AFFIDAVIT OF MATTHEW J. MARVIN, CLPE, CFWE

I, Matthew J. Marvin, hereby declare under penalty of perjury as follows:

1. I am a Senior Consultant and Technical Manager employed by Ron Smith & Associates, Inc. (hereinafter RS&A). RS&A is a private forensic science company headquartered in Mississippi. RS&A was founded in 2002 by Ron Smith, a forensic analyst who at that time had over thirty years of experience working in forensic laboratories. Our firm contracts with government officials and private entities to provide a range of forensic analytical services, including latent print examination in either pre-trial or post-conviction cases. Our managers and senior analysts also consult with prosecutors and defense attorneys regarding complex forensic issues in their casework, and provide training services for forensic analysts nationwide. Our experts are fully qualified to provide expert witness testimony in any and all levels of courts of law. Our experts have been authorized by our clients on numerous occasions to conduct automated searches on behalf of our clients through local, state and federal databases, to include the FBI's Next Generation Identification system. More information about RS&A, our staff, and our services can be found at www.ronsmithandassociates.com.

2. I have been a full-time forensic analyst since 2002. My experience in the field of forensic science includes DNA extraction and analysis, and latent print analysis, among other areas. I have been a Board Certified Latent Print Examiner ("CLPE") since 2006. There are currently less than 1,000 CLPEs in the world. Prior to obtaining my board certification as a CLPE, I spent two and one-half years in training in the area of latent print examinations. During my training period, I examined an estimated 40,000 prints, and would estimate that I have examined hundreds of thousands of additional prints since obtaining my CLPE certification.

3. Prior to working for RS&A, I was employed with the Colorado Bureau of Investigation Forensic Science Laboratory for ten years. I was the technical leader for latent prints, footwear, and tire tracks for the Colorado Bureau of Investigation when I was recruited to work for RS&A. In my current capacity as Senior Consultant and Technical Manager at RS&A, I am responsible for managing and overseeing all technical aspects of our laboratory headquarters regarding latent print analysis. These responsibilities include, but are not limited to, writing and updating our laboratory policies and procedures (SOPs); researching and ensuring that our laboratory stays current with new equipment and techniques; conducing validation studies and staff performance reviews; training, supervising, and reviewing the work of other examiners; conducting and/or assisting with internal audits; and actively conducting examinations in the areas of latent prints, footwear, and tire tracks.

4. I am an active member of both the Rocky Mountain and the Mississippi Divisions of the International Association for Identification and I am a sustaining active member of the parent body of the International Association for Identification ("IAI"). I serve as a member on the IAI Latent Print Certification Board, which is a seven member board that writes and administers the latent print board certification test for the world. I am on the IAI Science and Practices Subcommittee on Latent Print Development, which is a seven member committee that serves as the technical experts in latent print development for the IAI. A complete and current copy of my CV is attached as Exhibit A.

State v. Ledell Lee: Analysis Conducted and Scientific Conclusions Reached

5. In August 2018, RS&A was retained by the Innocence Project, Inc., to conduct an independent reanalysis of latent prints that were recovered from the scene of a 1993 homicide in Arkansas. I was the principal analyst and case manager assigned to the matter, although other analysts at RS&A – including Mr. Smith – reviewed and/or assisted with the analysis at various stages of the process.

6. At the time RS&A was retained to conduct our review, we were informed by the Innocence Project that the case involved a homicide in which the convicted individual, Ledell Lee, had been tried twice for the crime, with the second trial occurring in October, 1995. We were further informed that the latent print evidence in question had been described during trial testimony by a state analyst as consisting of four latent prints from the crime scene that were "of value". At both trials the state analyst testified that Mr. Lee was excluded as the source of the four prints. We were also informed that all four prints remain unidentified to this date.

7. RS&A was requested to conduct an independent examination of the latent lifts previously examined by the analyst from the Arkansas State Laboratory. In this independent examination, RS&A was requested to determine if the four latent prints that were testified to at trial as being excluded from Mr. Lee are suitable for Automated Fingerprint Identification System (AFIS) searching with today's technology, and also if there are latent prints, in addition to the four testified to by the state analyst, that are also suitable for comparison and/or AFIS searching.

8. AFIS systems exist at multiple levels. At the local level and state level, an AFIS system is typically referred to just as AFIS, or with the level of search preceding (local AFIS or state AFIS). In the past, the national AFIS system was referred to as the Integrated Automated Fingerprint Identification System (IAFIS). Currently the national AFIS system is referred to as Next Generation Identification (NGI).

9. The results of our examination and conclusions drawn from this independent examination are set forth in our final report dated July 6, 2019. A true and correct copy of that report is attached hereto as Exhibit B.

10. I have been asked by counsel from the Innocence Project to provide this affidavit as a supplement to our report, to (1) explain the process by which we reached our conclusions in further detail, and (2) set forth the technological and scientific advancements since Mr. Lee's 1993 arrest and 1995 trial that allowed us to reanalyze the latent prints in question and reach the conclusions set forth in our report.

Overview of Methodology and Conclusions

11. In consideration of this affidavit, our firm received and reviewed the following materials:
   a. One 10 page .pdf file named "BeckJames – Trial 1 Testimony" Bates number 1255-1264.
   b. One 11 page .pdf file named "BeckJames – Trial 2 Testimony" Bates number 2263-2273.
   c. One 4 page.pdf file named "WardRichard – Trial 1 Testimony" Bates number 1085-1088.
   d. One electronic file folder labeled "High-Res Scans" containing 15 .jpg images of 9 latent lifts labeled E-18 through E-26.
   e. One electronic file folder labeled "Photos of Physical Evidence" containing 21 .jpg images of the front and back of latent lifts labeled E18 through E-26.

12. Beginning in August, 2018, RS&A proceeded to conduct a detailed examination of the provided images to determine whether latent prints were present on the nine latent lifts labeled E-18 through E-26 that were suitable for forensic analysis using presently available technology – that is, whether it contained sufficient ridge detail to be of value for comparison purposes and/or "of value" for AFIS searching. In the field of latent print analysis, "of value" is a term that states whether the latent in question is suitable for comparison to known individuals – *i.e.,* whether a scientific conclusion can be drawn as to whether an individual is excluded as the source of the latent, or in some cases, whether, in the analyst's opinion, an individual may be "identified" as the source. In the field of latent print analysis, "of value for AFIS searching" is a term that states whether the latent in question is suitable for searching through an AFIS system – i.e., whether a computer algorithm has the ability to search a latent print, and whether, in the analyst's opinion, the search may result in a candidate that could be subsequently "identified" as the source.

13. We conducted all examinations using digital processing techniques (discussed below) that are now widely accepted and utilized in the field of latent print analysis. These digital techniques were not available in, or utilized for, latent print analysis at the time of the 1993 homicide in this case, nor at Mr. Lee's 1995 trial.

14. Consistent with our usual protocols, each latent print that was suitable for comparison was given a unique identifier, with each identifier beginning with "L-" and then a sequential number. It should be noted that "L-" is merely a designator that is used internally in our laboratory to distinguish impressions from the multiple disciplines in our laboratory.

    a. Latent lift E-18 was marked on the back as being lifted from "front storm door". Latent lift E-18 contained two latent fingerprints that were suitable for comparison. These two latent fingerprints were given internal designators L-1 and L-2. **Both latent fingerprints L-1 and L-2 are suitable for AFIS searching at all levels of available AFIS systems (local, state, and national).**

    b. Latent lift E-19 was marked on the back as "State's Exhibit 40", "93-2253", and "020993", but did not list a scene location from which the print was lifted. Detective Sergeant Richard Ward testified at Mr. Lee's first trial that State's Exhibit 40 consisted of a latent lift that he processed off the top of the television set in the living room. Latent lift E-19 contained one latent fingerprint that was suitable for comparison. This latent fingerprint was given the internal designator L-3. **Latent fingerprint L-3 is suitable for AFIS searching at all levels of available AFIS systems (local, state, and national).** It should be noted that all latent lifts for which images were submitted have the signature "K. Boyd" on the back of the latent lifts with the exception of E-19. Latent lift E-19 bears no signature.

    c. Latent lift E-20 was marked on the back as being lifted from "front door (storm)". Latent lift E-20 contained one fingerprint that was suitable for comparison. This latent fingerprint was given the internal designator L-4. Latent fingerprint L-4 is not suitable for AFIS searching.

    d. Latent lift E-21 was marked on the back as being lifted from "front storm door". Latent lift E-21 contained one fingerprint that was suitable for comparison. This latent fingerprint was given the internal designator L-5. **Latent fingerprint L-5 is suitable for AFIS searching at all levels of available AFIS systems (local, state, and national).**

    e. Latent lift E-22 was marked on the back as being lifted from "front storm door". Latent lift E-22 contained areas of ridge detail, but none of the areas of ridge detail were suitable for comparison.

    f. Latent lift E-23 was marked on the back as being lifted from "calender book" (misspelled on card). Latent lift E-23 contained areas of ridge detail, but none of the areas of ridge detail were suitable for comparison.

    g. Latent lift E-24 was marked on the back as being lifted from "ladies wallet". Latent lift E-24 contained areas of ridge detail, but none of the areas of ridge detail were suitable for comparison.

    h. Latent lift E-25 was marked on the back as being lifted from "calender book" (misspelled on card). Latent lift E-25 contained areas of ridge detail, but none of the areas of ridge detail were suitable for comparison.

i. Latent lift E-26 was marked on the back as being lifted from "calender book" (misspelled on card). Latent lift E-26 contained one fingerprint that was suitable for comparison. This latent fingerprint was given the internal designator L-6. **Latent fingerprint L-6 is suitable for AFIS searching at all levels of available AFIS systems (local, state, and national).**

j. In summary, between the submitted images of the latent lifts E-18 through E-26, there are a total of six latent fingerprints that are suitable for comparison. **Five of the six latent fingerprints that are suitable for comparison are also suitable for AFIS searching through all available levels of AFIS systems.**

15. My individual conclusions in this case that (1) there are a total of six latent fingerprints contained within the images of E-18 through E-26 and (2) five of the six latent fingerprints are suitable for AFIS searching through local, state, and national AFIS systems, were independently reviewed by at least one additional analyst at RS&A. In addition, and also consistent with RS&A protocols, another analyst conducted a final, independent technical review to ensure that all of our standard procedures were followed and documented in the case file before our final report was issued.

Scientific and Technological Advancements Utilized

16. RS&A was able to view and analyze the ridge detail on latent prints marked L-1 through L-6 in this case using digital processing techniques for latent print analysis that are now widely used in the industry, but which were not available at the time of Mr. Lee's 1995 trial.

17. Specifically, we reexamined latent lifts E18- through E-26 (which contained latent prints L-1 through L-6) by (1) receiving the submission of high-resolution images of all of the prints in question and (2) at RS&A's laboratory, digitally processing those images -- without altering them -- using computer software that substantially increases an analyst's ability to view and document ridge detail present on a latent print, far beyond what is possible with a traditional fingerprint magnifier.

18. Regarding the digital photographs of the latent lifts, the industry standard presently directs analysts to photograph latent prints using a high-resolution digital camera or other device. These capabilities are determined by the megapixel (MP) of the sensors in the device, which results in an image, which once calibrated to natural size, can be determined by the pixels per inch (PPI) of the resultant image. The current recommendation for minimum resolution of a digital image of a latent print is 1,000 PPI.

19. The first fully integrated SLR digital camera, the Nikon D1, was not released until 1999; and even then, the MP sensors were far lower than what is required and utilized for digital analysis of latent prints. For that reason, virtually all forensic

laboratories in 1999, and certainly at the time of Mr. Lee's trial in 1995, were still using film for photography. Further, the digital cameras that existed in the late 1990s lacked the MP sensors and ppi resolution required for latent print analysis under today's standards. For example, the Nikon D1 had only a 2.7 MP sensor. Presently, RS&A uses a Nikon D800 camera that has a 36 MP sensor – far higher resolution than what was available even a decade ago, much less in the late 1990s. While the minimum MP sensor required to view an image at 1,000 PPI resolution involves a mathematical formula depending on the size of the image, photographing a piece of paper measuring 4x5 inches containing a latent print would typically require a 20 MP sensor to obtain 1,000 PPI resolution.

20. Regarding the digital enhancement methods utilized to view the ridge detail present on the digital images of the latent lifts, we utilized a software program called Photoshop CC. Photoshop CC was first released in June 2013. Photoshop CC currently exists as a cloud based subscription service. The most recent update (version 20.0.6) was released on August 13, 2019. Version 20.0.6 was used by RS&A for the digital enhancement of the images in this case.

21. It should be emphasized that despite the popular (lay) use of Photoshop to, among other things, alter digital images, the techniques employed by RS&A in this case and throughout the industry do <u>not</u> in any way alter the underlying image, but merely enhance the color and shading using specific mathematical formulas in order to better distinguish and render visible the ridge detail that is present. Moreover, Photoshop CC tracks the user's techniques at each step of the process. Each time a process is utilized to enhance the image, that process gets recorded and embedded into a file that stays with the image itself and can be viewed by others.

22. While various versions of Photoshop CC are widely used in the field of latent print analysis today, none of them were available at the time of Mr. Lee's 1995 trial. The first version of Photoshop CC was released in June, 2013. Even the predecessor to the Photoshop CC versioning, Photoshop CS, was not developed and made available for use until October 2003.

23. In sum, while the advanced techniques utilized in this case are now widely used in the industry and here permitted RS&A to successfully process, view and analyze the ridge detail present on latent lifts E-18 through E-26, they were not available at the time of Mr. Lee's 1995 trial.

Advances in AFIS Technology

24. Over the years, automated fingerprint searching technology has evolved tremendously. There are multiple vendors for Automated Fingerprint Identification Systems (AFIS) used throughout the United States at the local and state levels. Due to the large variety of AFIS systems available, it is difficult to speak on the advances of all of the systems. However, the national AFIS system

is a single system with the matching algorithms built by Idemia (previously Morpho). The national system has seen massive upgrades since the mid 1990's, and even more so within the last five years.

25. Next Generation Identification (NGI) is the federal AFIS system maintained by the FBI. NGI is the largest criminal fingerprint database in the world. Currently, NGI contains fingerprints and criminal histories for more than 70 million subjects in the criminal master file. Furthermore, the criminal database includes fingerprints from ~73,000 known and suspected terrorists processed by the U.S. or by international law enforcement agencies. The civil database contains the fingerprints from ~34 million subjects. The civil fingerprints are mostly of individuals who have served or are serving in the U.S. military or have been or are employed by the federal government.

26. The FBI has been the national repository for fingerprints and related criminal history data since 1924. In 1924, 800,000 fingerprint records from the National Bureau of Criminal Identification and Leavenworth Penitentiary were consolidated with Bureau files. In October 1980, the first use of computers to search fingerprint files at the FBI took place, but while computer searching was being developed, this was not a systematic use of computers to search crime scene prints against known fingerprints.

27. It was not until 1999 that the FBI launched the earliest version of its automated latent print searching database. The precursor to NGI, the Integrated Automated Fingerprint Identification System (IAFIS), was launched on July 28, 1999. At the time of the initial launch, the IAFIS matcher was a combination of two vendors "Lockheed" and "Morpho". The advent of IAFIS allowed investigators to search crime scene prints in a systematic and automated manner through the national database of known prints for the first time.

28. In the two decades since IAFIS's 1999 launch, automated fingerprint database technology has continued to greatly expand its capabilities. On May 5, 2013, NGI implementation increment 3 went into effect. In implementation increment 3, IAFIS saw significant gains. IAFIS added the ability to search palm prints. It also got a new matcher that is three times more accurate than the previous matcher and runs off algorithms that are 100% Morpho (now Idemia). NGI implementation increment 3 expanded latent print searches from only the Criminal Master File to include the Civil Repository and the Unsolved Latent File (ULF), which means that latent prints can now be searched against the civil files and the ULF. NGI expanded searches of the ULF to allow for criminal, civil, and investigative biometrics to search against unsolved latent prints, which has resulted in new investigative leads. On September 7, 2014, the FBI announced that NGI was at full operational capability and effectively replaced IAFIS.

29. In the summer of 2016, NGI got another upgraded matcher, which is the algorithm that performs the searches and returns potential matching fingerprints,

which are called candidates. At this point in time, the FBI is recommending that all latent fingerprint images that were submitted to IAFIS prior to 2013 should be resubmitted to the NGI for a new search.

"The CJIS Division recommends latent fingerprint images submitted prior to 2013 be resubmitted to the NGI system if no identification was made during the initial search."
-https://www.fbi.gov/services/cjis/fingerprints-and-other-biometrics/ngi

30. From the earlier versions of the FBI's Integrated Automated Fingerprint Identification System (IAFIS) to today, a tremendous improvement in speed and matching capability has been observed. For this reason, many agencies have chosen to re-launch old latent print cases through the latest version of the FBI's system, and this decision has been met with great success and literally thousands of older case prints have now been identified. The FBI continues to advance the science of automated latent print searching and every few years a newer and more accurate version of NGI has been implemented. The system in place currently is far better than the version in place even five years ago and certainly is much more accurate than the system which was in place in 1995.

31. The current national AFIS / NGI system can generate results with great speed and efficiency. While the rate at which comparisons made and matches generated varies from state to state depending on a variety of factors (such as connection speed, available hardware, and method of connection), in some jurisdictions a search of NGI can yield potential matches to crime scene fingerprints in as little as ten minutes. In other jurisdictions, a search may take a few hours or a day to complete. Furthermore, entering and searching latent print information in any AFIS system including NGI does not in any way alter or consume the original latent evidence. Once a search is completed, the candidate matches can be reviewed by independent examiners, and the search can be repeated at other AFIS terminals.

Recommendations

32. I recommend that the prints marked L-1 through L-3, L-5 and L-6, which have been deemed suitable for AFIS searching, be searched, at a minimum, through both the Arkansas state AFIS and national NGI. I would recommend that I, or someone from RS&A, be present while the prints are run through the AFIS systems. There is interpretation, and therefore decision making, employed by the examiner in the process of orienting a latent print, marking the features that will be searched through AFIS, reviewing potential candidate matches, and other aspects of searching a latent print through an automated system. Members of our staff are often permitted by other law enforcement agencies to be present during AFIS searches, or to conduct AFIS searches ourselves. In this particular case, I would not recommend that RS&A be granted unlimited or unattended access to AFIS, but rather that RS&A be allowed to be present when the searches are being

conducted, and that RS&A be allowed to have input into the portions of the searches that involve interpretation and decision making.

33. RS&A has had great success working side by side with public laboratory examiners in conducting AFIS searches when RS&A examiners are allowed to be present during the searches, and are also allowed to provide input into the portions of the searches that involve interpretation. RS&A has recently worked with the Innocence Project on a case out of Louisiana involving an individual by the name of Archie Williams. In Mr. Williams' case, there were eleven latent prints that were suitable for state AFIS and NGI searching, and were searched. Some of the latent prints that were suitable for AFIS searching were previously searched through AFIS by the Louisiana State Police in 1999. The searches conducted by the LSP laboratory in 1999 did not result in any potential matches.

34. In Mr. Williams' case, RS&A traveled to the LSP laboratory in 2019 and conducted searches of all eleven prints through both the state AFIS and NGI in the same manner as is being recommended in Mr. Lee's case (RS&A examiners being allowed to be present and to have input into the portions of the searches that involve interpretation and decision making). Of the eleven prints that were searched in 2019, one print hit to a corresponding known print belonging to an individual named Stephen Forbes. Stephen Forbes had been convicted of committing sexual assaults in the same neighborhood where the victim had been attacked. The known prints of Stephen Forbes were present in the AFIS system at the time the prints were searched by the LSP laboratory in 1999 and did not result in any potential matches. The print that hit in 2019 was initially searched through the state AFIS, with no hit to a corresponding known print. That same print was then searched through NGI, which resulted in the hit to Forbes.

35. In summary, it is my recommendation that the five unidentified latent prints collected by law enforcement from the scene of the 1993 murder for which Ledell Lee was convicted be searched in both state and national AFIS systems with the presence and input of RS&A examiners. To do so may result in identifications of the source of one or more of these latent prints, using advanced technology which was not available at the time of Mr. Lee's 1995 trial.

I hereby affirm under penalty of perjury that the foregoing is true and correct.

Matthew J. Marvin
Matthew J. Marvin

Sworn to before me this 4th day of Oct. , 2019.

Notary Public _Brenda Carey_

STATE OF MISSISSIPPI
NOTARY PUBLIC
ID # 126002
BRENDA CAREY
Commission Expires
Nov. 12, 2022
LAUDERDALE COUNTY