we no longer be involved in the training efforts of the current DNA staff at APD, effective immediately."[122] Further efforts at training the APD DNA Laboratory Analysts to return to casework within the APD DNA Laboratory and under APD leadership have not been resumed.

[116] *Id.* at 15-16, 20, 32.
[117] *Id.* at 16-17
[118] *Id.* at 23-25.
[119] *Id.* at 26-29.
[120] *Id.* at 18-22.
[121] APD Retraining PIR Response 2-12-18.pdf.
[122] Email, J. Koehler to M. Valdez and B. Mills, Dec. 2, 2016.

Part I: Contributing Factors to the Closure of the APD DNA Laboratory and Recommendations for Reform

Section A: Overarching Structural/Management Challenges Within APD

The ultimate responsibility for creating a scientifically sound and operationally effective culture of quality and high reliability in the APD DNA Laboratory fell on the layers of management within APD that oversaw the DNA Laboratory from its inception in 2004 through its closure in 2016. This includes the Analysts and Technical Leaders of the DNA section, the management and quality assurance leaders of the APD forensic laboratory as a whole, and senior APD leadership.

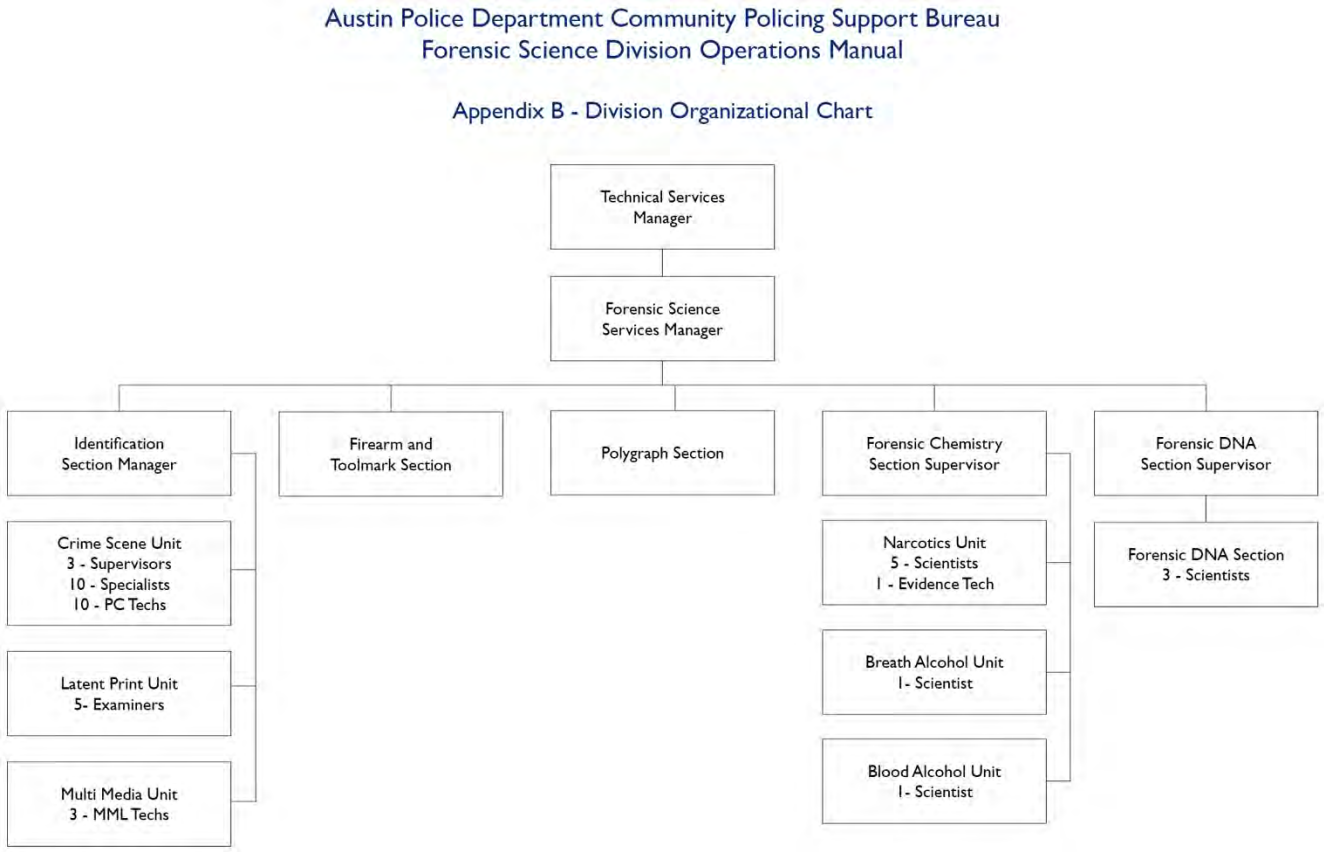

Figure 3. APD Forensic Science Services unit Organizational Chart, 2005

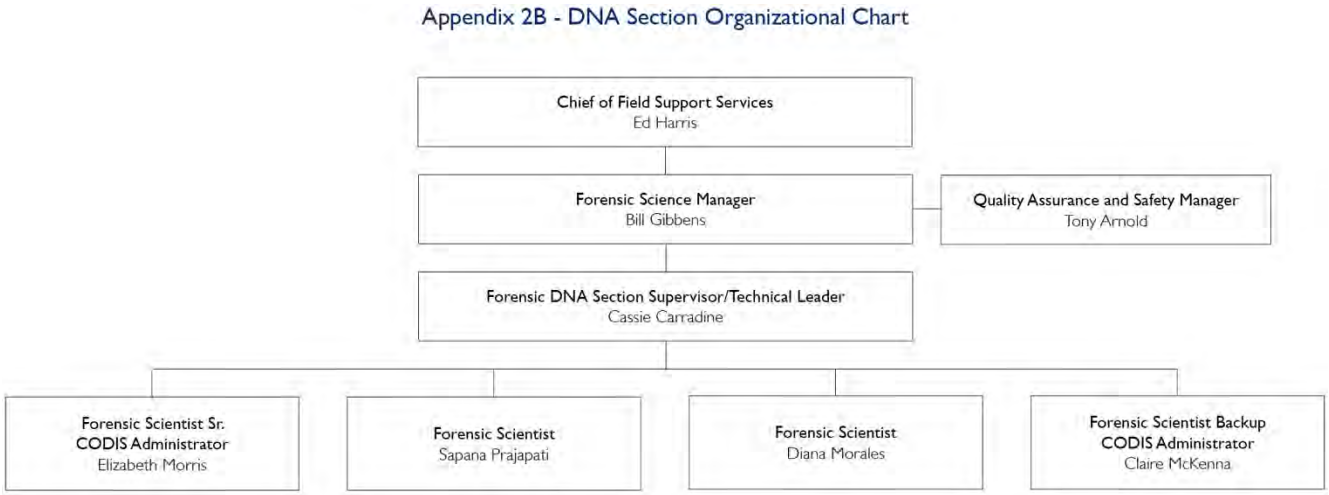

Figure 4. APD DNA Section Organizational Chart, 2010

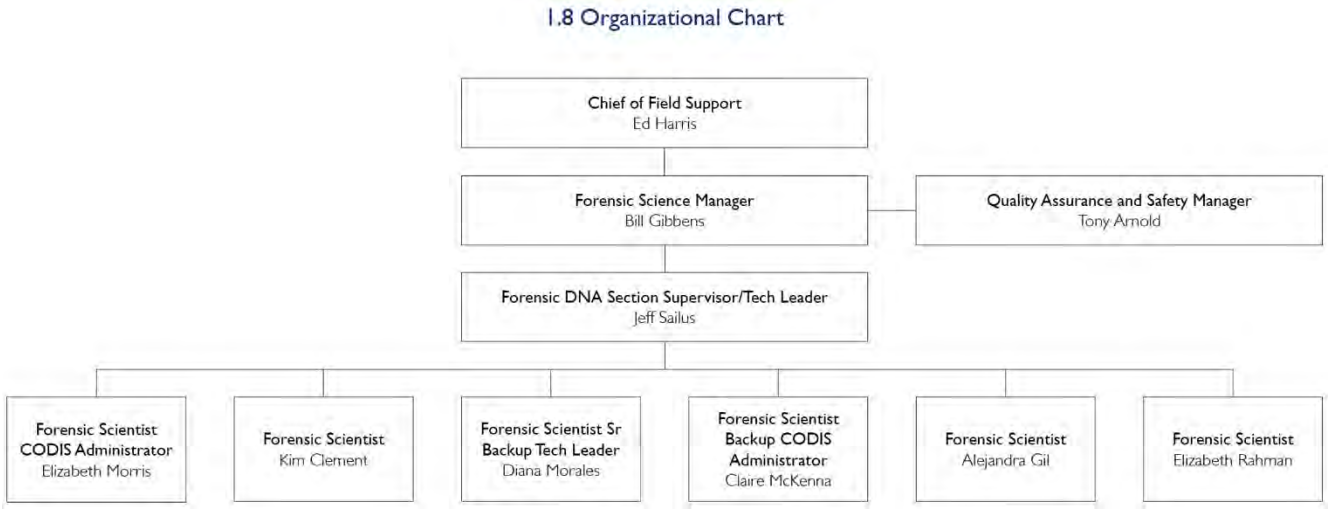

Figure 5. APD Forensic Science Services unit Organizations Chart, 2015

APD DNA Laboratory Technical Leaders

The individual who bears the most direct responsibility for the APD DNA Laboratory's work at any given time is the Technical Leader. It was the original Technical Leader who had the direct authority for embracing the specific (and ultimately flawed) procedures and techniques used by the APD DNA Laboratory for analyzing DNA mixtures, and it was her successors who had primary responsibility for adhering to those procedures after their flaws were well-known. At the same time, many of the issues around the analysis of mixtures that were clear to experts in 2015 were less well known in 2010 and 2013, at the time those procedures were adopted by APD. And while the Technical Leaders did not build effective quality processes within the DNA Laboratory, it is also true they were not operating within a robust quality framework established by APD Laboratory management or APD leadership. In such an environment, underlying practices can "drift" or gradually erode from written standards, and errors can, and in this case did, continue for years without detection.

Compounding the challenge, the DNA Technical Leaders in the APD DNA Laboratory from the time of its inception adopted methods that were not fit for purpose and lacked proper validation. For example, the DNA

Laboratory acted to implement the QBST almost immediately after the issuance of the SWGDAM Interpretation Guidelines for Autosomal STR Typing in January 2010, embracing a threshold based on the quantity of input DNA without waiting to see what other laboratories in Texas or elsewhere were doing. Validation studies to support the QBST were completed on the same date that an accreditation audit visit was initiated in April 2010, suggesting the validation studies were rushed to completion. Later, the DNA Laboratory was also one of the first labs to transition to the new Fusion amplification kit in 2014; while this improved the Laboratory's DNA detection and analysis capabilities, its chosen implementation proved over time to be suboptimal, actually increasing the risk of stochastic effects that could lead to errors in the evaluation of DNA profiles from casework.

If they were not known before implementation of these methods, the limitations of these approaches should have become clear when other jurisdictions (a) opted not to pursue the QBST and (b) implemented Fusion and generated data illustrating that the "28-cycle" implementation generated fewer stochastic effects.

Unfortunately, the DNA Laboratory's quality assurance system was ineffective, lacking an effective feedback loop for analyzing technical risks, or an efficient system for revisiting or modifying the implementation of these techniques. The continued use of the QBST makes plain the lack of effective systems or processes to reevaluate the methods as consensus against them emerged over time.

The Laboratory's second Technical Leader expressed a desire to modify Laboratory protocols to shift to a 28-cycle implementation of Fusion. He also expressed a desire to move away from the need for a stochastic threshold and toward probabilistic genotyping, using a continuous software method. These were scientifically sound approaches that would likely have improved the quality of DNA mixture interpretation in the APD Laboratory (assuming appropriate implementation, validation, training and other critical factors were in place). But this same Technical Leader also clung to the inappropriate QBST process longer than was defensible, advocating for a strategy that would have perpetuated unacceptable risk to casework. Compounding the challenge was the Technical Leader's untimely illness and passing; in his absence, the DNA Laboratory lacked both effective scientific leadership and an effective contingency plan and was unable to progress with the proposed move to probabilistic genotyping after late 2014.

The harm of these errors was compounded by the fact that the issues within the laboratory do not appear to have been understood within the legal community. Judges and lawyers cannot control a laboratory's acts or omissions or those of its employees. Neither can they be held responsible for the DNA Laboratory's failure to develop and manage effective QA systems. At the same time, structures designed to maximize transparency, external oversight, and communication can be constructed that benefit from the participation of the downstream stakeholders who receive information from the DNA laboratory (e.g., prosecutors, defense attorneys, and judges) to ensure that the Austin criminal justice system is better able to identify and address potential quality issues rapidly and efficiently. Some jurisdictions have recognized the need for professionals within the legal

system to provide some oversight through boards or panels.[123] After consultation with the Austin Stakeholders Group, we suggest the creation of a Scientific Advisory Panel (SAP) and Justice Stakeholder Advisory Panel (JSAP) that would provide guidance and advice to lab management and communicate to the community, stakeholders, and the TFSC regarding quality, transparency, and objectivity of the DNA Laboratory.

The SAP would be comprised of national thought leaders in the DNA and forensic science communities, who would provide scientific guidance to the DNA Laboratory and larger crime laboratory management on various issues including, but not limited to, innovations, technical improvements, standard operating procedures, validation studies, and corrective actions. SAP members would be nominated by laboratory management and approved by the JSAP.

The JSAP would include community justice system representatives who would provide guidance on upstream/downstream use of DNA evidence and improve the integration of that information with the rest of the criminal justice system. The DNA Laboratory and the SAP would provide the JSAP with regular reports on lab operations, changes, improvements, and corrective actions to encourage transparency of DNA Laboratory operations. In exchange, the JSAP would review and advise the SAP and the DNA Laboratory on useful administrative policies, procedures, and information dissemination and transparency to ensure that the other criminal justice stakeholders are receiving all the information they need in an efficient format, and that they are serving as quality stewards and critical assessors of DNA Laboratory reports and analyses.

The SAP and JSAP would regularly review Laboratory policies and procedures and would work with the TFSC to fill in quality assessment gaps not addressed through accreditation and auditing. They would conduct periodic public meetings and make any records from such meetings publicly available. While it may be useful for the DNA Laboratory to enter into formal agreements with the SAP and JSAP to establish membership, roles, and responsibilities, it is important to note that the SAP and JSAP would have an advisory role only. All decision-making regarding DNA Laboratory management, including decisions about technologies to use in the laboratory, what equipment to test, purchase and install, and casework, quality and employment-related actions, would remain with DNA Laboratory personnel and management.

Consider how such boards could have prevented the Technical Leader's decision to employ the QBST, the improper use of the CPI calculation, and the insufficient validation studies supporting them. The SAP and JSAP could (a) subject such a process to rigorous evaluation by internal or external advisors with appropriate expertise in DNA analysis prior to its implementation and periodically into the future; (b) help to ensure that the lab employees properly disclose records and other information to APD leadership or other parts of the criminal justice system and (c) help to ensure that the FBI's QAS requirements (and all other appropriate standards and requirements) are followed. Had the SAP and JSAP been in place during the time period in question, the following actions may have never occurred:

[123] See C. Carradine, "Calculation of Stochastic Threshold," signed and initialed by T. Arnold, QA Manager, April 22, 2010. Validation studies to support the QBST were completed by the APD DNA Laboratory Technical Leader in the same month. A summary of the validation studies was completed on April 22, 2010, four days before the DNA Laboratory's initial ASCLD/LAB accreditation review.

- The DNA Laboratory's decision to adopt the flawed QBST in the first place;
- The DNA Laboratory conducting incomplete and/or ineffective validation studies for both the QBST and the shift in technology from Profiler Plus/COfiler amplification kits to the Fusion amplification kit;
- The DNA Laboratory's implementation of Fusion in a fashion that was later understood to create more interpretation issues;
- The DNA Laboratory's lack of modification to its methodologies as more information on the Fusion implementation was generated by other laboratories across the country; and
- The DNA Laboratory's unwillingness to follow the direction of the TFSC when the Laboratory's inappropriate methodology for DNA mixture interpretation was discovered.

The SAP and JSAP could also be beneficial in not simply identifying issues but also fostering dialogue about them. Such a dialogue with national experts in 2010 (when the QBST was created) or 2014 (when Fusion was implemented) would have identified, and perhaps prevented or stopped the implementation of both processes. At the least, they would have fostered better awareness in the criminal justice system about potential risks with these specific DNA procedures.[124]

Ensuring these conversations take place, are transparent, are joined by other parts of the criminal justice system and are focused on quality would protect future DNA Laboratory and Technical Leaders from embracing or prolonging ineffective processes or procedures. It would also more rapidly identify instances in which the DNA Laboratory is charting a course different from the mainstream while providing a resource group for addressing issues that arise. Finally, it would benefit the jurisdiction and other stakeholders by making these decisions open and publicly known, as opposed to the internal, unpublished decisions made in the sole discretion of APD DNA Laboratory Technical Leaders from 2004 – 2015.

APD Leadership and Laboratory Management

After the individuals who worked in the DNA Laboratory, the managers of the APD Forensic Services Section and the overall leadership of the APD were next in line to ensure that the DNA Laboratory was accurate, reliable, and efficient. Unfortunately, APD was poorly equipped to satisfy that responsibility.

The DNA Laboratory was overseen by the APD Forensic Services Manager (Figure 5 above), a nonsworn civilian employee with no scientific background in DNA who also oversaw the other forensic disciplines in the APD crime laboratory (e.g., toxicology, ballistics, fingerprints, etc.). Forensic Services were themselves just one portion of the Field Support Division, also managed by a non-scientific, non-sworn civilian employee. Field Support then reported to an Assistant Chief who reported to the Chief of Police (Figure 4 above).

[124] Compliance with standards set forth ISO 17025:2017, required under the current ANAB system, would require a reconstituted DNA Laboratory to undertake this process.

Neither the Forensic Services Manager nor the Laboratory's Quality Assurance/Safety Manager had prior experience in DNA analysis. As a result, they gave great discretion to the DNA Technical Leader to determine the DNA Laboratory's scientific direction, including the deployment of technology, the design and implementation of new protocols and procedures, and to evaluate and design corrective actions for any quality concerns or errors occurring in the DNA Laboratory. Because they lacked the necessary domain expertise to engage with the Technical Leader on technical or quality issues, they were unable to provide guidance or oversight, or even to be aware of decisions made by the Technical Leader in 2005 and beyond (including the implementation of the QBST with use of the CPI for DNA mixtures, the incomplete and inadequate validation studies, and the later implementation of Fusion) that were substantial factors in the issues that persisted through 2015 and led to the closure of the Laboratory.

The placement of the Laboratory-specific management and Forensic Science Services several layers below the Chief of Police or his general management level reduced the organizational visibility of issues within the DNA Laboratory. APD leadership, then and now, consisted of highly credentialed and experienced police officers with a depth of experience in policing, not in hard science or DNA analysis, and no one in the senior ranks of APD leadership prior to 2016 possessed the scientific background necessary to evaluate the Forensic Science Services unit or the DNA Laboratory. The DNA Laboratory (as well as the Laboratory's Safety and Quality Assurance group) was four levels removed from APD senior leadership, in a division not managed by sworn officers and competing for attention and resources with multiple investigational chains of command being represented by sworn officers who were generally unaware of and uneducated in the DNA Laboratory's needs. This organizational structure was ill-equipped to provide the necessary oversight or transparency that are needed for a high-quality DNA laboratory operating in a larger criminal justice system.

Section A: Contributing Factors

A-1 **CONTRIBUTING FACTOR**: The Austin Police Department (APD) did not provide effective management and scientific oversight to the DNA Laboratory Supervisor and Technical Leader.

A-2 **CONTRIBUTING FACTOR:** The APD Forensic Science Services unit (including the Forensic Science Services Manager and the Quality Assurance and Safety Manager) and the APD Field Support Services division leader lacked the scientific and technical expertise necessary to effectively manage the APD DNA Laboratory.

A-3 **CONTRIBUTING FACTOR:** The APD Forensic Science Services Manager was not at a "policy-maker" level within APD, limiting the visibility of issues within the DNA Laboratory to APD leadership.

A-4 **CONTRIBUTING FACTOR:** The APD Forensic Science Services Quality Assurance and Safety Manager had no expertise in DNA analysis and failed to apply his training in quality assurance to the DNA Laboratory.

A-5 **CONTRIBUTING FACTOR:** The APD DNA Laboratory Technical Leader implemented methods that lacked proper validation, were not fit for purpose, and lacked the benefit of lessons learned from other laboratories around the country.

Section A: Recommendations

A-1 **RECOMMENDATION:** Any DNA laboratory established within the City of Austin should have a structure of independence, scientific excellence, transparency, and operational excellence and efficiency. In particular, the management structure of the DNA laboratory should ensure that:

- The Technical Leader meets all administrative requirements necessary to satisfy the requirements of the Federal Bureau of Investigation Quality Assurance Standards for DNA Laboratories (FBI QAS) and has the substantive leadership, education, training and technical skills to thrive in the role.
- The Technical Leader reports, either directly or indirectly, to an individual with a Ph.D. in a relevant scientific field who has prior management experience in a forensic lab;
- If the DNA laboratory is a part of a larger organization and/or forensics laboratory, the manager with overall responsibility for the DNA laboratory should be at the level of general management within the larger organization and the laboratory should have a direct voice in top-line budget requests on a par with other parts of the organization;
- If the DNA laboratory is a part of a larger organization and/or forensics laboratory, the manager with overall responsibility for the DNA laboratory should be at a level of seniority that ensures that the DNA laboratory's operations are separate and independent from influences within the criminal justice system; and

A-2 **RECOMMENDATION:** The DNA laboratory should have a Scientific Advisory Panel (SAP) and a Justice Stakeholder Advisory Panel (JSAP), made up of external advisors who can:

- Provide scientific input and expertise to ensure continuous high-quality laboratory practices and to review and advise on policies, procedures and processes over time;
- Improve the transparency and awareness of the other stakeholders involved in utilizing the DNA laboratory and its output (e.g., APD, the Travis County District Attorney's Office, the criminal defense bar, the courts, and the citizens of Austin);
- Provide ongoing input and information about the downstream requirements of DNA analysis that allow scientific information to be used appropriately and effectively in criminal investigations and in the adjudication of criminal charges in court; and
- Efficiently review prior to implementation and periodically reassess the adoption of technologies and methodologies in use at the DNA Laboratory.
- The SAP should include scientists from outside Texas and should include scientists from disciplines outside the realm of forensic science, including but not limited to at least one statistician with

exposure to forensic science (e.g., OSAC Statisticians Task Group or a CSAFE consortium institution).

A-3 **RECOMMENDATION:** The DNA Laboratory Technical Leader and laboratory manager should actively and regularly engage with a capable and trained Quality Assurance and Safety Manager whose role should exist outside of the Technical Leader's reporting line. The Quality Assurance and Safety Manager should have specific training in the discipline of laboratory quality management as well as a working understanding of DNA techniques and relevant issues.[125]

Section B: Implementation of the Quantification-Based Stochastic Threshold (QBST)

In 2010, the APD DNA Laboratory Technical Leader elected to adopt a Quantification-Based Stochastic Threshold (QBST) for the APD DNA Laboratory. [126]

DNA is amplified through a process known as polymerase chain reaction, or PCR. PCR reproduces, or "amplifies," selected sections of DNA from a biological sample, making copies of the DNA that render it suitable for interpretation and comparison with the DNA profile generated from another sample. Stochastic effects are random events that occur during the amplification of small amounts of DNA that may impact the quality and interpretation of the resulting DNA profile data.

Specific types of stochastic effects include:

1. **Peak height imbalance** between sister alleles for a heterozygous genotype at a locus;
2. Allele **drop out** (the loss of one or more alleles that should have been displayed at one or more loci if sufficient amounts of DNA had been present during amplification);
3. Elevated **stutter peaks** (a common artifact of the PCR amplification process typically observed one or more repeat units smaller or larger than an STR allele in a DNA profile); and/or
4. Allele **drop in** (the observed presence of one or more additional alleles not from the DNA contributor).

The possibility that stochastic effects may have occurred and impacted a DNA profile may be assessed by reviewing the DNA profile. One common mechanism used to address the possibility that the stochastic effect of drop out may have occurred during amplification of a specific DNA sample is to establish a "stochastic threshold" during validation studies conducted by the laboratory prior to introducing a particular test or process into casework. The "stochastic threshold" is the point at which there is high confidence that both alleles in a heterozygous allele pair are present at a locus, with no reason to assume that one or more alleles is missing from that locus. In addition, for single-source DNA profiles, the stochastic threshold gives reasonable assurance that a

[125] In June 2019, the APD hired a QA Program Manager whose resume appears consistent with this recommendation.
[126] For additional information, please refer to the Final Audit Report for Austin Police Department Forensic Services Division DNA Section, July 8, 2016 (hereafter the "TFSC Audit Report,") pp. 3-7.
[127] TFSC Audit Report, at 12-13.

single observed allele at a locus that is above the threshold represents the homozygous genotype of the individual contributing the DNA.

These and other challenges in mixture interpretation were the subject of discussions among experts in DNA analysis throughout the 2000s, especially at the time the SWGDAM Interpretation Guidelines for Autosomal STR Typing were published in January of 2010. Between the publication of the SWGDAM Guidelines and the scheduled date for an accreditation review by the American Society of Crime Lab Directors/Laboratory Accreditation Bureau (ASCLD/LAB) scheduled for April of that year, the Technical Leader in the APD DNA Laboratory developed a quantitation-based stochastic threshold ("QBST"). Unlike other techniques used to identify stochastic effects, the QBST used the estimated quantity of input DNA into the amplification reaction as the primary method for determining potential stochastic effects.[127] This use of the QBST as a tool for mixture analysis appears to have been unique. We are unaware of any other laboratory in the United States that took this approach to DNA mixture analysis. Instead, the accepted method of assessing drop out of alleles in mixtures during the time period in question was based on peak height as indicated by Relative Fluorescence Units ("RFUs"),[128] and scientific papers published prior to early 2010 emphasized the need to rely on peak height, rather than the amount of DNA input into the reaction, as the method for determining stochastic effects in a mixed sample.[129]

It is unclear whether the Technical Lead was aware of these papers at the time she implemented the QBST. The APD DNA Laboratory was one of the earlier DNA laboratories in Texas to adopt a stochastic threshold,[130] and awareness of the optimal ways to address stochastic effects was gradually expanding throughout the forensic DNA community. The TFSC itself recognized "the significant confusion in the forensic DNA community regarding mixture interpretation from the inception of PCR-based methods in the mid-late 1990s to the present."[131]

At the same time, no other laboratory in Texas (or elsewhere) adopted the QBST,[132] and no other peer-reviewed journal articles were published citing the acceptance of a quant-based ST for mixture interpretation.[133] Thus, by the time of the TFSC Audit in 2016, experts in the analysis of mixed DNA profiles were definitive that "[u]sing a QBST to determine potential stochastic effects in DNA mixtures is neither scientifically valid nor supported by the forensic DNA community." There appeared to be no structure within the DNA Laboratory for the periodic review of methodologies like the QBST to ensure that the APD Laboratory was staying current with well-established scientific principles.

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[127] TFSC Audit Report, at 12-13.
[128] *See* Butler, above fn **Error! Bookmark not defined.**
[129] *See*, e.g., Budowle, B., Onorato, A. J., Callaghan, T. F., Manna, A. D., Gross, A. M., Guerrieri, R. A., ... & McClure, D. L. (2009). Mixture interpretation: defining the relevant features for guidelines for the assessment of mixed DNA profiles in forensic casework. *Journal of Forensic Sciences*, 54(4), 810-821 at 811; Moretti, T. R., Baumstark, A. L., Defenbaugh, D. A., Keys, K. M., Smerick, J. B., & Budowle, B. (2001). Validation of short tandem repeats (STRs) for forensic usage: performance testing of fluorescent multiplex STR systems and analysis of authentic and simulated forensic samples. *Journal of Forensic Science*, 46(3), 647-660 at 656.
[130] The majority of Texas laboratories adopted a dual threshold at some point between 2010 and 2015. TFSC Audit Report, pp. 9-10.
[131] *Id.*[132] TFSC Audit Report, at 14.
[132] TFSC Audit Report, at 14.
[133] TFSC Audit Report, at 13.

Whatever the risks of unidentified or misinterpreted stochastic effects existed due to the QBST and its use of the CPI were increased by the APD DNA Laboratory's implementation of Fusion in 2013. The implementation of Fusion created increased risks of stochastic effects due to the significant decrease in DNA needed for amplification. The amplification kits in use prior to 2013, called Profiler Plus/COFiler, functioned optimally when the sample amplified was greater than 1-2 ng, while the Fusion amplification kit could work with a much smaller amount of DNA (0.25 – 0.5 ng). This increased the risk of stochastic effects occurring with low-template samples, especially those with mixtures of DNA,[134, 135] and increased the risk of interpretation error. To make matters worse, the Technical Leader elected to implement Fusion using 30 amplification cycles to generate the sample that would be analyzed rather than the 28 cycles used for previous kits. At the time, this was within the range of the manufacturer's guidance to laboratories.[136] Over time, however, most laboratories that implemented Fusion elected to use a 28- or 29-cycle implementation, as their validation studies and experience showed fewer stochastic effects generated with these lower cycle numbers.[137] Here again, there appears to have been no mechanism for, or effort to periodically review methodologies to ensure that the DNA Laboratory was staying abreast with the latest scientific consensus.

The implementation of 30-cycle Fusion amplification kits did not create a merely theoretical risk to casework. APD DNA Analysts had observed stochastic effects (e.g., allele dropout) in their casework even when the quantity of DNA in the sample exceeded the QBST, and TFSC auditors observed allele dropout above the QBST in over 1/3 of the cases they reviewed.[138] Because allele dropout reduced the number of alleles used to calculate the Combined Probability of Inclusion (CPI), these effects complicated the ability of APD DNA Analysts to provide appropriate statistical values for individuals reported to be included as possible contributors to DNA mixtures.

While members of the DNA scientific community had published on problems with DNA mixtures and mixture interpretation and were engaged in conversations about the most effective methods for analyzing DNA mixtures, it was not until 2014 and the events that occurred in relation to the DNA Unit of the Washington, D.C. Department of Forensic Science that the TFSC focused on the fact that different laboratories in Texas were handling mixtures in different ways, and identified the need to review and address the issue of how best to properly interpret DNA mixture samples.

The TFSC quickly initiated a statewide conversation with laboratory directors. Upon learning of the APD DNA Laboratory's unique QBST method, the TFSC engaged in a conversation with the DNA Laboratory Technical Leader, management of the APD forensic laboratory and national experts in DNA mixture analysis (e.g., Dr. Bruce Budowle of the University of North Texas and Dr. John Butler of the National Institute of Standards and Technology, who was influential in the promulgation of the 2010 SWGDAM Guidelines). These experts concurred that the QBST was not an appropriate methodology for assessing the possibility of

[134] Fusion user's manual, p. 6, available online at https://www.promega.com/-/media/files/resources/protocols/technical-manuals/101/powerplex-fusion-system-protocol.pdf?la=en
[135] See Memorandum from Cassie Carradine to Bill Gibbens regarding Stochastic Threshold for Mixture, dated May 1, 2014, at 1.
[136] Fusion user's manual.
[137] Personal communication with Charlotte Word, DNA consultant.
[138] TFSC Audit Report, at 16.

drop out during the analysis of DNA profile data from multiple individuals, and the TFSC informed the DNA Laboratory of the need to apply an appropriate methodology and conduct a case review to ensure that any errors caused by the flawed QBST methodology were identified and addressed.[139]

Problems with the APD DNA Laboratory's use of QBST were compounded by its response to the TFSC's demands for change. While the Technical Leader had begun efforts to optimize the laboratory's chemistry and update the Laboratory's mixture interpretation methods to ensure the most accurate possible DNA statistics, he resisted abandoning the QBST. Not wanting to address past cases or lose resources needed for ongoing casework, the APD Forensic Science Manager and DNA Technical Leader continued to defend the QBST, citing to language from the SWGDAM 2010 Mixture Guidelines, as well as from Dr. Butler's textbook, "Advanced Topics in Forensic DNA Typing: Methodology." The specific language in the SWGDAM guidelines was as follows:

> 3.2.2. If a stochastic threshold based on peak height is not used in the evaluation of DNA typing results, the laboratory must establish alternative criteria **(e.g., quantitation values or use of a probabilistic genotype approach)** for addressing potential stochastic amplification. The criteria **must be supported by empirical data and internal validation** and must be documented in the standard operating procedures.

(Emphasis added).

The Technical Leader persisted in his position that the QBST was suitable for current casework even after being informed multiple times by the TFSC that the language cited was not meant to endorse the use of a quant-based ST for mixtures and the approach was "scientifically indefensible."[140] Rather than immediately suspending the use of the QBST (in other words, suspending casework in the DNA Laboratory) and reviewing past cases to ensure no prior casework had been adversely impacted by its use, the Technical Leader proposed to complete validation studies that would have enabled the DNA Laboratory to move forward into probabilistic genotyping, an emerging method for analyzing DNA mixtures that would have eliminated the need for a stochastic threshold. While this was a scientifically viable strategy for future cases (assuming appropriate implementation, validation, training and other critical factors were in place), it did nothing to identify or address any potential errors caused by the QBST over time, or to alleviate the risks present in ongoing cases. The Technical Leader's plan for going forward was incomplete, not properly staffed, and subjected individuals in the criminal justice system to increased risk of error and inaccuracy in the investigation and adjudication of their cases.

As it turned out, the DNA Laboratory was unable to move forward to probabilistic genotyping due to structural weaknesses in its team. While the Technical Leader initiated the proposed validation studies for probabilistic genotyping in October 2014, the studies were delayed by, among other things, the untimely sick leave of the APD Technical Leader and the lack of anyone else in the APD DNA Laboratory with the ability to complete

[139] Email J. Sailus to T. Arnold, B. Gibbens, J. Sailus, K. Clement, A. Gil, C. McKenna, D. Morales, E. Morris, E. Rahman, J. Sailus, and A. Washington Re: List of Criteria for Protocol Review, sent Oct. 16, 2015 6:14 p.m.
[140] TFSC Audit Report, at 14.

the studies. The Technical Leader had not designated or trained a successor or replacement who could conduct this important work, and the Interim Technical Leader who stepped into the role in November 2014 was not technically equipped to handle the rigors of the role.

In short, the original Technical Leader implemented in 2010 a unique methodology for interpreting mixture DNA samples that became increasingly indefensible over time and increased the risk of stochastic effects with a suboptimal implementation of the Fusion amplification kit in 2013. Her successor identified concerns with the QBST approach and the Fusion implementation, but resisted calls from the TFSC to abandon it notwithstanding concerns raised by Analysts with casework, and proposed an approach that the Laboratory was unable to implement that did not address the concerns that the QBST could have adversely impacted many of the DNA Laboratory's prior or then-current cases.

The persistence of these flawed methodologies was facilitated by the lack of technical expertise or quality assurance oversight mentioned above, and by the lack of a structure of periodic evaluation of methodologies in the DNA Laboratory to ensure that the Laboratory was not deviating from the scientific mainstream.

Nor were auditors or accrediting bodies useful sources to identify the problems with the DNA Laboratory's use of the QBST. While the SWGDAM Guidelines represented the 2010 scientific consensus on analyzing and interpreting DNA mixtures, their categorization as "guidelines" excluded them from audit review in either the annual FBI QAS audit or the 5-year ASCLD/LAB accreditation reviews. Put differently, the QBST was not considered by QAS external auditors or ASCLD/LAB accreditors in the determination of whether the APD DNA Laboratory received accreditation and did not limit the ability of the APD DNA Laboratory to submit samples to the FBI's national CODIS database.

Section B: Contributing Factors

B-1 **CONTRIBUTING FACTOR:** The APD Technical Leader implemented a Quantification-Based Stochastic Threshold (QBST) that was not generally accepted in the scientific community.

B-2 **CONTRIBUTING FACTOR:** Like other laboratories across the country, the DNA Laboratory adopted an incorrect method of utilizing the Combined Probability of Inclusion (CPI) that used a known profile to decide which loci would be used for statistical calculations, creating a risk of bias in the analysis.

B-3 **CONTRIBUTING FACTOR:** While issues with mixture DNA analysis and interpretation and inconsistent interpretative methods among forensic laboratories were prevalent during the time period in question, the APD DNA Lab continued to analyze mixtures using the QBST, a methodology that was increasingly scientifically indefensible.

B-4 **CONTRIBUTING FACTOR:** The DNA Laboratory's 2013 adoption of Fusion amplification kits increased the potential risk of unidentified stochastic effects in DNA analysis. The implementation

chosen by the Technical Leader was within manufacturer's permitted range at the time, but subsequent broader deployment in other labs demonstrated that fewer stochastic effects were seen with a 28-cycle process.

B-5 **CONTRIBUTING FACTOR:** The APD DNA Laboratory had no apparent process for the periodic review of scientific methodologies to ensure that the Laboratory remained in line with evolving scientific knowledge. The APD DNA Laboratory's Quality Assurance Program failed to evaluate and address the problems with the use of QBST in conjunction with the 30-cycle implementation of Fusion amplification kits.

B-6 **CONTRIBUTING FACTOR:** Once the issues with the QBST were identified by the TFSC, the APD DNA Laboratory's Technical Leader resisted the TFSC's requirement that the Laboratory stop using QBST.

B-7 **CONTRIBUTING FACTOR:** The 2014 Technical Lead improperly relied upon the 2010 SWGDAM Guidelines on interpretation of mixtures, which were:

a. Vaguely worded; and
b. Intended primarily for single-source and 2-person mixtures of high quality, and not for DNA profiles generated from small amounts of DNA.

B-8 **CONTRIBUTING FACTOR:** Compliance with the 2010 SWGDAM Guidelines on interpretation of mixtures, relied upon by the 2014 Technical Leader to defend the QBST, was not required to satisfy ASCLD/LAB accreditation requirements or the FBI QAS. Thus, neither ASCLD/LAB accreditors nor FBI QAS auditors were required to review the QBST methodology to evaluate whether it complied with the SWGDAM Guidelines.

B-9 **CONTRIBUTING FACTOR:** The proposed path forward by the DNA Laboratory Technical Leader was scientifically viable but did not address the risk of errors in past or then-current casework caused by the implementation of the QBST.

B-10 **CONTRIBUTING FACTOR:** The extended sick leave of the Technical Leader, who was directing the validation studies on probabilistic genotyping, slowed the APD DNA Laboratory's transition away from the QBST.

B-11 **CONTRIBUTING FACTOR:** Neither the Interim Technical Leader nor any other Analyst in the DNA Laboratory possessed the technical skill to continue the validation studies on probabilistic genotyping in the absence of the Technical Leader.

B-12 **CONTRIBUTING FACTOR:** APD Laboratory management did not provide the Interim Technical Leader with additional support to complete the validation studies on probabilistic genotyping.

Section B: Recommendations

B-1 **RECOMMENDATION:** The DNA Laboratory should follow current Organization of Scientific Advisory Committee (OSAC) Standards for DNA laboratories as such standards may be enhanced by the TFSC, including (for example and without limitation) ANSI/ASB Standard 20 and Standard 40 regarding validation for the interpretation of DNA mixtures and interpretation and comparison protocol development.

B-2 RECOMMENDATION: The SAP should advise the DNA Laboratory Manager and Technical Leader on when to update lab protocols, methodologies or equipment. The DNA Laboratory should provide the SAP with periodic updates for the first two years after it implements a new technology or methodology to minimize unintended negative consequences.

B-3 RECOMMENDATION: The DNA Laboratory should designate a Continuing Forensic Education Coordinator who will be responsible for the internal dissemination of emerging scientific knowledge, the professional development of lab employees, and should foster relationships with leaders in the field by regularly attending relevant scientific meetings and conferences.[141]

B-4 RECOMMENDATION: The DNA Laboratory should implement a "high priority" acceleration capability for concerns that could impact current or past cases.

Section C: Inadequate or Insufficient Validation Studies for the QBST

Before the QBST (or any method or equipment used in a DNA laboratory) could be deployed on casework, ASCLD/LAB accreditation standards and the FBI Quality Assurance Standards (QAS) required the completion of validation studies designed to simulate its use with mock casework samples. In the case of the QBST, appropriate validation studies would have established a stochastic threshold that analysts could rely on to aid in the evaluation and interpretation of casework DNA profiles where stochastic effects may have occurred during DNA amplification, and establish the risk or likelihood that stochastic effects had appeared in a particular profile.

FBI QAS Standard Eight specifically addresses validation and is clear that proper validation is a requirement: "The laboratories shall use validated methodologies for DNA analysis."[142] This requirement extends to manual and robotic methods, and the validation studies must be reviewed and approved of by the laboratory's technical leader before being used in the lab.[143] Proper validation requires the laboratory to evaluate the appropriate number and type of samples "necessary to demonstrate the potential limitations and reliability" and that the internal validation should include repeatability, reproducibility (precision and accuracy), sensitivity and

[141] The Technical Leader fulfills this role in most DNA laboratories; it does not need to be designated to a separate employee.
[142] *Id.,* Standard 8.1.
[143] *Id.,* Standard 8.3.

stochastic effects, mixture studies, known and non-probative or mock evidence samples and contamination assessment.[144]

A set of validation studies for the QBST was conducted by the Technical Leader; interestingly, they were completed on the same date in April 2010 that ASCLD/LAB initiated its accreditation visit of the APD crime laboratory, including the DNA Laboratory, suggesting that the accreditation review may have acted as an external variable limiting the conduct of robust validation studies.

It is unclear whether the Technical Leader sought any external scientific guidance regarding how to conduct these validation studies. Regardless, during the TFSC-initiated audit, Dr. Budowle and Ms. Koehler (acting as a representative of ANAB) observed problems with the APD DNA Laboratory's validation studies, even under generally accepted expectations of the time in 2010, [145] and an expert retained by the TFSC to review the validation studies found numerous issues with the adequacy of the studies conducted in both quality and quantity.[146]

As a result of these issues, the utility of the validation studies to support the use of the QBST was limited, allowing stochastic effects to occur without detection in casework. This would lead to the inappropriate reporting of some mixed DNA profiles and misapplication of the CPI calculation.

In keeping with the DNA Laboratory's practice, the stochastic threshold validation studies were not made available to the general public. The validation studies were, however, available to ASCLD/LAB auditors during the 2010 accreditation review. While the validation studies were reviewed during the audit/accreditation process,[147] the reviewers did not note any concerns with the validation studies or the use of the QBST in casework – to the contrary, the audit stated that the listed validation studies were "evaluated and approved."[148] In keeping with ASCLD/LAB and QAS audit practices, the validation studies seem to have been reviewed only to verify their existence and not to evaluate their fitness for purpose, as no concerns were listed in 2010. Similarly, auditors of the DNA Laboratory in 2014 provided no comments regarding the validation studies used by the DNA Laboratory supporting the DNA Laboratory's transition to the Fusion amplification kit in 2014.[149]

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[144] Scientific Working Group on DNA Analysis Methods, Validation Guidelines for DNA Analysis Methods, Approved December 5, 2016, at 9. Accessed at http://media.wix.com/ugd/4344b0_813b241e8944497e99b9c45b163b76bd.pdf.
[145] TFSC Audit Report, p. 12;
[146] Report of Dr. Angela van Daal, January 22, 2017. Dr. van Daal concluded (p. 3) that "[t]here are many fundamental issues with the APD validation studies. These include:

1. Lack of understanding of experimental design by analysts and technical leader
2. Lack of understanding of proper use of equipment
3. Insufficient number of samples analyzed
4. Insufficient range of complex mixture ratios analyzed
5. Insufficient statistical analyses
6. Procedures and interpretations implemented not supported by validation results
7. Inadequate review of data generated in validation studies."

[147] 2010 QAS Audit, p. 91; 2010 ASCLD-LAB Accreditation Inspection Report, p. 6.
[148] 2010 QAS Audit, p. 91.
[149] 2014 QAS Audit, p. 61.

This reveals another weakness of the accreditation and audit system. Per QAS requirements, assessors were not required to re-review previously approved validation studies once they have been "evaluated and approved" in a previous audit.[150] As a result, once the inadequate validation studies had survived an audit review, they were not revisited, even as views of what constituted suitable validation studies grew and evolved over time. As with the use of the QBST itself, an error made in 2010 (inadequate validation studies) was able to persist by a gap in periodic oversight and review (no review of validation studies once reviewed.)

Section C: Contributing Factors

C-1 **CONTRIBUTING FACTOR:** The DNA Laboratory Technical Leader conducted validation studies to establish a stochastic threshold that were later determined to be inadequate for the types of mixture-DNA analysis that the APD DNA Laboratory performed.

C-2 **CONTRIBUTING FACTOR:** APD Laboratory management did not review validation studies, relying on external audits as evidence of the utility of laboratory policies and procedures, despite the fact that such audits did not review the robustness, accuracy, or completeness of the validation studies.

C-3 **CONTRIBUTING FACTOR:** ASCLD/LAB and FBI QAS external audits marked validation studies for the QBST as "evaluated and approved" although the auditors did not appear to review the robustness, accuracy or completeness of the validation studies.

C-4 **CONTRIBUTING FACTOR:** Once they have been reviewed, validation studies receive "carry-over" approval and are not required to be reviewed in subsequent audits or re-approved externally.

Section C: Recommendations

C-1 **RECOMMENDATION:** New policies and procedures should be implemented for the DNA Laboratory that ensure that validation studies are robust and suitable for their intended purpose. At a minimum, the DNA laboratory's policies and procedures for forensic DNA testing validation and data interpretation should adhere to the current 2020 FBI QAS requirements and any future updates. Prior to implementation of validation policies or procedures in the DNA laboratory, the SAP and laboratory leadership should ensure that the policies conform to ISO 17025; ANSI/ASB Standard 20 and 40 (added to the OSAC registry), forthcoming ANSI/ASB Standards including 18, 38, 41 and 77 and Best Practice Recommendation 114; and current and future publications from SWGDAM on validation, testing procedures, interpretation and training. To the extent any national standard, guideline or recommendation is revised, enhanced or clarified by the TFSC, the laboratory should follow TFSC guidance.

[150] 2010 QAS Audit, pp. 48-49.

C-2 **RECOMMENDATION:** The SAP should review and assess DNA Laboratory validation studies and proposals for material technical and methodological operational changes prior to implementation and at least every two years thereafter.

C-3 **RECOMMENDATION:** The DNA Laboratory should ensure that completed validation studies are publicly available for review and comment.

C-4 **RECOMMENDATION:** ANAB and FBI QAS auditors should receive formal training on what constitutes inadequate validation studies, and/or clarify in their audit reports that validation studies are being evaluated for their fitness for their intended purpose.

C-5 **RECOMMENDATION:** The DNA laboratory should engage a statistician as well as topic-specific experts, either as consultants or in a full-time capacity, to ensure that validation studies are sufficiently robust and broad to support accurate testing in every anticipated activity of the DNA laboratory.

C-6 **RECOMMENDATION:** The TFSC should establish a process for reviewing and approving certain critically important and/or "novel" validation studies in DNA labs in Texas, including conducting a "gap analysis" with respect to how DNA method validations are vetted under existing systems of oversight. The TFSC should consider a process for filling any gaps in validation review to the extent resources permit.

Section D: Insufficient Succession Planning

The DNA Laboratory's Technical Leader went on an extended sick leave in November 2015.[151] This left the APD DNA Laboratory without a Technical Leader, a requirement for compliance with FBI QAS.[152]

The combination of an unexpected health issue and the FBI QAS requirement that the Technical Leader possess a master's degree[153] severely limited the options available to the APD crime laboratory management in identifying a suitable replacement Technical Leader. First, because The Technical Leader was on sick leave, HR rules prevented APD from hiring a permanent replacement for the Technical Leader position. Second, only one APD DNA Analyst possessed the necessary academic credentials to satisfy the QAS requirements for the position.[154] Given the exigent circumstances, her promotion to Interim Technical Leader was viewed as the only short-term option.[155]

Unfortunately, while the DNA Analyst who was promoted to Interim Technical Leader may have had the necessary academic background, she lacked the operational, management, and technical ability necessary to

[151] Powerpoint presentation, "Timeline of Events in the APD DNA Lab," slide 5, included in documents provided by Travis County District Attorney's Office as "Timeline.ppt;" Email from Lynn Garcia to John Buckleton and Bruce Budowle re: Roster for Training Next Week, November 12, 2015, 1:32 PM
[152] FBI QAS Section 5.2
[153] FBI QAS section 5.2.1.
[154] Email B. Gibbens to D. Morales, November 10, 2015.
[155] Interview.

thrive in the role. While the Interim Technical Leader was experienced with the policies and procedures of the APD DNA laboratory, the Quattrone Center's reviewers are of the opinion that under other circumstances, APD laboratory management would have chosen another individual for the role. The Interim Technical Leader had not previously been a Technical Leader or laboratory manager, lacked familiarity with the proposed validation studies for probabilistic genotyping, and did not have a history of attending conferences or professional meetings where new developments in the field were discussed. A different DNA Analyst had been the Laboratory's selection to attend conversations regarding the QBST and other concerns in the former Technical Leader's absence. Furthermore, the Analyst selected as Interim Technical Leader had been identified as a source of actual and potential quality concerns when she was an Analyst:

- In 2010, concerns about the Analyst's technical skills and performance on proficiency exams were reported as part of a 2010 workplace harassment complaint, though the ensuing investigation by non-scientists found no merit to these claims;
- The Analyst had been suspended from casework in January – February 2015 while a self-reported instance of contamination was reviewed;[156] and
- The Analyst's work was strongly criticized in a January 2015 letter from a DNA expert engaged by a defense attorney in a criminal case that provided a detailed and critical review of the then-Analyst's casework.[157]

The Technical Leaders during these instances defended the Analyst's work – but even if the suspension from casework was caused by reasonable and unintentional error and the DNA expert's criticism was a reasonable scientific disagreement rather than a true quality concern,[158] other Analysts were not coming under similar criticism. Furthermore, the prior Technical Leader's selection of other analysts to conduct validation studies and to attend outside conferences and educational events imply that the Analyst who was named Interim Technical Leader was not being groomed to be a candidate for the Technical Leader position, and thus her elevation to Interim Technical Leader should have raised substantial concerns with APD laboratory management.

Thus, in a substantial irony, the administrative requirements of the FBI Quality Assurance Standards (presumably designed to enhance quality in the Laboratory) coupled with a lack of scientific depth among the DNA Analysts forced APD Laboratory management to appoint an individual to the Technical Leader position who was less qualified as a matter of substance than other analysts in the lab.[159]

Section D: Contributing Factors

D-1 **CONTRIBUTING FACTOR:** In late 2015, the APD DNA Laboratory Technical Leader went out on an extended sick leave and ultimately passed away.

[156] Memorandum, J. Sailus to T. Arnold Re: DNA Foreign Profile Investigation, March 9, 2015.
[157] Letter from Melanie S. Trapani, Associate Laboratory Director, Cellmark Forensics, Inc. to Attorney Nate Stark, January 6th, 2015.
[158] Email J. Sailus, January 20, 2015.
[159] The permanent Technical Leader position was posted as open on May 2, 2016, but ultimately was never filled.

a. The Technical Leader's extended sick leave limited APD's ability to hire a suitable Technical Leader for the DNA Laboratory; and
b. APD Laboratory management performed inadequate succession planning in the leadership of the DNA Laboratory.

D-2 **CONTRIBUTING FACTOR**: The APD DNA Analyst put in the role of Interim Technical Leader lacked the skills and knowledge necessary to be an effective Technical Leader, and no other APD DNA Analyst met the QAS requirements to be a Technical Leader.

D-3 **CONTRIBUTING FACTOR:** The FBI QAS requirement that the Technical Leader possess a Masters' degree limited the ability of the APD DNA Laboratory to appoint a suitable Interim Technical Leader. It is unlikely that the individual chosen to be the Interim Technical Leader would otherwise have been promoted to the Interim Technical Leader role, as the individual met the degree requirements but lacked the relevant experience or training necessary to thrive in the role.

Section D: Recommendations

D-1 **RECOMMENDATION:** DNA Laboratory SOPs related to Organization and Management (QAS 4.1.6) and Personnel (QAS 5.2.4.1.1) should include language that addresses the possibility of extended leaves of absence of a Technical Leader.

D-2 **RECOMMENDATION:** DNA Laboratory management should have a robust written and implemented succession planning process, ensuring the lab's capacity to function without a loss of quality upon the unexpected incapacitation of the Technical Leader or other critical personnel.

D-3 **RECOMMENDATION:** DNA Laboratory management should have a robust written and implemented professional development program for analysts, providing the ability for qualified analysts to progress in responsibility and capability.

D-4 **RECOMMENDATION:** The DNA Laboratory should have qualified and competent DNA analysts on staff who can fulfill the role of interim technical leader when necessary.

Section E: Incomplete Review of Quality Complaints in 2010

The 2010 workplace complaint filed by a DNA Analyst provided an early opportunity for the management of the DNA Laboratory as well as APD Forensic Science management and APD leadership to identify quality issues in the DNA Laboratory. APD Forensic Science management and APD leadership, including its Human Resources Department, took the complaint seriously, and the organization ensured that the complaints themselves as well as responses to the complaints from all other analysts in the DNA Laboratory were formalized in writing. The investigation, which included input from the APD Lab Manager, the head of Quality Assurance, the Head of Field Services, a representative of Human Resources, and an Assistant Chief also issued a final report stating clearly the conclusions of the investigation.

At the same time, both the participants in the investigation and its conclusions made clear that the APD was investigating the complaints almost exclusively as a human resources/personality conflict concern, and not as a potential indicator of a lack of robust policies or procedures that might be indicative of lax quality practices in the lab. No experts in the field of DNA analysis or trained in serology were involved in the investigation, and there was no substantive review of the proficiency tests of analysts named in the complaint. In part, this was the result of the structure of the DNA Laboratory; there simply was no person other than the Technical Lead, who was also criticized in the complaint, who could have provided such technical input. By not going outside of APD to engage a consultant or other entity who could have provided that expertise, and instead relying on the fact narratives of individuals within the DNA Laboratory to provide refutations of the complaint, the opportunity to learn more about the actual workings of the lab in ways that could have improved its scientific performance was lost.

Section E: Contributing Factors

E-1 **CONTRIBUTING FACTOR:** The 2010 employee complaint including personnel and quality concerns was reviewed by APD lab management and APD Human Resources as a non-scientific HR complaint, and not as a complaint regarding quality of scientific work in the DNA Laboratory.

E-2 **CONTRIBUTING FACTOR:** The APD had no scientific capability within APD but outside the DNA Laboratory capable of independently evaluating the quality concerns raised by an employee complaint in 2010.

Section E: Recommendations

E-1 **RECOMMENDATION:** The DNA Laboratory should implement and follow the Texas Forensic Science Commission (TFSC) Code of Professional Responsibility for Forensic Management, including but not limited to its requirements for reporting concerns with quality of the work done in the lab, including scientific and nonscientific concerns, that is compliant with ISO 17025.[160] The SAP and JSAP should also participate in reviewing and approving those protocols.

Section F: Contamination Events in Casework

One focus of the TFSC audit was the review of multiple cases of likely contamination in the APD DNA Laboratory. Contamination exists when DNA profiles are found to contain data from one or more sources different than what was included in the original sample. Contamination is a risk and a concern in any DNA Laboratory. DNA laboratory experts that spoke with the Quattrone Center unanimously agreed that

[160] The current APD forensics laboratory has a reporting mechanism that satisfies ISO 17025, and APD employees have multiple paths for anonymous reporting, including reporting to the TFSC.

contamination is at once unacceptable and, to some extent, unavoidable – no laboratory will be perfect in avoiding contamination, particularly as our ability to detect smaller and smaller quantities of DNA increases.

While all can agree that contamination is undesirable, standards for what constitutes contamination and how much contamination should be expected in a forensic DNA laboratory are elusive. The SWGDAM's 2017 Contamination Prevention and Detection Guidelines for Forensic DNA Laboratories, for example, states that "[d]espite employing numerous measures to prevent contamination, contamination incidents will be encountered on occasion. Therefore, a laboratory should define a tolerance level based on each methodology, technology and sensitivity requirements."[161]

Two specific instances of suspected contamination were motivating factors in the TFSC's decision to audit the APD DNA Laboratory in 2016. The first involved a case of contamination detected not in a case sample, but in a reagent blank control that impacted ten cases. The TFSC reviewers found that case samples were not contaminated, and the contamination was limited to the reagent blank. Accordingly, each of the ten cases in question was able to be re-analyzed without the contaminant, and interpreted and reported.

The other case of likely contamination[162] was more problematic. It involved a sexual assault prosecution in which the DNA from a sample taken from a victim of sexual assault appeared in a mixture with the DNA of a sample taken from a penile swab from a man who was later conclusively excluded as the perpetrator of the sexual assault.[163] Furthermore, the likely contamination was not detected by the DNA Laboratory, but by the Travis County District Attorney's Office, which had difficulty squaring the results of the report with the facts of the case as they had become known.

As the TFSC points out, the case raised a number of "red flags" that should have been addressed by the DNA Laboratory, including whether the APD DNA Lab employed evidence handling practices sufficient to guard against carryover contamination, whether there could have been carryover contamination in any other cases by this analyst or other analysts, whether the DNA analysts understood the role of the quality assurance process in vetting possible contamination and concerns from end-users in the criminal justice community, and whether the DNA Analysts understood their disclosure and notification obligations imposed by federal and state law.[164]

The facts of the likely carryover contamination case are described in the TFSC Audit Report.[165] At the time of the Quattrone Center's review, the case was the subject of pending litigation between the victim of the sexual assault and multiple defendants, including the City of Austin, Travis County, the District Attorney for Travis

[161] Contamination Protection and Detection Guidelines for Forensic DNA Laboratories, Scientific Working Group on DNA Analysis Methods, January 12, 2017, p. 14. The SWGDAM defines a "tolerance level" as "the level of contamination that does not interfere with a confident interpretation of the data." Id., at 28.
[162] As the TFSC Audit Report states, "it is impossible to conclude with 100% certainty that the results were attributable to carryover contamination. However, there are a number of red flags in the case that lend support to carryover contamination as the most likely explanation for the results, including the discordant results from" an independent laboratory that was engaged to retest samples from the case. TFSC Audit Report at 18. Accordingly, we will refer to this instance as one of "likely contamination."
[163] TFSC Audit Report, p. 18.
[164] TFSC Audit Report, pp. 20-21.
[165] TFSC Audit Report, p. 18-22.

County, and the current and former Chiefs of the Austin Police Department. Accordingly, the Quattrone Center's review of the case was limited to evaluating the environment in which contamination events occurred in the APD DNA Laboratory, and what might be done going forward to promote fewer contamination events and greater transparency within the laboratory.

Contamination is a serious concern in any DNA laboratory and carryover contamination in particular might be thought of as a DNA laboratory's equivalent to the "never event" in a hospital setting – an undesirable or adverse event that is unambiguous (e.g., clearly identifiable and measurable), serious, and usually preventable.[166] One example of a clinical "never event" that is akin to a DNA laboratory setting might be that of a patient contracting an infection in the hospital that the patient did not have when he or she entered the facility.

The following additional facts may be relevant to this review of the APD DNA Laboratory:

- After issuing the audit report, the TFSC reviewed an additional 60 cases that were analyzed by the APD DNA Laboratory between October 2008 and April 2010.[167] Among these reported and reviewed cases, the TFSC did not identify any additional cases of contamination.[168]
- During the 2010 – 2015 time period, Austin DNA Analysts maintained a contamination log in which they listed cases in which contamination was detected. For cases reported in the log, the analysts took steps to (a) ensure the contamination did not affect final analyses of cases and (b) understand the source of the contamination so that corrective action could be taken. It is this contamination log – reported by the APD DNA Analysts themselves – that formed the basis for many of the defects identified in the TFSC Audit Report.[169]

The fact that the Analysts themselves identified these additional contamination events and documented them at the time of their identification indicates that the Analysts were aware of, and in at least partial satisfaction of their obligations to document contamination events. The documented contamination events were detected and addressed by the DNA Laboratory prior to the submission of a final report on the DNA analysis to APD investigators or to the DA's Office or defense counsel. Accordingly, the Quattrone Center found no reason to believe that the final case reports for the cases listed in the contamination log were negatively impacted by the contamination events.

Reasonable minds could differ on whether the number of contamination events that occurred in a DNA Laboratory the size of the APD DNA Laboratory were too many or an "acceptable" number.[170] To evaluate whether the number of contamination events in the DNA Laboratory was itself cause for concern, Quattrone

[166] Agency for Healthcare Research and Quality Patient Safety Primer, "Never Events," accessed at https://psnet.ahrq.gov/primer/never-events.
[167] Presentation from D. Jody Koehler, M.S., February 10, 2017.
[168] Id.
[169] The DNA Laboratory Analysts we interviewed stated that they would faithfully enter any instance of confirmed contamination in the contamination log, but there is no way to conclusively prove whether the contamination log is a complete list of contamination events that occurred in the APD DNA Laboratory during the 2010 – 2015 time period.
[170] In 2008, there were no instances of contamination in the APD DNA Laboratory contamination log. In 2009 and 2010 there were five (5) logged instances of contamination, three by one analyst and one each by two others. Contamination events occurred at a similar rate between 2011 and 2015, with eight (8) logged contamination instances. While not all APD Analysts worked the entire 2008 – 2015 time period, one analyst had seven (7) of the combined thirteen (13) instances of contamination, and one had four (4); no other analyst had more than one.

discussed the topic with several national thought leaders in forensic DNA analysis (e.g., Dr. John Butler (NIST), Dr. Michael Garvey (Philadelphia Police Department Office of Forensic Science), Dr. Jenifer Smith (Washington, D.C. Office of Forensic Sciences), Dr. Peter Stout (Houston Forensic Science Center), Dr. Charlotte Word (forensic DNA consultant and expert witness)) and experts in DNA analysis from the Hospital of the University of Pennsylvania (e.g., Ms. Margaret Bulley, Dr. Steven Raper, Dr. Vivianna van Deerling). These individuals agreed with the SWGDAM conclusion that "[d]espite employing numerous measures to prevent contamination, contamination incidents will be encountered on occasion," and thus that the existence of contamination incidences in a DNA laboratory is not per se evidence of a lack of appropriate quality controls or lab management. Moreover, while reiterating that any contamination is cause for concern and review, the instances and types of contamination listed in the contamination log were not viewed by our laboratory experts as atypical for a laboratory of the size of the APD DNA Laboratory in type or number (assuming accurate logging of all known contamination events). More important, they said, was whether the same analysts were repeatedly committing contamination events, and the Laboratory's response to the events.[171]

The DNA Laboratory discussed its contamination events internally, as well as with auditors who reviewed the contamination logs. Unfortunately, the DNA Laboratory's transparency stopped there. The Laboratory had an established practice of not sharing its contamination logs outside of the DNA Laboratory, even excluding the Forensic Science Services unit's Quality and Safety Manager. The contamination events were also not shared with external observers, including the DA's Office or community stakeholders. Sharing this information would likely have generated a more robust, creative, and useful response to contamination errors, and it would have helped the DA's Office satisfy its obligation to disclose potential exculpatory information to the defense and the court in criminal cases. It also would have enabled external stakeholders to identify trends or patterns that might help in developing useful responses to quality concerns in the Laboratory.

The failure of DNA Laboratory management to inform the Laboratory's QA managers about contamination events is a multi-level failure of both the DNA Laboratory Technical Leaders and the APD Forensic Science Services unit's QA management, who should have insisted on receiving the contamination logs. It is also a failure of overall Forensic Science Services unit management and APD leadership, who should have insisted on the delivery and review of the contamination logs outside the DNA Laboratory, and organizations like the DA's Office, who may be required to disclose that information.

The lack of an effective Quality Assurance program meant that the Technical Leaders were left to address problems in an area that they lacked expertise – in this case, the design of corrective actions that would be useful in responding to the logged contamination events. We found no evidence of any guidance from the QA Manager to the Technical Leader or others in the DNA Laboratory on responses to contamination events. Neither APD laboratory managers nor APD supervisors requested or reviewed contamination logs, and the laboratory QA manager deferred to the DNA Technical Leader on the remediation of DNA contamination events.

[171] Those contamination events that were documented by the APD DNA Laboratory were set forth in the Laboratory's contamination log, which identified 11 contamination events between 2010 and 2015. One analyst was listed on five of these events over the five-year period, with another analyst listed on four and two additional analysts listed on one each.

Perhaps predictably, the corrective actions taken after contamination events were unlikely to effectively curtail or prevent subsequent contamination events in the future. Examples of the corrective actions included in the contamination log after the 2008 – 2010 period reviewed by the TFSC included the following:

- November 2011 "analyst will re-run with greater care"
- January 2012 "monitored case, gave some glove tips"
- Seven cases affected by possible contamination during extraction or amplification: "manager supervised [repeat] extraction process and cases are fine"
- Feb 2015 analyst identified as source of contamination "corrective action limited to counseling and procedural review"

A component of this issue is the lack of any communication between the DNA Laboratory and the APD's Quality Assurance personnel regarding what a "useful" corrective action might be. Instructing individuals not to repeat an accidental or unintentional action, for example, is almost guaranteed to be ineffective, since the result was not intended to begin with. Admonishments like "be more careful" or "pay attention" may be similarly lacking in useful behavioral modification in many situations. For some scenarios, specific skill training may be useful, but may also suffer from some of the same challenges.

Section F: Contributing Factors

F-1 **CONTRIBUTING FACTOR:** APD DNA Laboratory contamination events were generally not communicated outside the DNA Laboratory, whether to APD laboratory management or quality assurance management, or to external parties.

F-2 **CONTRIBUTING FACTOR:** The APD and the DA's Office had no notification system in place for contamination logs or incident reports to be sent to the DA's Office.

F-3 **CONTRIBUTORY FACTOR:** APD Forensic Science management did not ensure that the DNA Laboratory's contamination log was provided to APD leadership or external stakeholders.

F-4 **CONTRIBUTING FACTOR:** APD Forensic Science management did not ensure that the DNA Laboratory's contamination log was provided to the APD Forensic Science Quality Assurance and Safety Manager.

F-5 **CONTRIBUTING FACTOR:** The APD Forensic Science Quality and Safety Manager was not involved in the documentation or resolution of contamination issues within the DNA Laboratory.

F-6 **CONTRIBUTING FACTOR:** The leadership of the APD DNA Laboratory conducted ineffective corrective actions when contamination events were discovered.

Section F: Recommendations

F-1 **RECOMMENDATION:** The DNA laboratory should publish its contamination events online. The DNA laboratory should:

- Publish each contamination event within 30 days of its discovery by the laboratory; and
- Publish related contamination event quality assurance documentation within 30 days of any update throughout the investigative/corrective action period until remediation is completed.
- Publish each corrective action on the Laboratory's web site in an appropriate fashion

F-2 **RECOMMENDATION:** The DNA laboratory should evaluate the effectiveness of any implemented corrective action within 12 months after the corrective action is implemented, and more frequently if appropriate.

F-3 **RECOMMENDATION:** The DNA laboratory's QA division should be actively involved in the design, management, and confirmed completion of each corrective action.

F-4 **RECOMMENDATION:** The DNA laboratory must promptly notify the Quality Assurance Manager, the Case Manager, the forensics laboratory leader, the Scientific Advisory Panel (SAP), and the Justice Stakeholder Advisory Panel (JSAP) of contamination events and remedial actions.

F-5 **RECOMMENDATION:** The SAP and/or JSAP should collaborate with the DNA laboratory to establish a process for the periodic review of contamination events and remedial actions to identify quality issues that might be identified through trend analysis as opposed to individual case review.

F-6 **RECOMMENDATION:** The DNA Laboratory[172] must notify the District Attorney's Office and the Court of contamination events and corrective actions that might affect laboratory reports issued in criminal cases.[173] The DNA Laboratory must also ensure that such information is included in the relevant case file and made available to all attorneys of record in a timely manner and pursuant to the disclosure policy described in Recommendation K-10 below.

F-7 **RECOMMENDATION:** The DNA Laboratory should consider implementing an Occurrence Reporting System (e.g., SafetyNet), which allows for regular reviews (e.g., monthly) of contamination events, led by QA, to identify both individual issues and trends within the DNA Laboratory.

F-8 **RECOMMENDATION:** QA for the DNA Laboratory should be actively engaged in managing and remediating DNA Laboratory contamination issues, protocol deviation or other issues. QA should

[172] If the recommendation to implement a Case Manager role (Recommendations G-6 or K-12) is followed, this would be a suitable activity for the Case Manager.

[173] Stakeholders expressed concern that the Laboratory might not know the identity of responsible prosecution or defense attorneys at the time of the notification requested in this Recommendation. An online portal of the type described in Recommendation F-8, which would allow for electronic delivery of any case-related documents would address this problem.

ensure that proper notification is provided to downstream criminal justice stakeholders and the public and should be involved with case-specific quality issues and periodic contamination log review.

F-9 **RECOMMENDATOIN:** The QA Manager should have the authority to recommend to the Laboratory Manager that any analyst be temporarily removed from casework pending a more thorough review of any contamination event. The Lab should create a protocol for escalating disagreements between Technical Leader and QA to the Lab Manager and/or SAP.

F-10 **RECOMMENDATION:** The DNA Laboratory should engage QA in the design of effective corrective actions that focus on generating environmental, not personnel reforms where possible.

F-11 **RECOMMENDATION:** The DNA Laboratory and SAP/JSAP should conduct periodic reviews of the types of errors that have occurred to ensure that errors are not being repeated in the DNA Laboratory.

F-12 **RECOMMENDATION:** The DNA Laboratory should establish objective guidance for severity and frequency of those contamination events that could lead to the suspension or removal of DNA analyst(s) or the DNA Laboratory from casework.

F-13 **RECOMMENDATION:** The DNA Laboratory should establish a hierarchy of escalating organizational responses where repeat violations of the same protocol by analysts occur.

F-14 **RECOMMENDATION:** The TFSC should ensure that accreditors of Texas DNA laboratories conduct proper reviews of contamination events and/or protocol deviations, including deploying auditors with appropriate technical expertise and ensuring that each auditor has appropriate time to review and assess contamination events and corrective actions that have occurred since the last assessment, and to interview broadly to identify the potential for lack of required documentation.

Section G: Improper Protocol Deviations

A protocol deviation occurs whenever an analyst acts in ways that differ from an existing forensic DNA testing protocol during the testing or analysis of a biological sample. In a DNA Laboratory, a protocol deviation may occur because a mistake has been made, or because of a conscious decision to depart from a stated protocol in a specific way intended to enhance the analysis of a specific DNA profile. Thus, a properly documented deviation can sometimes be evidence of a functional process.

In instances where an APD DNA Analyst departed from a protocol, the Analyst was required to seek a specific approval from the Technical Leader for the protocol deviation at issue and record the deviation and the rationale for the deviation on the appropriate deviation worksheet in the case record or, when needed, in the report.[174]

[174] 2016 APD SOPs (p. 87) state that the deviation will be included in the analyst's final report "when necessary." Here, we recommend eliminating the "when necessary" language and including all deviations in the final report.

Both the Analyst and the Technical Leader were then required to approve the protocol deviation in writing. If this procedure was followed, the deviation itself would be included permanently in the case file, and the QA manager was expected to retain a copy. This documentation is important for the quality of the work. Protocol deviations may be the subject of a pre-trial hearing or information that the prosecution will want to present during direct testimony, or a defense attorney may question a witness about during cross-examination. Thus, in instances where a deviation occurs, the laboratory should ensure that the deviation is fully documented, and that documentation regarding the deviation is sufficient for anyone in the laboratory or a qualified external analyst to fully understand and evaluate the rationale for and impact of the protocol deviation on the case. When information regarding any protocol deviation is provided in the final report, efforts should be made to report it in terms that police, prosecutors and defense attorneys with some understanding of the forensic DNA testing process may understand.

As with undocumented contamination events, it is impossible for a review of this scope to determine whether there are instances of undocumented protocol deviations in casework conducted by APD DNA Analysts between 2010 and 2015. Individuals who participated in our review claimed to understand their obligation to document all protocol deviations, specific examples to the contrary notwithstanding.

Not all protocol deviations are negative occurrences. To the contrary, protocol deviations can be thoughtful and specific departures from a protocol that allow a sample to be effectively tested and/or analyzed.[175] Thus, not every protocol deviation should be thought of as an "error" or unintended outcome necessitating a root cause analysis. Because of this, and because many protocol deviations conducted by the APD DNA Laboratory are unlikely to be relevant to a new DNA laboratory in Austin operating under new leadership and with updated protocols and equipment, Quattrone did not review each protocol deviation that was documented in the APD DNA Laboratory between 2010 and 2015. In order to illuminate some of the challenges that the APD DNA Laboratory experienced, however, Quattrone reviewed a case identified by the TFSC in its Audit Report in which an APD DNA Analyst improperly documented a deviation from protocol.

The APD DNA Laboratory conducted its testing in the case Quattrone reviewed between July 10 and October 23, 2015. The case suffered from a litany of errors in calculation, technical review, review and approval of a protocol deviation by the Technical Leader, and the lead Analyst's preparation for testimony in court.[176] Ultimately the underlying DNA analysis was not used by prosecutors in the legal case, but it does provide a useful opportunity for learning and improvement in the DNA Laboratory.

[175] Personal communication, Charlotte Word, DNA consultant.
[176] By the time the case came to trial, the Analyst who had generated the report had been promoted to Interim Technical Leader; her actions in this analysis and her inability to defend them serve as evidence that she was unprepared for the rigors of the Interim Technical Leader position.

A simplified flow chart of the Analyst's handling of the case is set forth below in Figure 6.

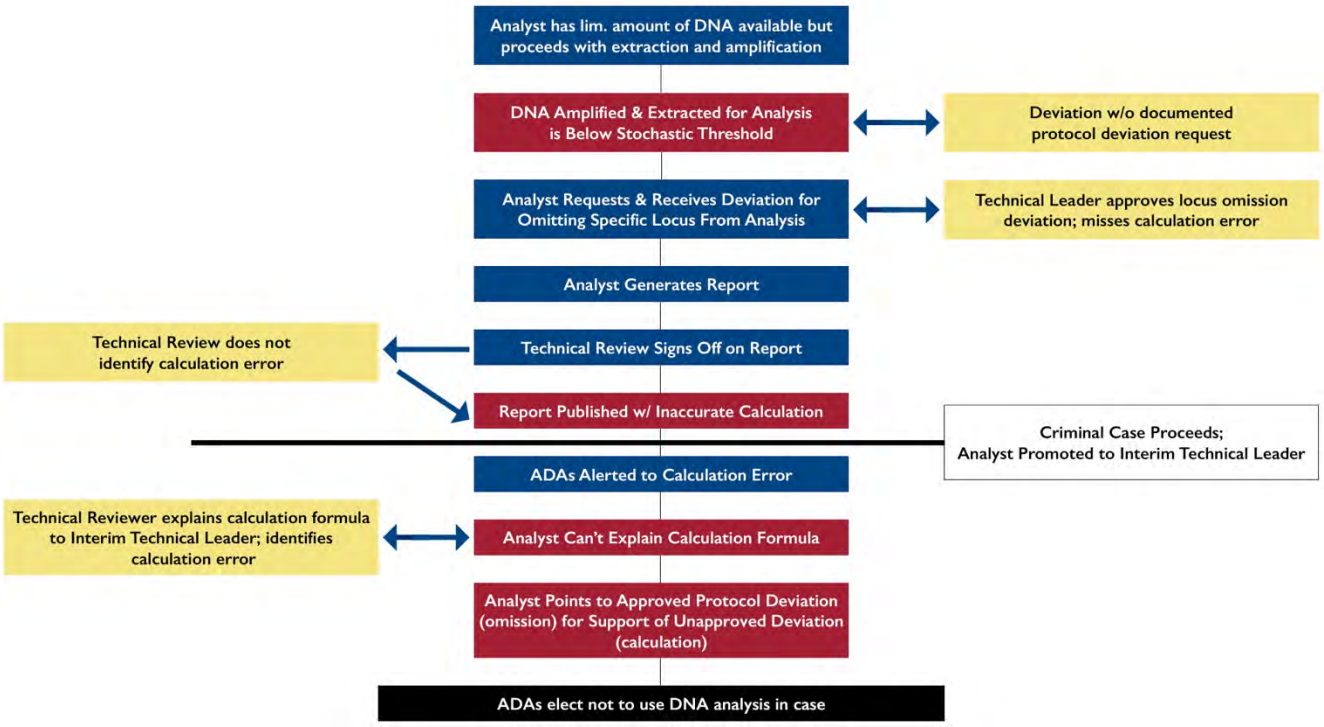

Figure 6. Flow Chart of Case Concerns.

To begin with, the amount of DNA extracted and available for amplification from the sample submitted for testing was below the quant-based stochastic threshold set by the APD DNA Laboratory for profile interpretation. The Analyst proceeded to amplify the DNA to generate a DNA profile for possible interpretation. Since the amount of DNA amplified was below the QBST, a deviation from protocol should have been requested to interpret and compare the DNA profile obtained prior to issuing the final report. The Analyst did not request a protocol deviation for this.

In the course of the analysis, the Analyst requested a protocol deviation for another related but different reason. The Analyst requested that the Technical Leader approve the interpretation of the major contributor DNA profile within a mixed DNA sample with the omission of one locus from the evaluation that did not meet the laboratory requirement for a major contributor. The deviation and justification documented by the Analyst was:

> Deviation is requested from the rule of a major/minor component criteria. Item 1.3: the overall profile is being considered and at locus D12S391 it doesn't meet major/minor component criteria. This locus is being called Inc [Inconclusive] & will not [be] used for comparisons or statistics. The remaining interpretable loci meet major component criteria. I am requesting to call a major component on this profile.

Under "Duration of Request" the form states: "One time only," meaning that the requested deviation was limited to this specific profile and case. The deviation was approved by the Technical Leader on the same day it

was requested, and it was considered a "minor deviation" per the laboratory's protocol and policies. The Technical Leader's initials signify agreement with the requested deviation. Because the deviation was deemed "minor"[177] no further action was needed by the Analyst, though a notification about the deviation should have been transmitted to the Forensic Science Services unit's QA Manager. The protocol deviation form did not contain any language indicating that the analyst, technical reviewer or the Technical Leader was aware that the profile being interpreted did not meet the criteria of the QBST.

A second DNA Analyst in the Laboratory conducted a technical review of the case file on several occasions. The Review Form in the case file shows a check mark under "Technical Review" for the requirement to "[c]heck stochastic threshold," indicating that this step was performed by the technical reviewer.[178] Neither this second Analyst nor the Technical Leader detected the undocumented protocol deviation related to the calculation error and the QBST.

The case in question went to trial in May 2016. On May 4, 2016, the Travis County District Attorney's Office was notified by a Texas DPS DNA Analyst of an apparent deviation from protocol regarding the QBST in the case. Two Assistant District Attorneys (ADAs) immediately went to the courthouse and met with the APD DNA Analyst in question outside of the courtroom, to discuss the findings before allowing the Analyst to testify.

The ADAs pointed out to the Analyst that the amount of the DNA amplified was below the DNA Laboratory's QBST value of 0.0625 ng, and therefore the sample should have been listed as "uninterpretable" rather than interpreted and reported. The DNA Analyst first explained that she had multiplied the concentration of DNA by the amount of DNA amplified; unfortunately, this calculation was still below the QBST and thus should have been called "uninterpretable." The Analyst then called a colleague in the APD DNA Laboratory for assistance. The colleague reminded the Analyst that APD's method was to multiply the amount of *available* DNA (30x), not the amount of *amplified* DNA (15x). This changed the multiplier and surpassed the QBST, but the calculation that had been performed was an incorrect calculation.

The inability of the Analyst to defend her report, or to accurately respond to questions about the calculations and procedures used in the DNA Laboratory, was even more concerning given that the Analyst had been promoted to Interim Technical Leader in the time since she had generated the report, suggesting a lack of technical competence that could have substantially negative effects on the rest of the Laboratory and its work.

[177] APD DNA Laboratory SOPs defined a "minor" deviation in 2013 as "a deviation that is not expected to alter the results of analysis and generally will not extend beyond one week. Some examples may include performing an examination with reduced quantities of samples or reagents, due to the limited nature of samples, or modifying an instrument to improve resolution on question samples and known samples." The examples were deleted from the SOPs effective in 2015 and 2016.
[178] Review Form, Case # L1409568.

In summary, the Analyst committed multiple errors:

1. Conducting an interpretation and comparison of a DNA profile after determining that the amount of DNA amplified was below the Laboratory's QBST, without first receiving a protocol deviation approval;
2. An improper mathematical calculation regarding the amount of DNA amplified;
3. An inability to recall the proper calculation methodology upon questioning; and
4. An inability when questioned by the ADAs to justify or explain a report that was to be admitted as evidence in a criminal trial.

These errors were accompanied by other errors in the supposed checks and balances of the process. Neither the DNA Analyst who conducted the technical review nor the Technical Leader who signed off on the protocol deviation noted in the form that the original amount of the sample was below the QBST, or that the lead Analyst had incorrectly flagged the profile from the sample as interpretable, despite the fact that the technical review had a check mark in the box marked "check stochastic threshold."[179] Thus, the analyst committed errors and those errors went undetected by the reviewers whose responsibility it was to serve as stopgaps and quality checks.

The following day, the Analyst participated in a conference call with the TFSC, the ADAs, and members of APD Forensic Laboratory leadership to better understand these errors. On that call, additional concerns came to light. The Analyst pointed to a "Deviation Request Form" that allowed for the removal of one locus from the major contributor profile as "inconclusive;" however, the documented deviation did not also specify that the profile could be interpreted even though the amount of DNA was below the QBST because a major contributor profile was present. The absence of recognition, documentation or approval of this *second* specific deviation created further confusion and concern.

It may not be surprising that a DNA Analyst might need the case file to refresh her recollection in May 2016 of a case she analyzed in the fall of 2015. Further, the Analyst had recently been promoted to Interim Technical Leader in the wake of the death of the Laboratory's Technical Leader only three weeks before, creating additional demands on the Analyst's time in the period leading up to her planned testimony in court. Even so, this cannot excuse the Analyst's lack of preparation for trial or explain the underlying mathematical or methodological errors. While the challenges she faced are regrettable, they cannot be permitted to have a negative effect on the accuracy of case testing or reporting, or on truthful and accurate trial testimony in criminal cases.

Finally, while the District Attorney's Office did identify the error prior to the Analyst's testimony, it did so only by chance; had the DPS Analyst not been reviewing current cases using the QBST as a precaution, the DA's Office would not have identified the potential miscalculation in time to prevent the Analyst's testimony and the submission of the report as evidence. To the extent the DA's Office fortuitously avoided using the flawed report

[179] Review Form, case file L1409568.

in a criminal case, this case might be considered a "near miss" in the world of quality assurance,[180] as all of the factors were in place for an error that was narrowly averted by a stroke of good fortune.[181] Even so, it is clearly an unacceptable event that impacts a criminal case, as attorneys on both sides of the case had spent time and energy preparing and strategizing for trial with the assumption that the flawed report was accurate.

Section G: Contributing Factors

G-1 **CONTRIBUTING FACTOR:** APD DNA Laboratory SOPs stated that protocol deviations would be included in the Analyst's final report "when necessary,"[182] instead of mandating inclusion of each and every protocol deviation in the final report.

G-2 **CONTRIBUTING FACTOR:** The APD DNA Analyst in this case relied upon a quantity of extracted DNA evidence that was below the threshold set by the APD DNA Laboratory for profile interpretation.

G-3 **CONTRIBUTING FACTOR:** The APD DNA Analyst in this case made improper calculations.

G-4 **CONTRIBUTING FACTOR:** The APD DNA Analyst in this case did not document each of the protocol deviations on the proper deviation request form.

G-5 **CONTRIBUTING FACTOR:** The APD analyst in this case failed to seek approval for a deviation from protocol in sample interpretation.

G-6 **CONTRIBUTING FACTOR:** The DNA Analyst assigned as the technical reviewer in this case did not detect the inaccurate calculations or identify the undocumented protocol deviation.

G-7 **CONTRIBUTING FACTOR:** The APD DNA Analyst was not ready to testify at trial and was unfamiliar with her own case file, unable to explain the protocol deviations and methodology under questioning and provided multiple conflicting and/or insufficient explanations for deviation.

Section G: Recommendations

G-1 **RECOMMENDATION:** The Standard Operating Procedures of the DNA Laboratory should require that all deviations be included in the analyst's final report, and not merely include protocol deviations "when necessary."

G-2 **RECOMMENDATION:** The DNA Laboratory should hire analysts whose qualifications and knowledge help ensure that the DNA data interpreted and reported is of a sufficient quality and quantity, that analyses conducted rely upon generally accepted and properly validated methods, and that protocol deviations and other errors are documented in records and are reported and properly disclosed.

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[180] See, e.g., National Safety Council, "Near Miss Reporting Systems," accessible at https://www.nsc.org/Portals/0/Documents/WorkplaceTrainingDocuments/Near-Miss-Reporting-Systems.pdf.
[181] A qualified DNA expert employed by an attorney representing the defendant might also have identified these errors in the DNA analysis far earlier in the adjudication of the case.
[182] 2016 APD DNA Laboratory SOPs, at 87.

G-3 **RECOMMENDATION:** The DNA Laboratory should ensure that preparation of an analyst to provide court testimony includes an effective "mock trial" exercise that will prepare the analyst for his or her testimony through mock direct and cross-examination.

G-4 **RECOMMENDATION:** The DNA Laboratory should ensure that analysts have adequate time to review their documents and prepare for any Court appearance.

G-5 **RECOMMENDATION:** The DNA Laboratory should provide a checklist for DNA analysts on steps that should be taken to prepare for court testimony that includes a review of relevant calculations and documentation of protocol deviations.

G-6 **RECOMMENDATION:** The DNA Laboratory should explore the potential creation of a Case Manager role to manage trial preparation and assist the Analyst in preparation.

G-7 **RECOMMENDATION:** The DNA Laboratory should have a technical review of each DNA analysis conducted by a second qualified analyst. That technical review should include rigorous review of the case file and any deviations, with a specific sign-off on each deviation.

G-8 **RECOMMENDATION:** The DNA Laboratory should modify its SOP requirements for technical review to should ensure calculations for each sample in each case are properly conducted and disclosed. The laboratory's Technical Leader must be responsible for ensuring that validation of any system includes the appropriate validation and verification of any calculations, software, etc. used during the testing and/or interpretation steps with the appropriate demonstration that all is working correctly (with maintained documentation), as defined by the July 2020 QAS requirements for software validation and ANSI/ASB Standards 20 and 40, and other standards that may apply depending on the procedures utilized within the laboratory.

Once an analysis has been completed, a technical reviewer responsible for reviewing and confirming all case-specific/case-relevant information will review each case, including but not limited to:

- Was the appropriate laboratory SOP followed?
- Is the documentation in the case file appropriate, such that each action taken on the case can be completely reconstructed?
- Does the profile fit with what is known about the starting biological sample?
- Were the data appropriately evaluated and interpreted?
- Were comparisons done correctly?
- Were statistics done correctly, using the proper system, and with correct data entry?
- Is the report accurate and correctly stated?
- If probabilistic genotyping software is used, are the results generated by the software intuitively supported when the analyst considers the totality of the available data?

– If there are any manual calculations, then those should be checked, and all manual data entry should be verified for accuracy.

G-9 **RECOMMENDATION:** The DNA Laboratory should establish a standard operating procedure (SOP) that all deviations are provided to the Laboratory's QA department along with a stated rationale explaining the departure and its approval. Major deviations should be sent to QA contemporaneously and minor deviations may be sent periodically.[183]

G-10 **RECOMMENDATION:** The DNA Laboratory should identify any analytical protocol deviations applied within a case in the final report. The justification for and approval of any applied deviation should be included in the case file that is fully disclosed to the prosecution and defense counsel.

G-11 **RECOMMENDATION:** The DNA Laboratory should prominently document each protocol deviation, along with a rationale for the protocol departure and the related approval, in materials provided to law enforcement and defense representatives for the case(s) in which the deviation occurred.[184]

G-12 **RECOMMENDATION:** The DNA Laboratory should ensure effective disclosure and explanation regarding protocol deviations in materials delivered by the DNA Laboratory to prosecutors and defense attorneys.[185]

G-13 **RECOMMENDATION:** The District Attorney's Office procedure for case management for cases involving DNA evidence should include an attorney responsible for identifying and reviewing all protocol deviations and their materiality to the case file prior to case resolution.

G-14 **RECOMMENDATION:** The District Attorney's Office should interview DNA Analysts whom the Office expects to testify sufficiently in advance of the scheduled testimony to identify and resolve any confusion about the Analyst's anticipated testimony regarding Laboratory casework.

G-15 **RECOMMENDATION:** Any case file for a sample that will be used to adjudicate a criminal case should be probed by the District Attorney's Office for method and statistical calculations and related errors prior to preparing the DNA Analyst to testify in court.

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[183] DNA Labs across the state of Texas are required to send documentation of each major nonconformity to the Texas Forensic Science Commission for review.

[184] The practice of publishing each corrective action on its web site is followed by other laboratories, including the Houston Forensic Science Center. Two such examples can be found at https://records.hfscdiscovery.org/Published/2019-015.pdf#search=19%2D5701%2DU2588A%2019%2D5701%2DU2588E and https://records.hfscdiscovery.org/Published/2019-042.pdf#search=028401318.

[185] This Recommendation would be assisted by adoption of Recommendation G-6, establishing a Case Manager role within the DNA Lab that could perform this important function.

Section H: Use of AP Reagent Outside of Manufacturer's Instructions

The TFSC Audit Report found that

> The forensic biology screening analysts routinely use a SERI Acid Phosphatase (AP) reagent beyond the "make fresh daily" instructions on the reagent bottle. APD DNA Lab analysts are instructed to make the AP reagent when needed and are allowed to use the reagent anywhere from a few days to 2-4 weeks or until they run out of prepared reagent. Though analysts perform a quality check of the reagent daily, there is no supporting documentation on the criteria (e.g., time frame for development of color reaction or intensity of the color reaction) for assessing whether the AP reagent is performing optimally…
>
> Subjectivity in analysis and possible loss of sensitivity in an AP reagent could lead analysts to miss potential semen stains when those stains are present, but significantly weaker than the positive control (or negative). As provided in the FBI's Quality Assurance Guidelines (QAS) (sic), if chemical reagents are to be used beyond expiration dates (or in this case outside the manufacturer's instructions), such use should be supported by validation data. When asked to supply the validation data to support the extended use of the reagent, the APD DNA Lab was unable to do so.[186]

After the TFSC Audit Report was published, APD and DPS DNA analysts conducted the comparative study requested by the TFSC Audit Report and found that there was no negative impact to analytic sensitivity using their previous method vs. following the manufacturer's instructions;[187] accordingly, there was no apparent damage done to prior casework as a result of the Analysts' workaround.

The APD DNA Laboratory had an SOP that permitted storage of the reagent in a darkened container and refrigerated "until a 4+ rating is no longer achieved with the control. A positive and negative control must be tested on day of use."[188] DNA Analysts in the lab developed a practice of mixing the reagent and using it for multiple days, testing the reagent at the start of each day to ensure its appropriateness for use in casework. This practice complied with the Laboratory's SOPs but was contrary to the manufacturer's instructions on the reagent packaging, which instructed new batches of reagent to be made daily.

Analysts in the Laboratory at the time of the TFSC Audit professed to be unaware of this difference between their practice and the manufacturer's instructions, which were on the bottle of the reagent that they used regularly. While they pointed to their actual practice of daily control testing as evidence that the reagent was still active, that practice was non-uniform. Different analysts used batches of reagent for different periods of time,

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[186] TFSC Audit Report, at 22-23.
[187] Email from A. Amilhat to B. Mills, D. Kadavy Feb. 28, 2018 4:33 pm re: AP Study summary complete. Stakeholder group members from ACDLA, CAPDS, and JPD were provided the study just prior to the finalization this report. These stakeholders expressed concerns about the methodology, findings, and interpretations of the study, and did not concur with the characterization of the study herein.
[188] 2014 DNA Training Manual, §9.1. Prior years had stated that "AP Test Reagent can be stored at 2-8°C for one year," (2011 – 2013) or that "AP Test Reagent can be stored at 4°C for one year" (2004 – 2010).

and the assessment of whether the reagent was active was based on a subjective visual scale, increasing the potential for less active reagent to miss the presence of semen in a sample.

The DNA Laboratory was unable to produce validation studies to confirm the period of time that the reagent would remain potent if stored and used according to the Laboratory's SOPs.

The procedure actually used in the Laboratory appeared to be a "work-around" implemented in the Laboratory. Making a fresh batch of reagent daily is time-consuming and potentially more expensive to the Lab and increases the likelihood of mixing a bad batch of the reagent. Analysts did not question the utility of the practice, believing that the daily quality check was a confirmation that the reagent is working effectively and suitable for casework. As it turned out, they were correct; subsequent studies conducted after the TFSC Audit Report revealed that the useful life of the reagent when stored according to the APD SOPs was past the period of time that APD Analysts had been using individual batches of the AP Reagent.

The fact that the Analysts' procedure was not causing harm in this instance, however, does not tell the whole story. The Laboratory should not have adopted a procedure that departed from manufacturer's instructions without first conducting and documenting the comparative study that proves conclusively that the procedure is not creating the risk of a quality issue. It is certainly desirable to improve workflow while maintaining or improving quality, but to depart from manufacturer's instructions without taking the necessary steps to conclusively verify that quality is maintained creates risk, even on apparently small issues. While subsequent testing showed that procedure did not appear to limit the reagent's accuracy, if the Analysts had been wrong, thousands of criminal cases could have been negatively impacted. A laboratory with a robust culture of quality and precision would not have permitted such a situation.

Section H: Contributing Factors

H-1 **CONTRIBUTING FACTOR:** The APD DNA Laboratory implemented a practice that differed from manufacturer's daily use instructions without conducting or documenting appropriate validation studies to support the practice.

H-2 **CONTRIBUTING FACTOR:** APD DNA analysts reported that they were unaware that they were deviating from manufacturer's instructions, despite the presence of differing instructions on the reagent bottle.

H-3 **CONTRIBUTING FACTOR:** APD analysts advocated to retain their protocols against manufacturer instructions without supporting data, suggesting a resistance to and/or a lack of awareness of quality and safety improvement.

Section H: Recommendations

H-1 **RECOMMENDATION:** The DNA Laboratory should ensure that analysts purposefully review protocols to identify and prevent "protocol creep" away from protocols or to modify protocols where appropriate. The DNA Laboratory should include interviews of analysts to ensure the work is consistent with protocol as well.[189]

H-2 **RECOMMENDATION:** The DNA Laboratory should not deviate from manufacturer's instructions on how to use materials without first conducting and documenting validation studies to ensure no loss in fidelity.

H-3 **RECOMMENDATION:** The DNA Laboratory should create an SOP that allows for QA and DNA Technical Leader to have bilateral discussions, with upward review by Lab Manager and SAP as needed to address disputes.[190]

Section I: Freezer Outage

On March 14, 2016, the Interim Technical Leader was notified by a DNA Analyst that "Freezer 5," a freezer within the DNA Laboratory in which numerous evidence samples and DNA samples were stored, was operating well above its appropriate temperature range.

The Interim Technical Leader responded to the issue, and quickly identified the cause of the outage: a condenser on the outside roof of the freezer had failed. A new condenser was installed, and the freezer was restored to its appropriate temperature range. Further investigation revealed that the freezer had apparently been out of temperature range since March 8, 2016, and the Interim Technical Leader initiated a root cause analysis to understand why it had taken so long for the lab to be aware of the freezer outage.

Based on the root cause analysis, the Interim Technical Leader took corrective actions, including dividing and spreading out the load on the pager system so that future outages would not occur. The freezer and pager system were reset and brought back into operation along with a system of automatic periodic pages to members of the DNA Laboratory that would confirm the pager system's ongoing operation. Finally, the protocols on manual reviews of the freezer's temperature were modified to ensure that pager failures would be backed up with human checks.

The Interim Technical Leader reported these findings and actions to laboratory administrators with recommendations about next steps and a request for assistance on what further corrective actions might be necessary. Overall, these actions taken by the Interim Technical Leader to understand and correct the

[189] This is included in existing accreditation/quality requirements and is ongoing in DPS and other labs in TX.
[190] This recommendation is consistent with QAS requirements, and accordingly, APD and DPS crime labs may already have SOPs responsive to this recommendation. The SOP should clarify that documentation is required that justifies why the Laboratory deviated from any manufacturing protocol or labelling.

mechanical and process errors that had allowed the freezer to warm up and to stay outside of temperature range for several days were rapid, competent and thorough.

While the reaction to the mechanical challenge of the freezer outage was appropriate, two issues are worthy of greater focus. First, this outage could have been prevented had APD laboratory management responded to a prior identification of the risk of the freezer's outage. In 2014, prior to the Interim Technical Leader's appointment, the then-Technical Leader had informed APD Forensic Laboratory management of the need to upgrade the freezers to prevent a freezer outage, and presented a detailed plan for avoiding potential damage from a freezer outage.[191] The requests from the Technical Leader included funding to support redundancy for the condenser on the roof and the evaporator in the chamber itself as well as for monthly maintenance visits from those companies. The email stated, "[T]he risk of this catastrophically failing is high because of the limited options of moving the evidence in a timely manner to a new location and limited space at other locations." It described "redundancy for the condenser on the roof and the evaporator in the chamber itself" as a "HIGH PRIORITY REQUEST," and continued "if funding for the back-up system is not needed, then funding for increased maintenance visits from the contractor will be necessary. Currently this is quarterly but may need to go to monthly."

The Technical Leader also described outstanding issues, including the creation of a backup plan to move freezer contents to avoid a catastrophic failure, and a question about how often the "paper tracer" on the freezer should be changed to ensure it was a useful temperature gauge visible outside the freezer. Ultimately, however, it appears that the Technical Leader elected not to purchase the "paper tracer" based on inconvenience (the paper would need to be replaced weekly) and expense.[192]

The second issue is once again an issue of transparency within the DNA Laboratory about issues that occurred. While the Interim Technical Leader properly handled the in-lab notifications regarding the freezer malfunction, that memo also included a recommendation that other downstream stakeholders of the criminal justice system did not need to be informed of the outage:

> There are hundreds of evidence samples stored in freezer 5. Samples types include; evidence just collected, evidence being screened for biological material, evidence being DNA tested, and evidence pending analysis. Although it would be possible to determine the number of samples stored in freezer 5 during the impacted time frame, there is no way to determine if any samples have been compromised. Each case is independent of any other sample and the impact on that particular sample is unknown. It is not uncommon to perform DNA testing on a sample and not get a DNA profile. The lack of a DNA profile cannot be used to make the determination of w:hether or not the sample was impacted by the freezer 5 outage. **For this reason I do not believe that customer notifications need to take place at this time. If in the future the**

[191] Email August 19, 2014 from J. Sailus to B. Gibbens, M. Galindo, and R. Galvin, copying T. Arnold, A. Gil, C. McKenna, D. Morales, E. Morris, and A. Washington.
[192] Email from D. Morales to M. Galindo Re: in regards to F5 red pen and round paper, March 16, 2016 2:21 pm.

laboratory determines that a sample has been affected by this incident, the customer will be notified and all necessary documentation will take place.[193]

(Emphasis added).

The DNA Laboratory did not act in accordance with the disclosure obligations that existed, especially in light of the constitutional due process considerations articulated in *Brady v. Maryland* and codified in the Michael Morton Act. The existence of this recommendation in a publicly discoverable memorandum suggests, however, that the Interim Technical Leader was not being deliberately deceptive but rather had a poor understanding of the laboratory's role within the criminal justice system. The memo provided both supporting information and the rationale for her recommendation in an email that was sent to multiple members of the chain of command. The stated rationale focuses much more on the substantive assessment that there were no actions that could be taken to rectify the situation and there was no way to tell whether any archival samples might have been damaged, as DNA can exist without decay at room temperature.

Unfortunately, this was an incomplete analysis that did not address the potential consequences of the freezer outage to specific criminal cases. It does not matter whether the problem can be fixed, nor does it matter whether one can tell if archival samples were damaged. When evidence is potentially compromised due to an extended freezer outage, that information should, without question or reservation, be communicated to the District Attorney so that she may fulfill her constitutional and statutory disclosure obligations. The ultimate determination regarding whether the outage mattered in any given criminal case is within the sole purview of the court.

The outage of the freezer was ultimately made public when a different APD DNA Analyst testified to the outage under cross-examination in a sexual assault case in the fall of 2016. The Travis County District Attorney's Office did not agree with the perspective of the Interim Technical Leader regarding the APD DNA Laboratory's obligation to disclose the outage.

Here again, a lack of awareness of downstream disclosure responsibilities and a culture characterized by a lack of transparency prevented important information about a laboratory issue from being disclosed outside of the DNA Laboratory. Whether the failure of the Interim Technical Leader and APD forensic laboratory management to disclose the outage beyond the APD was intentionally deceitful or not, the appearance of deceit created substantial concern for the Austin Stakeholder Group and raised questions about the extent to which the laboratory understands its disclosure obligations.

Section I: Contributing Factors

I-1 **CONTRIBUTING FACTOR:** APD Laboratory management did not provide adequate response to 2014 requests to improve the freezer. The Laboratory Manager did not ensure fault tolerance and the

[193] Memo-f5.

Technical Leader's requests were not handled by lab management or the Interim Technical Leader upon the Technical Leader's sick leave.

I-2 **CONTRIBUTING FACTOR:** The Technical Leader elected not to purchase a daily manual tracking system due to inconvenience and expense.

I-3 **CONTRIBUTING FACTOR:** Neither the APD DNA Interim Technical Leader nor APD Laboratory management appeared to understand the obligations of the Travis County DA's Office to disclose to courts, defense attorneys, and others any information that could lead to potentially exculpatory evidence or lead to impeachment information.

I-4 **CONTRIBUTING FACTOR:** APD did not disclose the freezer failure to external stakeholders.

Section I: Recommendations

I-1 **RECOMMENDATION:** Management must have sufficient funding to ensure fault tolerance for mission-critical equipment.

I-2 **RECOMMENDATION:** The DNA Technical Leader and Laboratory Manager should retain a list of "open items" enabling an Interim or replacement Technical Leader or Lab Manager to remain apprised of each issue that remains unresolved and requiring managerial attention.

I-3 **RECOMMENDATION:** The District Attorney's Office and the JSAP should provide guidance and/or training to the DNA laboratory management regarding expectations and processes for efficient and complete disclosures.

I-4 **RECOMMENDATION:** The DNA laboratory should produce disclosure procedures that align with guidance and expectations of the District Attorney's Office, the defense bar and the JSAP.

Section J: Additional Austin Stakeholder Group Recommendations

The Quattrone Center review was limited to identifying factors between 2010 and 2015 that contributed to the quality issues in the APD DNA Laboratory that were identified in the TFSC Audit Report. As the Austin Stakeholders Group discussed these issues in the context of helping to design a new DNA laboratory that would be a national leader in quality, the group crafted additional recommendations that are hallmarks of a high-quality laboratory and that the Stakeholders Group wanted to memorialize as essential I the hope that the new laboratory's leadership, supported by the Scientific Advisory Panel (SAP) and Justice Stakeholder Advisory Panel (JSAP) might find them useful as it works to initiate the laboratory.

J-1 **RECOMMENDATION:** Each and every manager, director, staff or advisor providing technical leadership to the DNA laboratory, including but not limited to technical leaders and quality assurance

and laboratory staff, shall be well informed of all current guidelines, best practices and standards for forensic science testing, validation and training issued by any authoritative body (e.g., SWGDAM, ANSI/ASB, OSAC, FBI Quality Assurance Standards, International Organization of Standards (ISO), recognized accrediting bodies (ANAB, A2LA), TFSC etc.) and shall ensure that the DNA laboratory stays current with implementation and training of personnel as needed to meet them.

J-2 **RECOMMENDATION:** Regardless of where the new DNA Laboratory in Austin is instituted, the DNA laboratory should implement a new set of protocols, policies and procedures for training of personnel in conjunction with external scientific and community advisors, either from the SAP and JSAP recommended in this document or in such other structure as the City of Austin and the stakeholder group should determine. That training should be conducted by one or more qualified trainers with detailed familiarity with the new policies and procedures controlling the DNA Laboratory's actions.

J-3 **RECOMMENDATION:** Prior to their implementation, the SAP and the leadership of the DNA laboratory should agree on the initial policies, procedures and protocols that will govern the laboratory's actions. Such policies, procedures and protocols must conform with all applicable state and national standards and otherwise appropriate for the laboratory's chosen instrumentation and anticipated analytical methods.

J-4 **RECOMMENDATION:** The SAP and the leadership of the DNA laboratory should evaluate existing policies and procedures from not fewer than three (3) DNA laboratories of similar or larger size to the DNA laboratory, at least one (1) of which should be outside Texas, that are deemed to be high-quality laboratories, and carefully consider select policies and procedures that will optimize the quality of the DNA laboratory's work.

J-5 **RECOMMENDATION:** All applications for DNA Analyst should be reviewed de novo and suitable evaluations of professional competence, reference and background checks should be performed prior to an offer of employment. The DNA laboratory management must make responsible hiring decisions, with support from external advisors. Each new analyst must be qualified to conduct the work expected of him or her, and extensively trained on all relevant protocols, policies and procedures prior to conducting case work. Modified training based on prior experience should be permitted on a limited basis during the laboratory's inception.

J-6 **RECOMMENDATION:** DNA laboratory leadership, with advice and input from the SAP and the JSAP, should design and implement a high-quality training and testing/evaluation program that includes education on, among other priorities:

- The role of technical review
- Proper preparation for trial
- Appropriate corrective action after calculation errors;
- Appropriate corrective action after technical review errors;

- Processes for documenting protocol deviation; and
- Proper procedures for review and sign off on protocol deviations

J-7 **RECOMMENDATION**: Initial training of the DNA laboratory's inaugural analysts must be conducted by an experienced trainer, and ideally one who has previously conducted training in a forensic DNA laboratory. The initial training should be performed by an individual as his or her main professional focus, and not as a "side job" or a time-constrained engagement.

J-8 **RECOMMENDATION**: DNA laboratory management, in conjunction with the SAP and JSAP, should review and consider implementing a quality assurance process throughout the DNA laboratory that emulates the Houston Forensic Science Center (HFSC) process of running "blind" samples (i.e., test samples that the Analyst does not know are test, and therefore treats as real samples) through the analysis process to identify potential errors and establish laboratory error rates over time.

Part II: A Multi-Stakeholder Model for Improving DNA Laboratory Quality: Promoting More Effective Oversight and Responses to Laboratory Errors Throughout the Austin Criminal Justice System

Section K: A System-Wide View on Enhancing the Quality of DNA Analysis

The primary responsibility for ensuring that a forensic DNA laboratory is generating scientifically accurate, precise, reliable and timely reports rests with laboratory personnel. While part of the Quattrone Center's review focused on contributing factors that directly impacted the DNA Laboratory and its personnel, a unique and challenging aspect of forensic science is that laboratories operate within a larger criminal justice system based on adversarial representation.[194] The other actors within this system have critically important roles in determining what scientific information is used and how it is presented to and by attorneys (and sometimes defendants) before and during the plea bargain process and criminal trials.

For example, police officers and crime scene technicians make important decisions about what evidence to collect initially, and how to handle properly the evidence collected; the quality of these samples necessarily affects the ability of DNA laboratory personnel to perform their work. Similarly, prosecutors act as officers of the court with a responsibility to submit reliable and valid forensic evidence and to inform defendants and their attorneys, courts and jurors of the scientific, statistical or other limitations of that evidence. Defense attorneys have a duty to zealously represent their clients and cannot do so without understanding the forensic analysis

[194] See, e.g., Dror I. E. (2015). Cognitive neuroscience in forensic science: understanding and utilizing the human element. *Philosophical transactions of the Royal Society of London. Series B, Biological sciences*, *370*(1674), 20140255. https://doi.org/10.1098/rstb.2014.0255

employed. And judges are the final gatekeepers of scientific evidence and cannot fulfill this duty effectively without a familiarity with analytical concepts, limitations and current trends.

It would be inaccurate to say that other stakeholders in the criminal justice system bear direct responsibility or blame for the issues in the APD DNA Laboratory that were identified in the TFSC Audit Report. At the same time, if the Austin Stakeholders Group is to make recommendations that have the best chance of providing measurable improvement in a future laboratory, understanding how the laboratory operates within the larger environment of the Austin criminal justice system of police, prosecutors, defense attorneys, judges, and regulatory organizations (e.g., the TFSC) can help to create a multi-stakeholder vision of quality improvement that will provide layers of assurance that future issues in the DNA laboratory can be rapidly identified, communicated, and resolved.[195]

To better understand the environment in which the APD DNA Laboratory was operating, and so that we could make recommendations that would provide system-wide support for a high-quality DNA laboratory in Austin going forward, we interviewed and spoke with members of the Travis County District Attorney's Office, the Austin criminal defense bar, and the Texas 167th District Court, among other downstream recipients, evaluators, and "users" of the APD DNA Laboratory's reports and testimony. In addition, the Quattrone Center interviewed members of the Texas Forensic Science Commission, a state agency of Texas that investigates complaints that allege professional negligence or misconduct by a laboratory, facility or entity accredited by the Director of the Texas Department of Public Safety that would substantially affect the integrity of the results of a forensic analysis.[196]

The individuals with whom we spoke were uniformly determined to manage criminal cases openly, transparently, and ethically. They also identified environmental, supervisory, structural, and communication-based challenges that created opportunities for the errors identified in the Audit Report to occur, and to go unnoticed for an extended period.

As the use of DNA evidence in criminal cases increases, so too does the need for lawyers and judges adjudicating such cases to receive DNA records and to be knowledgeable of DNA science, the practices and protocols of DNA laboratories, issues affecting DNA evidence before it gets to the laboratory, and effective and accurate ways to assess, present, and challenge DNA evidence while recognizing the strengths and limitations of the tests performed. There is no question that this is a difficult and demanding task, but if attorneys on such cases lack this knowledge, the consequences can be dire for individuals on trial or participating in a plea negotiation process, as well as for current or future victims of crime.

[195] See, e.g., National Institute of Justice (NIJ). (2014). Mending Justice-Sentinel Events in Criminal Justice. Note that the concept that downstream recipients of data or reports from a DNA laboratory can contribute to improving the criminal justice system by identifying concerns with the laboratory's techniques, policies, processes or output does not suggest that they could be legally or factually "responsible" for any specific violation of due process rights that may be suffered by an individual in a criminal case.

[196] The TFSC is not an end-user of the DNA laboratory's output but as an investigational agency, it has an important role to play in ensuring that forensic laboratories are operating under appropriate conditions and using credible scientific methods and techniques.

Information coming from a DNA laboratory must be evaluated critically by one or more qualified prosecutors before its use in a criminal prosecution, and it should also be evaluated and probed by a qualified defense attorney. In some cases, it may be appropriate for each of these legal entities to consult with one or more subject matter experts. Attorneys should make certain they have the complete case folder, supporting data, bench notes and any other information needed to make this assessment (e.g., technical manuals, standard operating procedures used in the case, etc.). They then should work to ensure, among other things, that: the DNA evidence was of sufficient quality and quantity to test and interpret; the methods used by the laboratory were properly validated and generally accepted in the scientific community and were correctly used during the testing of the case at hand; the data were correctly evaluated and reported; the DNA records and limitations of the evidence and the testing procedures and data are disclosed to all parties; and that the data were evaluated and presented in a fair and unbiased way, so that it can be assessed by a similarly critical judge as evidence in a criminal case.

To build upon the criminal justice community's desire to enable improved quality within the DNA Laboratory, Austin's next DNA laboratory should collaborate closely with its downstream stakeholders in criminal justice, including the TFSC to create a system that will educate relevant stakeholders in (among other things):

- How the DNA laboratory handles and processes samples;
- How DNA samples are tested and analyzed within the laboratory;
- How DNA profiles are interpreted and compared;
- How statistical values are calculated;
- Scientific, testing, statistical or other limitations that may exist for specific methodologies used in the DNA laboratory; and
- Which areas of testing and interpretation pose the greatest challenges to the community.

This will require the downstream stakeholders to establish structures that provide access for attorneys handling criminal cases with DNA evidence to designated attorneys with specific DNA expertise. This can be done in different ways. Existing organizations might appoint and educate one or more attorneys and designate them as "DNA Advocates," or attorneys could complete Continuing Legal Education (CLE) or other courses created by the TFSC or the Courts allowing individual attorneys to be "DNA-certified" and therefore able to accept indigent defense representations on a court-appointed basis, for example. Attorneys serving in these roles would not necessarily be scientists themselves but would know enough about the science (including current trends and areas of disagreement) to be able to identify issues of concern and consult reputable resources and subject matter experts.

Finally, lawyers and judges can assist the DNA laboratory by acting as a source of education. Judges and lawyers are typically (and should be) more knowledgeable of the case law and statutes that govern the admissibility of DNA evidence than most laboratory employees. Therefore, through groups such as JSAP, lawyers can be instrumental in increasing laboratory employees' knowledge of issues such as disclosure requirements and the methods that should be followed in order for the evidence to be properly admitted in court. In so doing, they can ensure the laboratory's continued dedication to the production of accurate and complete scientific

information, in ways that maximize its utility in Texas or federal courts as they search for the truth in criminal cases.

The District Attorney's Office

While the Travis County District Attorney's Office lacked direct management or supervisory responsibility for the APD DNA Laboratory, prosecutors play a role in deciding what evidence should be subjected to DNA analysis, evaluating the quality and meaning of the evidence and the laboratory's test results, determining whether or not it should rely on the DNA evidence, and ensuring that the DNA laboratory properly discloses records and other information to defense counsel. Acting as an officer of the court, the DA's Office presents DNA analysis as reliable and valid evidence in criminal cases. Thus, as with defense attorneys, the DA's Office serves as an important check on DNA evidence and related information. The DA's Office is also legally obligated to act as the government's representative to the court and has ethical and legal obligations regarding the disclosure of exculpatory, mitigating or impeachment information.[197]

During the time period between 2010 and 2015, the APD DNA Laboratory shared laboratory reports with investigational units in the APD and with the District Attorney's Office, who then bore the responsibility for making full and appropriate disclosures to defense counsel of record in specific cases. The assignment process for individual cases within the DA's Office from 2010 – 2015 was such that DNA cases could be assigned to Assistant District Attorneys who lacked specific expertise in the science of forensic DNA testing, and thus could have benefitted from consultation with scientific and/or legal experts with greater awareness of potential scientific or legal issues in the case(s). While it is unlikely that every ADA will obtain (or need) substantial scientific depth in DNA analysis to effectively manage the bulk of their cases, ensuring that one or more members of the DA's Office possess this expertise and that it is easily accessible to attorneys throughout the Office for cases involving DNA analysis will allow prosecutors to better evaluate the reliability and weight of the DNA evidence, and identify possible problems with the DNA laboratory's testing, within and across cases, expanding prosecutors' ability to flag and disclose such errors is in the interest of all parties.

Another aspect of ensuring quality throughout the Austin criminal justice system involves making sure that information generated by the DNA laboratory is equally shared among prosecutors and the defense bar. This obligation has historically been the responsibility of the prosecution, since the APD DNA Laboratory, like many DNA laboratories across the country, rarely (if ever) shared information directly with defense counsel because the identity of defense counsel was not known to the DNA Laboratory. Often, this was due to timing, since reports may be generated by the DNA Laboratory for review by police and prosecutors during the investigation phase of the case before charges have been filed, for example. In addition, the administrative burden of staying current as defendants in cases may change attorneys, etc. can be substantial. The District Attorney's Office naturally keeps track of such things; constructing a similar system for the DNA Laboratory would be clunky and onerous to maintain. However, several members of the Austin Stakeholders Group

[197] *See, e.g., Brady v. Maryland*, 383 U.S. 83 (1963); Texas Code of Criminal Procedure Art. 39.14 (commonly known as the "Michael Morton Act.") Nothing in this report should be construed as setting forth a specific legal standard for disclosure of information in criminal cases.

observed that because the DNA Laboratory's mission is scientific accuracy, rather than "finding a match" for any specific sample, there should be no reason why the DNA laboratory should not provide equal access to DNA reports or information to both the District Attorney's Office and to defense attorneys, making analysts equally available to answer questions, provide additional detail or clarity, etc. to all.[198]

The Defense Bar

We depend on defense attorneys to defend the rights of individuals accused of crimes. This work can entail challenging the work of law enforcement (both police and prosecutors), identifying structural flaws in criminal investigations or prosecutions, and challenging evidence, including DNA evidence. While defense attorneys have no ability to control the output of a DNA laboratory, defense teams can and should investigate and challenge DNA evidence and the underlying data supporting that evidence. One way to do this is to evaluate and identify testing or analytical flaws in DNA records pertaining to criminal cases.

During the 2010 – 2015 time period that was the focus of our review, Austin had two institutional public defender programs—one serving juveniles and the other individuals with mental illness.[199] In most cases, Travis County judges appointed counsel to indigent defendants semi-randomly from a "wheel" of attorneys. This meant that, like the District Attorney's Office, cases with DNA evidence might be assigned to defense attorneys with little experience with or scientific awareness and understanding of forensic DNA testing. These attorneys would be unlikely to notice irregularities or problems with DNA analysis.

Neither of the two institutional public defender offices had a substantial volume of DNA cases or the technical proficiency to identify systemic issues with the laboratory casework. Thus, while individual attorneys might have identified issues of concern in specific cases, the existing indigent defense organizations did not have an organized or standardized way for aggregating the depth of scientific knowledge, or the detailed awareness of specific criminal cases across the system, necessary to dependably identify trends in APD DNA Laboratory policies, procedures or methodologies that would have been needed to identify the types of errors found in the TFSC Audit Report.

Even if such a structure had existed, its ability to identify the problems set forth in the TFSC Audit Report would have been complicated by the lack of transparency seen in the APD DNA Laboratory. As we have noted elsewhere, APD DNA Laboratory employees did not fully document problems and disclose relevant records. In addition, there are certain types of laboratory errors that are difficult to discern even with a retained expert, since experts typically focus on a relatively narrow universe of information especially when resources are limited.

Travis County, the City of Austin, and the legal community have taken steps to review cases that may have been affected by the work of the APD DNA Lab and to address this structural concern going forward. For example,

[198] If Austin creates a future DNA laboratory as a government-funded entity that provides information directly to the defense In criminal cases, a method will need to be created that properly documents this disclosure in the "Morton form" that is maintained as a case record showing all discovery provided to the defense.
[199] A Managed Assigned Counsel (MAC) program was initiated on January 1, 2015. Given that it takes months and sometimes years for DNA cases to proceed forward, it is doubtful that any CAPDS attorneys were on 2010-2015 cases.

the Travis County District Attorney's Office, the Travis County Juvenile Public Defender Office (JPD), and The Forensic Project, a unit of the Capital Area Private Defender Service (CAPDS), are reviewing cases that may have been affected by the APD DNA Laboratory's work, conducting materiality reviews, and pursuing collateral review on some cases. In addition, Austin has received funding to create an institutional public defense organization.[200] CAPDS, JPD and the new public defender office will work collaboratively to, among other things, identify overarching issues that affect the quality and reliability of DNA evidence presented in courts.

The Courts

The Travis County courts also have a role to play in ensuring the quality of DNA reports used in criminal cases. Judges act as scientific "gatekeepers," determining whether DNA evidence is admissible in court. Judges are farther removed from testing, reporting, analysis, or critical review of DNA evidence than prosecutors and defense attorneys, and they have no direct or supervisory authority over the DNA Laboratory. At the same time, they are responsible for overseeing courtrooms that operate within the rules and spirit of the Texas Code of Criminal Procedure and Texas Rules of Evidence, and creating an environment where prosecution and defense can openly, equally and fairly present and challenge DNA evidence. Judges also help to ensure that indigent criminal defendants in cases where DNA is at issue are granted necessary expert assistance and are receiving effective representation.

Ensuring that judges who are presiding over cases involving DNA evidence (or other forensic science evidence) have the necessary familiarity with the science to ensure appropriate admissibility reviews is an important check and balance on the quality of testing performed and the reports generated by a DNA laboratory. One potential way to improve this awareness for judges in Austin would be for the TFSC to work with the judges in Travis County and other organizations like the Texas Center for the Judiciary and the Center for American and International Law to develop a DNA training program specifically for judges. Using combined resources, the program could be tailored to meet the needs of the bench in Travis County, though core modules would be useful in various jurisdictions.

Police Officers and Crime Scene Technicians

Police officers and crime scene technicians are often the first people to collect and handle samples possible containing biological evidence. They play a significant role in collecting, packaging, handling and storing the evidence while maintaining the quality of those samples and documenting an appropriate chain of custody. The APD Forensic Science Bureau published a Physical Evidence Handbook that specifically addresses issues such as DNA evidence collection and the storage of DNA evidence. These topics would be suitable for discussion and review within the criminal justice community, perhaps in a discussion moderated by the JSAP.

[200] https://www.austinchronicle.com/daily/news/2019-08-30/state-grant-approved-for-public-defender-office/

Communication of Legal System Requirements to the DNA Laboratory

In order for laboratory management, judges and lawyers to do their jobs effectively, it is essential that DNA laboratory analysts and managers understand their obligations to document and disclose their work, and how such documents are used by judges, lawyers and jurors. A high-quality DNA laboratory should collaborate with these stakeholders in the legal system to ensure that DNA laboratory managers, QA personnel, technical leaders, analysts and technicians fully understand the obligations of transparency and disclosure required by law and by regulation. The failure to disclose material exculpatory, impeachment and mitigating records and other information violates defendants' and petitioners' fundamental right to due process.[201]

The Quattrone Center identified several situations suggesting that APD DNA Laboratory personnel either did not understand or chose to ignore their obligations to disclose quality, technical or other issuesevents within the DNA Laboratory to stakeholders outside of APD. Perhaps the most glaring example was the resistance of the DNA Laboratory Technical Leader in 2014 to reviewing prior mixture cases analyzed using the QBST, even after its flaws were laid bare and the risk to accurate DNA analyses in specific cases was known. While the Technical Leader agreed to abandon the QBST after the DNA Laboratory had properly implemented and validated probabilistic genotyping software, he balked at agreeing that the issues with the QBST required a thorough review of potentially affected cases, and advocated staying with QBST while transitioning to probabilistic genotyping despite the increased risk of stochastic effects. The Technical Leader either did not grasp or did not acknowledge the cost of this would be delaying (or avoiding altogether) a necessary review of cases potentially affected by the QBST, with potentially devastating consequences for victims of crime and for potentially wrongly convicted individuals.

Another example of the DNA Laboratory's failure to communicate necessary information involved the updating of case reports. Not until 2014 were the APD DNA Laboratory SOPs modified to include language complying with ISO 5.10.9 stating that "corrected reports will be issued when revision of the analysis information, opinions or conclusions is indicated."[202] This contributed to the inability of attorneys to identify concerns with the DNA Laboratory, as documents showing modifications or corrections were not created despite the awareness of analysts that errors had been made. The Technical Leader supported this view when preparing analysts for testimony at trial, and further supported this view when discussing evolving science issues with the TFSC.[203] Perhaps not surprisingly, this view extended to several of the DNA Analysts.[204] As one analyst put it when discussing contamination events: "we tell [ADAs] when we go to court that it is not a rule or an agreement that anytime something happens, we're going to let you know… [The DA's Office is] making it sound like there has been the standard that we have to tell you every time something happens, and we didn't have an understanding."

[201] See, e.g., *Brady v. Maryland*, 373 U.S. 83 (1963).
[202] APD DNA Laboratory SOPs 5.10.19.
[203] Email J. Sailus to V. Winkeler, January 21, 2015.
[204] Our review did not extend beyond errors related specifically to the DNA Laboratory. As a result, we do not know whether the perspective held by the DNA Technical Leader that analysts could correct report errors on the stand rather than changing the documentation was held in other parts of the APD Forensic Sciences Service. The responsibility to identify this issue on the part of the Technical Leader and correct it rested on the Quality Assurance Manager and the Forensic Laboratory Manager, as well as the District Attorney's Office, none of whom did so for reasons mentioned elsewhere in this Report.

Yet another example was the decision of the DNA Laboratory not to inform external stakeholders about the outage of Freezer 5 in 2015, as described in Section I above. The Interim Technical Leader of the DNA Laboratory, with the review of the Forensic Science Services Manager, recommended not notifying external organizations because it could not be known whether samples had been damaged. This prevented the District Attorney's Office from being able to satisfy its legal obligations. Rather than having uninformed and potentially biased members of the DNA Laboratory making decisions about disclosure, the downstream stakeholders of information from the Laboratory can ensure that the Laboratory employees are more knowledgeable about their obligation to document and disclose information, and that a more formal and thorough culture of transparency is implemented. For these reasons, educating DNA Laboratory management, analysts and technical leaders about the legal system is as important as educating lawyers and judges about the science of DNA and its limitations.

The ability of stakeholders other than law enforcement to communicate with the DNA Laboratory has been complicated since its inception by its placement within the APD. It is not surprising that a laboratory within (and funded by) a police department should prioritize police activity, or that there is a risk that the Laboratory employees might associate themselves on the side of the police and see their roles as helping to identify perpetrators of crime, rather than to analyze DNA samples accurately and efficiently. This may relate to or be compounded by the lack of transparency exhibited by the DNA Laboratory during the period of our review, which made it difficult for legal end-users of the Laboratory's DNA records, whether prosecutors or defense attorneys, to know whether or what issues might be occurring in the laboratory.

The Laboratory's obligation to provide information and thorough documentation to external stakeholders in the criminal justice system with thorough reports extends to the police investigating the case, and to both prosecutors and defense attorneys adjudicating the case. Prosecutors may need to communicate with DNA laboratory employees at various times during an investigation or during the prosecution of a case. Once charges have been filed against an individual, laboratory employees should also be willing to meet or speak with defense attorneys representing that individual. Ideally, this would be done through the creation of a "case manager" role that would be the first line of information and assistance for police, prosecutors, and defense attorneys seeking to conduct DNA testing and access the resulting reports. The case manager ensures that only task-relevant information is given to the DNA Analyst, reducing the risk that bias of any sort infiltrate the process, and ensures that the interests of the legal system in testing efficiency, testing completeness, and neutrality be preserved.[205] Whether the case manager role exists or not, it is essential that any such communications between laboratory employees and prosecutors and defense attorneys must be documented by the laboratory employee.

[205] *See, e.g.,* Dror, I. E., Thompson, W. C., Meissner, C. A., Kornfield, I., Krane, D., Saks, M., & Risinger, M. (2015). Letter to the editor-context management toolbox: a linear sequential unmasking (LSU) approach for minimizing cognitive bias in forensic decision making.

Section K: Environmental Conditions Affecting Quality in the APD DNA Laboratory

K-1 Downstream recipients of APD DNA Laboratory reports and data trusted in the APD DNA Laboratory to generate high-quality DNA testing results, reports and testimony, and did not have a structure for active engagement with the DNA Laboratory's personnel regarding methodologies, policies, procedures, reports, errors, deviations, corrective actions, or other quality assurance topics.

K-2 Prosecutors and defense attorneys working on DNA cases in Travis County were not all sufficiently knowledgeable about forensic DNA testing and related issues to effectively identify and respond to the problems within the APD DNA Laboratory.

K-3 As a general matter, between 2010-2015, the Travis County criminal justice system was not structured to optimize the delivery of DNA experts to defense attorneys who might have benefitted from their expertise. Defense attorneys did not always request training and judges did not always approve requests for retaining expert witnesses to help defense attorneys obtain a critical understanding of DNA test records or to assist with reviewing case files for testing, interpretation, comparison and reporting.

K-4 The APD DNA Laboratory lacked a culture of transparency. The Technical Leader and other Laboratory employees did not disclose all errors or document all changes to specific cases, or disclose all records and other information they were required to by law.

K-5 The stakeholders in the Austin criminal justice system lacked an effective channel for understanding what was occurring in the APD DNA Laboratory on a regular basis, for evaluating its practices, and for providing guidance about the requirements of the criminal justice system as it applied to DNA evidence.

Section K: Recommendations

K-1 **RECOMMENDATION:** The Travis County Criminal and Juvenile Court should make experts available to indigent defendants when useful to the case and make defense counsel aware that funds are available from the Court for retention of experts.[206]

K-2 **RECOMMENDATION:** The JSAP should include at least one criminal defense attorney practicing in the City of Austin who will sit on the JSAP.

K-3 **RECOMMENDATION:** The JSAP should include at least one individual from the Travis County District Attorney's Office.

K-4 **RECOMMENDATION:** The District Attorney's Office should ensure that it has one or more attorneys who are expressly responsible for serving as "DNA Advisors," individuals with a working knowledge of current DNA technologies with the ability to critically evaluate reports and case files coming from a DNA laboratory, and who can advise attorneys with less forensic science experience as

[206] A managed assigned counsel program was established by the courts in 2015; the Austin Stakeholder Group feels that this program has effectively addressed this recommendation.

their cases move through the criminal justice system, including appeals. The DNA Advisor would also be responsible for case coordination with the DNA Laboratory. The DNA Advisor need not be a position for one full-time employee; rather, those responsibilities may be shared by a properly trained team within the District Attorney's Office.

K-5 **RECOMMENDATION:** Judges in DNA cases should embrace their gatekeeping role in DNA cases by confirming that prosecutors and defense attorneys have sufficient time, full access to records, and access to any experts necessary to critically review the DNA records and findings, the case file, findings and any deviations, and that the parties have performed that review.

K-6 **RECOMMENDATION:** Travis County judges should identify one or more "DNA Advisors" with expertise in the admissibility and use of DNA in criminal cases, whom the court may assign to assist court-appointed attorneys in cases where DNA may be at issue.

K-7 **RECOMMENDATION:** Travis County Courts should require that court-appointed counsel complete a TFSC DNA education program in order to receive a "DNA-eligible" certification prior to receiving a case referral from a judge or participating as lead defense counsel in criminal cases where DNA is at issue.

K-8 **RECOMMENDATION:** The Texas Forensic Science Commission should create a Continuing Legal Education (CLE) course or attorney education program for the proper use of forensic science in the Courtroom, including DNA evidence.

K-9 **RECOMMENDATION:** The JSAP should collaborate with the DNA Laboratory to ensure bilateral education among DNA Laboratory personnel and JSAP representatives on all topics relevant to the use of DNA analysis in the criminal justice system.

K-10 **RECOMMENDATION:** The TFSC should work collaboratively with prosecutor and defense organizations to establish training on legal discovery disclosure requirements of Texas and federal law regarding DNA evidence for DNA Laboratory personnel. The training should be updated and remain current over time, and should include, but not be limited to:

- Disclosure requirements for DNA records and other information;
- The parties who should receive relevant discovery, including laboratory management, prosecutors, defense attorneys, and the court.

K-11 **RECOMMENDATION:** The JSAP should create a checklist for DNA analysts and case managers on potential types of exculpatory or impeachment information that are required by law to be disclosed, and the required recipients of the information.

K-12 **RECOMMENDATION:** The DNA Laboratory should assign each case to a "Case Manager" familiar with discovery requirements and other downstream legal/judicial concerns and enable that person to communicate with both prosecution and defense attorneys in addition to the APD.

K-13 **RECOMMENDATION**: The DNA laboratory should work with the JSAP to create a system by which records and other information will be effectively and efficiently delivered by the laboratory to prosecutors and defense attorneys in criminal cases. The system should ensure that both prosecutors and defense counsel receive the entire case file, and not just summary reports.[207]

Section L: Structural Weaknesses in Accreditations and Audits

One key element of the environment in which the APD DNA Laboratory was operating between 2010 and 2015 was the established system of external quality standards. The DNA Laboratory moved to become accredited immediately upon its creation and received accreditation from the American Society of Crime Lab Directors Laboratory Accreditation Board ("ASCLD/LAB") in August of 2005.[208]

The APD DNA Laboratory was subject to multiple quality assurance standards and accreditation requirements during the time period in question. Despite an ineffective quality assurance program, the open and persistent use of methods that were not generally accepted (e.g., the QBST), and inadequate validation studies, the APD DNA Laboratory maintained its accreditation under ASCLD/LAB and successfully passed multiple external audits under the Federal Bureau of Investigation ("FBI") Quality Assurance Standards ("QAS") that permitted the Laboratory to upload to and communicate with the FBI's national CODIS database of DNA profiles.[209] A list of internal and external audits and accreditation reviews conducted and a chronology of accreditations and audits (2004-2016) are attached to this document as Appendix C. Chronology of Accreditation and Quality Audits (2004-2016)

An important question asked by the Austin Stakeholders Group was how the issues raised in the TFSC's Report could have been so widespread given (a) the APD DNA Laboratory's ability to achieve ASCLD/LAB accreditation in 2005 and to renew that accreditation in 2010 and 2015, and (b) the Laboratory's continual compliance with the FBI QAS, which required annual audits conducted by external and internal auditors on alternating years. Once again, numerous factors – some structural, some informational, and some due to chance – combined to allow the APD DNA Laboratory to engage in suboptimal practices without being detected by an imperfect and misunderstood auditing and accreditation regime, and contributing to a misplaced sense of confidence in the Laboratory's quality by APD leadership and the rest of the Austin criminal justice system.

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[207] For one example of such a policy, see "Tarrant County Criminal District Attorney's Office Laboratories and Medical Examiner's Office Disclosure Compliance," Rev. 11-01-2017, attached as

Appendix F. Tarrant County Criminal District Attorney's Office Laboratory and Medical Examiner's Office Disclosure Compliance

[208] Letter from Donald Wyckoff, ASCLD/LAB Chair, to William Gibbens, Division Manager, Austin Police Department, August 4, 2005.

[209] DNA laboratories that seek to use the national CODIS database, either to upload DNA profiles into the database from convicted individuals or to access the database for comparison to current investigative profiles, must demonstrate compliance with the QAS on an annual basis, with an external audit being conducted by auditors from outside the laboratory every other year. An internal audit, conducted by individuals within the DNA unit and/or other units of the laboratory, or an external audit may be conducted in the other years.

To better understand these issues, the Quattrone Center interviewed forensic and DNA laboratory managers from forensic labs around the country, as well as representatives of the ANSI National Accreditation Board (ANAB), which acquired ASCLD/LAB[210] in 2016.[211] APD leadership and other non-scientific stakeholders in Austin's criminal justice system relied on the ASCLD/LAB accreditations and FBI QAS as evidence that the APD Forensics Science Services unit in general, and the DNA Laboratory specifically, were operating at a high level of quality that was at least comparable to other forensic DNA laboratories in the state and in the country. The perception that because the Laboratory was accredited, it must be high-quality was a substantial misunderstanding by APD leadership and others in the Austin criminal justice community and contributed to the lack of awareness of the issues in the APD DNA Laboratory over time.[212]

Findings in Reports of APD DNA Accreditation or Audits

Accreditation inspectors or auditors evaluate laboratory records and interview personnel to identify whether a practice within the DNA Laboratory satisfies accreditation requirements. Any requirement marked as a non-conformity to a standard is called a "finding," and requires an explanatory statement and verifiable documentation by the auditor. Laboratories are required to adequately address findings to receive accreditation or to "pass" the audit.

Set forth below are all of the findings related to the APD DNA Laboratory between 2004 and 2016. None of them was useful in helping APD Laboratory Management, APD Leadership, or other interested stakeholders gain awareness of the issues identified in the TFSC Audit Report.

The 2005 ASCLD/LAB inspection of the APD Forensic Science Services unit identified eleven (11) findings, of which only one (1) was related to the DNA Laboratory. This finding stated: "[i]n Biology, the refrigerator and freezer logs list an acceptable temperature range for each unit. When temperature checks show a unit is out of its acceptable range, there is often no documentation of corrective action taken."

In 2010, the ASCLD/LAB inspection reported eighteen (18) findings, none of which were directly related to the DNA Laboratory, though several addressed laboratory policies that may have affected the DNA Laboratory.[213]

In 2015, the ASCLD/LAB assessment reported nine (9) findings, of which one (1) was directed to the DNA Laboratory. The one directed to the DNA Laboratory states: "[o]pinions and interpretations were not clearly

[210] ASCLD/LAB provided the APD DNA Laboratory with its accreditations between 2005 and 2015.
[211] While the Quattrone Center was able to discuss the accreditation and audit process with individuals with supervisory or leadership responsibilities at ANAB, it did not speak with any individual who conducted an audit or accreditation visit at the APD DNA Laboratory.
[212] See, e.g., TFSC Audit Report at 27.
[213] 1.1.2.5 – an unique identifier was not associated with all paperwork for a case; 1.4.2.17 – a need for tracking changes in the laboratory LIMS was identified; 1.4.3.1 – the grading of proficiency test performance by the laboratory needed to be better defined

marked on all testing reports that were reviewed." Again, however, other findings may also apply as they addressed laboratory policies.[214]

Documentation from ASCLD/LAB indicates that all findings were appropriately addressed by the APD Forensic Science Services unit Laboratory, and thus accreditation was awarded in each of the three years.

No findings were reported for the APD DNA Laboratory in its four internal QAS audits (in 2006, 2008, 2011, 2013 and 2015) or for its seven external QAS audits (in 2005, 2007, 2009, 2010, 2012, 2014 and 2016), indicating that the DNA Laboratory's practices were in compliance with the FBI QAS.

Findings were reported for the internal QAS audits conducted in 2004 and 2014, and the external QAS audits conducted in 2004 and 2015. These findings did not impact laboratory testing of ongoing or past casework. The 2004 internal audit required an update to the APD DNA Laboratory organizational chart, and the 2004 external audit required the Lab to improve its records of its documents related to tracking the chain of custody of materials received by the laboratory.

The 2014 external QAS audit found deficiencies in the Lab's documentation for retention of documents and inconsistent use of dates for proficiency testing in the laboratory; two other non-conformities were identified that were overturned by the FBI NDIS Board[215] upon appeal by the laboratory.

The 2015 internal QAS audit identified: (1) missing documentation regarding keys and logs of combination lock codes; (2) recently expired NIST-traceable thermometers in use in the laboratory; and (3) a pipette that had been mistakenly approved for use in casework although it was out of calibration. No findings or issues with the DNA testing procedures, validation studies performed, protocols used by the laboratory, training of staff, etc. were identified during any of the audits.

The QBST was adopted by the APD DNA Laboratory in 2010, immediately after the publication of SWGDAM Guidelines regarding the analysis of mixture DNA. Adherence to SWGDAM Guidelines was not then (and is not now) required in order to meet the FBI QAS or to obtain ASCLD/LAB (or ANAB) accreditation. Accordingly, neither the ASCLD/LAB nor the internal or external FBI QAS audit visits assessed the QBST or any other type of stochastic threshold in any useful way, depriving Laboratory management of a potential opportunity to identify the QBST as unfit for its area of use.

Auditors did review studies that supported the use of the QBST in the APD DNA Laboratory for both the Profiler Plus/COfiler amplification kits and the Fusion kit. The 2004 external QAS audit document states the compliance of the Quantifiler, Profiler Plus and COfiler ABI reagent kits in the internal validation studies,

[214] ISO 4.8 – resolution of complaints did not include any non-written complaints; ISO 4.11.2, 4.11.4 – insufficient root cause analysis performed in 9 of 10 corrective actions reviewed; ISO 4.14.1 – Insufficient documentation of the management system audit (e.g., for verification of examination records with technical records under 4.13.2)

[215] The FBI National DNA Index System (NDIS) Board has the ultimate authority over decisions regarding the QAS audit findings.

which included "Sensitivity, Dilutions, Reproducibility… Mixtures,"[216] while the 2010 external QAS audit document states that auditors evaluated and approved the "Stochastic Threshold Study."[217] In addition, The APD 2014 QAS external audit documentation states the evaluation and approval of the validation of the PowerPlex Fusion Amplification Kit, including "stochastic effects" studies. [218, 219] However, the statement of "evaluation and approval" in the QAS audit documents does not provide support for the use of the QBST in the manner in which it was intended to be used in the DNA Laboratory. The inappropriateness of the QBST as an aid for assessing the risk of drop out could only have been evaluated from the review of case work by the auditors if they happened to have a case where the use of the QBST failed, raising a flag regarding its effectiveness.

Weaknesses in the Structure of Accreditation/Audit Review

The accreditation and external auditing process for forensic laboratories in the United States, and for DNA laboratories specifically, has some strengths and some challenges. ASCLD/LAB (now ANAB) and the FBI QAS provide a set of essential criteria for ensuring a minimum level of quality for all participating laboratories, and for DNA laboratories specifically. They also provide a strong focus on and criteria for documented procedures and policies for many critical areas of the laboratory (e.g., QA/QC program, root cause analysis and corrective actions, management, proper evidence handling and storage, technical/testing procedures, education and training of personnel, safety, and security). ASCLD/LAB and the FBI QAS also ensured periodic external and internal reviews of the existence of necessary laboratory documentation.

The process also provides an opportunity for individuals engaged in conducting audits (e.g., analysts, technical leaders, quality assurance managers) to visit other laboratories and establish critical networking relationships. The increased awareness of other laboratories' shared experiences, policies and procedures, etc. has the potential to promote improved practices and performance in DNA interpretation and/or reporting over time.

Overall, however, the accreditation and audit regime that has been in effect since the inception of the APD DNA Laboratory leaves quite a bit to be desired. "Passing" an audit does not mean that the specific standard procedures used in the laboratory have been approved, or that all the laboratory's validation studies are appropriate and sufficient. It does not mean the individuals in the laboratory have been properly trained, or that their interpretation, reporting and testimony have been approved for all analysts and all casework, etc. Rather, it means the laboratory possesses documentation setting forth rules that govern the laboratory's actions under a wide variety of predictable circumstances, as well as documentation supporting the fact that the rules are being followed by laboratory personnel.[220]

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[216] 2004 Audit Document.
[217] 2010 QAS Audit Document, p. 91.
[218] *See* 2014 QAS Audit Report.
[219] No additional review of these studies would have been performed in 2015 during the ASCLD/LAB inspection since DNA testing using the kit currently in use in the laboratory had already been evaluated and approved.
[220] See, e.g., The Guidance Document for the FBI Quality Assurance Standards for Forensic DNA Testing and DNA Databasing Laboratories, Effective 07/01/2020 at 3 ("A laboratory's *documentation of compliance* with the QAS is measured through an accreditation/audit process. Such accreditation inspections or audits are performed by forensic scientists, either internal or external to the laboratory, and are intended to evaluate and document compliance with established standards.") (emphasis added). It is the documentation of compliance, rather than the utility of the protocols documented for their intended purpose, that is being evaluated. *See also* Murphy, E. E. (2015). *Inside the cell: The dark side of forensic DNA*, at 62. Bold Type Books.

One example of how the current regime of accreditation can fail to enforce quality standards in a DNA Laboratory is the contamination issues identified in the APD DNA Laboratory's Contamination Log. As previously noted, the Contamination Log is a list of instances of contamination in the DNA Laboratory that were identified and documented by DNA Analysts or others in the Laboratory. These logs were made available to ASCLD/LAB and FBI QAS personnel evaluating the lab. Despite multiple audit and accreditation reviews of the APD DNA Laboratory starting in 2005, only when a TFSC auditor reviewed the logs in 2015 did concerns arise about the contamination issues with the APD DNA Laboratory.

Two possible conclusions arise. One possibility is that the TFSC reviewers demanded greater levels of quality than the ASCLD/LAB and FBI QAS reviewers of the APD DNA Laboratory. The other is that the ASCLD/LAB or QAS auditors were not conducting a thorough review of quality issues.

Unfortunately, it appears that both conclusions are accurate. The reviews typically conducted by ASCLD/LAB (now ANAB) accreditors and FBI QAS auditors are engaged not in the practice of evaluating whether existing protocols are useful for their intended purpose, but only identified whether required protocols exist. Often these auditors used "check-box" forms supplied for them by these organizations, in which the question the auditor is answering a "yes" or "no" option to the question "does x exist in the lab?"[221]

Even so, the number and type of contamination errors, whether or not they repeat, and whether certain analysts commit more errors than others, should be relevant to receiving accreditation or passing an audit. Section 7.1.3 of the 2010 QAS, for example, asks "[d]oes the laboratory have **and follow** documented procedures designed to minimize loss, contamination, and/or deleterious change of evidence and work product in progress?" (Emphasis added). Given this, the failure of the auditors to raise concerns about repeated contamination events from individual DNA Analysts seems curious.

In addition, the ASCLD/LAB and FBI QAS audits did not include any apparent effort to assess the effectiveness of corrective actions undertaken by a laboratory. Instead, the audits seemed to focus only on whether issues were appropriately logged and whether a corrective action process was undertaken and documented.[222]

The opportunity for issues to continue unobserved despite the Laboratory receiving "passing grades" in ASCLD/LAB and FBI QAS external audits was compounded by the rule that certain information, such as

[221] See, e.g., Quality Assurance Audit for Forensic DNA and Convicted Offender DNA Databasing Laboratories In Accordance with The Quality Assurance Standards for Forensic DNA Testing Laboratories and Convicted Offender DNA Databasing Laboratories Issued By The FBI Director, Issue Date 07/04 (Rev. #6).

[222] See, e.g., FBI QAS sections 3.2 and 14.1, effective September 1, 2011. The Audit form asks whether the Laboratory "maintains and follows a procedure regarding document retention that specifically addresses… corrective action" (p. 17), but the 2015 external FBI QAS audit issued no findings that the Laboratory was out of compliance in its performance of corrective actions. The form checks whether the Laboratory had "established and followed a corrective action plan that addresses discrepancies detected in proficiency tests and casework analysis," (p. 76) and that "documentation of all corrective actions [was] maintained," (p. 77). Again, no findings were issued in the 2015 QAS external audit. This stands in contrast to the finding in the ASCLD/LAB accreditation review in April of 2015, which found that ""[l]aboratory management acknowledged the majority of complaints received were not in writing and were not recorded, investigated nor were corrective actions taken," *see* fn. 227.

validation studies, need not be reviewed again once they have received an initial accreditation or audit review. The discussion under sections 8.3 and 8.4 of the QAS audit document states:

> A list of the validation studies in compliance with Standard 8.1 will be incorporated by the auditor into Appendix E. ***The validation studies found to be in compliance with Standard 8.1 after one external audit do not need to be reviewed*** (emphasis added).

Similar language exists in earlier QAS audit documents. While worded permissively, this statement typically has the effect of excusing the auditors from reviewing past validation studies during the current audit. If a problem is noticed by an auditor in a subsequent external audit during the review of new validation studies or casework, that auditor or other auditing team member(s) has the prerogative to request the prior validation studies for additional review. However, if the laboratory has moved onto different testing procedures, problems with past validations and/or casework will likely not be uncovered during later audits.

The ability of auditors to identify issues in DNA laboratories can also vary depending on the auditors themselves. The individuals who performed the ASCLD/LAB accreditations and external FBA QAS audits were themselves DNA analysts, QA/QC managers, and crime lab managers from other jurisdictions, serving as volunteers to ASCLD/LAB and the FBI. This creates two potential risks for the laboratory being reviewed. First, a DNA analyst from another laboratory may have a sympathetic view of errors (e.g., contamination events) in the laboratory being audited, and might therefore be more prone to react lightly to such errors, or not to document them aggressively. Second, the auditor may come from a laboratory that embraces the same practices that are in use at the laboratory being audited; if so, the auditor will not perceive the laboratory's practices as flawed or dangerous in any way. For example, if an ASCLD/LAB Auditor of the Austin DNA Laboratory were to have come from a laboratory that itself had inadequate validation studies, that auditor would be unlikely to recognize the APD validation studies as flawed.

It is another limitation of the audit/accreditation process that auditors can only conduct a small sampling of the lab's processes and documentation in the laboratory in the time allotted for the audit. As a result, audits or accreditation reviews are simply not thorough reviews of lab quality across all casework. In fairness to the auditors, expecting an audit to identify every potential issue in casework is an extraordinary demand given the magnitude of documentation required for each DNA sample analysis. A typical ASCLD/LAB audit for a laboratory the size of the Austin DNA Laboratory would include 1-2 auditors, themselves analysts or managers in other crime laboratories, who are expected to complete their review in 1-3 days,[223] often including both the ASCLD/LAB standards and the QAS. As a point of reference, since a thorough review of a single case might take anywhere from one to more than four hours depending on the complexity of the case file, auditors are unable to review more than a handful of individual cases in any depth. Thus, while auditors are not instructed to discuss or evaluate whether the lab is embracing "best practices," they would have virtually no ability to do so given the short time frame and nature of the criteria being reviewed.

[223] This points to another quality challenge with the current auditing structure. The limited time frame can impede thorough audit review, either simply because there is not enough time to do the necessary work or because volunteer auditors leaving their "home" labs may have an incentive to complete the audit quickly and get back to work, causing the potential for conducting audits quickly, rather than thoroughly.

Auditors' ability to identify issues is also limited by the information provided to them by the laboratory being audited, and they only review the topics included in the accreditation requirements. As previously noted, while the 2010 SWGDAM Guidelines set out important scientific information that the QBST was not fit for the purpose for which it was being used in the APD DNA Laboratory, compliance with those guidelines were not a requirement for ASCLD/LAB accreditation. Accordingly, even if an auditor had taken issue with the use of the QBST in the APD DNA Laboratory as contrary to the SWGDAM Guidelines, it would not have impacted the Laboratory's ability to get accredited.

Despite these limitations, auditors can and do identify and document issues deserving of focus, and audit organizations determine whether the laboratory's proposed response to identified issues is sufficient to allow the audit to be completed and a final audit report issued. Thus, while the laboratory must implement improvements in its sole discretion, it is a shared responsibility of the auditor and the organization to ensure that an issue has been properly addressed. It is common for the auditors during the next audit or follow-up visit to review that agreed-upon changes have been enacted and are being properly maintained.

Because significant portions of the audit require the review of protocols or SOPs, however, laboratories can often issue document changes that have little effect on actual practice. In 2014, for example, the DNA Laboratory's external FBI QAS audit was performed by the National Forensic Science Technology Center (NFSTC). The NFSTC issued a finding that the Laboratory's document retention policy was not in keeping with QAS Standard 3.2, which requires policies for the documentation and retention of, among other things, corrective actions taken to address nonconformities in the Laboratory.[224] In response to the finding, the Technical Leader issued a "Change by Memo" to the Laboratory's document retention policy that explicitly required the documentation of corrective or preventive action reports for 100 years,[225] which was attached to the final audit approved by NFSTC.[226] Notwithstanding these changes, the ASCLD/LAB accreditation review in 2015 included a finding that "[l]aboratory management acknowledged the majority of complaints received were not in writing and were not recorded, investigated nor were corrective actions taken."[227] Thus, despite a modification to the Laboratory's SOPs that required documentation and retention of corrective actions in 2014, the Laboratory failed to document, investigate, or correct concerns expressed verbally by analysts. This should have sent a significant red flag up beyond APD Laboratory management and into APD Leadership, but it did not. The laboratory proposed a new policy for the resolution of complaints that "any complaint received will be evaluated and acted upon… To ensure the effectiveness of the change, complaints and their resolution will be monitored."[228] Despite the fact that the new policy as stated still did not require documentation of all complaints, ASCLD/LAB renews the laboratory's accreditation, and the Laboratory continued operating with its status quo.

[224] FBI QAS 3.2;
[225] Memo, J. Sailus to B. Gibbens Re: Change by Memo: DNA SOP Changes, Effective 1/8/15.
[226] See 2014 FBI QAS Audit.
[227] Final Assessment Report of the Austin Police Department Forensic Science Laboratory, ASCLD/LAB – International, September 3, 2015, at 11.
[228] Id.

Finally, the FBI QAS requires that external audits be conducted bi-annually, with internal audits being conducted by Laboratory personnel on the alternating years. The APD DNA Laboratory's internal FBI QAS audits were conducted by the Technical Leader in most years between 2005 and 2015, and the final internal audit was conducted by the Interim Technical Leader with assistance from the APD DNA Analyst who was also the administrator of the APD's use of the FBI's CODIS database. While there was nothing inappropriate these audits being conducted entirely by internal DNA Laboratory personnel, a better practice would involve the inclusion of one or more individuals from outside the DNA section, preferably from the QA group or another "hard science" forensic discipline (e.g., toxicology) who could provide additional input and oversight. It is possible – though speculative – to say that a QA resource might have identified issues in the APD DNA Laboratory that might have limited protocol deviations or contamination issues, for example.

Several members of the Austin Stakeholders Group pointed out that accreditation and audits, like any field, are affected by their customers, and that a customer – in this case, the APD DNA Laboratory – concerned about the quality of a certain area of their organization can always ask the accreditor or auditor to give extra attention to that area. It would, therefore, be unfair to place all the responsibility for conducting useful audits on ASCLD/LAB and the FBI QAS. But the idea that ASCLD/LAB accreditation or satisfaction of the FBI QAS is evidence that a DNA laboratory is a "high-quality" laboratory generating accurate and reliable scientific information is fundamentally flawed. The accrediting organizations follow their own standards and requirements carefully and consistently – they provide an inventory of rules, documentation, and practices that may or may not promote high-quality behavior. The role they play is important, but it should not be considered a true or complete assessment of issues in a laboratory. That distinction was not effectively or widely understood by APD leadership or the other participants in the criminal justice system in Austin, and it contributed to a community-wide false sense of security that the Laboratory's work was consistently high-quality.

APD's Decision to Remain with ASCLD/LAB "Legacy" vs. "International" Accreditation

Some of the issues regarding the QBST and other challenges in the APD DNA Laboratory might have been identified years sooner than they were but for a decision made by the leadership of the APD Forensic Science Services unit regarding ASCLD/LAB accreditation. This decision covered the accreditation of the entire APD forensic laboratory, and not simply the DNA Laboratory.

A discussion about accreditation for the DNA Laboratory would more accurately be described as accreditation bestowed upon the Biology section of the APD Forensic Science Services laboratory as a whole. The existing APD forensics laboratory had previously been accredited by ASCLD/LAB at the time the DNA Laboratory was created, and ASCLD/LAB then reviewed the DNA Laboratory (or Biology section) and provided accreditation for that new and additional section of the crime laboratory.

When the DNA Laboratory was instituted in 2005, the APD Forensic Science Services unit was accredited by ASCLD/LAB. The Forensic Science Services unit had chosen to be accredited under ASCLD/LAB's "Legacy" program. By 2010, when the Forensic Science Services unit's accreditation was up for renewal, ASCLD/LAB was phasing out the "Legacy" accreditation standard and forcing laboratories to seek accreditation under a new

"International" accreditation that adhered to the more rigorous requirements of standard 17025 of the International Organization for Standardization (ISO 17025). ISO 17025 sets forth general requirements for the competence of testing and calibration laboratories and is the standard for which most forensic laboratories around the world must hold accreditation in order to be deemed technically competent. Nonetheless, the APD laboratory chose to remain accredited under the Legacy Program.

While ASCLD/LAB was requiring laboratories to move to the International standards in 2010, its deadline for the shift was based on the date of application for renewal, not the date of completing the accreditation itself. Thus, when the APD laboratory applied for re-accreditation in 2009 – over a year in advance of its August 2010 accreditation expiration date – it was permitted to renew its accreditation under the Legacy Program, even though that renewal did not actually occur until 2010. This allowed the APD laboratory to continue working as a fully accredited laboratory for five additional years of accreditation under a lesser set of quality standards than the national norm. The Austin crime laboratory was one of the last, if not the last crime laboratory accredited by ASCLD/LAB to make the transition to the International program, ten years after it was made available. As a result, the APD crime laboratory was accredited between 2010 and 2015, but not under the most demanding standard, and the DNA Laboratory was deprived of an external "push" for improved quality in areas that led directly to issues identified in the TFSC Audit Report in 2015. Many aspects of the ISO 17025 standards, including increased rigor around root cause analysis and corrective actions, might have been useful in identifying and resolving issues identified in the TFSC Audit Report.

Section L: Audit and Accreditation Contributing Factors

L-1 **CONTRIBUTING FACTOR:** The auditing and review mechanism created a false impression of quality in the APD DNA Laboratory among APD leadership and the Austin criminal justice community.

L-2 **CONTRIBUTING FACTOR:** Reviews of the APD DNA Laboratory performed by accrediting bodies were ineffective in responding to documented contamination events.

L-3 **CONTRIBUTING FACTOR:** "Check-box" audits like the FBI QAS audit form are not designed to assess the utility or efficacy of protocols or processes, including remediation or corrective action protocols or the adequacy or thoroughness of validation studies.

L-4 **CONTRIBUTING FACTOR:** ASCLD/LAB auditors have limited time to review case files.

L-5 **CONTRIBUTING FACTOR:** Inadequate documentation of corrective actions limited the ability of auditors in 2015, and potentially other years, to review and identify substantive quality assurance problems and laboratory errors.

L-6 **CONTRIBUTING FACTOR:** Internal QAS audits were conducted by APD DNA Laboratory technical staff and did not include APD laboratory QA or other scientific personnel.

L-7 **CONTRIBUTING FACTOR:** The APD forensics laboratory, and therefore the APD DNA Laboratory remained on less stringent "Legacy" accreditation standards with ASCLD/LAB rather than upgrading to the most rigorous "International" standards in 2010, and was one of the last laboratories in the country to receive accreditation that complied with the ISO 17025 standards.

L-8 **CONTRIBUTING FACTOR:** The ASCLD/LAB policy for converting to International standards was based on the date of application, not the date of transfer. The policy permitted five extra years at "Legacy" accreditation level before requiring a laboratory to upgrade to the "International" level.

Section L: Recommendations

L-1 **RECOMMENDATION:** The TFSC should provide education throughout the state on what accreditation does and does not do, with a focus on educating non-scientific stakeholders.

L-2 **RECOMMENDATION:** All corrective actions submitted to TFSC should be shared and put in a public database – similar to the National Aviation Safety & Reporting System[229] – to allow jurisdictions throughout the state to benefit from the learnings of other laboratories.[230]

L-3 **RECOMMENDATION:** The DNA Laboratory should ensure that an external reviewer evaluates all technical and evidence protocols at set intervals not merely for their existence, but to ensure their fitness for purpose. Results of these reviews should be documented and made public.

L-4 **RECOMMENDATION:** The TFSC should engage with DNA Laboratory Management to ensure that quality systems are reviewed for their effectiveness, and not merely their existence, and supplement accreditation reviews that do not provide such an assessment.

L-5 **RECOMMENDATION:** The DNA Laboratory should create a protocol for conducting internal audits rather than depending on auditors to find issues. Possible areas of focus include:

- Going beyond yes/no existence questions to test effectiveness;
- Increasing the intensity of audit preparation to include utility and practical impact;
- Conducting surprise audit prep discussions with checklists; and
- Including analysts from other lab disciplines (e.g., toxicology) in internal audits.

L-6 **RECOMMENDATION:** SWGDAM and other forensic thought leaders should consider whether ISO 17011, Requirements for Accrediting Bodies, provides sufficient guidance to ensure that accreditation organizations across the country are serving their intended purpose.

L-7 **RECOMMENDATION:** The DNA Laboratory Technical Leader and QA manager must ensure that all deviations and corrective actions are documented and published online in ways that are sensitive to

[229] https://asrs.arc.nasa.gov/
[230] The TFSC is currently at work on a database that is expected to satisfy this recommendation.

confidentiality requirements. The DNA Laboratory should eliminate any ability to delete deviations or corrective actions from any or all relevant files, including case files.

L-8 **RECOMMENDATION:** DNA Laboratory staff conducting internal audits should be accompanied by QA personnel with familiarity with DNA technologies and methodologies and/or colleagues from other disciplines within the lab.

L-9 **RECOMMENDATION:** The DNA Laboratory should involve external advisors in accreditation decisions.

L-10 **RECOMMENDATION:** ANAB should provide a date certain by which all labs receiving its accreditation must convert to the most current accreditation standards.

L-11 **RECOMMENDATION:** The TFSC should ensure that the DNA laboratory, and all accredited DNA laboratories in the state follow applicable SWGDAM, OSAC, QAS, ISO and accreditation standards and/or guidelines, which may include TFSC modifications or guidance as appropriate. The TFSC should also provide clear guidance to laboratories with respect to expectations for timing of standard and guideline adoption depending upon the complexity and relative priority of the standard or guideline in question. As new versions of standards and guidelines are released through SDO or similar processes, the TFSC should similarly set expectations for adoption of new versions.

L-12 **RECOMMENDATION:** When accreditation standards for DNA laboratories change or quality assurance problems or lab errors are identified in the field requiring changes of common practices, ANAB and QAS auditors should conduct a full and complete new accreditation review rather than a grandfathered review. At a minimum, the review should include those areas where the standards or practices have changed.

L-13 **RECOMMENDATION:** DNA analysts should accurately testify about the limitations of accreditation.

Section M: Financial Support for the APD DNA Laboratory, 2010 – 2015

In a perfect world, the DNA analyses performed by the APD Laboratory would be error-free and delivered instantaneously at no cost. In the real world, however, the output of a DNA laboratory in terms of quality and quantity will always be limited by the funding available. While the TFSC Audit Report did not review issues of funding, it may be useful to the conversation of reconstituting a DNA laboratory in Austin to ask whether another contributing factor to the issues within the APD DNA Laboratory was insufficient funding for the DNA Laboratory.

None of the individuals we interviewed felt that the work of the DNA Laboratory was compromised by a lack of funding by the APD. To the contrary, each individual we spoke to at the APD, whether they worked within or

outside the laboratory, believed that the DNA Laboratory had adequate resources to conduct its work and generate DNA analyses within reasonable periods of time. Similarly, individuals we spoke with from downstream criminal justice organizations felt that the DNA analyses were received in time frames which enabled criminal justice cases to proceed at a reasonable pace.[231] Further, there are examples (such as the purchase of STRmix probabilistic genotyping software) of the APD's willingness to fund new technology at the request of a Technical Leader.

At the same time, it is worth asking whether the quality assurance program and the quality of the analysts' work would have been better within the Laboratory if more money had been allocated to it, or if that money had been spent differently. Two items suggest the answer to that question is "yes."

First, budget management appears to have been the primary factor in (a) not replacing an aging condenser in 2014 and (b) electing not to proceed with a "paper tracker" system that would have more rapidly identified the freezer outage when the condenser failed. These decisions contributed greatly to the 2016 freezer outage and the potential deterioration of thousands of biological samples. While the link between not replacing the compressor and the freezer outage is clear, it was not a material expense and was more likely a poor resource allocation decision by management at the time. When the condenser did fail, APD leadership immediately approved the purchase and installation of a new condenser,[232] suggesting that funds would quickly be made available for mission-critical assets.

The other example is more speculative but also more potentially troubling. In 2016, APD Leadership asked two experienced crime lab managers from other jurisdictions to come to Austin and review the APD Forensics Laboratory as a whole, and provide guidance based on the Major City Chiefs Forensic Science Committee Position Paper that would assist APD leadership in ensuring that the laboratory was operating properly. The report issued by the external laboratory directors did not address whether the APD DNA Laboratory had sufficient budget to conduct its work, and in any event the DNA Laboratory was not conducting casework at the time. However, the report did evaluate the number of cases that were handled by various sections within the APD crime laboratory (Figure 7 below)and project "Optimum Staffing Based on Requests" (Figure 8 below) using data gathered from a sampling of crime labs across the country by the University of West Virginia Foresight Project. Based on those figures, the APD DNA Analysts had been conducting 108 cases per year against a national average of 89, a +18% caseload per analyst. Similarly, based on national staffing levels the reviewers would have expected the APD DNA Laboratory to employ 13.2 analyst FTEs, and the DNA Laboratory's actual staffing level was only 6 FTEs.[233]

[231] It is the Court of Criminal Appeals' and federal courts' job to determine, on a case-by-case basis, whether records were disclosed in a timely manner.
[232] The new condenser was requested on March 23, 2016 and approved on March 25, 2016. Email from N. Wright to B. Gibbens re: PRF – Condenser Unit, March 25, 2016, 8:34.
[233] Major Cities Chiefs Association Forensic Science Committee: An Assessment of Forensic Services: Austin Police Department, p. 14.

Unit	Actual: Cases Completed 2015 (P)	Actual: FTE per unit (F)	Average: APD cases per examiner (C)	National: Cases per examiner (C)	Projected: Cases completed based on Nat'l avgs and APD FTE (P)
DNA	647	6	108	89	534

Figure 7. Average Cases per DNA Examiner, MCC Report

Unit	Actual: APD requests per unit 2015 ®	Staffing requirements based on Nat'l reporting (F=R/C)	Actual FTE per unit (F)	Difference
DNA	1178	13.2	6	7.2 needed

Figure 8. Expected vs. Actual Staffing in APD DNA Laboratory, MCC Report

Individuals Quattrone interviewed in and outside of the APD DNA Lab stated they did not believe a lack of Analysts contributed to challenges within the DNA Laboratory, and many of the issues described above – use of the inappropriate QBST and CPI, insufficient validation studies, misapprehension of the role of accreditation and audits, etc. – seem unlikely to have been improved by simply adding headcount. At the same time, one of the largest areas of friction between the TFSC and the APD Laboratory Technical Leader in 2014 and 2015 was the Technical Leader's reluctance to abandon the QBST even after the TFSC had made clear that it was potentially damaging casework. This reluctance may have been driven in part by the fact that the DNA Laboratory lacked qualified individuals who were willing to both conduct validation studies for the probabilistic genotyping that would have helped the Laboratory transition away from the QBST, and to conduct the necessary case reviews to evaluate the impact of the QBST on older cases without adding to the Laboratory's backlog of case requests. If the Laboratory had been staffed at twice its then-current size, as recommended by the MCC, perhaps such a shift would have been possible, as would a training regimen to retrain the DNA Analysts on new protocols and procedures to address the other concerns identified by the TFSC's Audit.

Whether increased headcount would have contributed to a less severe outcome for the APD DNA Laboratory is pure speculation. What is not speculation is that a high-quality laboratory is adequately funded and staffed to employ a sufficient number of well-trained, highly skilled DNA Analysts to handle the incoming requests for testing in an efficient manner while keeping up with new technologies, professional training, and other requirements of the laboratory. Thus, ensuring that the new DNA laboratory is sufficiently funded will be essential no matter who manages the laboratory.

Part III: Where Should We Go from Here? An Austin Stakeholder Group Discussion

The City of Austin's engagement of the Quattrone Center had two objectives. The first was to learn about various factors that contributed to the errors identified in the TFSC Audit Report; that work is detailed above. The second was to gather information from other laboratories across the country that would assist the ASG in making recommendations to officials in the City of Austin and Travis County about how to implement a high-quality DNA Laboratory that would meet the needs of the jurisdiction's criminal justice system.

Quattrone began its evaluation of this process by responding to the ASG's request that the Quattrone Center moderate a discussion about what constitutes a "high-quality" DNA laboratory. The Quattrone Center provided the ASG with a paper published by Dean Gialamas, former Crime Lab Director of the Orange County Sheriff's Department, former Chief of the Technical Services Division within the Los Angeles Sheriff's Department, and a member of the National Commission on Forensic Science. Mr. Gialamas' paper, "A Review and Commentary on the Model Forensic Science Laboratory,"[234] was itself a synthesis of a series of other papers from long-time forensic lab experts on what makes a forensic laboratory high quality.

Ultimately, the qualities that the Austin Stakeholder Group focused on as necessary for any laboratory handling DNA or other biological samples for use in the criminal justice process are:

1. Independence
2. Accuracy and Reliability
3. Transparency; and
4. Efficiency

While these factors are set forth in more detail in Mr. Gialamas' paper, we offer brief definitions here. *Independence* relates to the ability of the laboratory to conduct scientific work in an atmosphere that is not unnecessarily affected by other external factors. An independent lab has (among other things) the authority to determine who it will or will not hire. It has the authority to determine what samples it will test and which it will not, and the order of their testing, and is not controlled or limited by the police investigational role. The laboratory has sufficient funds to conduct this testing using current technology and is not beholden to police investigative units for its funding, and the laboratory is free to design its own policies and procedures in ways that promote scientific excellence, accuracy and precision. In short, the laboratory is an agent of and practitioner of science and not an agent of law enforcement.

While structural independence – that is, independence from and structural separation from police investigational divisions – is essential, most forensic laboratories across the country continue to be contained within police

[234] Gialamas, D. M. (2013). A Review and Commentary on the Model Forensic Science Laboratory. *Forensic Science Policy & Management: An International Journal*, *4*(1-2), 29-37, accessible online at https://www.tandfonline.com/doi/abs/10.1080/19409044.2013.870618.

departments. However, the fact that it is the most common model should not be taken to mean that it is necessarily the most effective model.[235]

The fact that a laboratory exists within a police department does not *per se* mean that the laboratory cannot be independent.[236] It does, however, mean that jurisdictions that opt for this model should take steps to ensure that independence is jealously guarded and preserved, and that the natural incentives and goals of law enforcement do not erode the independence of the laboratory.

There are examples of laboratories within police departments that appear to reflect these principles of structural and technical independence (e.g., the Office of Forensic Science within the Philadelphia Police Department, headed by a non-sworn Ph.D. who reports directly to the Police Commissioner with dotted-line reporting to the Office of the Mayor). There are also examples of fully structurally independent laboratories that have had issues (e.g., the District of Columbia's Department of Forensic Science, removed from the Metropolitan Police Department and established through legislation; its Director and General Counsel resigned upon the discovery of the same challenges with interpretations of DNA mixture samples that led to the TFSC audit of the APD DNA Laboratory).[237]

Separating labs from police departments is not a new idea. In 2009, the National Academy of Sciences (NAS) issued its *Strengthening Forensic Science in the United States: A Path Forward.* In that report, NAS recommended that crime laboratory operations be removed from the administrative control of law enforcement agencies.[238] In 2012, Houston created a Texas Local Government Corporation (LGC) known as the Houston Forensic Science Center (HFSC), and in 2014, the HFSC began operating as Houston's independent crime lab.[239] Around the same time, however, the Forensic Science Committee of the Major City Chiefs Association agreed in a position paper in 2012 in which it stated "[f]orensic science… can function properly within a law enforcement agency… [providing] background information that permits the forensic scientist to select the most probative evidence,

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[235] Nicole Casarez, Sandra Thompson, *Symposium: from the Crime Scene to the Courtroom: The Future of Forensic Science Report: Three Transformative Ideals to Build a Better Crime Lab*, 34 GA. ST. U.L. REV. 1007, 1007-1009 (2018).

[236] *See, e.g.,* Major Cities Chiefs Association Forensic Science Committee position papers, accepted September 28, 2012, p. 3, accessible at https://www.majorcitieschiefs.com/pdf/news/forensic_positionsfinalapproved_copy.pdf#:~:text=Major%20Cities%20Chiefs%20Association%20Forensic%20Science%20Committee%20Position,San%20Diego%2C%20CA%20Peter%20Newsham%20-%20Washington%2C%20DC ("Forensic Science Organizations can function properly within a law enforcement agency . . . the scientist, however, must remain free from undue influence in regards to the analytical conclusions and reporting of results."); National Research Council. (2009). *Strengthening forensic science in the United States: a path forward*. National Academies Press, at 24 ("[t]o improve the scientific bases of forensic science examinations and to maximize independence from *or autonomy within* the law enforcement community . . .)" (emphasis added)

[237] Whether a DNA laboratory exists within a police department or not, it is difficult to imagine that a forensic DNA laboratory in Austin would not count local law enforcement as its main (and potentially only) provider of biological samples. Such leverage can have positive or negative influence on the organization and its perceived independence.

[238] Committee on Identifying the Needs of the Forensic Sciences Community, National Research Council. "Strengthening Forensic Science in the United States: A Path Forward," 2009, Recommendation 4, p. 24 ("advocated for "removing all public forensic laboratories and facilities from the administrative control of law enforcement agencies or prosecutors' offices" to "improve the scientific bases of forensic science… and to maximize independence from or autonomy within the law enforcement community") (emphasis added).

[239] Casarez and Thompson, *supra* n. 21, at 1011-1012. An important distinction, however, is that the HFSC was created by removing the entire Houston Police Department forensics department from HPD, and not just its DNA laboratory. Operating the DNA laboratory as its own LGC separate from the rest of the existing APD Forensic Sciences Services unit would require additional "back-office" and operational support (e.g., payroll, human resources, health benefits, etc.) that was previously provided under the APD umbrella.

prioritize necessary analyses, and formulate a working hypothesis. The scientist, however, must remain free from undue influence in… conclusions and reporting of results."[240]

Accuracy and Reliability are straightforward; when the laboratory conducts scientific procedures, those procedures are done correctly, with appropriate experimental support, and yield accurate and defensible results. Moreover, the procedures are followed every time and yield predictable and repeatable results as well as accurate results. In theory, the laboratory's quality control, quality assurance, and quality management roles, supported by periodic laboratory reviews (e.g., audits) and personnel reviews (e.g., certifications, trainings, etc.), among other things, will support these goals.

Transparency is essential to provide those within and outside the laboratory with the opportunity to evaluate the laboratory and to understand what is truly occurring within the laboratory. A transparent laboratory will, for example, publish its policies, procedures and protocols so that outsiders can evaluate them and compare them with other laboratories. It will publish information about its output – what and how many tests are being conducted, what is the turnaround time from the receipt of evidence and request for a test to the time the report is provided, etc. The laboratory might also publish deviations from protocols, contamination or other errors that occur from time to time, and corrective actions taken so that evaluators of the laboratory can see the efforts made towards continual quality improvement. It would publish audit and accreditation reports as well as analysts' performance on skills evaluations, etc. to confirm that personnel development and skills are suitable for the roles. Many of these policies are exemplified by the current Houston Forensic Science Center (HFSC), which, as noted above, publishes virtually all the above information on-line for the public. As a Local Government Corporation (LGC), the HFSC has certain obligations to provide information to the public under Texas Law; these obligations ensure the HFSC will operate with transparency and that transparency has been a large part of restoring the trust of the citizens of Houston in the HFSC's performance.

Efficiency means that the laboratory can conduct its work and produce accurate and reliable scientific results and laboratory reports that can be used by others in the criminal justice system in a timely and cost-effective fashion. The laboratory's work should not slow down an already clogged criminal justice system; at the same time, analysts should be fully engaged and not idly awaiting the next sample to arrive. The laboratory should have the bandwidth to conduct all necessary tests but the ability to discern what evidence should be tested and what tests should be performed, so that the minimum amount of community resources is used to achieve these goals.

The DNA Laboratory within the APD Forensic Science Services unit lacked these essential characteristics in many ways, and the recommendations herein are designed to provide additional independence, accuracy, reliability, transparency, and efficiency to the next DNA laboratory in Austin.

Given the breadth, depth and duration of errors within the APD DNA Laboratory, an important (and divisive) question for the Austin Stakeholders Group was whether a reconstituted DNA Laboratory (euphemistically described as "DNA Lab 2.0") could exist within the APD, even with the recommendations suggested in this

[240] Major City Chiefs Association Forensic Science Committee Position Papers, accepted September 28, 2012, accessed at https://www.majorcitieschiefs.com/pdf/news/forensic_positionsfinalapproved_copy.pdf, p. 3.

document, or whether such a laboratory could only be trusted to provide high-quality work through a structure that was completely distinct from the APD. It cannot be overstated that the lack of quality in the DNA Laboratory's operations has created deep mistrust in many segments of the community regarding the APD's ability to avoid the same pitfalls in the future. At the same time, as noted elsewhere in this report, the APD has responded to the suspension of the DNA Laboratory by instituting a number of important structural improvements designed to make the crime laboratory as a whole more independent and transparent, and to respond to these concerns, including:

- Hiring a Ph.D. with both appropriate scientific expertise and appropriate management expertise to oversee the Forensic Science Services unit;
- Raising the seniority of the scientific leader of forensic services to the level of senior management in the Department;
- Ensuring that the laboratory's chain of command is separate from the investigational departments within APD;
- Hiring new and more experienced quality assurance personnel;
- Improving the laboratory's transparency to the criminal justice system and to the community; and
- Creating a nascent group of scientific advisors to interact with the laboratory on important structural decisions, including evolving scientific, environmental, and structural developments in forensic science across the country and around the world that might impact the ability of the laboratory to provide high-quality forensic scientific services.

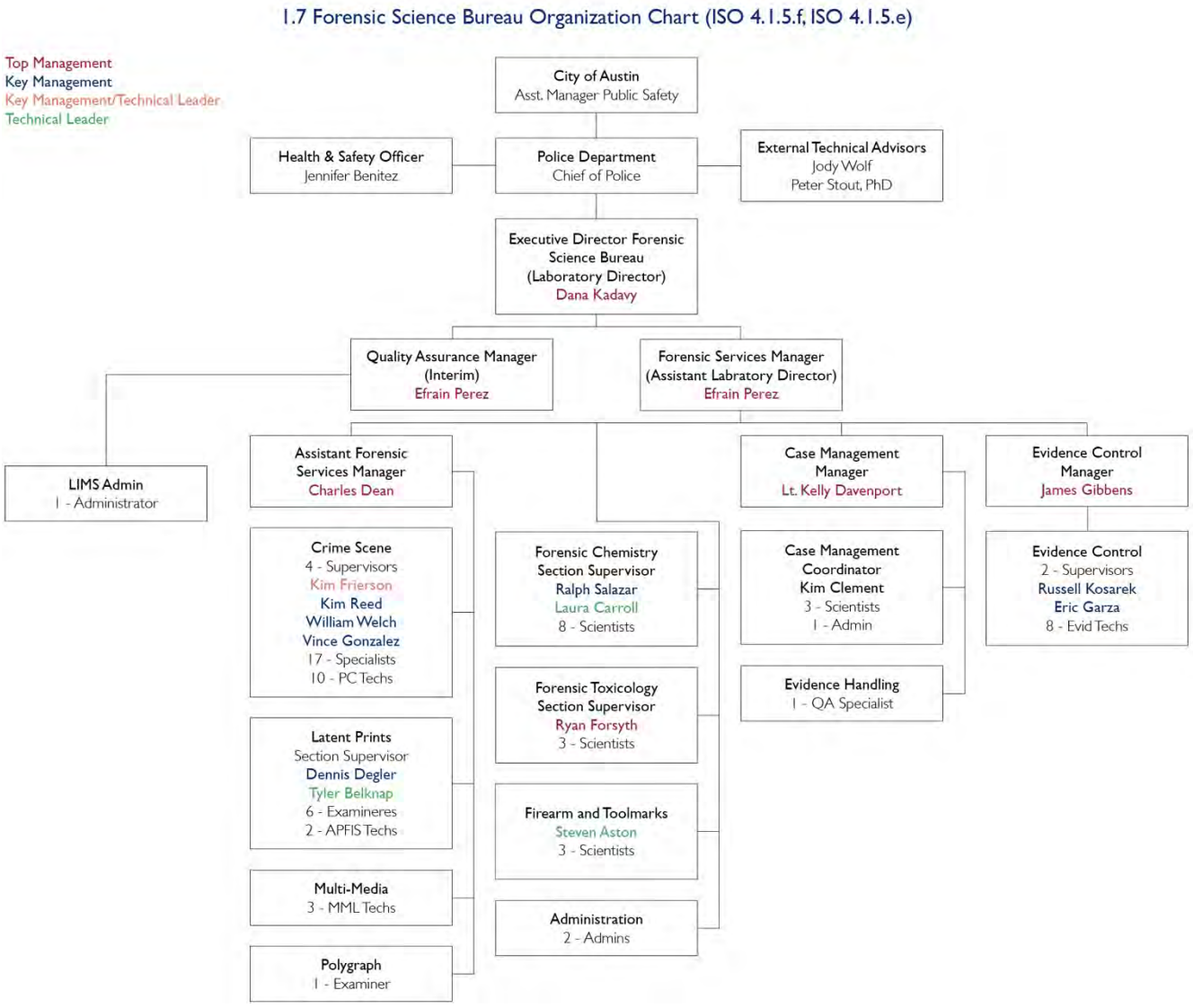


Figure 9: Current APD Forensic Science Bureau Organizational Chart

These changes have occurred while the DNA Laboratory has not been actively engaged in casework, and so their specific impact on the DNA Laboratory cannot be assessed. They are, however, in line with the structure of other forensic DNA laboratories across the country, whether those laboratories are within or structurally separate from police departments.

Structural Options for DNA Lab 2.0

Introduction

After participating in a group discussion on what qualities are inherent in a "high-quality" DNA laboratory,[241] the Austin Stakeholder Group turned its focus to evaluating the different options for providing DNA lab capability for Austin. In December 2019 the ASG met to discuss "DNA Lab 2.0," a meeting during which present ASG members were asked to do the following things:[242]

- Identify all possible lab options, then select a smaller number of likely options for further evaluation.
- Discuss benefits and challenges for the selected lab options.
- Discuss what would make the selected options successful.
- Develop cost estimates for the selected options.

The following sections provide a summary of that meeting.

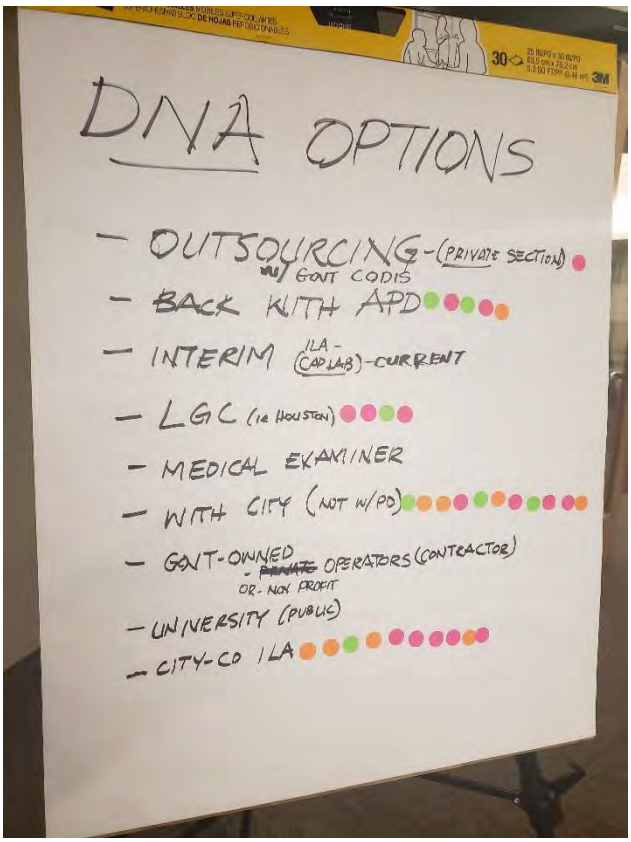
Selecting DNA lab options to evaluate

The Austin Stakeholders Group reviewed a number of different examples of DNA laboratories around the country, including Philadelphia (laboratory within the police department but with clear structural designs to convey independence); Washington, D.C. (all forensic services conducted by an outside organization established by statute); Houston (a Texas Local Government Corporation (LGC)); and New York City (DNA laboratory included within the Office of the Medical Examiner).

[241] Representatives of the Quattrone Center were present for portions of this conversation, but the discussion was an Austin Stakeholder Group discussion moderated by representatives of the City of Austin.
[242] Representatives from Quattrone attended portions of this meeting by telephone, and were available to respond to questions from the ASG.

The Workgroup brainstormed the following DNA laboratory options:

- Outsource laboratory testing and analyses
- Reconstitute the Lab within APD
- Continue the current arrangement, with the Lab run by the Department of Public Safety and outsource providers
- Form a Local Government Corporation similar to the Houston Forensic Science Center
- Reconstitute the Lab within the Travis County Medical Examiner Office
- Create a new Lab run by the City of Austin independent of APD
- Engage a government-owned operator (contractor or nonprofit)
- Contract with a University
- Enter into a City-County interlocal agreement (ILA) for laboratory services



Based on the discussion, the following lab options were identified by the Austin Stakeholders Group as the options that were most supported by ASG members present during the meeting:

- Reconstitute the Lab within APD
- Create a new Lab run by the City of Austin independent of APD
- Form a Local Government Corporation similar to the Houston Forensic Science Center
- Enter into a City-County interlocal agreement (ILA) for the Lab's services

The options that did not advance for consideration and the reasons why are described in Appendix G below.

DNA Lab Options – Benefits and Challenges

When evaluating the selected lab options, the Workgroup assumed that any future lab would incorporate the recommendations set forth in this Report. Underlying the recommendations is a framework of ideals that support a "utopian crime lab," including independence, accuracy & reliability, transparency and efficiency. Regardless of how a DNA lab is formed, meeting as many of these elements increases the probability of an effective and efficient lab. See earlier in this report for a fuller discussion of this framework.

Reconstitute the DNA Lab within APD

The following tables summarize the benefits/challenges of this option that were brainstormed during the meeting by participating Austin Stakeholder Group members.

Benefits
• Time to implement this option would be one of the quickest along with the option of a DNA lab with the City (not in APD). Estimated time to full operational capability: 2.5 years. • APD's Forensic Science Bureau (FSB) is positioned to assume responsibility for a DNA lab, employing many of the recommendations embodied in the "utopian crime lab" framework (e.g., the Forensic Science Bureau Executive Director is now a direct report to the Police Chief). • Establishing a DNA lab in APD allows leveraging of necessary administrative/support resources existing within the City (e.g., Human Resources, IT support, Finance/Accounting/Payroll, evidence handling, etc.). • Having the lab in APD would minimize delay in transmitting analysis results to investigators and facilitate close coordination of testing samples to support high priority cases

Challenges
• Regaining Public trust and stakeholder acceptance would be very difficult to achieve. There are stakeholders that believe independence, transparency, accuracy and reliability, and accountability can only be achieved with a lab that is independent of local government. • Concern that funding to properly staff and resource a DNA lab would compete with other APD budget priorities, particularly given the property tax revenue cap. • Concern that proximity of APD investigators would introduce cognitive bias in DNA lab analysts' work, in violation of the "utopian crime lab" sought by the group.

For this option to be successful, a significant outreach effort to explain to stakeholders how this option would be different than the condition under the prior Lab that led to laboratory errors and problems with the quality assurance program would be required to address negative perceptions. In addition to incorporating the recommendations in this report, establishing a scientific advisory board and a justice stakeholder advisory board; establishing case managers who serve to insulate analysts from the law enforcement investigators; and implementing recommended reporting processes would be crucial to the acceptance of this option.

Create a new Lab run by the City of Austin independent of APD

The following tables summarize the benefits/challenges of this option that were brainstormed by participating Austin Stakeholder Group members.

Benefits
• In this option, the Executive Director of the Forensic Science Bureau would report to the Assistant City Manager designated by the City Manager for matters related to the DNA lab. This would provide management independence from the law enforcement function of the City. • Time to implement this option would be one of the quickest as the lab would physically be established in APD's lab facility and be able to leverage administrative/support resources of the City. Estimated time to full operational capability: 2.5 years.

Benefits
• Having the lab in the City would minimize delay in transmitting analysis results to investigators and facilitate close coordination of testing samples to support high priority cases. • Would likely have increased public perception of transparency and accountability.

Challenges
• Regaining Public trust and stakeholder may still be difficult to achieve. There are stakeholders that feel strongly that independence, transparency, accuracy and reliability can only be achieved with a lab that is independent of local government. • Concern that funding to properly staff and resource a DNA lab would compete with other citywide budget priorities, particularly given the property tax revenue cap. • Concern that proximity of APD investigators would introduce cognitive bias in DNA lab analysts' work.

For this option to be successful, a thoughtful outreach effort to inform stakeholders how this lab option is independent from APD and the City's commitment to making the DNA lab a priority would still be required to address negative perceptions and gain stakeholder buy-in. As before, incorporating the Austin Stakeholder Group's recommended corrective actions and putting in place "utopian crime lab" elements such as the scientific and justice stakeholder advisory boards will be critical to the acceptance of this option.

Form a Local Government Corporation (LGC) Similar to the Houston Forensic Science Center

The following tables summarize the benefits/challenges of this option that were brainstormed by participating Austin Stakeholder Group members.

Benefits
• An LGC represents the greatest level of independence from the law enforcement function of the selected options. The Executive Director of the LGC would report to a Board of Directors appointed by the governmental agencies that created the LGC. • Would be able to develop its own budget recommendation, independent of competing budget requirements. • Would be able to take advantage of private sector personnel practices (would still be required to follow applicable procurement statutes relevant to the creating governmental agencies). • Would be able to perform fund raising activities. • Would be viewed as giving balanced voice to all stakeholders. • Would be able to provide the Executive Director with broader guidance than an individual reporting senior executive.

Challenges
• Time to implement this option would be the longest of the selected options. Estimated time to full operational capability: 5 years. • Would require significant legislative action from the partner governmental agencies to create the LGC.

Challenges
• Would require State legislative action to provide for the LGC to perform DNA report uploads to the Combined DNA Index System (CODIS). (Note: This is not expected to be a difficult challenge to surmount; similar action was conducted to enable the Houston Forensic Science Center's DNA laboratory to upload to CODIS). • Would require hiring almost all new staff. It is likely that not all DNA analysts working in the DPS Capital Area Lab currently supporting Austin will want to work for the LGC. • In addition to lab staff, the LGC would have to hire or otherwise pay for support staff (e.g., HR, Finance/Accounting/Payroll, IT, legal counsel, etc.). • Would likely require acquisition of a new facility. • The LGC budget would require annual approval of the governmental agencies that created it.

For this option to be successful, the partnering governmental agencies must be committed to the anticipated length of time, effort and cost to establish an LGC that will perform DNA lab functions. Also critical to the success of this option is the appointment of a well-rounded Board of Directors who will hire an Executive Director; together, they will oversee the physical creation of the DNA lab.

Enter into a City/County Interlocal Agreement (ILA) for the DNA Lab's services

This option provides a means by which the County may enter into an ILA with the City for the provision of services. Examples of existing ILAs between the City and County include Emergency Medical Services; Animal Services; and the Combined Transportation, Emergency and Communication Center. Note that a City/County ILA for the provision of DNA lab services does not have a bearing on whether the DNA lab reports to APD or the City Manager's Office.

The following tables summarize the benefits/challenges of this option that were brainstormed by participating Austin Stakeholder Group members.

Benefits
• Can provide DNA lab services to the County and municipalities within the County; potential for faster processing of cases for the Sheriff's Office and local police departments. • Cost would be allocated as determined by cost of service study. • Potential for implementing service level agreements. • Would facilitate greater transparency and accountability between the City and County.

Challenges
• Time to implement this option would be dependent on whether an ILA could be negotiated and approved by the City and County in parallel with – rather than after – establishing full operational capability within the City. Estimated time to full operational capability with an ILA: 3 years. • Concern that turnaround time for processing cases may be impacted if services are not properly resourced, particularly given the property tax revenue cap.

Challenges
• Concern that responding to emergent needs may require amendment to the ILA. • Budget for provided services requires annual approval by ILA governing agency partners. • Does not address concerns related to independence and stakeholder input as completely as an LGC option.

For this option to be successful, the same elements described for the DNA lab within APD or the City (not in APD) would need to be addressed. In addition, well defined services and corresponding service level agreements as well as reporting requirements will facilitate increased transparency and accountability between the City and County.

Conclusion

The errors that occurred within the APD DNA Laboratory and problems with the quality assurance program that were uncovered by the Texas Forensic Science Commission have deeply shaken the confidence of the Austin Stakeholders Group and the citizens of Austin. This review was undertaken in order to better understand how such departures from generally accepted practices occurred, and how they persisted undetected for such lengths of time. Our hope is that the discussion of contributing factors and the recommendations will help in creating a new DNA laboratory that will operate in ways that will generate accurate and reliable scientific results.

APPENDICES

Appendix A. Table of Contributing Factors and Recommendations

Contributing Factors and Environmental Conditions Leading to the Closure of the APD DNA Laboratory and Recommendations for Reform	
Contributing Factors / Environmental Conditions	**Recommendations**
Section A: Overarching Structural/Management Challenges Within APD	
A-1 <u>CONTRIBUTING FACTOR</u>: The Austin Police Department (APD) did not provide effective management and scientific oversight to the DNA Laboratory Supervisor and Technical Leader. A-2 <u>CONTRIBUTING FACTOR</u>: The APD Forensic Science Services unit (including the Forensic Science Services Manager and the Quality Assurance and Safety Manager) and the APD Field Support Services division leader lacked the scientific and technical expertise necessary to effectively manage the APD DNA Laboratory. A-3 <u>CONTRIBUTING FACTOR</u>: The APD Forensic Science Services Manager was not at a "policy-maker" level within APD, limiting the visibility of issues within the DNA Laboratory to APD leadership. A-4 <u>CONTRIBUTING FACTOR</u>: The APD Forensic Science Services Quality Assurance and Safety Manager had no expertise in DNA analysis and failed to apply his training in quality assurance to the DNA Laboratory. A-5 <u>CONTRIBUTING FACTOR</u>: The APD DNA Laboratory Technical Leader implemented methods that lacked proper validation, were not fit for purpose, and lacked the benefit of lessons learned from other laboratories around the country.	A-1 <u>RECOMMENDATION:</u> Any DNA laboratory established within the City of Austin should have a structure of independence, scientific excellence, transparency, and operational excellence and efficiency. In particular, the management structure of the DNA laboratory should ensure that: • The Technical Leader meets all administrative requirements necessary to satisfy the requirements of the Federal Bureau of Investigation Quality Assurance Standards for DNA Laboratories (FBI QAS) and has the substantive leadership, education, training and technical skills to thrive in the role. • The Technical Leader reports, either directly or indirectly, to an individual with a Ph.D. in a relevant scientific field who has prior management experience in a forensic lab; • If the DNA laboratory is a part of a larger organization and/or forensics laboratory, the manager with overall responsibility for the DNA laboratory (and, if the DNA laboratory is included within a larger forensics laboratory, the forensics laboratory as a whole) should be at the level of general management within the larger organization and the laboratory should have a direct voice in top-line budget requests on a par with other parts of the organization; • If the DNA laboratory is a part of a larger organization and/or forensics laboratory, the manager with overall responsibility for the DNA laboratory (and, if the DNA laboratory is included within a larger forensics laboratory, the forensics laboratory as a whole) should be at a level of seniority that ensures that the DNA laboratory's operations are separate and independent from influences within the criminal justice system; and A-2 <u>RECOMMENDATION:</u> The DNA laboratory should have a Scientific Advisory Panel (SAP) and a Justice Stakeholder Advisory Panel (JSAP), made up of external advisors who can: • Provide scientific input and expertise to ensure continuous high-quality laboratory practices and to review and advise on policies, procedures and processes over time; • Improve the transparency and awareness of the other stakeholders involved in utilizing the DNA

	laboratory and its output (e.g., APD, the Travis County District Attorney's Office, the criminal defense bar, the courts, and the citizens of Austin); • Provide ongoing input and information about the downstream requirements of DNA analysis that allow scientific information to be used appropriately and effectively in criminal investigations and in the adjudication of criminal charges in court; and • Efficiently review prior to implementation and periodically reassess the adoption of technologies and methodologies in use at the DNA Laboratory. • The SAP should include scientists from outside Texas and should include scientists from disciplines outside the realm of forensic science, including but not limited to at least one statistician with exposure to forensic science (e.g., OSAC Statisticians Task Group or a CSAFE consortium institution). A-3 **RECOMMENDATION:** The DNA Laboratory Technical Leader and laboratory manager should actively and regularly engage with a capable and trained Quality Assurance and Safety Manager whose role should exist outside of the Technical Leader's reporting line. The Quality Assurance and Safety Manager should have specific training in the discipline of laboratory quality management as well as a working understanding of DNA techniques and relevant issues.
Section B: Implementation of the Quantification-Based Stochastic Threshold (QBST)	
B-1 **CONTRIBUTING FACTOR:** The APD Technical Leader implemented a Quantification-Based Stochastic Threshold (QBST) that was not generally accepted in the scientific community. B-2 **CONTRIBUTING FACTOR:** Like other laboratories across the country, the DNA Laboratory adopted an incorrect method of utilizing the Combined Probability of Inclusion (CPI) that used a known profile to decide which loci would be used for statistical calculations, creating a risk of bias in the analysis. B-3 **CONTRIBUTING FACTOR:** While issues with mixture DNA analysis and interpretation and inconsistent interpretative methods among forensic laboratories were prevalent during the time period in question, the APD DNA Lab continued to analyze mixtures using the QBST, a methodology that was increasingly scientifically indefensible. B-4 **CONTRIBUTING FACTOR:** The DNA Laboratory's 2013 adoption of Fusion amplification kits increased the	B-1 **RECOMMENDATION:** The DNA Laboratory should follow current Organization of Scientific Advisory Committee (OSAC) Standards for DNA laboratories as such standards may be enhanced by the TFSC, including (for example and without limitation) ANSI/ASB Standard 20 and Standard 40 regarding validation for the interpretation of DNA mixtures and interpretation and comparison protocol development. B-2 **RECOMMENDATION:** The SAP should advise the DNA Laboratory Manager and Technical Leader on when to update lab protocols, methodologies or equipment. The DNA Laboratory should provide the SAP with periodic updates for the first two years after it implements a new technology or methodology to minimize unintended negative consequences. B-3 **RECOMMENDATION:** The DNA Laboratory should designate a Continuing Forensic Education Coordinator who will be responsible for the internal

potential risk of unidentified stochastic effects in DNA analysis. The implementation chosen by the Technical Leader was within manufacturer's permitted range at the time, but subsequent broader deployment in other labs demonstrated that fewer stochastic effects were seen with a 28-cycle process.

B-5 CONTRIBUTING FACTOR: The APD DNA Laboratory had no apparent process for the periodic review of scientific methodologies to ensure that the Laboratory remained in line with evolving scientific knowledge. The APD DNA Laboratory's Quality Assurance Program failed to evaluate and address the problems with the use of QBST in conjunction with the 30-cycle implementation of Fusion amplification kits.

B-6 CONTRIBUTING FACTOR: Once the issues with the QBST were identified by the TFSC, the APD DNA Laboratory's Technical Leader resisted the TFSC's requirement that the Laboratory stop using QBST.

B-7 CONTRIBUTING FACTOR: The 2014 Technical Lead improperly relied upon the 2010 SWGDAM Guidelines on interpretation of mixtures, which were:

a. Vaguely worded; and
b. Intended primarily for single-source and 2-person mixtures of high quality, and not for DNA profiles generated from small amounts of DNA.

B-8 CONTRIBUTING FACTOR: Compliance with the 2010 SWGDAM Guidelines on interpretation of mixtures, relied upon by the 2014 Technical Leader to defend the QBST, was not required to satisfy ASCLD/LAB accreditation requirements or the FBI QAS. Thus, neither ASCLD/LAB accreditors nor FBI QAS auditors were required to review the QBST methodology to evaluate whether it complied with the SWGDAM Guidelines.

B-9 CONTRIBUTING FACTOR: The proposed path forward by the DNA Laboratory Technical Lead was scientifically viable but did not address the risk of errors in past or then-current casework caused by the implementation of the QBST.

B-10 CONTRIBUTING FACTOR: The extended sick leave of the Technical Leader, who was directing the validation studies on probabilistic genotyping, slowed the APD DNA Laboratory's transition away from the QBST.

B-11 CONTRIBUTING FACTOR: Neither the Interim Technical Leader nor any other Analyst in the DNA Laboratory possessed the technical skill to continue the validation studies on probabilistic genotyping in the absence of the Technical Leader.

dissemination of emerging scientific knowledge, the professional development of lab employees, and should foster relationships with leaders in the field by regularly attending relevant scientific meetings and conferences.

B-4 RECOMMENDATION: The DNA Laboratory should implement a "high priority" acceleration capability for concerns that could impact current or past cases.

B-12 CONTRIBUTING FACTOR: APD Laboratory management did not provide the Interim Technical Leader with additional support to complete the validation studies on probabilistic genotyping.	
Section C: Inadequate or Insufficient Validation Studies for the QBST	
C-1 CONTRIBUTING FACTOR: The DNA Laboratory Technical Leader conducted validation studies to establish a stochastic threshold that were later determined to be inadequate for the types of mixture-DNA analysis that the APD DNA Laboratory performed. C-2 CONTRIBUTING FACTOR: APD Laboratory management did not review validation studies, relying on external audits as evidence of the utility of laboratory policies and procedures, despite the fact that such audits did not review the robustness, accuracy, or completeness of the validation studies. C-3 CONTRIBUTING FACTOR: ASCLD/LAB and FBI QAS external audits marked validation studies for the QBST as "evaluated and approved" although the auditors did not appear to review the robustness, accuracy or completeness of the validation studies. C-4 CONTRIBUTING FACTOR: Once they have been reviewed, validation studies receive "carry-over" approval and are not required to be reviewed in subsequent audits or re-approved externally.	C-1 RECOMMENDATION: New policies and procedures should be implemented for the DNA Laboratory that ensure that validation studies are robust and suitable for their intended purpose. At a minimum, the DNA laboratory's policies and procedures for forensic DNA testing validation and data interpretation should adhere to the current (2020) FBI QAS requirements and any future updates. Prior to implementation of validation policies or procedures in the DNA laboratory, the SAP and laboratory leadership should ensure that the policies conform to ISO 17025; ANSI/ASB Standard 20 and 40 (added to the OSAC registry), forthcoming ANSI/ASB Standards including 18, 38, 41 and 77 and Best Practice Recommendation 114; and current and future publications from SWGDAM on validation, testing procedures, interpretation and training. To the extent any national standard, guideline or recommendation is revised, enhanced or clarified by the TFSC, the laboratory should follow TFSC guidance. C-2 RECOMMENDATION: The SAP should review and assess DNA Laboratory validation studies and proposals for material technical and methodological operational changes prior to implementation and at least every two years thereafter. C-3 RECOMMENDATION: The DNA Laboratory should ensure that completed validation studies are publicly available for review and comment. C-4 RECOMMENDATION: ANAB and FBI QAS auditors should receive formal training on what constitutes inadequate validation studies, and/or clarify in their audit reports that validation studies are being evaluated for their fitness for their intended purpose. C-5 RECOMMENDATION: The DNA laboratory should engage a statistician as well as topic-specific experts, either as consultants or in a full-time capacity, to ensure that validation studies are sufficiently robust and broad to support accurate testing in every anticipated activity of the DNA laboratory. C-6 RECOMMENDATION: The TFSC should establish a process for reviewing and approving certain critically important and/or "novel" validation studies in DNA labs in Texas, including conducting a "gap analysis"

	with respect to how DNA method validations are vetted under existing systems of oversight. The TFSC should consider a process for filling any gaps in validation review to the extent resources permit.
Section D: Insufficient Succession Planning	
D-1 <u>CONTRIBUTING FACTOR</u>: In late 2015, the APD DNA Laboratory Technical Leader went out on an extended sick leave and ultimately passed away. c. The Technical Leader's extended sick leave limited APD's ability to hire a suitable Technical Leader for the DNA Laboratory; and d. APD Laboratory management performed inadequate succession planning in the leadership of the DNA Laboratory. D-2 <u>CONTRIBUTING FACTOR</u>: The APD DNA Analyst put in the role of Interim Technical Leader lacked the skills and knowledge necessary to be an effective Technical Leader, and no other APD DNA Analyst met the QAS requirements to be a Technical Leader. D-3 <u>CONTRIBUTING FACTOR</u>: The FBI QAS requirement that the Technical Leader possess a Masters' degree limited the ability of the APD DNA Laboratory to appoint a suitable Interim Technical Leader. It is unlikely that the individual chosen to be the Interim Technical Leader would otherwise have been promoted to the Interim Technical Leader role, as the individual met the degree requirements but lacked the relevant experience or training necessary to thrive in the role.	D-1 <u>RECOMMENDATION</u>: DNA Laboratory SOPs related to Organization and Management (QAS 4.1.6) and Personnel (QAS 5.2.4.1.1) should include language that addresses the possibility of extended leaves of absence of a Technical Leader. D-2 <u>RECOMMENDATION</u>: DNA Laboratory management should have a robust written and implemented succession planning process, ensuring the lab's capacity to function without a loss of quality upon the unexpected incapacitation of the Technical Leader or other critical personnel. D-3 <u>RECOMMENDATION</u>: DNA Laboratory management should have a robust written and implemented professional development program for analysts, providing the ability for qualified analysts to progress in responsibility and capability. D-4 <u>RECOMMENDATION</u>: The DNA Laboratory should have qualified and competent DNA analysts on staff who can fulfill the role of interim technical leader when necessary.
Section E: Incomplete Review of Quality Complaints in 2010	
E-1 <u>CONTRIBUTING FACTOR</u>: The 2010 employee complaint including personnel and quality concerns was reviewed by APD lab management and APD Human Resources as a non-scientific HR complaint, and not as a complaint regarding quality of scientific work in the DNA Laboratory. E-2 <u>CONTRIBUTING FACTOR</u>: The APD had no scientific capability within APD but outside the DNA Laboratory capable of independently evaluating the quality concerns raised by an employee complaint in 2010.	E-1 <u>RECOMMENDATION</u>: The DNA Laboratory should implement and follow the Texas Forensic Science Commission (TFSC) Code of Professional Responsibility for Forensic Management, including but not limited to its requirements for reporting concerns with quality, including scientific and nonscientific concerns, that is compliant with ISO 17025. The SAP and JSAP should also participate in reviewing and approving those protocols.
Section F: Contamination Events in Casework	
F-1 <u>CONTRIBUTING FACTOR</u>: APD DNA Laboratory contamination events were generally not communicated outside the DNA Laboratory, whether	F-1 <u>RECOMMENDATION</u>: The DNA laboratory should publish its contamination events online. The DNA laboratory should:

to APD laboratory management or quality assurance management, or to external parties.

F-2 **CONTRIBUTING FACTOR:** The APD and the DA's Office had no notification system in place for contamination logs or incident reports to be sent to the DA's Office.

F-3 **CONTRIBUTING FACTOR:** APD Forensic Science management did not ensure that the DNA Laboratory's contamination log was provided to APD leadership or external stakeholders.

F-4 **CONTRIBUTING FACTOR:** APD Forensic Science management did not ensure that the DNA Laboratory's contamination log was provided to the APD Forensic Science Quality Assurance and Safety Manager.

F-5 **CONTRIBUTING FACTOR:** The APD Forensic Science Quality and Safety Manager was not involved in the documentation or resolution of contamination issues within the DNA Laboratory.

F-6 **CONTRIBUTING FACTOR:** The leadership of the APD DNA Laboratory conducted ineffective corrective actions when contamination events were discovered.

- Publish each contamination event within 30 days of its discovery by the laboratory; and
- Publish related contamination event quality assurance documentation within 30 days of any update throughout the investigative/corrective action period until remediation is completed.
- Publish each corrective action on the Laboratory's web site in an appropriate fashion

F-2 **RECOMMENDATION:** The DNA laboratory should evaluate the effectiveness of any implemented corrective action within 12 months after the corrective action is implemented, and more frequently if appropriate.

F-3 **RECOMMENDATION:** The DNA laboratory's QA division should be actively involved in the design, management, and confirmed completion of each corrective action.

F-4 **RECOMMENDATION:** The DNA laboratory must promptly notify the Quality Assurance Manager, the Case Manager, the forensics laboratory leader, the Scientific Advisory Panel (SAP), and the Justice Stakeholder Advisory Panel (JSAP) of contamination events and remedial actions.

F-5 **RECOMMENDATION:** The SAP and/or JSAP should collaborate with the DNA laboratory to establish a process for the periodic review of contamination events and remedial actions to identify quality issues that might be identified through trend analysis as opposed to individual case review.

F-6 **RECOMMENDATION:** The DNA Laboratory must notify the District Attorney's Office and the Court of contamination events and corrective actions that might affect laboratory reports issued in criminal cases. The DNA Laboratory must also ensure that such information is included in the relevant case file and made available to all attorneys of record in a timely manner and pursuant to the disclosure policy described in Recommendation K-10 below.

F-7 **RECOMMENDATION:** The DNA Laboratory should consider implementing an Occurrence Reporting System (e.g., SafetyNet), which allows for regular reviews (e.g., monthly) of contamination events, led by QA, to identify both individual issues and trends within the DNA Laboratory.

F-8 **RECOMMENDATION:** QA for the DNA Laboratory should be actively engaged in managing and remediating DNA Laboratory contamination issues, protocol deviation or other issues. QA should ensure that proper notification is provided to downstream criminal justice stakeholders and the

	public and should be involved with case-specific quality issues and periodic contamination log review. F-9 RECOMMENDATION: The QA Manager should have the authority to recommend to the Laboratory Manager that any analyst be temporarily removed from casework pending a more thorough review of any contamination event. The Lab should create a protocol for escalating disagreements between Technical Leader and QA to the Lab Manager and/or SAP. F-10 RECOMMENDATION: The DNA Laboratory should engage QA in the design of effective corrective actions that focus on generating environmental, not personnel reforms where possible. F-11 RECOMMENDATION: The DNA Laboratory and SAP/JSAP should conduct periodic review of the types of errors that have occurred to ensure that errors are not being repeated in the DNA Laboratory. F-12 RECOMMENDATION: The DNA Laboratory should establish objective guidance for severity and frequency of those contamination events that could lead to the suspension or removal of DNA analyst(s) or the DNA Laboratory from casework. F-13 RECOMMENDATION: The DNA Laboratory should establish a hierarchy of escalating organizational responses where repeat violations of the same protocol by analysts occur. F-14 RECOMMENDATION: The TFSC should ensure that accreditors of Texas DNA laboratories conduct proper reviews of contamination events and/or protocol deviations, including deploying auditors with appropriate technical expertise and ensuring that each auditor has appropriate time to review and assess contamination events and corrective actions that have occurred since the last assessment, and to interview broadly to identify the potential for lack of required documentation.
Section G: Improper Protocol Deviations	
G-1 CONTRIBUTING FACTOR: APD DNA Laboratory SOPs stated that protocol deviations would be included in the Analyst's final report "when necessary," instead of mandating inclusion of each and every protocol deviation in the final report. G-2 CONTRIBUTING FACTOR: The APD DNA Analyst in this case relied upon a quantity of extracted DNA	G-1 RECOMMENDATION: The Standard Operating Procedures of the DNA Laboratory should require that all deviations be included in the analyst's final report, and not merely include protocol deviations "when necessary." G-2 RECOMMENDATION: The DNA Laboratory should hire analysts whose qualifications and knowledge help ensure that the DNA data

evidence that was below the threshold set by the APD DNA Laboratory for profile interpretation. **G-3** **CONTRIBUTING FACTOR:** The APD DNA Analyst in this case made improper calculations. **G-4** **CONTRIBUTING FACTOR:** The APD DNA Analyst in this case did not document each of the protocol deviations on the proper deviation request form. **G-5** **CONTRIBUTING FACTOR:** The APD analyst in this case failed to seek approval for a deviation from protocol in sample interpretation. **G-6** **CONTRIBUTING FACTOR:** The DNA Analyst assigned as the technical reviewer in this case did not detect the inaccurate calculations or identify the undocumented protocol deviation. **G-7** **CONTRIBUTING FACTOR:** The APD DNA Analyst was not ready to testify at trial and was unfamiliar with her own case file, unable to explain the protocol deviations and methodology under questioning and provided multiple conflicting and/or insufficient explanations for deviation.	interpreted and reported is of a sufficient quality and quantity, that analyses conducted rely upon generally accepted and properly validated methods, and that protocol deviations and other errors are documented in records and are reported and properly disclosed. **G-3** **RECOMMENDATION:** The DNA Laboratory should ensure that preparation of an analyst to provide court testimony includes an effective "mock trial" exercise that will prepare the analyst for his or her testimony through mock direct and cross-examination. **G-4** **RECOMMENDATION:** The DNA Laboratory should ensure that analysts have adequate time to review their documents and prepare for any Court appearance. **G-5** **RECOMMENDATION:** The DNA Laboratory should provide a checklist for DNA analysts on steps that should be taken to prepare for court testimony that includes a review of relevant calculations and documentation of protocol deviations. **G-6** **RECOMMENDATION:** The DNA Laboratory should explore the potential creation of a Case Manager role to manage trial preparation and assist the Analyst in preparation. **G-7** **RECOMMENDATION:** The DNA Laboratory should have a technical review of each DNA analysis conducted by a second analyst. That technical review should include rigorous review of the case file and any deviations, with a specific sign-off on each deviation. **G-8** **RECOMMENDATION:** The DNA Laboratory should modify its SOP requirements for technical review to should ensure calculations for each sample in each case are properly conducted and disclosed. The laboratory's Technical Leader must be responsible for ensuring that validation of any system includes the appropriate validation and verification of any calculations, software, etc. used during the testing and/or interpretation steps with the appropriate demonstration that all is working correctly (with maintained documentation), as defined by the July 2020 QAS requirements for software validation and ASB Standards 20 and 40, and other standards that may apply depending on the procedures utilized within the laboratory. Once an analysis has been completed, a technical reviewer responsible for reviewing and confirming all case-specific/case-relevant information will review each case, including but not limited to: – Was the appropriate laboratory SOP followed?

	– Is the documentation in the case file appropriate, such that each action taken on the case can be completely reconstructed? – Does the profile fit with what is known about the starting biological sample? – Were the data appropriately evaluated and interpreted? – Were comparisons done correctly? – Were statistics done correctly, using the proper system, and with correct data entry? – Is the report accurate and correctly stated? – If probabilistic genotyping software is used, are the results generated by the software intuitively supported when the analyst considers the totality of the available data? – If there are any manual calculations, then those should be checked, and all manual data entry should be verified for accuracy. G-9 RECOMMENDATION: The DNA Laboratory should establish a standard operating procedure (SOP) that all deviations are provided to the Laboratory's QA department along with a stated rationale explaining the departure and its approval. Major deviations should be sent to QA contemporaneously and minor deviations may be sent periodically. G-10 RECOMMENDATION: The DNA Laboratory should identify any analytical protocol deviations applied within a case in the final report. The justification for and approval of any applied deviation should be included in the case file that is fully disclosed to the prosecutor and defense counsel. G-11 RECOMMENDATION: The DNA Laboratory should prominently document each protocol deviation, along with a rationale for the protocol departure and the related approval, in materials provided to law enforcement and defense representatives for the case(s) in which the deviation occurred. G-12 RECOMMENDATION: The DNA Laboratory should ensure effective disclosure and explanation regarding protocol deviations in materials delivered by the DNA Laboratory to prosecutors and defense attorneys. G-13 RECOMMENDATION: The District Attorney's Office procedure for case management for cases involving DNA evidence should include an attorney responsible for identifying and reviewing all protocol deviations and their materiality to the case file prior to case resolution. G-14 RECOMMENDATION: The District Attorney's Office should interview DNA Analysts whom the

	Office expects to testify sufficiently in advance of the scheduled testimony to identify and resolve any confusion about the Analyst's anticipated testimony regarding Laboratory casework. G-15 RECOMMENDATION: Any case file for a sample that will be used to adjudicate a criminal case should be probed by the District Attorney's Office for method and statistical calculations and related errors prior to preparing the DNA Analyst to testify in court.
Section H: Use of AP Reagent Outside of Manufacturer's Instructions	
H-1 CONTRIBUTING FACTOR: The APD DNA Laboratory implemented a practice that differed from manufacturer's daily use instructions without conducting or documenting appropriate validation studies to support the practice. H-2 CONTRIBUTING FACTOR: APD DNA analysts reported that they were unaware that they were deviating from manufacturer's instructions, despite the presence of differing instructions on the reagent bottle. H-3 CONTRIBUTING FACTOR: APD analysts advocated to retain their protocols against manufacturer instructions without supporting data, suggesting a resistance to and/or a lack of awareness of quality and safety improvement.	H-1 RECOMMENDATION: The DNA Laboratory should ensure that analysts purposefully review protocols to identify and prevent "protocol creep" away from protocols or to modify protocols where appropriate. The DNA Laboratory should include interviews of analysts to ensure the work is consistent with protocol as well. H-2 RECOMMENDATION: The DNA Laboratory should not deviate from manufacturer's instructions on how to use materials without first conducting and documenting validation studies to ensure no loss in fidelity. H-3 RECOMMENDATION: The DNA Laboratory should create an SOP that allows for QA and DNA Technical Leader to have bilateral discussions, with upward review by Lab Manager and SAP as needed to address disputes.
Section I. Freezer Outage	
I-1 CONTRIBUTING FACTOR: APD Laboratory management did not provide adequate response to 2014 requests to improve the freezer. The Laboratory Manager did not ensure fault tolerance and the Technical Leader's requests were not handled by lab management or the Interim Technical Leader upon the Technical Leader's sick leave. I-2 CONTRIBUTING FACTOR: Neither the APD DNA Interim Technical Leader nor APD Laboratory management appeared to understand the obligations of the Travis County DA's Office to disclose to courts, defense attorneys, and others any information that could lead to potentially exculpatory evidence or lead to impeachment information. I-3 CONTRIBUTING FACTOR: APD did not disclose the freezer failure to external stakeholders.	I-1 RECOMMENDATION: Management must have sufficient funding to ensure fault tolerance for mission-critical equipment. I-2 RECOMMENDATION: The DNA Technical Leader and Laboratory Manager should retain a list of "open items" enabling an Interim or replacement Technical Leader or Lab Manager to remain apprised of each issue that remains unresolved and requiring managerial attention. I-3 RECOMMENDATION: The District Attorney's Office and the JSAP should provide guidance and/or training to the DNA laboratory management regarding expectations and processes for efficient and complete disclosures. I-4 RECOMMENDATION: The DNA laboratory should produce disclosure procedures that align with guidance and expectations from the District

	Attorney's Office, the defense bar and the JSAP.
Section J: Additional Austin Stakeholder Group Recommendations	
	J-1 RECOMMENDATION: Each and every manager, director, staff or advisor providing technical leadership to the DNA laboratory, including but not limited to technical leaders and quality assurance and laboratory staff, shall be well informed of all current guidelines, best practices and standards for forensic science testing, validation and training issued by any authoritative body (e.g., SWGDAM, ANSI/ASB, OSAC, FBI Quality Assurance Standards, International Organization of Standards (ISO), recognized accrediting bodies (ANAB, A2LA), TFSC etc.) and shall ensure that the DNA laboratory stays current with implementation and training of personnel as needed to meet them. J-2 RECOMMENDATION: Regardless of where the new DNA Laboratory in Austin is instituted, the DNA laboratory should implement a new set of protocols, policies and procedures for training of personnel in conjunction with external scientific and community advisors, either from the SAP and JSAP recommended in this document or in such other structure as the City of Austin and the stakeholder group should determine. That training should be conducted by one or more qualified trainers with detailed familiarity with the new policies and procedures controlling the DNA Laboratory's actions. J-3 RECOMMENDATION: Prior to their implementation, the SAP and the leadership of the DNA laboratory should agree on the initial policies, procedures and protocols that will govern the laboratory's actions. Such policies, procedures and protocols must conform with all applicable state and national standards and otherwise appropriate for the laboratory's chosen instrumentation and anticipated analytical methods. J-4 RECOMMENDATION: The SAP and the leadership of the DNA laboratory should evaluate existing policies and procedures from not fewer than three (3) DNA laboratories of similar or larger size to the DNA laboratory, at least one (1) of which should be outside Texas, that are deemed to be high-quality laboratories, and carefully consider select policies and procedures that will optimize the quality of the DNA laboratory's work. J-5 RECOMMENDATION: All applications for DNA Analyst should be reviewed de novo and suitable evaluations of professional competence, reference and background checks should be performed prior

	to an offer of employment. The DNA laboratory management must make responsible hiring decisions, with support from external advisors. Each new analyst must be qualified to conduct the work expected of him or her, and extensively trained on all relevant protocols, policies and procedures prior to conducting case work. Modified training based on prior experience should be permitted on a limited basis during the laboratory's inception. J-6 RECOMMENDATION: DNA laboratory leadership, with advice and input from the SAP and the JSAP, should design and implement a high-quality training and testing/evaluation program that includes education on, among other priorities: • The role of technical review • Proper preparation for trial • Appropriate corrective action after calculation errors; • Appropriate corrective action after technical review errors; • Processes for documenting protocol deviation; and • Proper procedures for review and sign off on protocol deviations J-7 RECOMMENDATION: Initial training of the DNA laboratory's inaugural analysts must be conducted by an experienced trainer, and ideally one who has previously conducted training in a forensic DNA laboratory. The initial training should be performed by an individual as his or her main professional focus, and not as a "side job" or a time-constrained engagement. J-8 RECOMMENDATION: DNA laboratory management, in conjunction with the SAP and JSAP, should review and consider implementing a quality assurance process throughout the DNA laboratory that emulates the Houston Forensic Science Center (HFSC) process of running "blind" samples (i.e., test samples that the Analyst does not know are test, and therefore treats as real samples) through the analysis process to identify potential errors and establish laboratory error rates over time.
Section K: A System-Wide View on Enhancing the Quality of DNA Analysis	
K-1 Downstream recipients of APD DNA Laboratory reports and data trusted in the APD DNA Laboratory to generate high-quality DNA testing results, reports and testimony, and did not have a structure for active engagement with the DNA Laboratory's personnel regarding methodologies, policies, procedures, reports, errors, deviations, corrective actions, or other quality assurance topics.	K-1 RECOMMENDATION: The Travis County Criminal and Juvenile Court should make experts available to indigent defendants when useful to the case and make defense counsel aware that funds are available from the Court for retention of experts. K-2 RECOMMENDATION: The JSAP should include at least one criminal defense attorney practicing in the City of Austin who will sit on the JSAP.

K-2 Prosecutors and defense attorneys working on DNA cases in Travis County were not all sufficiently knowledgeable about forensic DNA testing and related issues to effectively identify and respond to the problems within the APD DNA Laboratory.	**K-3** **RECOMMENDATION:** The JSAP should include at least one individual from the Travis County District Attorney's Office.
K-3 As a general matter, between 2010-2015, the Travis County criminal justice system was not structured to optimize the delivery of DNA experts to defense attorneys who might have benefitted from their expertise. Defense attorneys did not always request training and judges did not always approve requests for retaining expert witnesses to help defense attorneys obtain a critical understanding of DNA test records or to assist with reviewing case files for testing, interpretation, comparison and reporting.	**K-4** **RECOMMENDATION:** The District Attorney's Office should ensure that it has one or more attorneys who are expressly responsible for serving as "DNA Advisors," individuals with a working knowledge of current DNA technologies with the ability to critically evaluate reports and case files coming from a DNA laboratory, and who can advise attorneys with less forensic science experience as their cases move through the criminal justice system, including appeals. The DNA Advisor would also be responsible for case coordination with the DNA Laboratory. The DNA Advisor need not be a position for one full-time employee; rather, those responsibilities may be shared by a properly trained team within the District Attorney's Office.
K-4 The APD DNA Laboratory lacked a culture of transparency. The Technical Leader and other Laboratory employees did not disclose all errors or document all changes to specific cases, or disclose all records and other information they were required to by law.	**K-5** **RECOMMENDATION:** Judges in DNA cases should embrace their gatekeeping role in DNA cases by confirming that prosecutors and defense attorneys have sufficient time, full access to records, and access to any experts necessary to critically review the DNA records and findings, the case file, findings and any deviations, and that the parties have performed that review.
K-5 The stakeholders in the Austin criminal justice system lacked an effective channel for understanding what was occurring in the APD DNA Laboratory on a regular basis, for evaluating its practices, and for providing guidance about the requirements of the criminal justice system as it applied to DNA evidence.	**K-6** **RECOMMENDATION:** Travis County judges should identify one or more "DNA Advisors" with expertise in the admissibility and use of DNA in criminal cases, whom the court may assign to assist court-appointed attorneys in cases where DNA may be at issue.
	K-7 **RECOMMENDATION:** Travis County Courts should require that court-appointed counsel complete a TFSC DNA education program in order to receive a "DNA-eligible" certification prior to receiving a case referral from a judge or participating as lead defense counsel in criminal cases where DNA is at issue.
	K-8 **RECOMMENDATION:** The Texas Forensic Science Commission should create a Continuing Legal Education (CLE) course or attorney education program for the proper use of forensic science in the Courtroom, including DNA evidence.
	K-9 **RECOMMENDATION:** The JSAP should collaborate with the DNA Laboratory to ensure bilateral education among DNA Laboratory personnel and JSAP representatives on all topics relevant to the use of DNA analysis in the criminal justice system.
	K-10 **RECOMMENDATION:** The TFSC should work collaboratively with prosecutor and defense

	organizations to establish training on legal discovery disclosure requirements of Texas and federal law regarding DNA evidence for DNA Laboratory personnel. The training should be updated and remain current over time, and should include, but not be limited to: • Disclosure requirements for protocol deviations, quality assurance issues, and corrective actions, at a minimum; • The parties who should receive relevant discovery, including laboratory management, prosecutors, defense attorneys, and the court. K-11 RECOMMENDATION: The JSAP should create a checklist for DNA analysts and case managers on potential types of exculpatory or impeachment information that are required by law to be disclosed, and the required recipients of the information. K-12 RECOMMENDATION: The DNA Laboratory should assign each case to a "Case Manager" familiar with discovery requirements and other downstream legal/judicial concerns and enable that person to communicate with both prosecution and defense attorneys in addition to the APD. K-13 RECOMMENDATION: The DNA laboratory should work with the JSAP to create a system by which records and other information will be effectively and efficiently delivered by the laboratory to prosecutors and defense attorneys in criminal cases. The system should ensure that both prosecutors and defense counsel receive the entire case file, and not just summary reports.
Section L: Structural Weaknesses in Accreditation and Audits	
L-1 CONTRIBUTING FACTOR: The auditing and review mechanism created a false impression of quality in the APD DNA Laboratory among APD leadership and the Austin criminal justice community. L-2 CONTRIBUTING FACTOR: Reviews of the APD DNA Laboratory performed by accrediting bodies were ineffective in responding to documented contamination events. L-3 CONTRIBUTING FACTOR: "Check-box" audits like the FBI QAS audit form are not designed to assess the utility or efficacy of protocols or processes, including remediation or corrective action protocols or the adequacy or thoroughness of validation studies. L-4 CONTRIBUTING FACTOR: ASCLD/LAB auditors have limited time to review case files.	L-1 RECOMMENDATION: The TFSC should provide education throughout the state on what accreditation does and does not do, with a focus on educating non-scientific stakeholders. L-2 RECOMMENDATION: All corrective actions submitted to TFSC should be shared and put in a public database – similar to the National Aviation Safety & Reporting System – to allow jurisdictions throughout the state to benefit from the learnings of other laboratories. L-3 RECOMMENDATION: The DNA Laboratory should ensure that an external reviewer evaluates all technical and evidence protocols at set intervals not merely for their existence, but to ensure their fitness for purpose. Results of these reviews should be documented and made public.

L-5 **CONTRIBUTING FACTOR:** Inadequate documentation of corrective actions limited the ability of auditors in 2015, and potentially other years, to review and identify substantive quality assurance problems and laboratory errors.

L-6 **CONTRIBUTING FACTOR:** Internal QAS audits were conducted by APD DNA Laboratory technical staff and did not include APD laboratory QA or other scientific personnel.

L-7 **CONTRIBUTING FACTOR:** The APD forensics laboratory, and therefore the APD DNA Laboratory remained on less stringent "Legacy" accreditation standards with ASCLD/LAB rather than upgrading to the most rigorous "International" standards in 2010, and was one of the last laboratories in the country to receive accreditation that complied with the ISO 17025 standards.

L-8 **CONTRIBUTING FACTOR:** The ASCLD/LAB policy for converting to International standards was based on the date of application, not the date of transfer. The policy permitted five extra years at "Legacy" accreditation level before requiring a laboratory to upgrade to the "International" level.

L-4 **RECOMMENDATION:** The TFSC should engage with DNA Laboratory Management to ensure that quality systems are reviewed for their effectiveness, and not merely their existence, and supplement accreditation reviews that do not provide such an assessment.

L-5 **RECOMMENDATION:** The DNA Laboratory should create a protocol for conducting internal audits rather than depending on auditors to find issues. Possible areas of focus include:

- Going beyond yes/no existence questions to test effectiveness;
- Increasing the intensity of audit preparation to include utility and practical impact;
- Conducting surprise audit prep discussions with checklists; and
- Including analysts from other lab disciplines (e.g., toxicology) in internal audits.

L-6 **RECOMMENDATION:** SWGDAM and other forensic thought leaders should consider whether ISO 17011, Requirements for Accrediting Bodies, provides sufficient guidance to ensure that accreditation organizations across the country are serving their intended purpose.

L-7 **RECOMMENDATION:** The DNA Laboratory Technical Leader and QA manager must ensure that all deviations and corrective actions are documented and published online in ways that are sensitive to confidentiality requirements. The DNA Laboratory should eliminate any ability to delete deviations or corrective actions from any or all relevant files, including case files.

L-8 **RECOMMENDATION:** DNA Laboratory staff conducting internal audits should be accompanied by QA personnel with familiarity with DNA technologies and methodologies and/or colleagues from other disciplines within the lab.

L-9 **RECOMMENDATION:** The DNA Laboratory should involve external advisors in accreditation decisions.

L-10 **RECOMMENDATION:** ANAB should provide a date certain by which all labs receiving its accreditation must convert to the most current accreditation standards.

L-11 **RECOMMENDATION:** The TFSC should ensure that the DNA laboratory, and all accredited DNA laboratories in the state follow applicable SWGDAM, OSAC, QAS, ISO and accreditation standards and/or guidelines, which may include TFSC modifications or guidance as appropriate. The TFSC should also provide clear guidance to laboratories with respect

	to expectations for timing of standard and guideline adoption depending upon the complexity and relative priority of the standard or guideline in question. As new versions of standards and guidelines are released through SDO or similar processes, the TFSC should similarly set expectations for adoption of new versions. L-12 RECOMMENDATION: When accreditation standards for DNA laboratories change or quality assurance problems or lab errors are identified in the field requiring changes of common practices, ANAB and QAS auditors should conduct a full and complete new accreditation review rather than a grandfathered review. At a minimum, the review should include those areas where the standards or practices have changed. L-13 RECOMMENDATION: DNA analysts should accurately testify about the limitations of accreditation.

Appendix B. Participants in the Review[243]

Austin Stakeholders Group[244]

Name	Organization
Rey Arellano	City of Austin (Co-Chair)
Roger Jefferies	Travis County (Co-Chair)
Selena Alvarenga	Austin Criminal Defense Lawyers Association
Alice Amilhat	Texas Department of Public Safety
Lindsay Bellinger	Capital Area Private Defender Service
Krista Chacona	Austin Criminal Defense Lawyers Association
Gregg Cox	Travis County District Attorney's Office
Jane Eggers	Capital Area Private Defender Service
Peter Einhorn	Office of Travis County Judge Sarah Eckhardt
Troy Gay	Austin Police Department
Cary Grace	City of Austin Law Department
Debra Hale	Criminal Courts Administration
Bradley Hargis	Capital Area Private Defender Service
Dana Kadavy	Austin Police Department
Jennifer Kraber	Travis County Attorney's Office
Kameron Johnson	Juvenile Public Defender Office
Stacie Lieberman	Capital Area Private Defender Service
John Lopez	Travis County District Attorney's Office
Brian Manley	Austin Police Department

[243] The current ACDLA and CAPDS Austin Stakeholder Group members are grateful to have had the opportunity to participate in the Austin Stakeholder Group's meetings with the Quattrone Center, and we agree with some of the findings and recommendations made in Quattrone's report. ACDLA and CAPDS object, however, to the failure of the Quattrone Center to be transparent with stakeholders during the review and evaluation of its report. For more than six months, the ACDLA and CAPDS have repeatedly requested (both orally and in writing) information underlying assertions made in the report. Despite our multiple requests, Quattrone has failed to provide Stakeholders with access to all of the records they have created and relied upon in the report, including but not limited to the following: 1) records pertaining to the interviews that were conducted by Quattrone (the content of the interviews and the notes and other records created during the interview); 2) records that interviewees and other individuals and agencies gave to Quattrone (that are not available online); and 3) copies of (or even citations to) some Texas scientific studies and related data discussed in the report, and the data that Quattrone relied upon and the basis for its unsourced estimates of how many years it will take to open the various structural options for the DNA lab. The AP reagent was provided to us right before Quattrone finalized its report, and we have concerns about that study and do not concur with Quattrone's characterization of it.We also object to all of Quattrone's statements and suggestions in its report regarding lab analysts' or other state agents' intent or lack of intent and Quattrone's comments about why lab analysts acted or failed to act. For these reasons, ACDLA and CAPDS object to the Quattrone's report and state that the names of the organizations and its current members and employees are included conditionally and with reservation. Quattrone's Response: At the outset of the process, all stakeholders, including representatives of ACDLA and CAPDS, agreed on a process designed to maximize participation from individuals who had worked in or engaged with the APD DNA Laboratory during the period in question. Stakeholders agreed that interviews and transcripts from interviewees would be kept confidential unless and until a valid legal procedure required their release. The Quattrone Center conducted its interviews based on that agreement with the stakeholders, which was repeated to individuals who voluntarily agreed to be interviewed. Those documents are now being released in a method that honors that agreement among the stakeholders, and with the individuals who participated in interviews, for whose assistance the Quattrone Center is grateful.

[244] Not all individuals listed here participated in the group for the entire review period.

Margaret Moore	Travis County District Attorney's Office
Walter Muse	Office of Commissioner Jeffrey Travillion
Scott Ruplinger	Juvenile Public Defender Office
Barbara Rush	Office of Commissioner Brigid Shea
Trudy Strassberger	Capital Area Private Defender Service
Martin Zamzow	Office of Commissioner Gerald Daugherty

Advisory Panel

Name	Organization
Gary Bledsoe	Texas NAACP
Ana DeFrates	Survivor Justice Project
Lynn Garcia	Texas Forensic Science Commission
Jeremy Martin	Austin Chamber of Commerce
John McCormick	Defense Attorney
Matt Simpson	Texas ACLU
Kelly White	The SAFE Alliance

Quattrone Center for the Fair Administration of Justice

Name	Organization
Margaret Bulley	University of Pennsylvania Medical School/Hospital of the University of Pennsylvania
Adam Hammoud	Morgan, Lewis & Bockius LLP
John Hollway (Project Leader)	University of Pennsylvania Law School
Nola Joyce	Independent Consultant, Police Strategy & Management
Andrew Katz	Morgan, Lewis & Bockius LLP
Brittany Keesling	University of Pennsylvania Law School
Banee Pachuca	Morgan, Lewis & Bockius LLP
Steven Raper, M.D., J.D., M.A.	University of Pennsylvania Medical School/Hospital of the University of Pennsylvania
Barbara Robinson	Morgan, Lewis & Bockius LLP
Courtney Sanders	Morgan, Lewis & Bockius LLP
Vivianna Van Deerlin, M.D.	University of Pennsylvania Medical School/Hospital of the University of Pennsylvania
Amanda Woog	University of Pennsylvania Law School
Charlotte Word, Ph.D.	Independent Consultant, DNA Analysis and Forensic Laboratory Management Expert

Appendix C. Chronology of Accreditation and Audits (2004 – 2016)

The APD forensic laboratory in general, and the APD DNA Laboratory specifically, were subject to several overlapping quality assurance standards and accreditation requirements. These included the forensic laboratory's accreditation under the American Society of Crime Lab Directors Laboratory Accreditation Board ("ASCLD/LAB").[245] The DNA Laboratory specifically was also subject to the Federal Bureau of Investigation ("FBI") Quality Assurance Standards ("QAS") in order to be able to upload to and communicate with the FBI's national CODIS database of DNA samples. In addition, the DNA Laboratory attempted to follow guidelines[246] from the FBI's Scientific Working Group on DNA Analysis Methods ("SWGDAM"). A list of internal and external audits and accreditation reviews conducted to ensure compliance with these standards is set forth in Figure 10 below.

The DNA Identification Act of 1994[247] enacted by Congress: (1) authorized the Federal Bureau of Investigation (FBI) to establish the DNA Advisory Board to develop standards for quality assurance for forensic DNA laboratories;[248] (2) authorized the FBI to establish the national Combined DNA Index System (CODIS), a database of DNA profiles to aid in law enforcement investigations; and (3) provided funding for forensic laboratories to improve the quality and availability of DNA analyses.

The DNA Advisory Board, which met from 1995-2000, issued two sets of Quality Assurance Standards (QAS), *The Quality Assurance Standards for Forensic DNA Testing Laboratories* and *The Quality Assurance Standards for DNA Databasing Laboratories*. Only the first set of standards applied to the APD DNA Laboratory, as the Laboratory did not manage a DNA convicted offender database section.

The QAS became effective on October 1, 1998. Under the direction of the Director of the FBI via the Scientific Working Group of DNA Analysis Methods (SWGDAM), additional revisions of the standards have been issued and became effective July 1, 2009, and September 1, 2011.[249] Companion audit documents for use during the mandatory annual audit of each DNA laboratory were also issued.[250] Revised QAS and audit documents have been issued and will be effective on July 1, 2020.[251, 252]

DNA Laboratories that seek to use the national CODIS database, either to upload DNA samples into the database from convicted individuals or to access the database for comparison to current investigative samples, must demonstrate compliance with the QAS on an annual basis, with an external audit being conducted by

[245] ASCLD/LAB was acquired by the ANSI National Accreditation Board ("ANAB") in 2016, and ANAB has been the responsible party overseeing the APD forensic laboratory's accreditation, including that of the Biology/DNA section.
[246] Guidelines are recommendations from the SWGDAM, but they are not standards, which would be required for accreditation or audit approval.
[247] https://www.congress.gov/bill/103rd-congress/senate-bill/497
[248] https://www.promega.com/-/media/files/resources/conference-proceedings/ishi-10/oral-presentations/04eisenberg.pdf?la=en
[249] Quality Assurance Standards for Forensic DNA Testing Laboratories, effective September 1, 2011, accessed at SWGDAM http://media.wix.com/ugd/4344b0_4a22824ce56f43d4b1a4d2486409f95d.pdf
[250] The FBI Quality Assurance Standards Audit For Forensic DNA Testing Laboratories, Effective September 1, 2011, accessed at http://media.wix.com/ugd/4344b0_c41c9ac31ca3401a988f54d4905cfb19.pdf
[251] Copies of these documents can be found on www.swgdam.org.
[252] The QAS applies only to the DNA testing section in a crime laboratory; QAS does not apply to any non-DNA testing conducted in the Biology/DNA unit (e.g., serology) or to any of the other forensic science units in the crime laboratory.

auditors from outside the laboratory every other year. An internal audit, conducted by individuals within the DNA unit and/or other units of the laboratory, or an external audit may be conducted in the other years.

Even before the creation of the APD DNA Laboratory, the DNA Advisory Board had issued a recommendation that all DNA laboratories become accredited and maintain accreditation. The accrediting bodies active at that time accepted the additional role of conducting the QAS external audit of the laboratory during their accreditation audit. In non-accreditation audit years, the laboratory could arrange for individual(s) from outside of its laboratory or laboratory system to conduct an external audit or contract with the National Forensic Science Technology Center (NFSTC) to conduct the audit under a grant with the National Institutes of Justice (NIJ). The APD DNA Laboratory pursued each of these paths at different times between its inception in 2004 and its suspension in 2016.

Access to and use of CODIS and receipt of federal funding by a forensic DNA laboratory have been contingent on the DNA section of a laboratory adhering to the FBI QAS and maintaining its accreditation.

ASCLD/LAB Accreditation Reviews

The American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB) was the primary accrediting body in the United States for forensic laboratories at the time the QAS were issued. ASCLD/LAB accreditation was granted to a crime laboratory for a 5-year period with the requirement for an audit near the end of each accreditation term to verify compliance. In addition, each accredited laboratory was required to make annual reports to the agency in the interim years and to keep the accrediting body apprised of any problems or issues in the laboratory that constituted a significant concern. In 2004, ASCLD/LAB added the option of a new program that incorporated the International Organization for Standardization 17025 (ISO 17025) standards into its accreditation program; this was termed the ASCLD/LAB International Program with the prior program referred to as the ASCLD/LAB Legacy Program.

Effective April 1, 2009, all laboratories seeking ASCLD/LAB accreditation or re-accreditation were required to apply for accreditation under the International Program. In 2016, ASCLD/LAB merged with ANSI National Accreditation Board (ANAB); ANAB continues to be the predominant accreditor of forensic laboratories in the United States.

The letter and accreditation certificate that signify the awarding of accreditation specify the disciplines within the laboratory that are encompassed by the accreditation. For ASCLD/LAB audits or inspections, a team of individuals with collective expertise in quality assurance programs and possessing technical knowledge of each of the disciplines in the crime laboratory is assembled to conduct the audit on the entire laboratory in the scheduled time. For a laboratory with a small DNA section, it was common for only one or two auditors with expertise in DNA testing to be responsible for conducting both the ASCLD/LAB audit to ensure the unit met the various ASCLD/LAB requirements, and in particular, the requirements for the Biology section, as well as conducting the QAS audit, using the current and appropriate audit documents for both audits.

Austin Police Department DNA Laboratory Audits

The APD DNA Laboratory underwent all appropriate accreditation and QAS audits during the time it was performing casework. The Laboratory was accredited or re-accredited three (3) times and underwent fifteen (15) separate QAS external or internal audits:[253]

- The first external audit of the new APD Biology/DNA Laboratory was conducted by an auditor from the Texas Department of Public Safety (DPS) on March 23, 2004. This audit was focused on serology readiness only prior to the initiation of screening of casework samples as the Laboratory was not conducting DNA testing at the time of its inception. An internal laboratory evaluation form was used for the audit.
- In July of 2004, an individual from the APD Forensic Science Services unit conducted the DNA Laboratory's first internal QAS audit,[254] and the following month the Laboratory was audited by an external reviewer using the FBI Quality Assurance Standards (QAS) audit document prior to the initiation of DNA testing on casework.
    - The first external QAS audit stated that the Laboratory's three newly hired DNA analysts had previously received sufficient training in the area of evidence handling and serology (the screening of evidence for the possible presence of biological materials), but the auditor was "unable to evaluate applicability" of this training since "neither a significant history of proficiency testing or casework" was in place.[255] Therefore, the initial audit for DNA testing could not, and did not include a review of any case reports.[256]
- On August 3, 2005, the APD Forensic Science Services unit, including the Biology/DNA Laboratory was accredited by ASCLD/LAB in the disciplines of controlled substances, toxicology (blood alcohol only), biology, firearms/toolmarks, latent prints, and crime scene.[257] This accreditation was valid for five (5) years.
- The APD Forensic Science Services unit was re-accredited for 5 years by ASCLD/LAB in 2010.[258] APD laboratory management elected to renew ASCLD/LAB under its "Legacy" program despite the existence of a newer and more robust "International" accreditation program developed by ASCLD/LAB that would have required the APD Laboratory to meet the International Organization for Standardization 17025 (ISO 17025) standards for testing and calibration laboratories. The International program was a more challenging one, and included the review of, among other things, the performance of certain corrective actions within forensic laboratories.

[253] *See* DNA Unit QAS or ASCLD/LAB Audit History.
[254] Memorandum from M. Padilla to C. Carradine, July 14, 2004 re: Quality Assurance Audit – preliminary review of Audit Standards criteria.
[255] See 2004 QAS External Audit Report, pp. 110-111.
[256] Id.
[257] The biology accreditation includes the DNA Laboratory. *See* APD's 2005 Certificate of Accreditation by The American Society of Crime Laboratory Directors.
[258] ASCLD/LAB Inspection Report (Accreditation), Austin Police Department Forensic Science Division, September 11, 2010.

In 2015, the APD Forensic Science Laboratory was accredited under the ASCLD/LAB International Program.[259]

- The APD DNA Laboratory conducted internal QAS audits in 2004 (prior to starting casework and prior to the QAS External audit in that year), 2006, 2008, 2011, 2013 and 2015, and was audited on the QAS by external auditors in 2004, 2005, 2007, 2009, 2010, 2012, 2014, 2015 and 2016.
- According to the cover pages of the internal QAS audit documents, an APD Forensic Scientist in the DNA Laboratory conducted the 2004 audit and the Interim Technical Leader conducted the 2015 internal audit along with the DNA Laboratory's CODIS administrator. The four remaining internal audits were conducted by the Technical Leader.
- All external QAS audits for which documentation was provided indicate that one, two or three auditors participated in the audit process, and in 2005, 2010 and 2015, these audits were conducted in conjunction with the ASCLD/LAB audit.
- Two additional audits were conducted, one by the Department of Justice Office of the Inspector General in 2010 and one by the FBI's National DNA Index System (NDIS) in 2013.

No additional audits of the DNA Laboratory have been performed since 2016 due to the suspension of DNA testing in the APD Forensic Science Bureau Laboratory.

[259] ASCLD/LAB-International Final Assessment Report, Austin Police Department Forensic Science Laboratory, August 2015.

Dates of Audit	Type	Audit Document Used	Auditor(s)	Findings for DNA Laboratory	Validation Reviewed	Comments
03/23/2004	Serology only	DNA General Laboratory Evaluation Form	Robin Freeman (TX DPS)	None	Says "not applicable"	Review of Serology prior to starting casework; very limited in scope
07/15/2004	QAS Internal	Not provided or specified – assume July 2004 QAS based on numbering	Maurice Padilla (APD Forensic Scientist)	4.1.c – org chart was incomplete for the DNA Laboratory	Checked "yes" to many criteria under Section 8, but not specified	Audit conducted prior to starting casework; Identified typos in training SOP, but not a finding
08/04/2004	QAS External	July 2004 QAS	Carolyn Van Winkle (Quality Manager/Sr. DNA Analyst - Tarrant Co. ME Office)	7.1.2 – not maintaining chain of custody after creating	All studies to meet criteria for Profiler Plus/COfiler on 310; Quantifiler on 7000	Audit conducted prior to starting casework; limited proficiency tests conducted; staff in training
03/21-24/2005	QAS External	July 2004 QAS	Rodney Anderson (IL State Police) Along with ASCLD/LAB	None	States Pro/CO, Quantifiler reviewed in previous audit; New 310 Genetic Analyzer – "studies compliant with standard"	

Dates of Audit	Type	Audit Document Used	Auditor(s)	Findings for DNA Laboratory	Validation Reviewed	Comments
03/21-24/2005	ASCLD/LAB – Legacy	2003 ASCLD/LAB	Rodney Anderson & others	11 total findings; only 1.4.2.1.3 applies to the Biology Section "In Biology, the refrigerator and freezer logs list an acceptable temperature range for each unit. When temperature checks show a unit is out of its acceptable range, there is often no documentation of corrective action taken."		Accreditation awarded August 3, 2005 for 5 years
07/13/2006	QAS Internal	July 2004 QAS	Cassie Carradine (Technical Leader, APD, DNA)	None	States Pro/CO, Quantifiler validation reviewed in 2 previous audits; new 310 and quantitation software reviewed in this audit	
06/27-29/2007	QAS External	July 2004 QAS	Garon Foster (Bexar Co. Crime Laboratory)	None	New 310	Does not mention validation of the quantitation software noted in 2006
07/22/2008	QAS Internal	July 2004 QAS	Cassie Carradine (Technical Leader, APD, DNA)	None	Qiacube 1; GeneMapper ID; ABI 7500; ABI 9700	
09/17-18/2009	QAS External	May 28, 2009 QAS, effective 07/01/09	Christina Capt, Amy Smuts (NTCHI)	None	Several instruments; Pro/CO ½ reactions	

Dates of Audit	Type	Audit Document Used	Auditor(s)	Findings for DNA Laboratory	Validation Reviewed	Comments
12/10/2009 – 04/26/2010	Stochastic threshold validation for Pro/CO					
04/26-29/2010	QAS External	May 28, 2009 QAS, effective 07/01/09	Melissa Keith (OK City Police Dept.) Along with ASCLD/LAB	None	QiaCube; Stochastic Threshold Study (Pro/CO)	
04/26-29/2010	ASCLD/LAB – Legacy	2008 ASCLD/LAB	Melissa Keith & others	18 total findings; none specific to Biology; these may be relevant: 1.1.2.5 – unique identifier not associated with all paperwork of case; 1.4.2.17 – need tracking of changes in LIMS; 1.4.3.1 – need to define grading of performance of proficiency tests		Accredited for 5 more years, until 8/2/2015
06/07-09/2011	QAS Internal	May 28, 2009 QAS, effective 07/01/09	Cassie Carradine (Technical Leader, APD, DNA)	None	None listed	
06/04-05/2012	QAS External	Sept. 1, 2011 QAS	Elizabeth Smith (NFSTC); Kelly McGill-Carroll (Johnson Co. Sheriff's Office); Muhammad Amjad (Indianapolis - Marion Co. Lab) by NFSTC	None	Automated platforms for extraction and plate set up	

Dates of Audit	Type	Audit Document Used	Auditor(s)	Findings for DNA Laboratory	Validation Reviewed	Comments
06/05-06/2013	QAS Internal	Sept. 1, 2011 QAS	Cassie Carradine (Technical Leader, APD, DNA)	None	None listed	
07/2013	Fusion casework starts – according to timeline provided					
06/16/2014	Jeff Sailus starts					
06/17/2014	Cassie Carradine retires					
11/17-19/2014	QAS External	Sept. 1, 2011 QAS	Kris Cano Whitman (Lab Manager, Scottsdale Police Dept Crime Lab); Shannin Guy (Forensic Scientist, Indianapolis-Marion Co. Lab)	3.2, 3.2d, 3.2e, 3.2f – no documented procedure for document retention for a few items; 13.1.3 – inconsistent dates with proficiency tests 2 others contested and overturned	Fusion Amplification and PopStats (sensitivity, stochastic effects, mixtures - see list for additional studies included); Automated extraction; Direct amplification for swabs	Fusion amplification signed off on July 30, 2013 according to audit document
04/20-24/2015	QAS External	Sept. 1, 2011 QAS	Christopher Comar (Broward Co. Sheriff's Lab) Along with ASCLD/LAB	Nothing listed	None	Per letter from Doug Hares, this does not count as the lab's 2015 audit due to being too close to the 2014 audit; internal audit conducted in Nov 2011

Dates of Audit	Type	Audit Document Used	Auditor(s)	Findings for DNA Laboratory	Validation Reviewed	Comments
04/20-24/2015	ASCLD/LAB – International (ISO standards)	ISO/TEC 17025:2005; ASCLD/LAB-International Supplemental Requirements - 2011	Christopher Comar & others	9 Corrective Actions noted; ISO 5.10.5 – Opinions and interpretations not clearly marked on reports (with Biology specifically cited); The following may be relevant to the Biology/DNA section: ISO 4.8 - resolution of complaints did not include any non-written complaints ISO 4.11.2, 4.11.4 – insufficient root cause analysis in 9 of 10 corrective actions reviewed ISO 4.14.1 – insufficient documentation of management system audit; unclear if 4.13.2 was done (verification of examination records with technical records)		The audit checklist was not provided, just the Final Assessment Report

Dates of Audit	Type	Audit Document Used	Auditor(s)	Findings for DNA Laboratory	Validation Reviewed	Comments
11/09-13/2015	QAS Internal	Sept. 1, 2011 QAS	Diana Morales, Elizabeth Morris (APD)	6.1, 6.1.1b – no definition of divisional or sectional key; no log of codes for DNA located 10.2.1, 10.2.1, 10.2.1.1 – expired NIST traceable thermometers identified 10.2.1.8 – pipette in use that was outside of tolerance range, but had been accepted by technical leader	None – no new validations	Diana Morales was Interim Technical Leader; Elizabeth Morris was CODIS administrator at time of the audit
07/08/2016	Texas Forensic Science Commission Final Audit Report is Issued					
11/29/2016	QAS External	Sept. 1, 2011 QAS	Erin Reat (Bexar Co. Quality Assurance Manager)	Nothing listed	None – validations previously reviewed prior to suspension of work	DNA operations were suspended at the time of the audit

Figure 10. Chronology of Audits and Accreditation Reviews.

Appendix D. Process and Limitations of the Review

Process of the Review

The Stakeholder Group followed the process depicted in Figure 11 below.

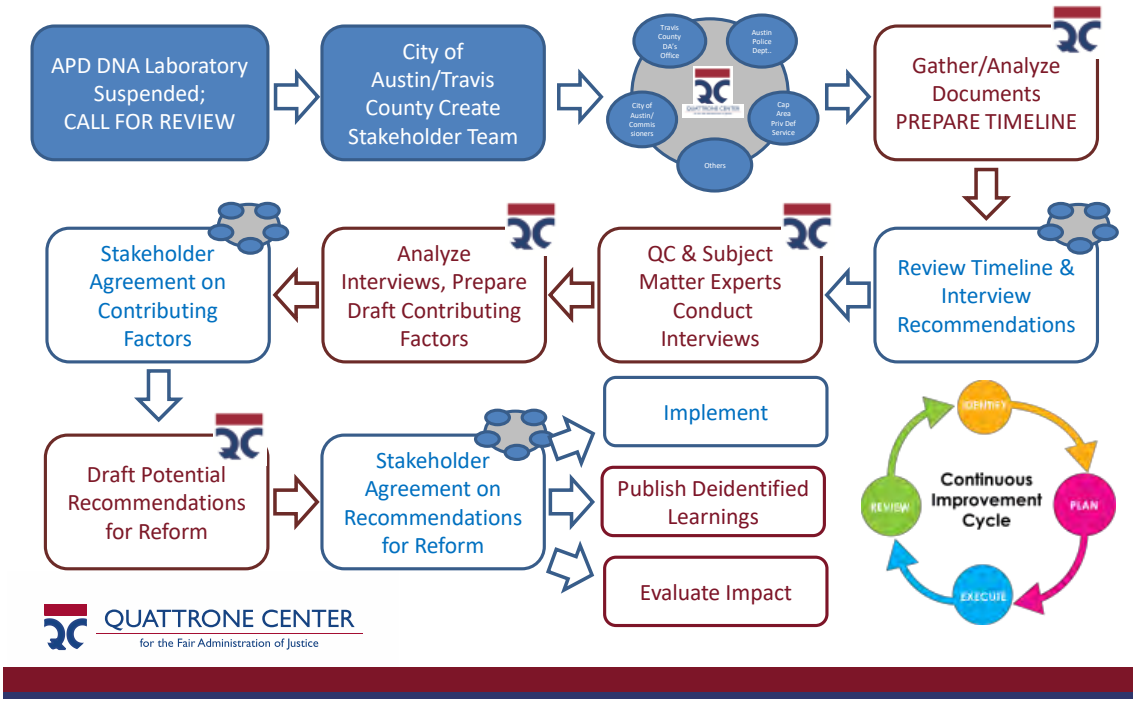


Figure 11. Austin Stakeholder Group DNA Laboratory Review Process

Quattrone began in April 2018 by reviewing thousands of pages of documents and emails related to the issues set forth in the TFSC Audit Report. For the most part, these documents had been accumulated by the Travis County DA's Office and placed in an internet-based folder and made available to the general public online.

From these documents and discussions with the Stakeholders, the Quattrone Center created a list of individuals who had been involved with the APD DNA Laboratory between 2010 and 2015 and were therefore potential interviewees to help Quattrone and the Stakeholder Group understand what was known or not known about issues at the DNA Laboratory at important decision points. The interviews were conducted by representatives of the Quattrone Center listed above. Wherever possible, Quattrone sought to understand the "then-current" perspective of actors during the 2010-2015 time period, and what had influenced their decisions, so that the recommendations for improvement generated by the review would be tailored to help others in their shoes make more informed decisions and generate improved outcomes in the future.

Quattrone conducted over 40 interviews between August of 2018 and May of 2019. Multiple members of the Austin Police Department participated, including not only DNA Analysts who worked in the Laboratory from 2010 – 2015 but also Department leadership, officers in investigational units who worked with the DNA Laboratory, and managers of the APD crime laboratory. We interviewed members of the Travis County District Attorney's Office, the Texas Department of Public Safety, the TFSC, and other city related entities. We also interviewed representatives from the ANSI National Accreditation Board ("ANAB"), the successor organization to ASCLD/LAB, and an organization that itself had conducted a RCA of the various accreditation reviews of the APD DNA Laboratory to understand whether and how it could have identified quality issues in the DNA Laboratory during the years in question. All interviews were completely voluntary. Not all individuals we sought to interview were available for a variety of reasons, though a majority of the individuals who were contacted did agree to participate.

Interviews were conducted by representatives of the Quattrone Center, sometimes accompanied by subject matter experts ("SMEs") with expertise in the area of the individual being interviewed. For interviews of former APD DNA Analysts, for example, interviews were conducted by a Quattrone Center representative and an expert in DNA analysis and forensic lab management. Similarly, interviews of APD leadership were conducted by a Quattrone Center representative and an expert in the strategic development and structure of large urban police departments. Interviews were analyzed by the Quattrone Center team, which included experts in DNA analysis and forensic lab management as well as experts in quality assurance and molecular and pathology laboratory management from the Hospital of the University of Pennsylvania, to ensure that our recommendations had the benefits of clinical lab management techniques and "best practices" in support of DNA analysis in a forensic laboratory setting.[260]

To provide the ASG with a broad understanding of current national practices in the conduct of DNA analysis and DNA laboratory management, the Quattrone Center interviewed nationally recognized experts in DNA analysis and forensic DNA laboratory management, including Dr. Bruce Budowle (University of North Texas), Dr. John Butler (NIST), Dr. Barry Fisher (Park Dietz and Associates), Dr. Michael Garvey (Philadelphia Police Department Office of Forensic Science), Dr. Tim Kupferschmid (Office of Chief Medical Examiner of the City of New York), Dr. Jenifer Smith (Washington, DC Department of Forensic Sciences), Dr. Peter Stout (Houston Forensic Science Center), Dr. Angela van Daal (van Daal Consulting), Dr. Karen Wiggins (Washington, DC Department of Forensic Sciences), and Dr. Charlotte Word (Forensic DNA Consultant and Expert Witness).

After completion of these interviews, the Quattrone Center synthesized the information and presented it to the Austin Stakeholder Group, leading a process that generated consensus around the (1) Contributing Factors and (2) Recommendations for Corrective Action included in this document. The Recommendations are intended to prevent the recurrence of the Contributing Factor(s). Included in the Recommendations are some practices used

[260] The requirements of a clinical DNA laboratory may differ at times from the requirements of a forensic DNA laboratory. At the same time, clinical professionals with expertise in DNA analysis provided a useful vantage point to evaluate the issues raised in the TFSC Audit Report, and innovative thoughts about recommendations for improvement that have been deployed in a hospital setting and might be useful for a forensic DNA laboratory as well (see, e.g., the Personal Responsibility Tool set forth in Appendix F.)

in other jurisdictions around the country that might be helpful to identifying a structure for an efficient and effective reconstituted DNA laboratory that will meet the needs of the Austin Police Department and the citizens of Austin.

Limitations of the Review

In researching and preparing this report, Quattrone's intent was to identify contributing or causal factors that allowed certain specific instances of identified error in the APD DNA Laboratory (e.g., the improper use of AP Reagent, the outage of a freezer holding DNA samples, etc.) to occur, as well as environmental factors outside of the APD DNA Lab that prevented members of the criminal justice community from effectively identifying and responding to the lab errors and other laboratory problems.

Given the breadth of issues identified in the TFSC Audit Report and the length of time they persisted, there are inherent limitations to the review conducted by Quattrone that are important to acknowledge, including:

- While a majority of the individuals Quattrone sought to interview participated, Quattrone could not interview everyone involved in the events in question. Individuals had passed away, were unwilling to speak with us, or were prevented from speaking with us due to pending litigation. They were speaking about events that had occurred years before. As a result:
  - Our list of contributing factors, while substantial, is likely to be incomplete; and
  - Our identification of contributing factors may be supported in some areas by incomplete or inaccurate information.
- Our review evaluated documents provided to us by members of the Austin criminal justice community. We did not, for example, review every item of correspondence among the employees of the APD forensic laboratory or the DNA Laboratory between 2010 and 2015. There are likely additional documents that might have informed our review that were not reviewed.
- During the initial stages of our interviews, a lawsuit was filed in the United States District Court for the Western District of Texas by a sexual assault victim against several individuals and organizations included in the Austin Stakeholder Group. Pending litigation often has a chilling effect that slows or prevents event reviews like this one. In this case, the pendency of the litigation delayed our review, limited our ability to speak to certain individuals and limited our access to certain case files, including information about at least one case cited in the TFSC Audit Report as a likely case of crossover contamination within the APD Laboratory.

This document is intended to create forward-looking recommendations that will enhance the Austin criminal justice system in its use of DNA information in criminal cases. It is not the intent of Quattrone or individuals who participated in the ASG meetings for this report to be used as a substitute for a trier of fact in a case or to diminish the strength or merits of a claim raised by a defendant or habeas petitioner, and it affirmatively should not be relied upon in any court of law as stating or implying any conclusions of fact or law regarding specific cases being adjudicated in the criminal justice system during the period in question. The report does not

supersede prior technical analyses, reports, or rulings on laboratory issues, and it does not provide support for any assertions regarding the intentionality of any DNA Laboratory analyst or other state actor regarding the topics reviewed.

Appendix E. Sample Personal Accountability Tool

Many of this report's recommendations are focused on creating an environment in which capable, well-trained DNA Analysts are hired and can be successful. It is equally important that each DNA Analyst be personally accountable for their work. Because the TFSC Audit Report found multiple violations had sometimes been committed by the same APD DNA Analyst, Quattrone sought to identify an approach that might assist a DNA laboratory Technical Leader or laboratory manager with addressing instances of repeated individual departures from protocols, expectations or quality norms. How should managers address repeated unintentional deviations or errors, either from an individual analyst or a group of analysts?

One way to address repeated issues has been demonstrated by the Hospital of the University of Pennsylvania, which uses a "personal accountability tool" to communicate with employees when there are persistent quality issues. The tool is a document that is presented to one or more employees; it identifies a specific quality issue and obtains the employee's specific commitment to following best practices, along with an acknowledgement that the hospital will be forced to act if violations of best practices continue. A sample of a personal accountability tool is below. In this example, written for a specific nursing group, the nurses all reviewed a set of best practices, and the final portion of the agreement states:

The Professional Nurse:

- I understand that unlabeled lab specimens should not leave the patients room
- I have read the above and agree to follow the steps outlined in the best practice and safety checks for sending lab specimens
- *I understand that if I do not follow the correct process for ordering, drawing and sending lab specimens a Note to file for initial mislabeling error & formal Coaching for subsequent infractions will occur.*

The intent of the personal accountability tool is to provide support for employees while at the same time putting them on notice of their obligation to follow certain specific best practices or protocols that have been problematic. The employees are put on notice of the need to do better and reminded that the laboratory may need to remove the employee from his/her role if the quality problems persist.

The personal accountability tool may be helpful to the next iteration of the DNA Laboratory as its leaders strive to implement and maintain a just culture that inspires innovation and quality improvement while promoting personal accountability and quality assurance.

Hospital of the University of Pennsylvania
Department of Nursing
Commitment to Correctly Label Lab Specimens
Personal Accountability Tool

Goal: Providing patient safety for correctly labeling lab specimens in order to prevent erroneous results and wrong treatments to the patient. Safety checks must be in place during all 4 parts of the lab labeling process. Unit Council, lab labeling champions, lab administration and unit leadership has decided to implement this best practice at the time of blood collection for all lab specimens.

Best Practice:
Order lab and obtain Cerner lab label before drawing specimens
All lab specimens will be collected using 2 unique identifiers
All lab specimens will have the correct patient label affixed

Safety checks for lab specimens are a 4-part process:

1. Identifying the patient and the lab label with 2 unique identifiers (Name & DOB or Name & MRN)
2. Drawing the specimen in the correct type of tube-info found on the Cerner Lab label and in your order
3. Drawing the specimens in the correct order
4. Affixing the label in the appropriate manner

The Professional Nurse:

- I understand that unlabeled lab specimens should not leave the patient's room
- I have read the above and agree to follow the steps outlined in the best practice and safety checks for sending lab specimens
- I understand that if I do not follow the correct process for ordering, drawing and sending lab specimens a Note to file for initial mislabeling error & formal Coaching for subsequent infractions will occur.

Clinical Nurse: _____
Date_____

Appendix F. Tarrant County Criminal District Attorney's Office Laboratory and Medical Examiner's Office Disclosure Compliance[261]

Orig. 11-2016

Rev. 11-01-2017

Tarrant County Criminal District Attorney's Office Laboratories and Medical Examiner's Office Disclosure Compliance

The United States Supreme Court has long held that evidence that could potentially assist in the defense of an individual accused of a crime ***must*** be disclosed to the defense. Failure to disclose can result in the reversal of a conviction and, for extreme violations of the rule, prosecution of violators. *Brady v. Maryland,* 373 U.S. 83, 87 (1963).

The duty to disclose rests primarily with prosecuting attorneys but information known to law enforcement agencies – even if never disclosed by those agencies to the prosecution – is still imputed to the prosecution. Timely disclosure of exculpatory, impeachment and mitigating information is also required under the "Michael Morton Act", TEX. CODE CRIM. PROC. art. 39.14(h). Article 39.14 contains no materiality provision for disclosing exculpatory or impeachment evidence. Given that members of your Agency often testify in criminal cases as "expert" witnesses regarding evidentiary testing our office must be informed of anything that could possibly constitute impeachment evidence.

The goal of the Criminal District Attorney is to exercise due diligence in light of our responsibility under the Brady doctrine and Article 39.14 and ensure that all defendants receive a fair trial. Therefore, it is a critical inquiry whether an employee's conduct, personnel history or information from a personnel file might constitute exculpatory, impeachment or mitigating information in a particular criminal case.

[261] ACDLA, CAPDS and JPD state as follows: This form is problematic in a number of respects, and we object to its inclusion as an appendix to the report. Among other things, this form can be read to suggest limitations on disclosure requirements that are contrary to well-established federal laws. For example, the form appears to primarily discuss impeachment information and does not discuss the range of DNA records that can be considered *Brady* material. The form also improperly suggests that a "non-conformity of applicable standards" is not a "reportable event" as long as it is limited and addressed during QA and QC protocols and RCA, as long as the nonconformity is contained "is contained and disclosed within the bench notes of any affected case(s)." *Id.* The *Brady* line does not suggest that an analyst's or any other state actor's summary of a *Brady* material constitutes sufficient disclosure: when records are material, all of the records must be disclosed. Further, evidence that leads to material exculpatory, impeachment, or mitigating evidence is also *Brady* material, as is evidence that impeaches or calls into question the state's investigation. *Kyles v. Whitley*, 514 U.S. 419, 445-446 (1995). Quattrone's response: The form is included as an example of how another jurisdiction has attempted to address disclosure of DNA laboratory information to the downstream criminal justice community in that jurisdiction. Travis County is under no obligation to follow this model, and certainly may wish to modify the text here in meaningful ways if such a model were to be adopted. We offer no opinion on the merits of the defense bar's concerns. Indeed, since the purpose of the document was to provide a model for further discussion on this topic among the stakeholders in Travis County who would be responsible for its implementation and use, we consider the defense bar's legitimate concerns raised herein to be proof that our intention has been successfully realized.

We confidently rely on the professional practices of our Agency partners in notifying us about any conduct of employees which meets our legal obligations.

Laboratory/Medical Examiner Obligation to Notify

Each respective Laboratory or Medical Examiner's Office ("Agency") should determine whether there are any such instances listed below about which the Tarrant County Criminal District Attorney's Office ("CDA") should be made aware. In that regard, the Agency should examine current and future employee personnel files and current and future employee conduct and notify the CDA as soon as possible when:

1) an employee has a pending criminal complaint or indictment or is the subject of an ongoing criminal investigation for any crime other than a Class C misdemeanor traffic violation;

2) an employee has a disposed felony or misdemeanor, other than a Class C misdemeanor traffic violation, committed at any time that resulted in a final conviction, probation, deferred adjudication, or pretrial diversion;

3) an employee has a pending formal investigation, sustained finding, or conclusion by the Agency for any of the following:
   - misrepresentation or failure to disclose a material fact on the employee's application;
   - untruthfulness or deception regarding facts in a report, statement, hearing, or official proceeding; or
   - bias or prejudice to an individual, class, or group of persons;
   - tampering, concealing or intentional misuse of evidence, with the exception of legitimate manipulation in the normal scope of laboratory business.

4) an employee resigns, receives a demotion, or disciplinary action when an investigation is imminent or pending, involving any matter listed in subsection 1,2, 3 (a) – (d) above or in relation to 5, 6 or 7 below;

5) the Agency has information related to an expert witness's performance deficiencies that affect the integrity of the reported results.

6) an employee or the Agency has a pending formal investigation or conclusion that there was professional misconduct or professional negligence as defined by Rule 1.2 of the Texas Forensic Science Commission ("TFSC") Policies and Procedures and as required to be reported to the TFSC under Texas Code of Criminal Procedure 38.01(4)(a), or the applicable accrediting body for that Agency, or

7) an employee or the Agency has a reportable event required to be disclosed to the TFSC or the applicable accrediting body for the Agency. Any subsequent action by the TFSC or accrediting

body, or any subsequently required root cause analysis, as well as the findings of those actions or analysis, should also be conveyed to the CDA for its consideration.

Compliance Procedure

Agency Process

- Furnish to the CDA discovery compliance attorney the employee's name, licensing identification number (if any), and a brief description of the finding and relevant related information.

- Notify whether the disclosure is classified as a "pending formal investigation" or "final" conclusion. Pending formal investigation or final conclusion is defined in a manner consistent with the Agency's individual rules and procedures.

1) Update the CDA of any changes to classifications or if removal from the database is warranted after the completion of the investigation.

2) Contact the CDA if in doubt about whether the conduct requires disclosure.

Criminal District Attorney Process

3) Rely on the due process provided by the Agency through disciplinary or other internal proceedings and will not re-litigate findings.

4) Categorize the disclosure as either "Pending" or "Final" as relayed by the Agency and notify the Agency of inclusion in the database. The Pending category will contain information submitted about pending formal investigations. If Pending allegations are sustained, the inclusion will be re-categorized as Final. If the allegations are not sustained, the case will be removed from the database.

5) Update the Agency regarding any reclassification or removals.

6) Classify any allegations that, if sustained would lead to a "Final" classification, but in which the employee resigns before the investigating body makes formal findings as "Final" and maintain this information in the database unless and until good cause is shown for its removal.

7) Notify the Agency of information independently discovered by the CDA, which may warrant inclusion in the database. If a prosecutor initiates a claim of untruthfulness from conduct occurring during judicial proceedings, the individual prosecutor must also immediately report such incident to the prosecutor's supervisor for the investigation and initiation of a charge of perjury against the employee.

8) Each ACDA shall check the database and notify opposing counsel of inclusions. "Pending" notices should be made to the defense but not filed in the records of the court unless done under seal or with the appropriate requests to the trial court for inspection and orders.

9) Disclosure information will be used to meet the State's obligation under the law with respect to cases that we prosecute.

10) Sponsorship of an employee in the database will be made on a case by case basis.

- Disclosure does not equal admissibility and, when appropriate, the CDA will object to the admissibility of the disclosed evidence through written motions and argument.
- Disclose upon employee written request his or her own inclusion in the database for any "Final" disclosure.
- Disclose a person's inclusion in the database to a potential employer agency with an executed waiver by applicant to the Agency.

For the purposes of 7) above a reportable event is one which 1) impacts the fundamental reliability of the overall laboratory/agency work product such that it poses a significant risk to processes, results, test/calibration items or judicial proceedings; or 2) does not impact the fundamental reliability of the overall laboratory/agency work product but does cast substantial doubt on the quality of the work product.

A reportable event does not include nonconformity of applications of standards, procedures or policies that are limited and appropriately addressed during quality assurance or control protocols and attendant conducted root cause analysis, provided that such nonconformity is contained and disclosed within the bench notes of any affected case(s).

Appendix G. Options Not Considered for "DNA Laboratory 2.0"

Outsourcing	DPS	Government-owned	Public University	Medical Examiner
• Cost/financial burden of bringing back expert testimony from an outsource lab • May not meet expectations as compared with other options • Long turnaround time for results due to backlog (for now) • Separate provision for CODIS upload required	• Local needs would compete with State-wide analysis requirements • Increased probability of attrition as analysts look to move to other DPS labs for various reasons	• Although there are Federal examples of this structure, this would be uncharted territory for local government • May not meet expectations as compared with other options • Similar structure goal as an LGC • Business stability • Separate provision for CODIS upload required	• Requires State funding and may require corresponding legislative action	• Not considered a viable option

Appendix H. Additional Case Issues Identified by UNTHSC/CHI

After the TFSC audit was completed, the UNTHSC/CHI reviewed the case documentation for 47 criminal cases worked by the APD DNA Laboratory between 2010 and 2015. This review was initiated by stakeholders in Travis County as part of a post-conviction legal materiality case triage process. The UNTHSC/CHI's analysis was limited to information available in case records; no physical evidence was re-tested. The issues described in this appendix were identified by UNTHSC/CHI in addition to the issues flagged during the TFSC audit. It is important to note the following regarding this list: (1) the problems described do not necessarily constitute an exhaustive list of errors in the 47 cases but rather focus on the most noteworthy issues observed; (2) the cases are not a representative sampling of APD DNA casework but rather constitute a small number of cases selected through the legal materiality triage process; (3) the analytical review performed by UNTHSC/CHI should not be viewed as a laboratory re-assessment or audit; and (4) UNTHSC/CHI's work is ongoing.

- Analyzing the Items of evidence at an analytical threshold lower than controls;
- Using a longer injection time for evidence than the negative amplification and positive controls;
- Contamination observed with reagent blanks in a couple of cases;
    - The laboratory should take extra steps to ensure that reagent blanks (RBQs) are far away from samples to avoid contamination from the samples or from ejecting tips into biohazards.
    - No additional reviews of processes and no training of others in the lab were noted.
- Evidence handling: two separate items of clothing were placed in the same evidence envelope. The DNA analyst proceeded with her analysis notwithstanding the potential confounding effects of the two items of clothing. Corrective policies have been enacted within the APD crime scene unit to address this issue.[262]

[262] Personal communication, Lynn Robitaille Garcia, Texas Forensic Science Commission.

Appendix I. List of Acronyms

ANAB	ANSI National Accreditation Board
AP	Acid Phosphatase
APD	Austin Police Department
ASCLD/LAB	American Society of Crime Lab Directors/Laboratory Accreditation Board
ASG	Austin Stakeholder Group
CLE	Continuing Legal Education
CODIS	Combined DNA Index System (national FBI DNA database)
CPI	Combined Probability of Inclusion
CSAFE	Center for Statistics and Applications in Forensic Evidence
DAO	District Attorney's Office
DNA	Deoxyribonucleic Acid
DPS	Texas Department of Public Safety
HR	Human Resources
ISO	International Organization for Standardization
JSAP	Justice Stakeholder Advisory Panel
NFSTC	National Forensic Science Testing Center
NIST	National Institute of Standards and Technology
OSAC	Organization of Scientific Advisory Committees (NIST committees for forensic science advancement)
QA	Quality Assurance
QAS	Quality Assurance Standards for DNA (FBI Standards)
QBST	Quantification-Based Stochastic Threshold
RCA	Root Cause Analysis
SAP	Scientific Advisory Panel
SOP	Standard Operating Procedure
SWGDAM	Scientific Working Group on DNA Analysis Methods
TFSC	Texas Forensic Science Commission

QUATTRONE CENTER

for the Fair Administration of Justice

Penn Law

University of Pennsylvania Carey Law School

DNA Lab Project Stakeholders

Project Workgroup

Name	Organization
Rey Arellano	City of Austin (Co-chair)
Roger Jefferies	Travis County (Co-chair)
Selena Alvarenga	Austin Criminal Defense Lawyers Association
Alice Amilhat	Texas Department of Public Safety
Lindsay Bellinger	Capital Area Private Defender Service
Krista Chacona	Austin Criminal Defense Lawyers Association
Gregg Cox	Travis County District Attorney's Office
Jane Eggers	Capital Area Private Defender Service
Peter Einhorn	Office of Travis County Judge Sarah Eckhardt
Troy Gay	Austin Police Department
Cary Grace	City of Austin Law Department
Debra Hale	Criminal Courts Administration
Bradley Hargis	Capital Area Private Defender Service
Dana Kadavy	Austin Police Department
Jennifer Kraber	Travis County Attorney's Office
Kameron Johnson	Juvenile Public Defender Office
Stacie Lieberman	Capital Area Private Defender Service
John Lopez	Travis County District Attorney's Office
Brian Manley	Austin Police Department
Margaret Moore	Travis County District Attorney
Walter Muse	Office of Commissioner Jeffrey Travillion
Scott Ruplinger	Juvenile Public Defender Office
Barbara Rush	Office of Commissioner Brigid Shea
Trudy Strassberger	Capital Area Private Defender Service
Martin Zamzow	Office of Commissioner Gerald Daugherty

Advisory Panel

Name	Organization
Gary Bledsoe	Texas NAACP
Ana Defrates	Survivor Justice Project
Lynn Garcia	Texas Forensic Science Commission
Jeremy Martin	Austin Chamber of Commerce
John McCormick	Defense Attorney
Matt Simpson	Texas ACLU
Kelly White	The SAFE Alliance

SENT VIA ELECTRONIC MAIL

August 14, 2020

Roger Jeffries, Justice & Public Safety County Executive, Travis County
(roger.jefferies@traviscountytx.gov)
Rey Arellano, Assistant City Manager, City of Austin (rey.arellano@austintexas.gov)
John Hollway, Quattrone Center for the Fair Administration of Justice (jhollway@law.upenn.edu)

Dear Messrs. Jefferies, Arellano and Hollway:

The Austin Criminal Defense Lawyers Association (ACDLA) and the Capital Area Private Defender Service (CAPDS) appreciate the City of Austin and Travis County's efforts to gain a more comprehensive understanding of the problems that occurred in the former Austin Police Department DNA Laboratory ("APD DNA Lab"). We also appreciate that the Quattrone Center for the Fair Administration of Justice ("Quattrone") has made some edits to its draft report on the former APD DNA Lab in response to Austin Stakeholder Group (ASG) members' concerns. Thanks to Quattrone's work, substantial improvements have been made to the Draft Report. We write today, however, because a number of our concerns and edits—many of which we have been raising since November 2019—were not addressed in the most recent draft of the report, which was sent to us on July 30, 2020 (hereinafter "7/30/20 Draft").[1]

As an initial matter, we note that Quattrone's response to our objection regarding its lack of transparency is incorrect. *Id*. at 121, n. 243. ASG members did not enter into an agreement with Quattrone that made its records confidential until we seek legal process.[2] *Id*. Moreover, such an agreement would be contrary to the contract between the City of Austin and the Trustees of the University of Pennsylvania.[3] This contract specifically provides that all of Quattrone's records and materials are public information[4] and requires Quattrone to turn over information that may constitute *Brady* material.[5] To the best of our knowledge, no such material has been provided, despite multiple requests. Further, Quattrone's claim that the records "are now being released in a method that honors that agreement" is false. *Id*. at 121, n. 243. There is no agreement and the only ASG members that Quattrone released some of these records to are Travis County District Attorney's Office prosecutors. Quattrone's lack of transparency and its misstatements have regrettably created a situation that ACDLA and CAPDS worked to avoid. Beginning in November 2019, right after the first draft of the report was released to the ASG, we wrote Quattrone about this issue multiple times, met with them, and attempted to come to a reasonable resolution.[6]

[1] The draft of the report we received as a pdf on July 30, 2020 is entitled "Quattrone Final Report Word- 7-28-20."
[2] No representative of CAPDS—past or present—who has served or is serving on the ASG recalls an agreement by which the stakeholders would be prevented from viewing the records and information that Quattrone has created and relied upon in its report.
[3] Contract Between the City of Austin and the Trustees of the University of Pennsylvania for DNA Consulting Services, MA 8700, PA180000002 (hereinafter "Contract").
[4] *Id*. at 7.10.2
[5] *Brady v. Maryland*, 373 U.S. 83 (1963); Contract, Exhibit C, 4.2 (H) ("The contractor shall disclose information discovered during the course of the review that may be considered exculpatory or impeachment [evidence] as defined by *Brady v. Maryland*, the Michael Morton Act, and Texas case law. This disclosure should be made to both the City and The County in a timely fashion.").
[6] Consequently, a letter requesting preservation in anticipation of litigation is being sent concurrently to Quattrone and Morgan Lewis & Bockius, LLP.

We have invested a considerable amount of time reviewing Quattrone's drafts and providing it with our edits and concerns because the rights of our clients and potential clients are at risk should Quattrone fail to address these concerns, and the report could negatively affect the ways in which the future DNA laboratory in Austin is structured and comes to fruition. Our concerns are heightened because it seems that Quattrone did not recognize or chose to ignore the fact that there are hundreds of cases in Texas that may have been affected by the former APD DNA Lab's work, and these cases are not final. Literature on "root cause analysis" (RCA)/sentinel event analysis, including studies published by the National Institute of Justice (NIJ), warn against conducting such analyses when cases potentially affected by the event/s being studied are not final.[7] One of the primary reasons that this is problematic is that some RCA practitioners espouse the view that their records and analyses should be confidential. Disturbingly, publications—including NIJ publications on applying RCA to the criminal justice system—recognize the conflict between the law and RCA practitioners' desire for their records to be confidential, but then go on to suggest ways in which to prevent disclosure of RCA records and related records.[8] If indeed the purpose of RCAs is "learning," then the processes followed and the records created and relied upon during an RCA should be accessible to everyone.[9]

As defense and habeas attorneys, we are certainly in favor of systemic change and recognize that problems with the criminal justice system are not solved by simply punishing certain individuals. Concurrently, accountability and transparency of state and private actors' (such as Quattrone's) processes are critical to improving the system.[10] We appreciate some of the work that Quattrone has done and agree with a number of the recommendations in the 7/30/20 Draft, but it appears that Quattrone is unwilling to make some critical edits, even edits that the Travis County District Attorney's Office and ACDLA, CAPDS and the Travis County Juvenile Public Defender's Office (JPD) collectively agreed upon. Therefore, instead of reiterating our edits, we provide the following objections and request that this letter be included in the final report, unless changes are made to the report and the process that fully address these objections:

1) ACDLA and CAPDS continue to object to Quattrone's lack of transparency regarding the records it created, received, and relied upon. The contract that Quattrone entered into with the City shows that the expectation of City and Travis County Officials and subgroups, such as the ASG, was that that Quattrone's records and process would be transparent. The contract is quite clear that all records and other information Quattrone and its agents created and relied upon are public records, and no oral agreement can modify that fact.[11] This contract has not been amended, and therefore if

[7] Beatrice Aguirre, *Beyond Bad Apples: Adopting Sentinel Event Reviews in Nevada's Criminal Justice System*, 18 NEV. L.J. 1059 (2018) (citing Nat'l Inst. of Justice, *Paving the Way: Lessons Learned in Sentinel Event Reviews*, 13 (2015); Dan Simon, *Front-end and Back-end Solutions*, in Nat'l Inst of Justice, *Mending Justice: Sentinel Event Reviews*, 28 (2014)).

[8] Nat'l Inst. of Justice, *Paving the Way: Lessons Learned in Sentinel Event Reviews*, 13 (2015); James M. Doyle, *Learning from Error in the Criminal Justice System: Sentinel Event Reviews,* in The National Institute of Justice, *Mending Justice: Sentinel Event Reviews*, 13 (2014) ("In some jurisdictions, for instance, a sentinel event review conducted by a school of criminal justice or the judiciary might provide a shield against Freedom of Information Act and public records requests.").

[9] Nany Ritter, *Testing a Concept and Beyond: Can the Criminal Justice System Adopt a Nonblaming Practice?,* 6 (2015) (quoting John Hollway: "'their [SERs] purpose is learning, not punishment,' he said, adding that personnel and discipline issues are handled through separate processes, which is something that other fields—such as medicine and aviation—have worked out, including by making the results of a review inadmissible as evidence in litigation.")

[10] Code of Professional Responsibility for Forensic Analysts and Crime Laboratory Management Subject to the Jurisdiction of the Texas Forensic Science Commission, §651.219 effective May 16, 2018, 43 TexReg 3106, c(3)-(5) (recognizing the importance of transparency and accountability).

[11] Contract provision 7.10.2 states,

Quattrone made any promises of confidentiality it violated that provision in the contract.[12] Moreover, if Quattrone has withheld any records or other information that may constitute *Brady* material[13] or would be disclosed pursuant to the Michael Morton Act and/or Texas case law, it has violated the contract.[14]

2) ACDLA and CAPDS object to all statements and suggestions made in Quattrone's report that the requested records "are now being released" to stakeholders. 7/30/20 Draft at 121. The only ASG members who have received access to some critical records—such as the interviews that form the bases of Quattrone's opinions in the 7/30/20 Draft—are Travis County prosecutors. Especially now that the District Attorney's Office has possession of these records, all exculpatory and impeachment evidence in those records must be disclosed to defense and habeas attorneys in short order.

3) ACDLA, JPD and CAPDS object to Quattrone's insistence on including Appendix F, a Tarrant County disclosure form. The Travis County District Attorney's Office did not disagree with our objection to this form (*see* 7/30/20 Draft at 140, n. 261), but Quattrone nevertheless included it as an appendix. This insistence to include a form that provides ways in which lab employees can deem records not reportable does not foster discussion, as Quattrone suggests, but instead presents as a model a process that limits prosecutors' and defense attorneys' access to laboratory information and hinders the state's ability to fulfill its constitutional and statutory disclosure obligations.

4) ACDLA, JPD and CAPDS object to the multiple times in the report in which the unorthodox quant-based stochastic threshold (QBST) approach is misrepresented. While Quattrone correctly acknowledges that the QBST was not used by any other lab in this country, it then incorrectly suggests that QBST was a legitimate method that was considered by the scientific community. 7/30/20 Draft at 17, 37, 40. Quattrone also analogizes QBST and CPI when they are fundamentally different: CPI was and is a generally accepted method when applied properly, but QBST never was. *Id*. at 17. Further, the scientific community did not "implicitly" caution against the use of QBST because no one outside of the APD DNA Lab even considered using such a flawed technique. *Id.* at 17, 37.

5) ACDLA, JPD and CAPDS object to Quattrone's conclusions about contamination events that occurred in the lab. Quattrone has conceded that its review was "limited to evaluating the environment in which contamination events occurred in the APD DNA Laboratory," but then goes on to import meaning into the fact that some contamination events were recorded and concludes, "the Quattrone Center found no reason to believe that the final case reports for the cases listed in the contamination log were negatively impacted by the contamination events." *Id*. at 50; *id*. at 50, n. 170. Quattrone also inappropriately assumed that the APD DNA Lab employees recorded all of the contamination events when it spoke with experts to "evaluate whether the number of contamination events in the DNA Laboratory was itself cause for concern"—interviews that the

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> Contractor acknowledges that all materials and other documents collected, compiled, generated or otherwise created by Contractor in the course of providing the Deliverables to the City are presumed to be either local government records or public information, both of which are subject to public disclosure under the Texas Public Information Act, currently codified at chapter 552 of the Texas Government Code. Contractor agrees that it must notify any third party from whom it collects any information or documentation of this presumption, and agrees that it may not make any representations or promises of confidentiality to the contrary to any third party.

Id.; Gov't Code § 552.001 *et seq*., § 552.002(a).

[12] Contract, 7.10.2.

[13] *Brady*, 373 U.S. 83.

[14] *Id*., Exhibit C, 4.2 (H).

ASG (except for Travis County District Attorney's Office members) have never been allowed to review. *Id*. at 50.

6) ACDLA, JPD, and CAPDS object to Quattrone opining that scientific studies referenced in the report show that no harm was caused by lab errors/protocol deviations, especially because Quattrone did not review those studies. For example, Quattrone opined that the lab analysts were "correct" in their feeling that there would be no harm in using AP reagent weeks after the manufacturers daily expiration limit because "subsequent studies conducted after the TFSC Audit Report revealed that the useful life of the reagent when stored according to the APD SOPs was past the period of the time that APD Analysts had been using individual batches of the AP Reagent." 7/30/20 Draft at 63. Assuming that the former APD DNA Lab followed its SOPs is a big assumption, and it is worth noting that ACDLA, JPD, and CAPDS received only one study and none of the underlying data. When we asked for copies of the data, Quattrone indicated that it does not have it.[15] Therefore, Quattrone has alleged in its report that the former analysts' use of unvalidated process was "correct" without, it seems, reviewing the data of the study or "studies" conducted by state agents.

7) ACDLA, JPD and CAPDS object to Quattrone's statements about former APD DNA laboratory analysts', technical leaders', and other individuals' intent and knowledge or lack of knowledge.[16] Quattrone was not asked to do a judge or jury's work and decide who had knowledge of the problems within the lab and whether intentional malfeasance or misconduct occurred, nor is Quattrone's work and knowledge sufficient to render such conclusions. Moreover, from a scientific perspective, Quattrone's evaluation did not involve a scientifically representative sample of cases that would allow it to reach such conclusions.

8) ACDLA and CAPDS object to Quattrone's statements that the proposed Scientific Advisory Panel (SAP) and the Justice Stakeholder Advisory Panel (JSAP) do the future DNA laboratory's work and "ensure continuous high-quality laboratory practices." 7/30/20 Draft at 35, 54, 78, 79. We are in favor of SAP and JSAP, but these voluntary groups comprised of individuals with other full-

[15] Email Message Sent by John Hollway (7/18/2020).

[16] 7/30/20 Draft Report at 23 (arguing that the "Technical Leader's argument pointed to a plain reading of the SWGDAM Guidelines" when DNA experts made clear that it was a poor interpretation of those guidelines and an understanding not based on science); *id*. at 46 ("but even if the suspension from casework was caused by a reasonable and unintentional error, and the DNA expert's criticism was a reasonable scientific disagreement rather than a true quality concern"); *id*. at 52 (characterizing errors as "accidental or unintentional" and stating that the results of the errors were "not intended"); *id*. at 66 (arguing that an analyst was not acting "deliberately deceptive but rather had a poor understanding of the laboratory's role within the criminal justice system"); *id*. (arguing that the analysts' lack of awareness of disclosure obligations and a "culture characterized by a lack of transparency prevented important information about a laboratory issue from being disclosed outside of the DNA Laboratory"); *id*. at 67 (stating for the "I-3 Contributing Factor" that "[n]either the APD DNA Technical Leader nor APD Laboratory management appeared to understand the obligations of the Travis County DA's Office to disclose to courts, defense attorneys, and others any information that could lead to potentially exculpatory evidence or lead to impeachment information."). We also object to Quattrone's attempt to suggest that external influences and "chance"—not the former APD DNA Lab employees' individual agency—were the real reasons behind the errors. *See, e.g*., *id*. at 43 (observing the QBST validation study was initiated on the same day in April 2010 as the ASCLD/LAB initiated its accreditation visit and finding that this suggests "that the accreditation review may have acted as an external variable limiting the conduct of robust validation studies" when that study and other validation studies could and should have been done previously); *id.* at 79 ("Once again, numerous factors – some structural, some informational, and some due to chance – combined to allow the APD DNA Laboratory to engage in suboptimal practices without being detected by an imperfect and misunderstood auditing and accreditation regime, and contributing to a misplaced sense of confidence in the Laboratory's quality by APD leadership and the rest of the Austin criminal justice system.").

time jobs and limited access to the DNA laboratory cannot fully monitor and ensure that the laboratory does high quality work. That is the job of lab employees in quality assurance and management positions. The report should make clear that SAP and JSAP are simply advisory panels.

9) ACDLA, JPD, and CAPDS object to the following discussion in its 7/30/20 Draft:

> the concept that downstream recipients of data or reports from a DNA laboratory can contribute to improving the criminal justice system by identifying concerns with the laboratory's techniques, policies, processes or output does not suggest that they could be legally or factually 'responsible' for any specific violation of due process rights that may be suffered by an individual in a criminal case.

7/30/20 Draft at 70, n. 195. The report should clearly explain that while judges, prosecutors, and defense attorneys are not responsible for the errors that occur in laboratories, the state does have the responsibility to disclose material exculpatory or impeachment evidence to defense or habeas counsel, and when that does not occur, a defendant's or applicant's right to due process is violated. *Brady*, 373 U.S. at 87; *Kyles*, 514 U.S. at 421. Therefore, when laboratories fully disclose their records, that act can help prevent violations of due process.

10) ACDLA, JPD and CAPDS object to Quattrone's suggestion, in Appendix H of the 7/30/20 Draft, that the UTHSC/CHI review of some case-specific DNA records in 47 cases is a representative sample and constitutes a study or audit of the former lab's work. 7/30/20 Draft Report at 145. We also object to Quattrone's suggestion that the issues listed are all of the issues identified by UNTHSC/CHI because that is not accurate and their work is ongoing. *Id*.

A related concern that ACDLA and CAPDS have is that Quattrone may argue in court proceedings that its method and practices are confidential and should not be subject to disclosure. However, like many RCA practitioners, Quattrone has presented on and written about its RCA approach in public forums and publications, and therefore it is not confidential.[17] Especially because Quattrone is working with public entities on policy issues, the public's interest in transparency far outweighs any economic interest it may have, and given the nature of its work and the contract it agreed to, any information about Quattrone's approach revealed in its records are, like the records, public information.

Travis County and the City of Austin lead the nation in identifying and remedying issues that have profound effects on underserved and underrepresented populations, including criminal defendants, habeas applicants, their families, and their communities. We are grateful to be a part of this effort. Thank you for your time and for including this letter in the final report.

[17] John Hollway, Calvin Lee, *Root Cause Analysis: A Tool to Promote Officer Safety and Reduce Officer Involved Shootings Over Time*, FACULTY SCHOLARSHIP AT PENN LAW, 1958 (2017) (describing their RCA approach); John Hollway, *A Systems Approach to Error Reduction in Criminal Justice*, FACULTY SCHOLARSHIP AT PENN LAW, 976 (2014) (describing his approach to applying RCA in criminal justice settings); *Using Root Cause Analysis to Instill a Culture of Self-Improvement: Program Replication Materials*, Innovations in Criminal Justice Summit (2015) (describing an "RCA" conducted by Quattrone and a District Attorney's Office); Speaker – John Hollway *A Systems Approach to Error Reduction in Criminal Justice* (2014), https://crim.sas.upenn.edu/events/speaker-john-holloway-systems-approach-error-reduction-criminal-justice (last visited August 11, 2020).

Sincerely,

The Austin Criminal Defense Lawyers Association
Capital Area Private Defender Service