No. 21-442

IN THE

Supreme Court of the United States

RODNEY REED, PETITIONER
v.
BRYAN GOERTZ, *et al.*

ON WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FIFTH CIRCUIT

BRIEF FOR CHASE BAUMGARTNER AS AMICUS CURIAE IN SUPPORT OF PETITIONER

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INTEREST OF AMICUS CURIAE[1]

Baumgartner writes to the Court as he believes, after reviewing the Court of Criminal Appeals of Texas's opinion, that, with regards to the belt, the Court of Criminal Appeals of Texas misunderstood the condition evidence must be in to be acceptable to TXDPS for DNA analysis. Baumgartner respectfully disagrees that the evidence is not appropriate for DNA testing only because it is potentially cross-contaminated.

[1]Pursuant to S. Ct. Rule 37.6 counsel for all parties to this matter have filed blanket consent for amicus curiae briefs in this case. No counsel for a party authored this brief in whole or in part. No person or entity other than amicus curiae and counsel for amicus curiae made a monetary contribution to the preparation or submission of this brief.

IDENTITY OF AMICUS CURIAE

Baumgartner is a former DNA analyst of the Texas Department of Public Safety ("TXDPS"). He was employed for eight years in the Austin-area crime laboratory and left in 2018 with the title of Lead Forensic Scientist. During his tenure with TXDPS, Baumgartner was responsible for examining evidence, testing the evidence for biological material, performing DNA analyses on any detected biological material, reporting his findings, and testifying in court as to those findings. During those eight years, Baumgartner testified as an expert witness for the State of Texas approximately twenty times. Additionally, he worked directly on hundreds of criminal cases, either by examining the evidence, writing reports, or reviewing cases of other DNA analysts to ensure accurate and reliable methods were used. Additionally, he was involved indirectly in numerous other cases by processing thousands of samples through the DNA analysis protocols with the aid of high-throughput robotics. Baumgartner's involvement, as confirmed by TXDPS, in Petitioner's case was limited to reviewing non-evidentiary data generated by another DNA analyst. Baumgartner has not previously reported on or performed scientific analysis on evidence in Petitioner's case.

Like the vast majority of crime laboratory requests, Baumgartner was primarily involved in pre-trial analysis for recently committed crimes. Yet there still was a significant amount of work that came from testing evidence from crimes committed far in the past in the form of either post-conviction or cold-case testing. This often-included evidence that had been

stowed in the courthouse for years, stored improperly in evidence warehouses by law enforcement, or generally was in less than pristine condition compared to evidence associated with more recent cases.

In all instances, murder weapons were often the centerpiece of DNA analysis and were routinely tested. Murder weapons represent that single piece of evidence that could contain both the perpetrator's DNA and the victim's DNA. As such, murder weapons were often the requested crucial tests of evidence from law enforcement and District Attorney's offices. For example, if a knife were to be used in a stabbing, samples would be typically collected from both a blood stain on the blade and from the potential skin cells on the handle. Forensic scientists perform this dual testing in the attempt to prove both, who potentially wielded the knife and that the knife was used to stab the victim. Likewise, in a strangulation case such as this, the ligature would be tested to prove who used the ligature to strangle the victim. Samples would be strategically collected from areas on which the assailant must have exerted substantial physical force to cause the strangulation. These areas would include the ends of the ligature, any knots tied in the ligature, and, as present in Petitioner's case, rips in the ligature material.

In addition to his regular duties, Baumgartner trained analysts for TXDPS and Austin Police Department. He trained analysts at every stage of the serology, which is the examination of the evidence for the presence of biological material, and DNA processes for TXDPS. When the Austin Police Department's DNA section was closed for improper

scientific methods and protocols, Baumgartner was appointed by TXDPS to be involved in the training of Austin Police Department's staff in both the high-throughput robotics and serology. TXDPS presented Baumgartner with an Excellence Award for his role in training the Austin Police Department's staff.

Baumgartner was also recognized for his work on improving TXDPS's DNA mixture interpretation. Baumgartner was one of four scientists TXDPS appointed to implement DNA mixture deconvolution software in all of the crime laboratories TXDPS oversees. This software breaks DNA mixtures into separate DNA profiles of the potential individuals who contributed to the DNA mixture. Additionally, it provides statistics on the likelihood of observing the evidence if it came from the individuals of interest rather than unknown individuals. In short, the software allows for reliable, consistent, and accurate interpretation of DNA mixtures that were once too complex to interpret by DNA analysts alone.

Baumgartner, as part of the four-scientist team, evaluated the software for scientific accuracy and reliability and implemented it in TXDPS crime laboratories across the state. The implementation team also trained every TXDPS DNA analyst in the use and understanding of this software. For his role in this implementation, TXDPS Crime Laboratory Director Brady Mills presented Baumgartner with an Assistant Division Director's Award for Outstanding Performance in which Director Mills noted:

> [Baumgartner], along with other team members, helped validate, implement and train the [DNA mixture

> deconvolution] software for the entire DPS DNA system. This was done under extreme pressure with deadlines to meet. He performed above and beyond expectations and delivered a quality product that has and will have a profound impact on the nature of mixture interpretation in the state of Texas.

Baumgartner's participation with the DNA mixture deconvolution software culminated in him co-authoring a joint publication with thirty-one other crime laboratories. In this publication, thirty-one crime laboratories shared data from all respective studies evaluating the DNA mixture deconvolution software. The data was reviewed, analyzed, and determined to be scientifically valid as used across the various laboratories. TXDPS and numerous other crime laboratories presently use this software, and Baumgartner is an expert on its use and application.

SUMMARY OF THE ARGUMENT

The opinion from the Court of Criminal Appeals of Texas affirmed the denial Petitioner's Chapter 64 request for post-conviction DNA testing. In its opinion, the court found that the belt used to strangle Ms. Stites was not subjected to a sufficient chain of custody. In support of its finding, the court noted that the chain of custody for the belt was not sufficient for DNA testing because the storage conditions in which it was discovered and its use at trial made it possible that the belt had been cross-contaminated by other evidence or individuals.

However, the court was seemingly unaware of TXDPS policy that allows for the analysis of cross-contaminated evidence or TXDPS's implementation of DNA mixture deconvolution software. This software allows DNA analysts to better report complex DNA mixtures and make interpretations that are more accurate and reliable than those that are made without the aid of such software. This is true even when the evidence may be contaminated.

Moreover, all DNA analysis, whether pretrial or post-conviction, runs the potential of being or becoming contaminated. Yet, DNA analysis is routinely offered to and relied upon by judges and juries. To say that potential contamination casts doubt on the integrity of the evidence only in post-conviction settings ignores the various manners and methods by which evidence may be contaminated at any stage in a case. Even with the potential contamination of this belt, if an interpretable DNA profile is developed from the belt, the mixture deconvolution software could determine if Petitioner or Mr. Fennel are true donors or non-contributors to the DNA profile with higher than 95% accuracy. Therefore, since the potential contamination addressed in the Court of Criminal Appeals of Texas's opinion does not make the evidence unacceptable for DNA analysis, it was improper to deny Petitioner's Chapter 64 motion on such grounds.

ARGUMENT

To order post-conviction DNA testing, chapter 64 of the Texas Code of Criminal Procedure requires that

the evidence "has been subjected to a chain of custody sufficient to establish that it has not been substituted, tampered with, replaced, or altered in any material respect."[2] When examining this requirement in Petitioner's case, the Court of Criminal Appeals of Texas found that the State's experts' testimony established that the items the trial judge deemed contaminated or tampered with were trial exhibits that were not individually packaged and subsequently handled by many people without gloves.[3] To the court, those issues "cast[] doubt on the evidence's integrity, especially for the specific testing [Petitioner] seeks."[4]

A. Petitioner requested routine DNA analysis.

The court indicates that the DNA testing Petitioner requests is prone to integrity issues as it is "a relatively new DNA technique that can develop a DNA profile from epithelial cells left by those handling the item."[5] The court noted that this technique is called touch DNA.[6]

Though perhaps not historically thought of concerning DNA analysis, skin cells have been a known source of testable DNA for over twenty years.[7]

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[2]TEX. CODE CRIM. PROC. ANN. § 64.03(a)(1)(A)(ii).
[3]*Reed v. State*, 541 S.W.3d 759, 770 (Tex. Crim. App. 2017).
[4]*Id.*
[5]*Id.* at 769.
[6]*Id.*
[7]Roland A.H. van Oorschot & Maxwell K. Jones, *DNA fingerprints from fingerprints*, 387 Nature 767 (1997) (developing DNA profiles from fingerprints); Alex Lowe et al.,

Touch DNA analysis is DNA analysis that is conducted on skin tissue or cells on items of evidence, even in the absence of suspected biological *fluids* such as blood or semen.[8] Moreover, now even some biological fluids that do not naturally contain DNA (like sweat, saliva, and urine) are considered vectors for touch DNA as those fluids can be carriers for skin cells.[9] For these reasons, TXDPS performs touch DNA analysis as it recognizes that even "[t]he slightest amount of DNA can now be detected with the very sensitive technologies in use."[10]

B. The potential contamination of the belt is typical in DNA analysis.

It is these sensitive technologies in use, not the source of the DNA being tested, that have increased the awareness of contamination in DNA analysis. Further, the conditions under which the evidence has been stored or handled before submission to a laboratory are never fully known by laboratory staff.

The propensity of individuals to deposit DNA and secondary transfer of low-level DNA from individuals to inert surfaces, 129 Forensic Sci. Int'l 25, 25–34 (2002) (determining that developing a full DNA profile from an item a person has merely touched is possible); Nat'l Inst. of Just., *Understanding DNA Evidence: A Guide for Victim Service Providers* (2001) (informing victim service providers where to collect potential skin cells for subsequent DNA analysis).

[8]Tex. Dep't of Public Safety, *Crime Laboratory Division Manual* 93 (2022) (emphasis added).

[9]Linda Jansson et al., *Individual shedder status and the origin of touch DNA*, 56 Forensic Sci. Int'l: Genetics 1, 6 (2022).

[10]*See* Tex. Dep't of Public Safety, *Crime Laboratory Division Manual* 75, 93 (2022) (discussing how detectable DNA contamination can occur simply by "touching a surface").

With this uncertainty, TXDPS has developed rigorous protocols for discovering and reporting DNA profiles despite potential contamination. To say it another way, contamination is a concern in DNA analysis whether performing analysis on blood, semen, or skin cells. It is not a unique concern of skin cells that casts doubt on the integrity of DNA, rather contamination is a concern in every DNA analysis.

Even before the rise of touch DNA analysis, the forensic community recognized that:

> DNA evidence can be contaminated when DNA from another source gets mixed with DNA relevant to the case. This can happen when someone sneezes or coughs over the evidence or touches his/her mouth, nose, or other part of the face and then touches the area that may contain the DNA to be tested.[11]

Crime laboratories, including TXDPS, operate under protocols that account for, detect, and report results in instances where the evidence has been contaminated regardless of the source of the DNA.

Laboratories recognize three manners of contamination: "(1) internal contamination between the samples and the DNA analysts, (2) cross-contamination between evidence of same case or different cases, and (3) external contamination which happens between the DNA samples and the police

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[11]Nat'l Comm'n on the Future of DNA Evidence, *What Every Law Enforcement Officer Should Know about DNA Evidence* (1999).

force or crime scene experts or manufacturers of reagents or consumables."[12] In post-conviction testing, the third manner can be expanded to include judges, jurors, and court personnel. While it is with the third manner of contamination the Court of Criminal Appeals of Texas has an issue in Petitioner's case, DNA analysts routinely conduct testing aware that any of the three manners may affect a particular case.

Again, the Court of Criminal Appeals of Texas found that the evidence was contaminated or tampered with because the evidence was not individually packaged and many people handled the evidence without gloves.[13] Though not central to its finding, the court also noted that the evidence was found in "unsealed boxes."[14]

i. TXDPS has protocols for accepting and testing unsealed evidence.

TXDPS procedures allow for the crime laboratories to accept and receive evidence in unsealed or improperly sealed packaging.[15] If evidence is submitted without a proper seal TXDPS either asks the customer to apply a proper seal at the time of submission, or TXDPS will apply a proper seal if the

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[12]Noora R. Al-Snan & Najib M. Alraimi, *Comparison between various DNA sterilization procedures applied in forensic analysis*, 12 Egyptian J. of Forensic Scis. 5, 5 (2022).
[13]*Reed v. State*, 541 S.W.3d 759, 770 (Tex. Crim. App. 2017).
[14]*Id.* at 767.
[15]Tex. Dep't of Public Safety, *Crime Laboratory Division Manual* 268 (2022).

customer is unavailable.[16] This is done to ensure that the laboratory does not add to issues that may affect the evidence, but the laboratory does not require guaranteed-pristine evidence before it is appropriate for analysis. On the contrary, it was often enough that law enforcement would bring evidence in unsealed containers that a policy for handling such circumstances was developed. The laboratory makes no assumptions about the state of the evidence before it arrives at the laboratory and is aware that contamination before submission by law enforcement is always a possibility.

ii. TXDPS has protocols for accepting evidence that is commingled.

TXDPS does support that packaging items of evidence separately is the best practice to prevent cross-contamination between items.[17] The concern over contamination is discussed *infra*. However, TXDPS also notes that some evidence may be packaged together. TXDPS's policy expressly states that "[s]wabs that are collected from a single stain may be packaged together in the same container."[18] When discussing the packaging of articles of clothing, TXDPS instructs that the evidence collected from one individual should not be packaged with evidence collected from a second individual; the clear implication is that clothing from the same person may be packaged together.[19] In Amicus's experience,

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[16] *Id.*
[17] *Id.* at 192.
[18] *Id.*
[19] *See id.*

evidence collected from the same area was often submitted in the same container or packaging.

The State's expert testified that contained within the same box were a blue pair of pants, a pair of panties, two socks, two shoes, a bra, a T-shirt, an earring, a back brace, a red HEB embroidered T-shirt, a knife, pieces of a broken plastic cup, Ms. Stites's name tag, and a brown planner.[20] Most of the evidence that was packaged together was clothing from the same individual. At worst, packaging the evidence in the same container may allow for cross-contamination between the items and TXDPS has protocols for detecting and addressing contamination.

iii. TXDPS does not require that law enforcement wear gloves when collecting evidence.

In instructing law enforcement on evidence collection, TXDPS's policy is that "[a]ll individuals at a crime scene *should* wear personal protective equipment such as gloves."[21] Notably, TXDPS does not require that law enforcement investigators *must* wear gloves when collecting evidence. Therefore, while TXDPS prefers evidence to be handled with gloved hands, being handled without gloves will not preclude the evidence from being submitted or tested. Importantly, TXDPS does require that items "used to package evidentiary items *must* be clean and not

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[20]Reporter's Record at 179–81, *State v.* Reed, No. 8701 (21st Dist. Ct. Bastrop Cnty., Tex. Nov. 25, 2014).

[21]Tex. Dep't of Public Safety, *Crime Laboratory Division Manual* 107 (2022) (emphasis added).

previously used,"[22] proving that TXDPS understands the mandatory and permissive nature of the words must and should. TXDPS does note that the reason gloves should be worn is "to prevent or limit contamination of the evidence."[23]

However, even the use of gloves cannot guarantee the prevention of cross-contamination. At least one study has found that, while wearing gloves, "DNA can potentially be re-distributed from the original area on the exhibit to other areas during examination via the gloves."[24] In reviewing this study, Interpol determined that gloves are a potential source of contamination in DNA analysis.[25] All to say, even under best practices, the potential for contamination will exist in forensic DNA analysis.

C. TXDPS has protocols for determining true donors even in cases of contamination.

All of these concerns over the storage and handling of the evidence (whether it be the handling by ungloved hands, being stored in an unsealed box, or being commingled with other evidence) all relate to the possibility that the evidence has become contaminated and therefore inappropriate for DNA testing.

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[22] *Id.* (emphasis added).
[23] *Id.*
[24] Mariya Goray et al., *DNA transfer: DNA acquired by gloves during casework examinations*, 38 Forensic Sci. Int'l: Genetics 167, 172 (2019).
[25] John M. Butler & Sheila Willis, *Interpol review of forensic biology and forensic DNA typing 2016-2019*, 2 Forensic Sci. Int'l: Synergy 352, 361 (2020).

TXDPS has different processes for whether the contamination was introduced by the laboratory and the contamination can be eliminated through laboratory procedures or whether the contamination occurred before submission to the laboratory and the contamination remains in the sample.[26] TXDPS calls contamination that occurred prior to submission and that remains in the sample despite proper laboratory procedure, unresolved contamination.[27] This unresolved contamination is the third manner of contamination where external contamination has occurred between the DNA samples and the police force, crime scene experts, or individuals present in the courtroom. In Petitioner's case, any potential contamination happened at trial, before the laboratory received the evidence for post-conviction testing. Therefore, if contamination were present, TXDPS would consider this unresolved contamination.

TXDPS allows for the interpretation and reporting of DNA profiles "even in the presence of unresolved contamination."[28] However, TXDPS does require that a DNA profile reported with unresolved contamination be compared to known reference DNA profiles of potential contaminators such as staff members, law enforcement officers, and manufacturers.[29] Here, the identity of all potential contaminators (i.e., the prosecutor, defense counsel, court clerk, and jurors) are known. It would be

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[26]*See* Tex. Dep't of Public Safety, *Biology/DNA Manual* 48, 49 (2022).
[27]*Id.*
[28]*Id.* at 49.
[29]*Id.*

possible to collect buccal swabs from these individuals and compare their known reference DNA profiles to any DNA profiles developed from the belt to detect and report if the belt is contaminated in compliance with TXDPS policy.

Unresolved contamination can increase the complexity of the DNA profile as well. Currently, DNA profiles that are determined to be mixtures of five or more individuals are too complex for interpretation per TXDPS policy.[30] However, to combat the growing complexity of DNA profiles, TXDPS has implemented DNA mixture deconvolution software to aid in analyzing DNA profiles.

TXDPS may try to "assume" the contaminating DNA profile through its DNA mixture deconvolution software.[31] An assumed profile is a DNA profile attributable to a particular individual that, based on the circumstances, the analyst assumes or expects is present in the DNA mixture. An analyst will expect an individual's DNA to be present in the profile based on the "nature of the item or by case documentation indicating prolonged and/or intimate exposure to the item by that individual."[32]

The power of assuming a DNA profile is that it allows the mixture deconvolution software used by TXDPS to essentially subtract out the contaminating DNA profile and resolve the remaining DNA data for interpretation. This ability to remove any contaminating DNA profiles from consideration and subsequent statistical calculations allows TXDPS to

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[30] *Id.* at 384.
[31] *Id.* at 49.
[32] *Id.* at 385.

report accurate and reliable results even when the DNA profile has unresolved contamination. Assuming lowers the complexity of the DNA mixture by one assumed contributor. For example, samples closely associated with the victim may have the victim's DNA profile assumed before comparison with any other reference profiles. In Petitioner's case, since the belt belonged to Ms. Stites, her DNA profile could be assumed on the belt to decrease the complexity of the remaining profile by one individual.

However, it is not typical to assume cohabitators on the other resident's clothing. Simply living in the same house does not create the prolonged and/or intimate exposure necessary for assuming. Because of this, Mr. Fennel could not be assumed on Ms. Stites's belt merely because he lived in the same residence as Ms. Stites. Nor would Petitioner be assumed on the belt from his claimed consensual sexual relationship with Ms. Stites.

Further, the software allows for assuming multiple individuals in a single profile. Even if DNA profiles from court personnel are also discovered on the belt, those profiles can be assumed in addition to Ms. Stites's profile. Therefore, by lowering the complexity of the potential DNA mixture with the help of this new software, TXDPS can accurately and reliable report results for DNA profiles that it could not have before.

Finally, TXDPS requires that any report issued with unresolved contamination bear a statement disclosing the quality event and have documented

approval from the DNA section's Technical Leader.[33] The DNA section's Technical Leader would evaluate and consider the same policies outlined in this brief. Therefore, it is highly likely that the belt would be approved to be tested, interpreted, and reported even if it is determined to have unresolved contamination.

D. The software can accurately determine true donors and non-donors when multiple unknown individuals are present in a mixture.

TXDPS contamination policy does have some practical drawbacks, namely securing reference samples from all potential contaminators. In Petitioner's case, there are a number of potential individuals from whom to obtain reference samples. However, the deconvolution software was extensively tested against highly complex mixtures with varying quality and quantity of DNA. In evaluating the software, TXDPS performed over 100,000 comparisons of known non-contributors to DNA mixtures. Even without any assumed DNA profiles, the software was able to accurately exclude 93.5% of known non-contributors.[34] Similarly, when examining known true donors, the software correctly included 85.3% of individuals.[35] Moreover, most of the errors in these analyses occurred when examining complex four-person mixtures without assuming any

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[33] *Id.* at 49.

[34] App. Ex. A, Table 1 (showing that for the 105,412 comparisons to non-donors for DNA mixtures, 6,868 individuals were not excluded).

[35] *Id.* at Table 2 (showing that for the 196 comparisons to true donors for DNA mixtures, twenty-nine individuals were not included).

individual's DNA was present in the mixture. Error rates for mixtures of five or more individuals' DNA were not calculated as those mixtures are currently too complex for interpretation, even with the aid of the software.

However, if the DNA profile from the belt is determined to be a mixture of four or fewer individuals then the profile can be further simplified by assuming Ms. Stites's DNA on the belt. As stated above, this essentially would transform a four-person mixture into a three-person mixture for the software to deconvolute. The software performs exponentially better at three person-mixtures excluding 97.6% of known non-contributors and including 96.6% of true donors.[36] Even in this worst-case scenario of developing the most complex, contaminated DNA profile that can still be interpreted, TXDPS analysts, with the use of the software, could accurately include or exclude Petitioner or Mr. Fennell with above 95% accuracy. With this level of accuracy, post-conviction DNA testing can be used, like the Fifth Amendment privilege, "to protect the innocent who otherwise might be ensnared by ambiguous circumstances."[37]

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[36] *Id.* (Table 1 showing that for the 77,967 comparisons to non-donors for DNA mixtures of three individuals or less, 1,853 individuals were not excluded and Table 2 showing that for the 120 comparisons to true donors for the same DNA mixtures, only four individuals were not included).

[37] *Grunewald v. United States*, 353 U.S. 391, 421 (1957).

CONCLUSION

The possibility of contamination has long been appreciated and accounted for by the forensic DNA community. With advances in technology, now more than ever, forensic DNA analysis can answer these difficult questions about who is and is not connected to a piece of evidence even when that evidence is potentially contaminated. But DNA testing can only answer these questions if it is ordered.

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APPENDIX

Exhibit A: Summary of comparison data utilizing mixture deconvolution software[38]

[38]Chase Baumgartner et al., Method Validation: STRmix mixture interpretation software and likelihood ratio, Tex. Dep't of Public Safety 5 (2016).

Table 1 - Data on false inclusions:

	Single Source	Two-Person	Three-Person	Four-Person
Total number of comparisons to non-donors	51,984	57,760	20,216	27,436
Maximum inclusionary Likelihood Ratio (LR) for a non-donor	2,037	1,848	2,880	805
Largest DNA amount (nanograms) of individual donor resulting in false inclusion	0.063	0.125	0.143	0.4
	Number of False Inclusion Occurrences			
LR > 10^4	0	0	0	0
10^3 < LR < 10^4	1 (0.002%)	1 (0.002%)	1 (0.005%)	0
10^2 < LR < 10^3	17 (0.03%)	10 (0.02%)	2 0.01%)	21 (0.08%)
10^1 < LR < 10^2	490 (0.9%)	174 (0.3%)	9 (0.04%)	171 (0.6%)
10^0 < LR < 10^1	661 (1.3%)	1,628 (2.8%)	28 (0.14%)	4,823 (17.6%)

Table 2 - Data on false exclusions:

	Single Source	Two-Person	Three-Person	Four-Person
Total number of comparisons to known donors	36	80	40	76
Maximum exclusionary Likelihood Ratio (LR) for a known donor	N/A	0.002	N/A	0.020
Largest DNA amount (nanograms) of individual donor resulting in false exclusion	N/A	0.025	N/A	0.2
	Number of False Exclusion Occurrences			
10^{0} > LR > 10^{-1}	0	1 (1.3%)	0	21 (27.6%)
10^{-1} > LR > 10^{-2}	0	1 (1.3%)	0	4 (5.3%)
10^{-2} > LR > 10^{-3}	0	2 (2.5%)	0	0
10^{-3} > LR > 10^{-4}	0	0	0	0
LR < 10^{-4}	0	0	0	0