NSW Police Force

EXPERT CERTIFICATE

Section 177, Evidence Act 1995 No. 25

In the matter of:	**Homicide of Ernest HEAD** **Forensic Case Numbers 76/4365**
Place Statement Made:	Fingerprint Operations, Police Headquarters, Parramatta
Date:	20 June 2023

Name:	Kate Louise REID
Work Address:	Fingerprint Operations – Police Headquarters, Parramatta
Work Telephone:	[redacted]
Occupation:	Senior Crime Scene Officer – Fingerprint Expert

STATES:

1. This statement made by me accurately sets out the evidence that I would be prepared, if necessary, to give in court as a witness. The statement is true to the best of my knowledge and belief and I make it knowing that, if it is tendered in evidence, I will be liable to prosecution if I have willfully stated in it anything that I know to be false or do not believe to be true.

2. I make the following declarations:

   - I have read the Expert Witness Code of Conduct in Schedule 7 of the NSW Uniform Civil Procedure Rules 2005 and I agree to be bound by the Code.
   - I have made all inquiries that I believe desirable and appropriate, and to the best of my knowledge, no matter of significance that I regard as relevant has been withheld from the court.

3. I hereby certify I am a Fingerprint Expert. I have specialised knowledge based on my training, experience and study of fingerprints since 2006. Refer to Annexure 1 for a summary of my qualifications and experience.

4. For a glossary of terms used in this certificate see Annexure 2.

5. On 15 June 2023, I received a written request to the Director of the Crime Disruption and Special Inquiries Law, Office of the General Counsel, NSW Police Force from Enzo CAMPOREALE, Crown Solicitor,

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requesting information in relation to the death of Ernest Head, to assist the Special Commission of Inquiry into LGBTIQ hate crimes. This letter was dated 14 June 2023.

6. On 30 May 2023, I provided an Expert Certificate in relation to a fingerprint review on NSWPF Forensic Case Number 76/4365. This statement is prepared to address requests for additional information in the written request from the Crown Solicitor.

7. In the Certificate provided 30 May 2023, I outlined my opinion, which is based wholly or substantially on my specialised knowledge as a fingerprint expert using the ACE-V methodology, I had reached the conclusion the fingerprint graph "B(1)" from Forensic Case number 76/4365, *a print in blood near body on kitchen wall* was identified to the right palm print of Engin SIMSEK following a search on the National Automated Fingerprint Identification System (NAFIS).

8. The record set of fingerprints in the name of Engin SIMSEK indicate they were taken on 27 July 1980 at Newtown Police Station with the Offence in Full listed as Malicious Injury.

9. The Major Crime Fingerprint Folder 76/48 referenced in the certificate provided 30 May 2023 contained records indicating the following examinations:

   - 76/4365 – Examination of [redacted]49 Grosvenor Cres, SUMMER HILL
   - 76/4175 – Examination of [redacted]/49 Grosvenor Cres, SUMMER HILL
   - 76/4176 – Examination of motor vehicle [redacted]

10. Records within Major Crime Fingerprint Folder 76/48 show the following reviews have been conducted on cases attached to this folder prior to 2023. They are listed on the Major Crime Running Sheet 76/48 as follows:

    - 16 April 2002, the case was reviewed at the request of Strike Force Palace by Detective Superintendent Ron SMITH. Unidentified fingerprints, including the palm print B(1) were searched on NAFIS and not identified.

    - 9 August 2004, the case was reviewed at the request of Unsolved Homicide by Detective Inspector Rod JARRETT. A Case Summary indicated fingerprints were eliminated to E.A. HEAD. These appear to be the fingerprints which records indicate are located on kitchen, bathroom and bedroom door jambs.

    - 17 August 2005, the case was reviewed at the request of Unsolved Homicide by Detective Inspector Rod JARRETT. Unidentified fingerprints, including the palm print B(1) was searched on NAFIS. Identifications

were recorded to retired Police Officer NP255 and NP256 for fingerprint graphs related to motor vehicle [redacted] at Five Dock Police Station. Fingerprint graph B(1) was not identified.

11. There have been a number of technological and procedural limitations which may have, either taken singularly or in combination, contributed to the palm print B(1) not being identified when reviews were conducted prior to 2023. These issues are described as follows:

I. **Fingerprint Record of Engin SIMSEK**

The fingerprint record of Engin SIMSEK was taken on 27 July 1980. At this time, a set of fingerprint records consisted of ten (10) rolled impressions, where each impression is rolled from nail edge to nail edge on the front of the form; plain impressions, where the four (4) fingers on each hand are placed together on the front of the form; plain impressions of the thumbs where each thumb is placed on the rear of the form; the interdigital impressions, where only the upper segment of each palm is recorded. There is no fingerprint record for the lower segment of palms for Engin SIMSEK. This is the only set of fingerprints on file with the NSW Police Force and the only set registered on the National Automated Fingerprint Identification System (NAFIS) database. The unidentified palm impressions B(2) and B(3) for Forensic Case Number 76/4365, they are impressions of the lower segment of the palm. Due to the lack of comparable area in the record set of fingerprints for Engin SIMSEK, these palm print impressions have never been compared to Engin SIMSEK.

II. **Early Automated Fingerprint Identification System (AFIS)**

AFIS was introduced as an NEC branded computerized searching tool in 1985, before moving to a more modern platform in 1999. Hardcopy fingerprint records were digitised and AFIS searching replaced the manual Henry System as the primary fingerprint identification tool. This system utilised only fingerprint impressions for searching capabilities. There were no capabilities for searching latent palm print impressions.

III. **SAGEM Tender for National Automated Fingerprint Identification System (NAFIS)**

In 1999 the NAFIS contract was awarded to SAGEM and early 2000 saw the customisation specifications of Australia's requirements being developed. All hardcopy fingerprint records were required to be converted from binary to greyscale. The conversion of over 2.4 million fingerprint records was carried out by SAGEM's conversion centre on the west coast of America. The conversion of records involved scanning the hardcopy fingerprint cards to which the quality was determined by the current technology. The conversion process was undertaken for the fingerprint record for Engin SIMSEK. In May 2001, SAGEM NAFIS started operation which included for the first time, a rudimentary palm print matching system.

IV. **NAFIS Searching Capabilities**

The ability of an automated fingerprint system to match a fingerprint is highly reliant on the accuracy of its matching fingerprint algorithm. The accuracy of a fingerprint algorithm is affected by the quality of

fingerprint images, which are subsequently digitised and subjected to a minutiae extraction process. The minutiae extraction process which can be an automated or manual process (or combination of both processes), identifies features within the fingerprint which a human fingerprint expert would use for identification. Examples of these features and how they are used for extraction are shown in Attachment 1A.

The accuracy of a fingerprint search is substantially dependent on the ability of the system to align the features in the known fingerprint to features in the unknown fingerprint. The greater the number of minutiae pairings in agreement, the higher the likelihood of a resulting database match. In searching for minutiae pairings, the algorithm is adversely affected by displacement and rotation, distortion and pressure, or skin condition differences at the time of capture. This leads to minutiae extraction errors relating to measurement between pairs of minutiae and the presence of a large number of spurious minutiae, or not detecting true minutiae at all. Examples of spurious feature extraction caused by distortion are shown in Attachment 1B. The greater the number of minutiae extraction errors, the less likely the fingerprint algorithm is going to propose an accurate candidate for a physical analysis by a human fingerprint examiner.

V. **NAFIS Upgrades**

In the years 2010-2013, NAFIS underwent multiple technical capability upgrades making it significantly more accurate when conducting new searches of latent fingerprints against the database. In February 2015, there was a further upgrade to the V11 matcher which incorporated a new algorithm. The upgrade reinitiated the minutiae extraction of fingerprint records, providing a more accurate coding of the records on the database. This was particularly effective for palm print record impressions which were particularly subject to spurious minutiae extraction. In addition, the new algorithm provided greater accuracy and matcher capability for future searches. It is of note, latent fingerprints registered on the system were not able to be automatically re-searched against the database following this update.

12. The conversion of the set of record fingerprints for Engin SIMSEK was an automatic minutiae extraction process which was not subject to the quality assurance of the current NAFIS system. Therefore, it is likely there was spurious minutiae or missing minutiae in the palm print impressions. The V11 update is likely to have provided a more accurate coding of the palm print record impressions of Engin SIMSEK. When searching latent print impressions, previous versions of NAFIS were more reliant on the individual interpretation of the operator for minutiae extraction which could also have attributed to decreasing the proficiency of the fingerprint algorithm in finding an accurate candidate. When the fingerprint graph B(1) was re-searched in March 2023, the NAFIS system was substantially more technically capable of identifying an accurate candidate for matching and less affected by the presence of spurious minutiae than previous iterations.

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13. The underlying scientific principles, the methodology used to reach the conclusion/s above and the various factors to be considered when interpreting fingerprint evidence are outlined in **Annexure 3**.

14. Fingerprint Operations, NSW Police Force is accredited by the National Association of Testing Authorities (NATA) as meeting the requirement specified by the Australian and International Standard (AS ISO/IEC 17025) for the competence of forensic laboratories (NATA Accreditation Number 15184). Accreditation requires adherence to an approved quality assurance system and participation in an external proficiency testing program.

15. I hereby give notice under the Criminal Procedure Act 1986, that the proposed exhibits, which have been indicated in this Certificate, may be inspected at Fingerprint Operations, Forensic Evidence and Technical Services Command, NSW Police Headquarters, Level 4B, 1 Charles Street, Parramatta at a mutually agreeable time.

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ANNEXURE 1

EXPERT QUALIFICATIONS IN THE SCIENCE OF FINGERPRINTS

Senior Crime Scene Officer Kate Louise REID

I have been attached to New South Wales Police Force Fingerprint Operations, Forensic Services Group since February 2009. Between September 2006 and February 2009, I performed duties as a Scene of Crime Officer at the Blue Mountains Local Area Command. During this time, I have acquired extensive training, knowledge and practical experience in the Science of Fingerprints.

My relevant qualifications include:

- *Certificate of Expertise in the Science of Fingerprints* issued and accredited by the Australasian Forensic Field Sciences Accreditation Board (AFFSAB); now known as the Australasian Forensic Science Assessment Body (AFSAB)
- *Bachelor of Science (Forensic Science),* from the University of Western Sydney
- *Vocational Graduate Certificate of Public Safety (Forensic Investigation),* from the Canberra Institute of Technology
- *Advanced Diploma of Public Safety (Forensic Investigation),* from the Canberra Institute of Technology
- *Diploma of Public Safety (Forensic Investigation),* from the Canberra Institute of Technology
- *Certificate IV in Crime Scene Examination*, from the Canberra Institute of Technology
- *Certificate of Completion, Advanced Chemical Enhancement and Detection Techniques*, New South Wales Forensic Services Group; Training and Development Services.
- *Certificate of Completion, Ridgeology Comparison Techniques Course*, New South Wales Forensic Services Group; Training and Development Services.
- *Certificate of Completion, Palm Print Comparison Techniques Course*, New South Wales Police Forensic Services Group; Training and Development
- *Certificate of Completion, Digital Crime Scene Photography Course, New South Wales Forensic Services Group, Training and Development*
- *Certificate of Completion, Fingerprint Induction Program*, facilitated by the New South Wales Police

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I have also gained extensive practical experience in the Science of Fingerprints while performing duties within Fingerprint Operation, where I have:

- Classified, searched, compared and identified latent finger and palm print impressions developed at crime scenes. I have also passed an annual latent print identification proficiency test in accordance with the standards set by the National Association of Testing Authorities of Australia (NATA);
- Classified, searched, compared and identified inked and livescan finger and palm print impressions on fingerprint ten print forms, utilising both computerised and manual classification systems;
- Examined and managed crime scenes, including many of a very serious and complex nature, and have developed numerous finger and palm print impressions that have been identified.
- Examined deceased persons to obtain finger and palm print impressions for the purposes of identification;

I have additional practical experience from performing duties at the Pemulwuy Laboratories (responsible for the specialised laboratory examinations of evidence for fingerprints using special chemical development and enhancement techniques) where I examined items of evidence and developed finger and palm print impressions that have been identified.

At the completion of my training, I successfully completed various written and oral examination set by the Australasian Forensic Field Sciences Accreditation Board (AFFSAB). I was certified by this panel and issued a Certificate of Expertise in the Science of Fingerprints recognising this achievement.

On numerous occasions I have lectured and trained colleagues in various aspects of the science of fingerprints. Furthermore, I have read and studied many books and manuals pertaining to the science of fingerprints, and I maintain an informed knowledge of current issues and new developments within the fingerprint science by reading articles and journals concerned with the field of forensic fingerprint identification.

I have attended NSW Police Force Fingerprint Expert Conferences in 2015 held at HMAS Penguin, in 2017 held at Holsworthy Army Barracks and in 2019 and 2022 held at the Mantra Hotel, Parramatta.

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ANNEXURE 2

GLOSSARY OF TERMS

Crime Scene Officer – An examination officer who collects forensic evidence at complex (major) crime scenes and may also be qualified to conduct fingerprint comparisons. The minimum qualification for a Crime Scene Officer is completion of the Forensic Investigator 1 Course (or equivalent) facilitated by NSW Police Force, Forensic Evidence and Technical Services Command.

Fingerprint – The intricate design of the friction ridge skin found on the underside of the fingers, palm, toes or feet. The word fingerprint is also a generic term used to describe all impressions of friction ridge skin.

Graph – A label used for recording purposes to indicate the location of fingerprint evidence developed at crime scenes or on evidence examined in a laboratory. F1 is the first fingerprint developed during the examination; F2 is the second fingerprint developed during the examination, etc.

Latent fingerprint – The impression left on a surface when contact is made with a fingerprint. Latent fingerprints are normally invisible and are mainly comprised of the residue on the skin, which may include natural perspiration and/or contaminants from other sources (e.g. moisturiser or food residue). Various development techniques are then applied (e.g. fingerprint powder or chemicals) to the fingerprint in order to make it visible.

NAFIS – The National Automated Fingerprint Identification System. This is a computerised database of fingerprint records that is used to search and store both record and latent fingerprints. Although NAFIS is a useful tool in searching latent fingerprints, it does not establish a fingerprint identification – this function is performed by a fingerprint expert.

NATA – National Association of Testing Authorities (NATA) is recognised by the Commonwealth government as the sole national accreditation body for establishing and maintaining competent laboratory practice

Record Fingerprint – A set of fingerprint impressions collected directly from a person for the purpose of identification. In most circumstances this is comprised of an impression from each of the ten fingers and an impression of each palm. These impressions are most commonly recorded on a 'Livescan' electronic fingerprint device, however can also be recorded using ink and paper.

Scene of Crime Officer – An examination officer who collects forensic evidence at non-complex (volume) crime scenes. The minimum qualification for a Scene of Crime Scene Officer is completion of the Forensic Investigator 1 Course (or equivalent) facilitated by NSW Police Force, Forensic Evidence and Technical Services Command.

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ANNEXURE 3

SCIENTIFIC PRINCIPLES

FUNDAMENTAL PRINCIPLES OF FINGERPRINT IDENTIFICATION

Fingerprint identification involves the assessment of impressions made by friction ridge skin on the underside of the fingers, palms and feet. All findings are premised on three fundamental principles that are supported by extensive bodies of research and empirical testing[1]:

- Friction ridge skin is so highly variable that it is not duplicated in another person or another region of the same person (uniqueness).
- Friction ridge skin is permanent and remains unchanged for the life of a person (permanence).
- Fingerprint pattern types vary within limits to allow for systematic classification.

FINGERPRINT IDENTIFICATION METHODOLOGY: ACE-V

Fingerprint examiners employ the *Analysis, Comparison, Evaluation and Verification (ACE-V)* methodology[2] when analysing fingerprint impressions. The phases of the ACE-V methodology are as follows.

Analysis is the assessment of a friction ridge impression to determine suitability for comparison. This incorporates the interpretation of pattern type, friction ridge path and friction ridge detail. Other factors considered include clarity, surface type, development method and distortion.

Comparison is the process of observing friction ridge detail in two impressions to determine whether or not there is agreement. This systematic, side-by side comparison process is based upon the appearance, sequence and spatial relationship of the friction ridge detail.

Evaluation is the process of reaching a conclusion based on the quality and quantity of information observed in the analysis and comparison phases. There are several possible conclusions that can be drawn:

- **Identified**: The two fingerprint impressions were made by the same person.

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[1] *For studies supporting uniqueness and permanency of friction ridge skin, see: Organisation of Scientific Area Committees (OSAC) - Friction Ridge Subcommittee 2017, Guideline for the Articulation of the Decision-Making Process for the Individualization in Friction Ridge Examination (Latent/Tenprint). Available from: https://www.nist.gov/topics/forensic-science/friction-ridge-subcommittee.*

[2] Ashbaugh, DR 1999, *Quantitative-Qualitative Friction Ridge Analysis: An Introduction to Basic and Advanced Ridgeology*, CRC Press, New York Boca Raton, pp. 87-148.

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- **Not Identified**: This conclusion can take one of two forms:
    - Exclusion: The two fingerprint impressions were not made by the same person.
    - Insufficient: There is insufficient clear friction ridge detail in the impression/s to conduct a comparison.
- **Inconclusive**: Following the comparison, there is insufficient friction ridge information in the latent fingerprint and/or the record fingerprint to identify or exclude the person as being the source of the latent fingerprint.

Verification is the independent analysis, comparison and evaluation of the friction ridge detail carried out by another qualified fingerprint examiner. In the NSW Police Force - Forensic Evidence and Technical Services Command, the verification step is undertaken by a designated Verification Expert, who is a senior, practicing fingerprint expert appointed to that role based on their skills, knowledge, training and experience in fingerprint analysis. Where the conclusions of the two experts are in agreement, the NSW Police Force – Forensic Evidence and Technical Services Command will report the unanimous decision.

In the majority of cases, the ACE-V process produces a unanimous conclusion between the two fingerprint experts. In rare cases where there are differing opinions between two experts, the case is referred to a senior fingerprint expert for a final determination. Following this assessment, the NSW Police Force – Forensic Evidence and Technical Services Command will report the consensus decision.

The ACE-V methodology, as applied by qualified, practising fingerprint experts, has been the subject of method validation studies and has been shown to be accurate, repeatable and reproducible.[3]

STATEMENT OF LIMITATIONS OF RESULTS

The conclusions expressed in this report are subject to certain inherent limitations of fingerprint evidence and the ACE-V methodology.

Potential for Error

Qualified, practicing fingerprint examiners have demonstrable and specialised abilities to accurately detect discriminating features in friction ridge skin impressions. The accuracy of qualified, practicing fingerprint experts in comparing and identifying friction ridge skin impressions has been demonstrated to significantly

[3]Langenburg, G 2012, *A Critical Analysis and Study of the ACE-V Process*. Ph.D. Thesis, University of Lausanne, Switzerland; Pacheco, I et al, 2014, 'Miami-Dade Research Study for the Reliability of the ACE-V Process: Accuracy & Precision in Latent Fingerprint Examinations', *NIJ Report (Award 2010-DN-BX-K268)*; Ulery, B et al, 2011, 'Accuracy and Reliability of Forensic Latent Print Decisions', *Proceedings of the National Academy of Sciences,* vol. 108, no. 19, pp. 7733-7738.

exceed that of people who are untrained (i.e. novices).[4] However, the comparison of fingerprint impressions is a task conducted by humans, and subsequently there exists a potential of error.

To mitigate risk of error, NSW Police Force - Forensic Evidence and Technical Services Command incorporates strict peer review practices requiring independent verification of all fingerprint identifications by a minimum of one appointed Verification Expert. My conclusion(s) is not a statement of fact, but one of expert opinion.

Absence of Fingerprints

It is not always possible to detect fingerprints which are suitable for analysis, even if a person has handled an object or touched a surface. Some explanations for this include:

- Insufficient perspiration or residue on the hands to leave a detectable or identifiable latent fingerprint.
- The poor condition of the receiving surface (e.g. rough, dirty or otherwise unsuitable surface).
- Handling an object in a manner that smears or obliterates any fingerprint on that object.
- Various environmental factors affecting the fingerprint after it has been placed on the surface (e.g. heat, moisture, sunlight, etc.).
- Measures were taken to prevent fingerprints being left on an object (e.g. the person wore gloves).

Age of Fingerprints

There is presently no scientific means of determining the age of a latent fingerprint. In some circumstances, a latent fingerprint may remain detectable and/or identifiable for a considerable length of time, whilst in others it will degrade relatively quickly. Factors which influence this variability include:

- The composition of the latent fingerprint. If it has a high content of fats or oils, it will last a longer period of time.
- A latent impression which is comprised of a large amount of fingerprint residue will more likely survive for a longer period of time than one with a smaller amount of residue.

[4]Tangen, J, Thompson, M & McCarthy, D, 2011, 'Identifying Fingerprint Expertise', *Psychological Science*, vol. 22, no. 8, pp. 995-997; Thompson, M, Tangen, J & McCarthy, D, 2014, 'Human Matching Performance of Genuine Crime Scene Latent Fingerprints', *Law and Human Behaviour*, vol. 38, no. 1, pp. 84-93.

- The type and condition of the receiving surface may affect the detectable life of a latent impression (e.g. porosity, cleanliness and chemical composition).
- If a fingerprint is positioned on a surface which is handled regularly it will more likely be damaged and may only last a limited period of time.
- Fingerprints which are exposed to sun, wind or rain will generally last a shorter period of time than those protected from the elements.
- The shorter the period of time between the deposit of a latent fingerprint and the examination of the surface on which it is deposited, the greater the chance of detection.

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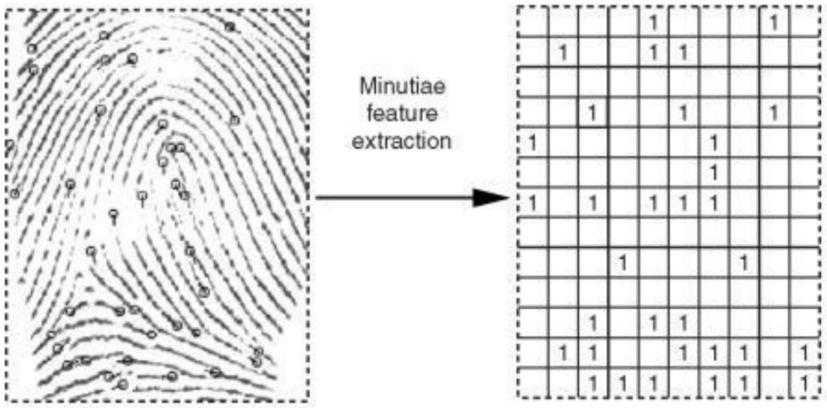
ATTACHMENT 1

NAFIS Searching Capabilities

ATTACHMENT 1A



Fingerprint Features – Minutiae Extraction Process

ATTACHMENT 1B

Example of spurious feature extraction caused by distortion

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