THE PRINT

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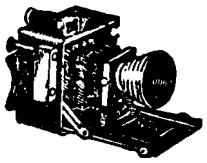

Perspectives on Livescan Imaging and Image Quality

(This article is reprinted from the April 2005 issue of Law Enforcement Technology.)

By **WILLIAM CASEY**

When the FBI Electronic Fingerprint Transmission Specification (EFTS), Appendix F, for fingerprint submission was developed in 1993, the main purpose was to develop objective national standards for insuring image quality for card scan systems and printers. These devices would provide fingerprint data to the FBI and later to its Integrated Automated Fingerprint Identification System (IAFIS), which was then in development.

In 1995 the EFTS Specification was amended to define minimum livescan fingerprint technical requirements (Appendix G). In 1999, Appendix F criteria applied to all scanner types. The purpose of the Appendix F and G standards was to ensure sufficient electronic fingerprint image quality for conclusive fingerprint comparisons, fingerprint classification, automatic feature detection and overall IAFIS search reliability.

In 1993, there was no IAFIS database. Today, there are nearly 49 million tenprint database records in IAFIS; and over 82 percent of daily submissions to FBI/IAFIS are now digital. This has corresponded with a significant increase in the use of electronic livescan systems, as opposed to inked cards, for the capture of fingerprint images throughout American law enforcement. With this technology so fully deployed nationally, it is important to review the role that electronic images play in making tenprint and latent fingerprint matches. In terms of the Mayfield case (Madrid bombing), the spotlight put on livescan [sic] has underscored the issue of image quality, and recently, the National Institute of Standards and Technology (NIST) has released image quality scoring metrics.

Underscoring image quality

In order to ensure the highest probability of obtaining a fingerprint match and subsequent positive identification, image quality is critical. In evaluating fingerprint images, certain criteria are essential: classification according to overall characteristic of loop, whorl, etc.; capture of the core and at least one of the deltas; identification of unique minutiae points, ridge endings, bifurcations, etc.; as well as analysis of specific ridge detail and pore structure.

There are three levels of fingerprint image detail. Level 1 identification detail includes the general ridge flow and pattern configuration. Level 2 identification detail includes the ridge ending and bifurcation formations. Level 3 identification detail of the dimensional attributes of a ridge includes the width, shape, pores, breaks and other permanent details.

Latent examiners want Level 3 fingerprint image detail to make identifications. There is zero tolerance for friction ridge identification error in forensic science and the fact that every impression varies makes it critical to capture the clearest images with the most data every time.

The same holds true in the automated fingerprint comparison process where high-integrity images are measured as having no smudging, false minutiae or other defects. Finer detail such as pores and ridges must be visible since they play a critical role in the comparison process. Additionally, gray-scale dynamic range must be captured with sufficient depth. The difference between the latent process and the automated process lies in the standardization of the data that is to be submitted to IAFIS and the need for interoperability — hence the EFTS Appendix F and G standards that emerged in 1993 and 1995.

Background on Appendix F

To compare where image quality is headed with what we have achieved thus far, it is useful to revisit Appendix F.

With the development of IAFIS, came the need for a standard for electronically encoding and transmitting fingerprint image data that would be a common interface for all AFIS systems. It begins with minimum 500-ppi resolution and 8-bit gray scale. In addition, there are six other areas that are measured:

- Geometric image accuracy measures the difference between the actual distance between any two points on a target and the distance between those same two points as measured by the livescan system.
- Modulation transfer function (MTF) measures contrast as a function of coarse and fine image detail. The Appendix F specification provides a range of values that represent the corresponding locally averaged image gray levels mapped through a calibration curve into the target reflectance space.
- Signal to noise ratio measures the ratio of signal to white noise deviation and signal to back noise deviation based on a random l/4-inch-area test field within the image area. The specification states to take care in ensuring the test area is free of dust, scratches and other imperfections.
- Gray-scale range of image data is a measure of the total number of gray levels that have signal content from the fingerprint image. High dynamic range scanners produce high contrast.
- Gray-scale linearity is a measure of gray scale across 14 patches in the image area.
- Output gray level uniformity is a measure of the consistency of gray level across the image area. This is determined by measuring the outputs of adjacent rows and columns against a black-and-white reference target.

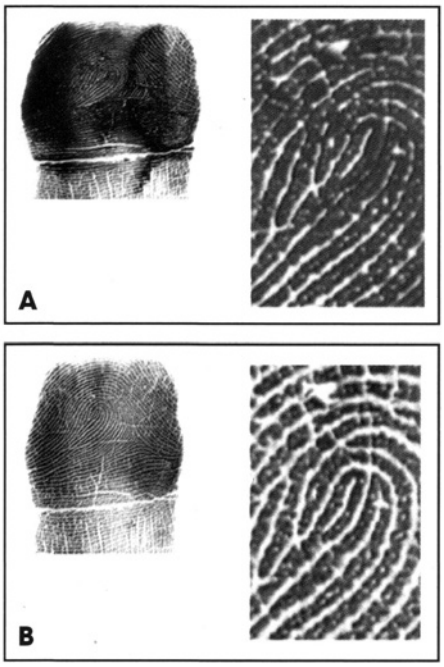

Image A: Standard definition livescan systems cannot distinguish between fingerprint ridges and moisture or sweat. As a result, blobs form, obscuring minutiae detail and compromising image quality.

Image B: Enhanced definition livescan systems include imaging technologies that ignore moisture regardless of whether there is moisture on the platen or if the subject's fingers are sweaty.

To determine whether a given livescan system meets these minimum criteria, each vendor submits a set of test image files captured from static test patterns. The test patterns are not designed to simulate fingerprint ridges but are designed to test digital camera performance; e.g., how sharp is the image, how much noise is in the image, is the image distorted and are gray levels reproduced faithfully. The expectation is that even though the Appendix F measurements are conducted in a "lab environment," the product will perform as well in a production environment.

As we move toward the deployment of livescan for broader homeland security uses, there will be a huge premium placed on improved image quality because of the implications of running a system designed for 200 million or more enrollees, the need for faster throughput and the minimizing of incidences where operators have to look further down the candidate list for a match.

Fast, accurate, trouble-free enrollment will be an essential requirement of these systems. Whether matching tenprints or latents, improvements to image quality will enhance matching accuracy and speed for the everlarger databases homeland security applications will eventually require.

Looking ahead

While the FBI set the most advanced image quality standards for its time, in a post 9/11 world, livescan has to address a bigger set of challenges. The issue of image quality therefore becomes exponentially more important. No longer will this technology be used solely by police departments, it is going to be relied upon by countless private agencies and governments all over the world to help identify those who may have a criminal record or may try to obtain false documents for entry into a country. This technology will be used in the future, along with other biometrics, for passports, driver's licenses, vital record authentication, visas, aircraft embarkations, etc.; mostly in the context of homeland security. These applications will need to match fingerprint records of varying sizes against larger databases than ever before. There also will be a significant growth of applications requiring simple verification of identity against very large databases, for a host of homeland security purposes.

Beyond Appendix F

With the introduction of new standards for image quality coming out of NIST, now is a good time to look beyond Appendix F for a better understanding of the different factors that affect image quality in real world usage of livescan. To meet this challenge, new solutions in livescan systems have been developed. The factors they address include:

• **Subject's finger condition.** Finger condition is the most difficult aspect to control. There are two parameters that need to be addressed: ridge structure and relative level of "moistness."

People who work with their hands, such as bricklayers, have poor ridge structure because the ridges are being "sanded smooth"on a daily basis. Years ago, the Boston (Massachusetts) Police Department had an interesting situation with a gentleman officers had arrested — a 50-year-old bricklayer who had absolutely no fingerprints after working with stone and bricks for more than 30 years. Officers used all the tricks of the trade, oils and other things, but there was absolutely no ridge detail to pick up. A livescan system with improved MTF performance will do a better job in reading fine details, such as those found on the bricklayer's hands, than one that meets minimum requirements.

The more typical condition is the relative dryness or wetness of the fingers. Typically, dry fingers must be moistened with an aqueous solution in order to get proper contact with the platen to achieve necessary image contrast. Untreated wet fingers can result in a "black blob" since standard optical schemes do not contrast between the ridges and the moisture.

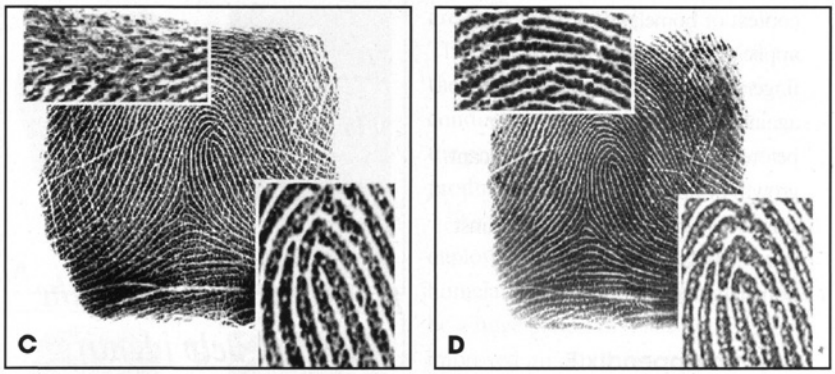

Image C: Fingerprint captured on a standard definition livescan. At the top, motion artifacts – shredded ridges – are visible due to the slow frame capture rate. Also, at the core of the fingerprint, ridge contours and pore detail are obscured. Over-processing creates excessive contrast – black and white with too little gray – causing fine details to be lost.

Image D: Fingerprint captured on an enhanced definition livescan. At the top, accurate ridge flow is visible due to the faster frame capture rate. In addition, the core of the fingeprint shows much clearer ridge definition and pore detail. With many levels of gray and less distortion, the critical details that enable better identification are maintained.

A more comprehensive and direct way of dealing with these issues is addressing signal-to-noise and MTF performance. These capabilities help extract the fine features whether or not a finger is dry. To address the sweaty finger issue, some livescan systems include special optics designed to eliminate this problem. These optics essentially render moisture like air so that the ridge and valley information comes through clearly, otherwise blobs could form and possibly obscure fingerprint detail. Ultrasonic capture of fingerprint images, rather than charged coupled device (ccd) capture, shows promise for eliminating both of these concerns. It is impervious to moisture problems and can capture sub-dermal fingerprint features otherwise "sanded smooth"by one's occupation, or done purposely by a criminal to avoid identification. It is not used as yet in commercial livescan.

• **Roll speed.** The objective of the fingerprint roll is to accurately record the fingerprint image with no artifacts and no false minutiae. Artifacts are ridge endings and bifurcations that are not present in the actual print. The presence of artifacts can create poor prints and may result in missed matches. The effects of motion and roll speed are best understood through the use of an analogy. Consider a camera with a slow shutter speed used to photograph a fast moving object. The result would be a blurred image. The same thing happens in the livescan world. Livescan systems with faster frame rates do a better job of capturing rolled prints. In addition, there are new technologies that overcome the smudging that often occurs when fingers are rolled. The combination of higher frame rates and these anti-smearing technologies helps to ensure artifact-free fingerprints regardless of the roll speed. In a recent case involving a crack addict who was being enrolled by regular livescan, repeated attempts resulted in failure. When enrolled using a livescan that utilized faster frame rates, the individual was successfully enrolled.

• **Coated platens.** Coated platens may result in some degradation in image quality, particularly with skin puckering and dark spots on knuckles. In addition, the coating must be replaced and care must be taken to ensure the coating is applied properly. Dirt, bubbles and other debris caught underneath could show up as false fingerprint data.

Questions to ask

The following are a few practical questions that should be asked when comparing livescan systems:

(l) How does the system deal with dry fingers or sweaty fingers?

(2) How does the system deal with subjects that have poor quality fingerprints?

(3) How many times do you have to do a roll before you get an acceptable image for AFIS submission?

(4) Does the operator have to be highly skilled in capturing fingerprints?

(5) When you roll slowly or fast, do you see smudging and smearing, particularly around the tips?

(6) Is the platen coated or uncoated?

(7) How does the system maintain consistent image quality over time?

(8) What is the overall capture time compared to inked prints?

(9) How does the system control the rejection of poor-quality prints?

(10) How much training is needed initially and on a follow-up basis?

The future

The importance of livescan image quality for AFIS performance and in ten print identifications has long been understood by the leadership of the FBI's Criminal Justice Information Services (CJIS) Division. Latent examiners also have long understood the importance of image quality in making positive identifications from partial latent fingerprints. This has led to the establishment of minimum standards known today as Appendix F. However, the expected dramatic increase in database sizes, along with the fact that courts are paying increased attention to the adequacy of proof for latent print positive identifications, means we are entering a new chapter in image quality. NIST's new image quality metrics will measure each fingerprint image submission to IAFIS and reject those that are of sub-standard quality. Training and competence of identification personnel, technology to enhance image quality, an understanding of what Appendix F is about, and asking the right questions of manufacturers about how their livescan systems can meet real world challenges, are all vital to getting the most out of fingerprint identification technology.

Superintendent William Casey is a veteran of the U.S. Navy and a 22-year veteran of the Boston Police Department. He has served as the chief of the Bureau of Administration and Technology, and has chaired the FBI's Advisory Policy Board, the APB's Identification Services Sub-Committee as well as the FBI's Task Force for Image Quality Standards (TFIQS).

Study of Faulty Fingerprints Debunks Forensic Science 'Zero Error' Claim

(This article was downloaded from the September 13, 2005, online version of Today@UCI.)

While forensic scientists have long claimed fingerprint evidence is infallible, the widely publicized error that landed an innocent American behind bars as a suspect in the Madrid train bombing alerted the nation to the potential flaws in the system. Now, UC Irvine criminologist Simon Cole has shown that not only do errors occur, but as many as a thousand incorrect fingerprint "matches" could be made each year in the U.S. This is in spite of safeguards intended to prevent errors.

Cole's study is the first to analyze all publicly known mistaken fingerprint matches. In analyzing these cases of faulty matches dating from 1920, Cole suggests that the 22 exposed incidents, including eight since 1999, are merely the tip of the iceberg. Despite the publicly acknowledged cases of error, fingerprint examiners have long held that fingerprint identification is "infallible," and testified in court that their error rate for matching fingerprints is zero.

"Rather than blindly insisting there is zero error in fingerprint matching, we should acknowledge the obvious, study the errors openly and find constructive ways to prevent faulty evidence from being used to convict innocent people," said Cole, an assistant professor of criminology, law and society.

The study appears in the current issue of the *Journal of Criminal Law & Criminology.*

Cole's data set represents a small portion of actual fingerprint errors because it includes only those publicly exposed cases of mistaken matches. The majority of the cases discussed in this study were discovered only through extremely fortuitous circumstances, such as a post-conviction DNA test, the intervention of foreign police and even a deadly lab accident that led to the re-evaluation of evidence.

One highly publicized example is that of Brandon Mayfield, the Portland lawyer who was arrested and held for two weeks as a suspect in the Madrid train bombings in 2004. FBI investigators matched prints at the scene to Mayfield, and an independent examiner verified the match. But Spanish National Police examiners insisted the prints did not match Mayfield and eventually identified another man who matched the prints. The FBI acknowledged the error and Mayfield was released.

Wrongful convictions on the basis of faulty evidence are supposed to be prevented by four safeguards: having print identifications "verified" by additional examiners; ensuring the examiners are competent; requiring a high number of matching points in the ridges before declaring the print a match; and having independent experts

examine the prints on behalf of the defendant. However, each of these safeguards failed in cases Cole studied. In fact, in four of the cases, independent experts verified the faulty matches.

Despite print examiners' zero-mistake claim, Cole points out that proficiency tests conducted since 1983 show an aggregate error rate of 0.8 percent. Though that may seem small, when multiplied by the large number of cases U.S. crime laboratories processed in 2002, it suggests there could be as many as 1,900 mistaken fingerprint matches made that year alone.

"While we don't know how many fingerprint errors are caught in the lab and then swept under the rug – or, worse, how many have still not been caught and may have resulted in a wrongful conviction – we clearly need a full evaluation of the errors," Cole said. "The argument that fingerprints are infallible evidence is simply unacceptable."

[Editor-All latent print examiners should be familiar with the cases that Simon Cole uses as examples and be prepared to address the issues involved. Cole's article is available online at www.nlada.org/Defender/forensics/for_lib/Documents/1128572507.37/FinalProof.pdf].]

Double Murder Trial Keys On Fingerprints

Nurse Accused Of Killing, Dismembering Two

(This article was downloaded from the October 28, 2005, online issue of The Star-Ledger.)

By **MARYANN SPOTO**
Star-Ledger Staff

Fingerprints found on garbage bags containing the severed remains of two men dumped in Ocean County could be the key to convicting the killer or could have led investigators to the wrong man, authorities argued yesterday in the double-murder trial of Richard Rogers.

During the first full day of testimony, prosecutors called witnesses who said Rogers' fingerprints matched those taken from garbage bags more than a decade ago in the unsolved murder of Thomas Mulcahy, a computer sales executive from Sudbury, Mass.

Through his cross-examination of those witnesses, Rogers' attorney is trying to convince jurors that although his client's fingerprints were on the bags, it does not make him the killer. Someone else could have touched the bags, defense attorney David Ruhnke suggested through his questioning.

Rogers, a 55-year-old former surgical nurse from Staten Island, is accused of killing Mulcahy, 58, in July 1992, and Anthony Marrero, 44, a prostitute from Manhattan, in May 1993, and dumping their dismembered bodies in wooded areas of Ocean and Burlington counties.

The two killings were considered cold cases until 2000, when authorities, using a newly developed technique to analyze fingerprints, matched Rogers' prints to those on the plastic bags containing the body parts.

Donald Giberson, a Manchester resident, described for the jury how he found the bag containing Marrero's arms at the end of Crow Hill Road, a dead-end dirt road in the Whiting section of town.

"I saw what I thought was a deer carcass," he said. On closer inspection, he said, "I look and seen it had fingers on it, so I immediately called Manchester police."

The murders of Mulcahy and Marrero were two of five killings that became the central focus of a multi-state police task force examining the cases of victims similarly killed.

Superior Court Judge James Citta, sitting in Toms River, has allowed the prosecution to present evidence in four of the five murders. Rogers is still a suspect in two of the other cases but has not been charged.

In all four of the killings, the victims were gay or bisexual men whom Rogers, a nurse at Mount Sinai Hospital for more than 20 years, was seen with before their deaths. All four victims had been dismembered and their remains disposed of in generally the same way.

Mark Woodfield, deputy chief of investigations for the Ocean County Prosecutor's Office, said he took fingerprints from several potential suspects in Marrero's death shortly after the killing, but none matched the ones on the bags.

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Upcoming SCAFO Meeting & Installation

December 4, 2005

Topic - The CSI Effect
Heidi Robbins,Assistant Director
Los Angeles Sheriff's Dept.
Scientific Services Bureau

Lunch Meeting at:
La Palapa Del-Mar Restaurant
Long Beach, CA

One Of Canada's Most Notorious Crooks Cuffed

(This article was downloaded from the October 19, 2005, issue of cnew.canoe.ca.)

By **GREG WESTON**
Sun Media Ottawa

After an extraordinary 30 years of successfully hiding from the law as a respected American businessman, the last member of Canada's infamous Stopwatch Gang still on a wanted list was captured yesterday in south Florida.

U.S. federal agents arrested Christopher Clarkson, 61, a former Ottawa resident, university grad, and one-time CBC producer, who disappeared from Canada in the middle of a 1976 drug trial.

He is also the nephew of well-known Toronto political scientist and author Stephen Clarkson, former husband of recently retired governor general Adrienne Clarkson.

Shortly after 8:30 yesterday morning, federal agents with guns drawn stormed the Florida offices of the man known in the community as commercial real estate agent Stephen Willis Duffy.

Clarkson faces charges of passport fraud in the U.S., in addition to an outstanding 20-year prison sentence given him in Canada in 1976 after he disappeared in mid-trial on drug charges.

Crime and Calamity

Yesterday's stunning arrest of Clarkson adds yet another chapter to the wacky tale of criminal mastermind Paddy Mitchell and the Stopwatch Gang, surely one of Canada's most bizarre sagas of crime and calamity.

It all began in 1974 when Mitchell and two unlikely partners in crime, Stephen Reid and Lionel Wright, pulled off the great gold heist at Ottawa airport, making off with $750,000 in bullion headed for the Canadian mint. By the time Mitchell's career came to an end in 1994, he and his gang had made it onto the FBI's 10 Most Wanted list as the last of America's bankrobbing gangs.

Two months after the gold robbery, Mitchell conscripted Clarkson and another pal, Thomas Harrigan, to play bit parts in a drug-smuggling operation that turned into more comedy than crime.

The plan was to ship a suitcase packed with cocaine from the Caribbean island of Curacao to Ottawa airport where Mitchell had bribed a baggage handler to steal the bag before it got to customs.

At that time, Clarkson was 26 years old, with degrees in philosophy and journalism, no criminal record, and a promising career as a drama series producer for the CBC.

One month after the gold heist, Clarkson and Harrigan travelled to Curacao, and a green suitcase arrived in Ottawa a few days later.

But the baggage handler missed the bag -- not once but three times -- as Mitchell frantically had the suitcase shipped back and forth between Ottawa and Toronto over the ensuing months. It was finally seized by authorities at the lost luggage impound at Pearson Airport in Toronto.

When the case finally came to trial in Ottawa in January 1976, Clarkson and Harrigan threw a beer party at a local tavern after the first week of testimony, and vanished.

The judge in the case was so mad that he continued the trial anyway, ultimately convicting and sentencing Clarkson and Harrigan to 20 years in prison -- if they were ever found.

Clarkson made his way to California and started a new life with a new identity -- that of a 4-year-old who died in northern California in 1948.

His big mistake? Applying for a U.S. passport. And getting arrested in 1991 on a drunken misdemeanour charge in Los Angeles.

Federal authorities checking the passport application matched Stephen Willis Duffy to his California driver's licence, and to his file on the drunk charge that included his fingerprints.

Fingerprints Matched

The fingerprints matched those of Canadian fugitive Christopher Clarkson.

As stunned co-workers watched Clarkson's life on the lam end in handcuffs yesterday, no one seemed more surprised than the fugitive impostor.

"He was definitely stunned," said Special Agent-in-Charge Ed Moreno. "But he didn't ask us any questions. He knew why we were there."

No one at the Hollywood real estate company had any idea Duffy was an impostor.

"The staff is all pretty shaken," said Alan Brown. "Nobody had any idea he was anything but a normal guy.''

Even if Clarkson is returned to Canada, it is unlikely he will do much prison time here.

Harrigan was arrested in 1990 in New York State, extradited to Canada, and tossed in jail to begin doing his 20-year sentence.

But a judge overturned both his original conviction and sentence, ruling the courts had no authority to try him in his absence.

The judge ordered a new trial that never happened.

MINUTES OF OCTOBER MEETING

DATE: October 1, 2005

LOCATION: Embassy Suites, Covina

HOST: SCAFO

SECRETARY: Mari Johnson

PROGRAM: 14th Annual Forensic Training Seminar

CALL TO ORDER: Meeting called to order by President Dennis Uyeda.

ATTENDANCE:

PAST PRESIDENTS: Alan McRoberts (1991), Clark Fogg (1994), Bill Leo (1996), Robert Goss (2001), Steve Tillmann (2002), Ed Palma (2004).

EXECUTIVE BOARD: Ed Palma, Dennis Uyeda, Susan Garcia, Gina Russell-Durgin, Mari Johnson, Craig Johnson, Susannah Baker, Sarah Watson, Marvin Spreyne, Bill Leo, Lisa DiMeo, Clark Fogg, and Alan McRoberts (Absent: Chuck Russell).

Members and guests present: 127

OLD BUSINESS:

Second Readings:

Rick Bass
Krshna Patel
Georgine Scott
Margaret Adams
Sheri Orellana

Motion to accept: Susan Garcia
Second: Craig Johnson

Swear Ins by Past President Ed Palma:

Venessa Schlottman, Pasadena Police Dept.
Steven Thomas, Los Angeles Sheriff's Dept.
Brian James, Los Angeles Sheriff's Dept.
Karin Owens, San Bernardino Sheriff's Dept.

NEW BUSINESS:

Cindee Lozano, Fullerton Police Dept.
Recommended by Clark Fogg
Stefanie Camarillo, Los Angeles Sheriff's Dept.
Recommended by Susan Garcia
Mary Ellen Gorski, Glendale Police Dept.
Recommended by Debbie Stivers
Leonard Cardea, Santa Ana Police Dept.
Mark Waldo, Santa Ana Police Dept.
Recommended by Heather Heider
Sylvia Romero, Los Angeles Sheriff's Dept.
Recommended by Anne Wenceslao
Michael Leo, Covina Police Dept.
Recommended by Bill Leo

2006 Elections Results

Susan Garcia (President)
Gina Russell-Durgin (Vice President)
Craig Johnson (2nd Vice President)
Sarah Watson (Sgt. at Arms)
Mari Johnson (Secretary)
Debbie Stivers (Director)
Amy Hines (Director)
Bill Leo (Historian)
Steve Tillmann (Editor)

ANNOUNCEMENTS:

In addition to the elected positions:
Dennis Uyeda (Chairman of the Board)
Lisa DiMeo (Treasurer) - second year of term
Sue Baker (Director) - second year of term
Marvin Spreyne (Director) - second year of term
Clark Fogg (Parliamentarian) - appointed
Alan McRoberts (Webmaster) - appointed

The 2006 Executive Board will be sworn in at the December meeting.

December meeting will be held Sunday, December 4 at 11:00 a.m.

DOOR PRIZES:

Provided by Clark Fogg, Mari Johnson, Susan Garcia, Gina Russell, Bill Leo, Armor Forensics, Lynn Peavy, and SCAFO.

MOTION TO ADJOURN: Susan Garcia
Second: Sarah Watson

MEETING ADJOURNED: 1250 hours

EXECUTIVE BOARD MEETING

A brief executive board meeting was held immediately following the business meeting.

Motion by Alan McRoberts for SCAFO to purchase the Adobe Publishing Suite software package ($700) for Steve Tillman to use as editor. Second by Marvin Spreyne. Motion approved.

"Every man owes a part of his time and money to the business or industry in which he is engaged. No man has a moral right to withhold his support from an organization that is striving to improve conditions within his sphere."

- President Theodore Roosevelt, 1908

For subscription or membership information, or address corrections contact:

S.C.A.F.O. **Lisa DiMeo, Treasurer**
P.O. Box 4146
La Mesa, CA 91944-4146
dimeo@scafo.org
$20.00 yearly subscription (attendance required for membership)
$30.00 yearly for International Subscriptions

C.S.D.I.A.I. **Ricardo Tomboc, Treasurer**
710 North "D" Street
San Bernardino, CA 92401
(909) 384-5701
$25.00 yearly membership

I.A.I. **Joe Polski, Chief Operations Officer**
2535 Pilot Knob Road, Suite 117
Mendota Heights, MN 55120-1120
(651) 681-8566 iaisecty@theiai.org
$60.00 yearly membership

S.C.A.F.O.
PO Box 893789
Temecula, CA 92589-3789

In This Issue

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Get "yourname@scafo.org".
See instructions on the website's email page.

-- Upcoming Events/Schools/Seminars--

December 4, 2005 ***(Sunday lunch meeting)***	***S.C.A.F.O. Meeting*** Susan Garcia Los Angeles Sheriff's Dept.
February 20 - 25, 2006	AAFS 58th Annual Meeting Seattle, WA
May 7 - 11, 2006	C.S.D.I.A.I. 90th Annual Training Seminar Ontario, CA
July 2 - 8, 2006	International Association for Identification Boston, MA
July 22 - 27, 2007	International Association for Identification San Diego, CA

Standardization, Training & Professionalism Since 1937

Southern California Association of Fingerprint Officers
An Association for Scientific Investigation and Identification Since 1937