



# Division of Technical Services Update

Alka B. Lohmann

Director of Technical Services

April 20, 2021

# DTS Staffing Update



- Quality Assurance Section reorganization
  - Section Supervisor Robyn Larson
  - Forensic Compliance & Safety Specialist in recruit
- Chemistry Research
  - 2 Forensic Laboratory Specialist (FLS) VI positions in recruit



# Accreditation



- Scope Extension – Forensic Biology
  - Eastern and Western
  - Y-STR
  - Assessed December 2020
- Document Surveillance – May 3-28, 2021
- Trigger Pull outside current scope
  - Estimation of measurement uncertainty being evaluated

# Forensic Training



- 102<sup>nd</sup> Forensic Science Academy (FSA)
  - Mostly students from the cancelled session last summer
  - Graduated April 1<sup>st</sup>
- 103<sup>rd</sup> FSA begins April 26<sup>th</sup>
- 104<sup>th</sup> FSA begins September 13<sup>th</sup>

# Forensic Training



- Byrne Justice Assistance Grant Program
  - Continuation Funding
  - Allows for 3<sup>rd</sup> Instructor (part-time)
  - Ensures 3 FSA sessions while maintaining Short Course offerings
- Short Courses
  - Based on positive feedback, online course are continuing to be offered
    - Interspersed with the in-person schedule

# Grant Update



- Department of Criminal Justice Services
  - Coronavirus Emergency Supplemental Funding
- Ensuring continuity of operations and safety of personnel with Breath Alcohol and Forensic Training
  - Equipment for online course delivery
  - Webcams and headsets with microphones



# Chemistry Program Update

Robyn Weimer  
Chemistry Program Manager

# Trainee Update – Trace Evidence



## **Central Laboratory:**

- One (1) trainee expected to complete fiber training July 2021
- One (1) trainee expected to complete tape training Aug 2021



# Trace Evidence: Changes to Align with National Standards



- October 2020:
  - assessment of significance into comparison reports (Standard Practice for Interpretation and Report Writing in Forensic Comparison of Trace Materials)
  - reporting the number of confirmed primer residue particles and their type (ASTM WK69622)
  - preservation and retention of ignitable liquid evidence (ASTM E2451)
- March 2021 – incorporation of refrigerators for preserving Fire Debris evidence (ASTM E2451)

# NIJ Grant – Fire Debris



- “A Foundational Study of Fire Debris Interpretation Using Quantitative Measures of Chromatographic Features with the Application of ACE-V Methodology”
- Final report submitted to NIJ March 29, 2021
- Publication:  
Christy, B., Winters, K., Rossheim, A., Newman, R., and Tang, L.,  
“A foundational study of fire debris interpretation using quantitative measures of chromatographic features in gasoline and the use of graphical display to demonstrate data sufficiency”, *Forensic Chemistry*, Vol 24. June 2021
- Internally working towards incorporating into analytical scheme

# Trainee Update – Controlled Substances



## **Western Laboratory:**

- One (1) trainee expected to complete training May/June 2021

# Section Training – Controlled Substances



- January 2021: Current Trends in Seized Drug Analysis (free) Online Symposium
  - Provided 8-15 hours of training
- February 2021: American Academy of Forensic Sciences (AAFS) Annual Meeting
  - 6 examiners attended virtually

# Board of Pharmacy Expedited Scheduling



DFS recommended six (6) compounds in January 2021. The compounds were considered at the Board's March 30<sup>th</sup> meeting and are pending final approval.

## **Synthetic Opioids:**

- Brorphine
- para-chlorofentanyl
- Metonitazene
- Etazene

## **Depressant properties:**


- Meclonazepam

## **Cannabimimetic Agents:**

- 5-fluoro EDMB-PICA

# Report on Seized Drugs - CY2019




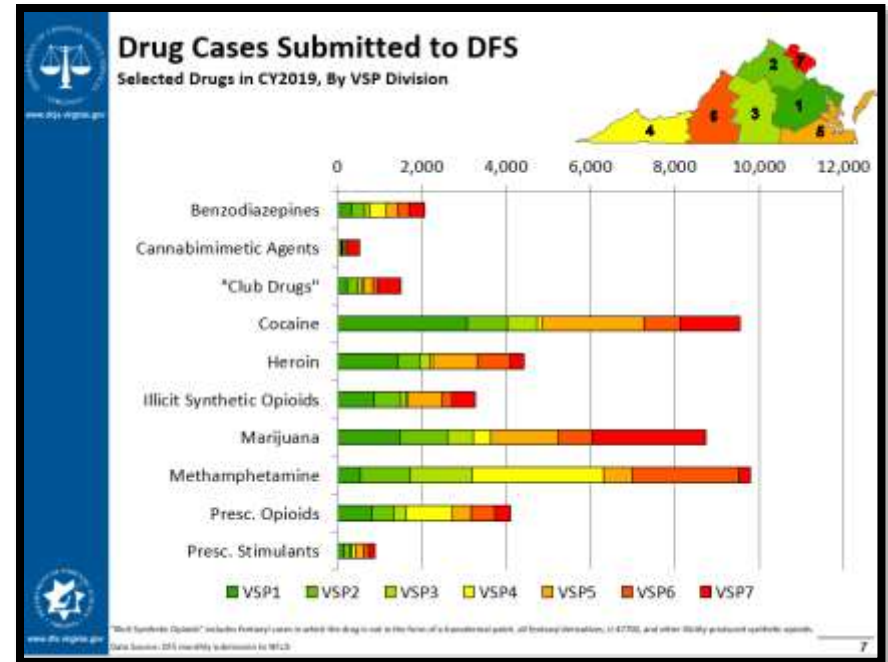
  
www.dfs.virginia.gov

## Drug Cases Submitted to the Virginia Department of Forensic Science

Calendar Year 2019

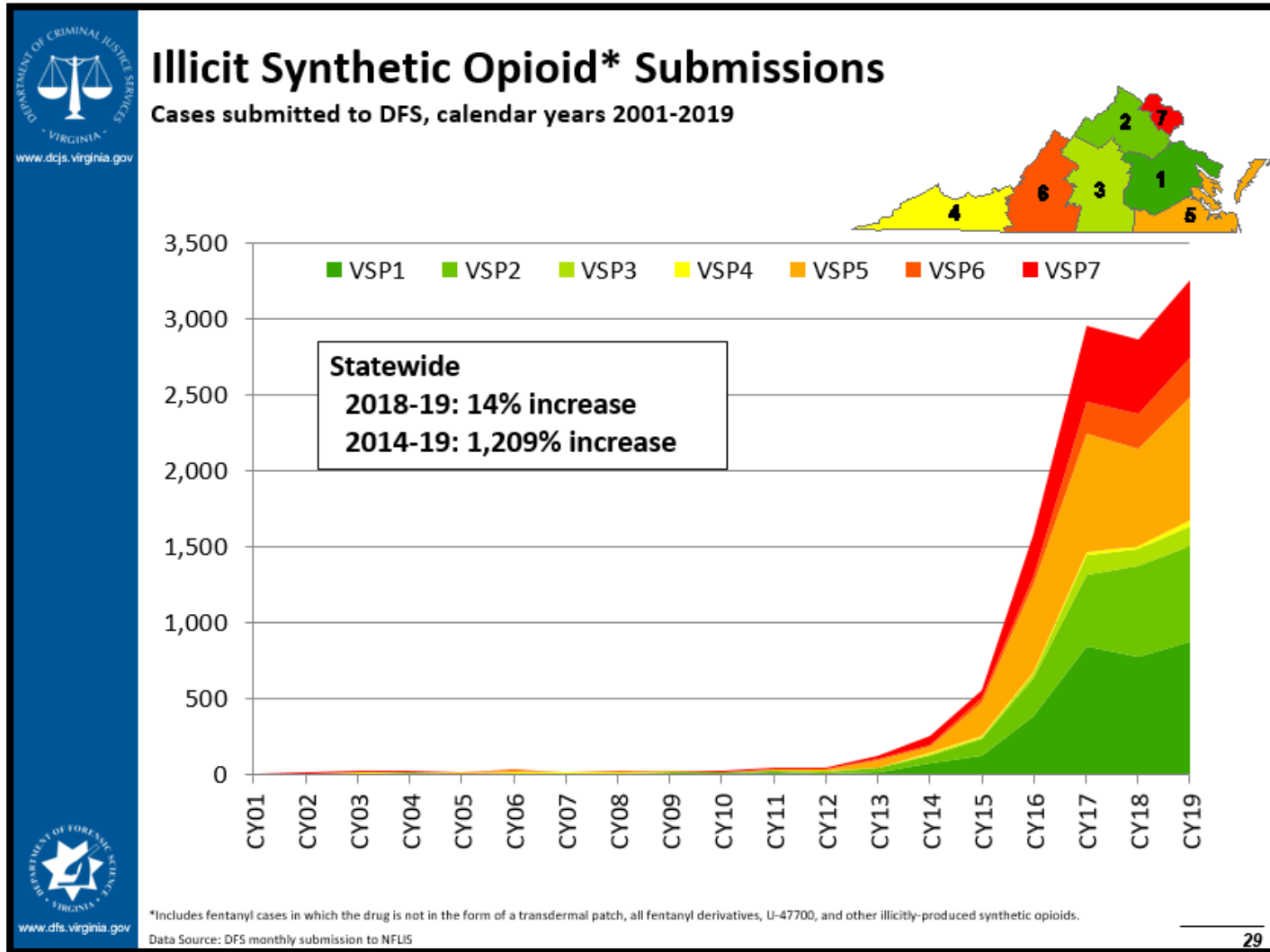
A Joint Report by the Virginia Departments of  
Forensic Science  
&  
Criminal Justice Services

  
www.dfs.virginia.gov



[https://www.dfs.virginia.gov/wp-content/uploads/2020/11/FINAL\\_DFS2019DrugSubmissionDataReport.pdf](https://www.dfs.virginia.gov/wp-content/uploads/2020/11/FINAL_DFS2019DrugSubmissionDataReport.pdf)

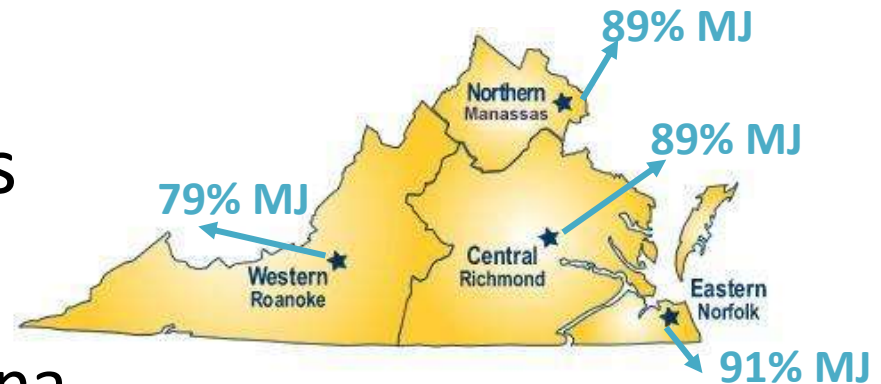
# Illicit Synthetic Opioids Continue to Rise



# Cannabis Update



- Semi-quantitative method implemented January 24, 2020
- CY2020: 8,594 items analyzed and reported as Marijuana or Cannabis (13% of all items analyzed)
- 7,451 items described as “plant material”
  - 87% reported as Marijuana
  - 13% were reported as Cannabis





# Cannabis Update



- December 11, 2020, semi-quant SOP update
  - Changed administrative threshold from 2% to 1%
  - Changed internal standard from androstenedione to testosterone
  - Expanded to cannabis extracts w/ tenfold dilution
- Quantitation of THC via GC-MS in selected ion monitoring (SIM) mode
  - Validation in progress
- Future subcommittee meeting needed

# Legislative Changes



- July 1, 2020
  - Simple possession of Marijuana was decriminalized
  - \$25 civil fine for possession of up to 1 oz
  - Hashish oil removed from the Virginia Code
- March 1, 2021
  - Limited searches without a warrant based solely on the odor of marijuana
- July 1, 2021
  - For those 21 years old or older, will be legal to possess up to 1 oz and cultivate up to 4 cannabis plants per household
- January 1, 2024
  - Regulated commercial market for marijuana sales



# Forensic Biology Program Update

Brad C. Jenkins

Forensic Biology Program Manager

# Forensic Biology Staffing



Central

1 in training Data Bank

Western

1 in training Casework

Northern – Fully staffed

Eastern - Fully staffed

# Staff Internal Training Projects



## Y-STR Training:

- Completed.....round 2?

## STRmix deployment:

- External training being scheduled for remaining examiners
- Testimony Training
- Additional mixture training sets

## Hair Training:

- Central Trace Evidence Section for 3 staff members

# Validation Update



- STRmix validation
  - Regional laboratory performance checks complete
  - Draft manuals in edit
- New Real Time PCR instruments QS4
  - New DNA quantitation kit
  - New Y-STR Kit evaluation
  - Additional Casework Direct studies

# Consumable Shortage



- Pipette tip shortage for Robotics
  - November
  - February moved to manual DNA extractions
  - Halted liquid validation studies
- Future outlook

# DNA Research Grant



- An automated or semi-automated differential extraction method using DNAase
- The Research position has been filled



# External Continuing Education



- Statewide examiners attended the AAFS remotely in February 2021

# External DNA Audit



First week of December 2020 for DFS

- Audit of the statewide system – Casework and Data Bank

Forensic Biology staff members conducted 2 external QAS audits

# Data Bank



## Dept. of Corrections and DFS project

- Electronic portal for sample information and pre-submission of sample data
- Will effectively replace current tracking system

## State Police and DFS Project

- Automated exchange of data to check the sex offender registry



# Physical Evidence Program Update

Sabrina S. Cillessen

Physical Evidence Program Manager

# Latent Prints / Impressions Staffing



- Fully staffed
- In training:
  - 1 in Western
  - 1 in Central
  - 1 in Central for Impressions

# Latent Print Continuing Education



- Common Sense Digital Imaging
- Ethical Considerations in Latent Print Examinations and Testimony
- What if I don't agree? Approaches to Conflict Resolution in Latent Print Analysis
- Implementing the Expanded OSAC Conclusion Scale
- Discriminating Power of Friction Ridge Arrangements
- Beyond the Discriminating Power of Friction Ridge Arrangements – Applying What You Learned

# Latent Print Database Search Results



- Latent Print vs Known Print
- AFIS/NGI Databases
- Search Criteria
- Additional Quality Assurance Steps
- Reporting
- Policy Notice
- Summary



# Latent Print vs Known Print

- Latent prints are unknown, partial, often smudged and distorted, unintentional impressions of friction ridge skin deposited on the surface of items.
- Exemplars are known prints that are clear and complete representations of the friction ridge skin.





# AFIS/NGI



- Automated Fingerprint Identification System (AFIS)
  - State system contains arrest and some applicant exemplars
  - NEC software
- Next Generation Identification (NGI)
  - Federal system contains arrest and some applicant exemplars as well as TSA Pre-Check cards
  - System also contains other biometric information not used for latent print searches
- Database searches are performed on latent prints recovered from evidence

# AFIS/NGI

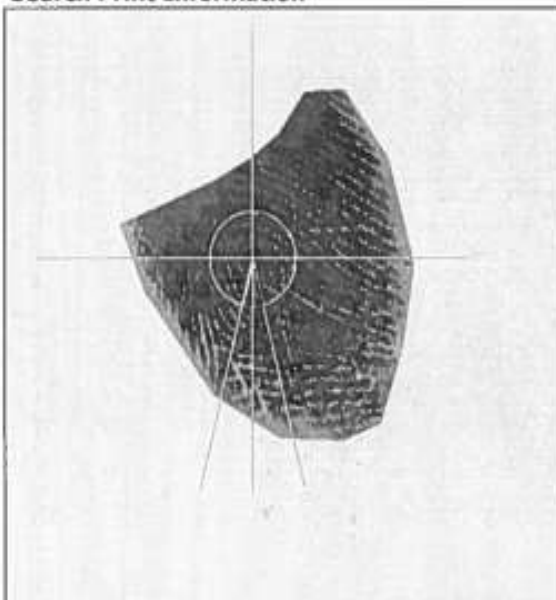


- Latent prints are coded (points or minutiae marked) by the software or an examiner
- Search is launched against the database
- Images that are visually similar to the latent print are presented to the examiner for comparison
- The system is designed to present known exemplars that look like the latent print

# Latent Verify - HIT Report (Minutia Included)



## Search Print Information



Crime Code:	
Case No.:	10021899999
Lift No.:	05
Item Number:	
Sex:	M
Race:	J
Agency Case Number:	219999999
Agency ORI:	MA122015Y
Pattern Type:	R
Finger Numbers:	1,2,3,4,5,6,7,8,9,10
Adjacent Pattern Types:	02277777
Minutia Count:	17
Search Date/Time:	2/24/2011 2:51:27 PM
Operator ID:	Sam.Glass
Verify 1 ID:	Sam.Glass
Verify 2 ID:	
Terminal ID:	FW-CENTRALAB
LOC Max.:	30
Search Database:	Both
Matching Algorithm:	<input type="checkbox"/> <input checked="" type="checkbox"/> FUSION

Memo: AF15 C4 *mg*

## File Print Information



Date Of Birth:	1972-01-01
Sex:	
Race:	J
SID:	1000005171
Name:	
Palm Print Available:	
Date Of Arrest:	2011-05-05
Booking ORI:	
Adult Flag:	
OCA:	1000005171
Annotation Right:	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Annotation Left:	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Pattern Type:	W <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> R <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Reference Pattern:	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Quality Rolled:	80 69 81 68 72 98 81 88 82 88
Quality Slap:	74 61 66 56 47 85 64 76 72 51
Minutia Count Rolled:	631 61 614 618 86 590 613 78 61 106
Minutia Count Slap:	85 63 61 72 41 82 66 61 68 67
Input Date:	2011-05-05
Operator ID:	100Y001
Terminal ID:	GWSD1701

Memo: "CILLESSEN, SABRINA STEELE"

# AFIS/NGI

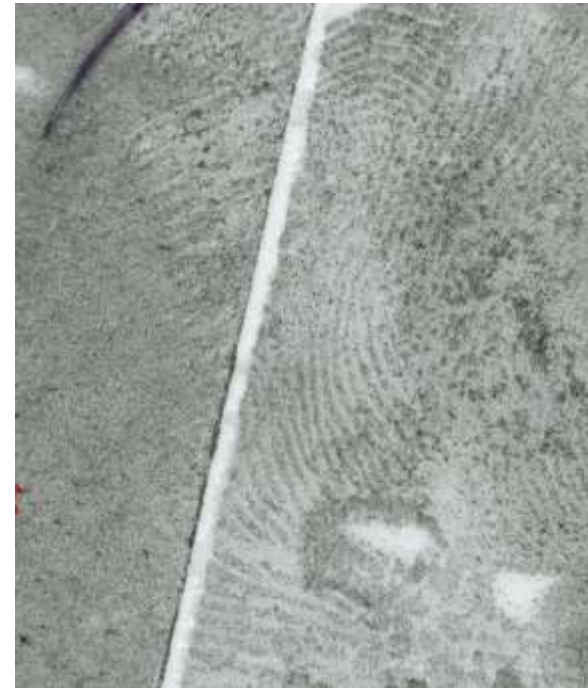
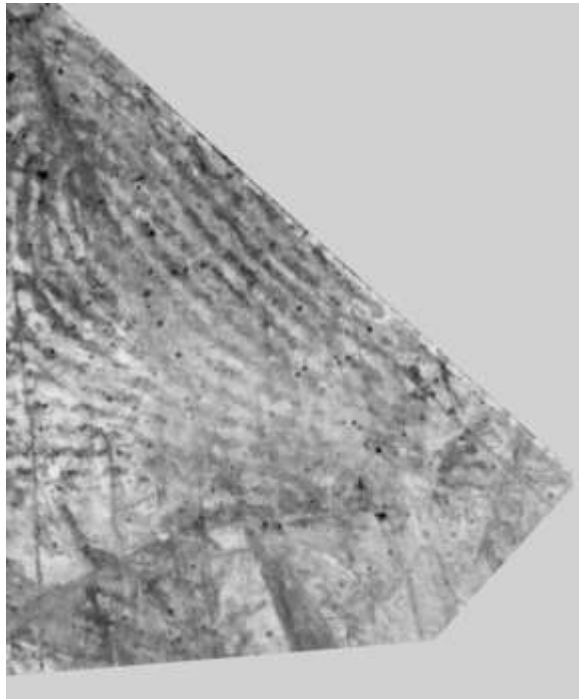


- Large database size combined with advancements in algorithm technologies present close non-matches (CNM)
- Complexity of latent print creates risk of CNM being reported as a match

# Search Criteria



- Patterns formed by the ridges can be common in certain areas of skin



# Search Criteria



# Search Criteria



11.2.9.2 Four complexity levels are possible as a result of the determination:

11.2.9.2.1 Complexity Level I: a latent print where the observed data does not provide an indication of anatomical region or orientation and any or all of the following factors are present: low specificity of features, significant distortion (e.g. rotational movement, multiple tap, superimposed impression, extreme pressure leading to tonal reversal, and slippage), high tolerances, and pattern forced area.

This level of complexity requires the additional quality assurance measures outlined in Section 12.2.2 of this manual.

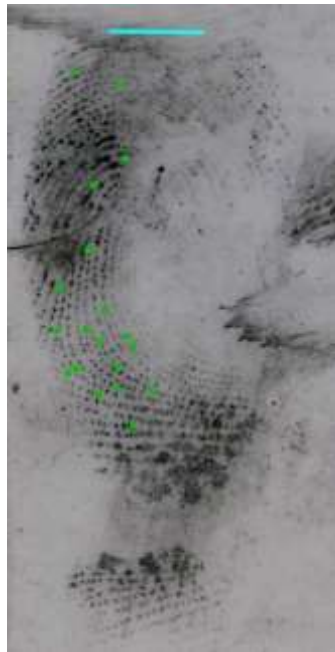
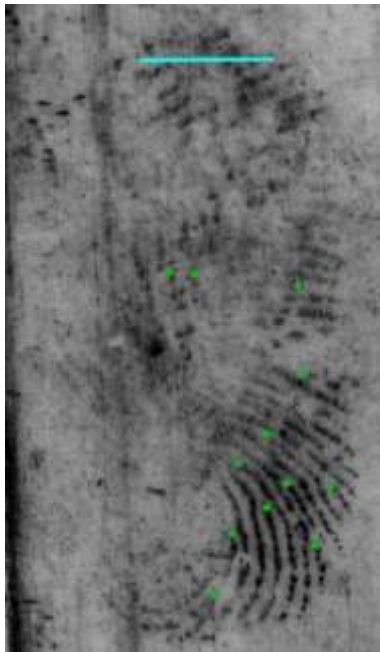
11.2.9.2.2 Complexity Level II: a latent print where the observed data provides an indication of the anatomical region and orientation and any or all of the following factors are present: low specificity of features, significant distortion (e.g. rotational movement, multiple tap, superimposed impression, extreme pressure leading to tonal reversal, and slippage), high tolerances, and pattern forced area.

This level of complexity requires the additional quality assurance measures outlined in Section 12.2.2 of this manual.

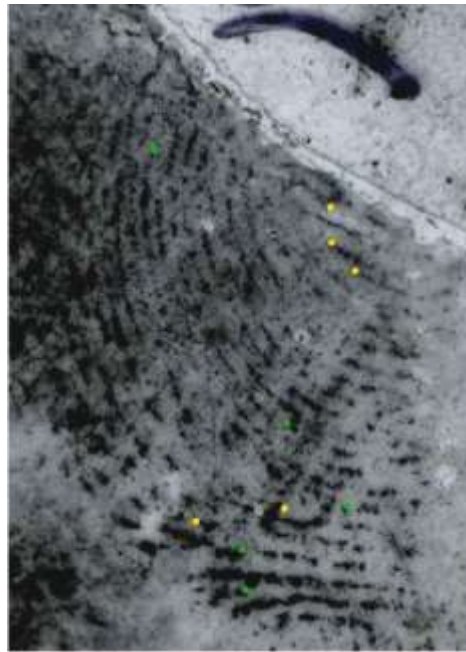
# Search Criteria



**Non-Complex**



**Complexity I & II**





# Additional Quality Assurance Steps



- 12.2.2 Prior to conducting a database search of a Complexity Level I or Level II latent print, the examiner shall consult with another examiner. The consult will result in either 1) agreement the print can be searched and vulnerable areas are documented (i.e. lack of specificity, distortion) or 2) agreement the print should not be searched or 3) the print is not searched due to lack of consensus. The consultation shall be documented.
- 12.2.2.1 A consultation is not required if a Complexity Level I or Level II latent print is not searched in a database.
- 12.2.2.2 A consultation is not required if a Complexity Level III or a Non-Complex latent print is searched in a database.
- 12.2.2.3 If a Complexity Level I or Level II latent print is identified to an exemplar retrieved as the result of a database search, the examiner shall participate in a consultation regarding the comparison conclusion. It is acceptable for the consultations to be conducted by the same examiner due to a potential advantage of the examiner being aware of the complexity issues discussed prior to searching in the database. The comparison shall be verified by an examiner not involved in the consultation.

# Reporting



Due to the nature of latent print *IP2* and given the higher chance of a coincidental match in a large database, similar corresponding characteristics could be observed in the friction ridge skin of a different person.




COMMONWEALTH of VIRGINIA  
DEPARTMENT OF FORENSIC SCIENCE



OFFICE OF THE DIRECTOR  
A Nationally Accredited Laboratory

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**NOTICE OF DFS POLICY CHANGE**

To: All Agencies Served by DFS  
From: Linda Jackson, Department Director   
Date: February 10, 2021  
RE: Latent Print Database (AFIS/NGI) Search Results

The Latent Print Section utilizes the Virginia Automated Fingerprint Identification System (AFIS) and the Next Generation Identification (NGI) system to provide investigative information about individuals potentially associated with criminal events through the search of partial latent prints recovered from evidence against databases of known exemplars (fingerprints and palm prints).

The known exemplars obtained as a result of a database search could potentially contain characteristics very similar to those present in the partial latent print (considered a "close non-match"). A comparison conclusion is an examiner's opinion based upon the interpretation of the details present in the latent print and the known exemplar. Historically, examiners have been able to differentiate between a close non-match and an identification; however, due to the increasing size of the databases and the advancements in matching algorithms, this task is becoming more difficult. Accordingly, the Department has implemented additional quality assurance measures and reporting requirements to minimize the risks for more complex latent prints.

Below is an example of the language that will be included on the Certificate of Analysis for instances where the risk of a potential close non-match is higher due to the complexity of the latent print.

*Due to the nature of latent print IP2 and given the higher chance of a coincidental match in a large database, similar corresponding characteristics could be observed in the friction ridge skin of a different person.*

The result of a database search is intended to provide an investigative lead, and any possible connection or involvement of the individual to the case must be determined through further investigation.

Please contact the Latent Print Section Supervisor for your service area at the number listed if you have any questions or concerns.

Laboratory	Section Contact	Phone Number
Central (Richmond)	Amanda Lane	(804) 588-6029
Eastern (Norfolk)	Chris Claytor	(757) 355-5950
Northern (Manassas)	Jessica Davis	(703) 334-9752
Western (Roanoke)	Kate Adolf	(540) 283-5975

# Summary



- New procedures include additional quality assurance steps for database searches of complex latent prints.
- The Department is confident in the conclusion reported.
- Investigating the result is part of the process.

# Firearms and Toolmarks Staffing



- In recruit:
  - 1 in Western
- In training:
  - 1 in Northern
  - 1 in Central
  - 1 in Eastern

# Firearms and Toolmarks

## Continuing Education



- CSAFE Introduction to Machine Learning for Forensic Science
  - Day 1, two hour on-line presentation Learning Algorithms for Classification
  - Day 2, three hour on-line presentation Random Forests – How they work and Same Gun or Different Gun? – Quantifying the similarity between bullet striations

# Firearms and Toolmarks



- Validation of the Cadre 3D scanner equipment
- Validation of Virtual Comparison Microscopy (VCM) for Comparison
- Validation of Virtual Comparison Microscopy (VCM) for Screening/Grouping

# Validation

## Cadre Equipment



- There is a statistical difference and variance between the gel's Ra values, but not the Rsm values.
- No statistical difference or variance was present related to the user or the environment.
- All measurements collected were within the acceptable quality assurance range.



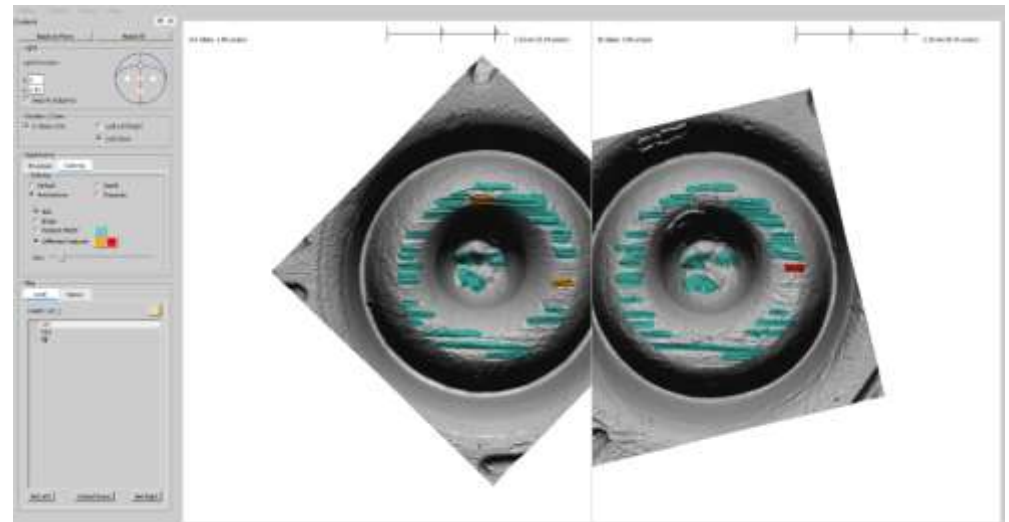
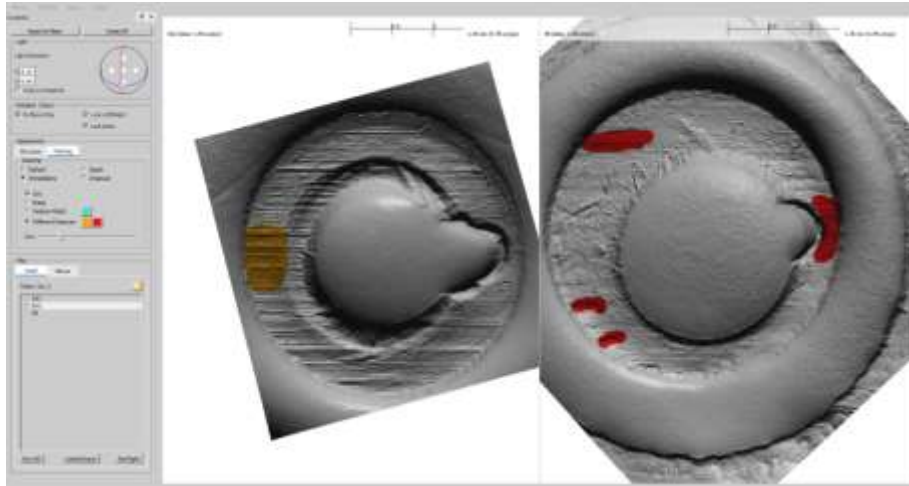
# Validation

## Cadre VCM Comparison



- 40 sets of images from CTS tests
- 20 sets of images from Hi-Point test
- Each examiner completed 10 CTS sets and 5 Hi-Point Sets
- No incorrect ID or Elimination
- 13 sets with differences in Elimination/Inconclusive or ID/Inconclusive
- 1 set all Inconclusive

# Validation Cadre VCM Comparison



# Validation Cadre Screening/Grouping



- Two sets of images were provided to the Firearms and Toolmarks Technical Resource Team for evaluation.
  - Set 1 ten images of cartridge cases fired in a Ruger Model P95DC or a Ruger Model P95.
  - Set 2 ten images of cartridge cases fired in either a Glock Model 35 or a Glock Model 23.

# Firearms and Toolmarks



- Uncertainty of Measurement (UoM) in the Range Determination method.
  - The evaluation of the measurement uncertainty of the range determination method indicates a variability of approximately 15/16 of an inch with a 95% confidence. Due to the results being reported as a range for approximate muzzle-to-target distance determinations, the variability of less than one inch does not impact the interpretation of the result and will not be included on the CoA.

# Firearms and Toolmarks



- Evaluation of the Uncertainty of Measurement (UoM) in the Trigger Pull method.
  - 8 firearms selected based on prevalence in the DFS firearms database, taken into consideration to cover different mechanisms to cover the spectrum of typical submissions.
  - Each examiner will determine (average of 3 measurements) the trigger pull five times for each firearm. 70 data points for each firearm will be collected.
  - An Access Database similar to the barrel/overall measurement database will be used to collect data.
  - A UoM will be calculated from the collected data for each type of firearm. The data from all examiners will be combined for the evaluation, similar to the procedure followed for the overall/barrel length measurement and the distance determination.

# DME Staffing



- Fully staffed and trained
- Turnaround times continue to improve
  - 15.0 days for a computer case;
  - 12.3 days for a mobile phone case;
  - 28.9 days for a video case;
  - 1.5 days for an image case;
  - Average = 18.7 days

# DME



- National Center for Missing & Exploited Children (NCMEC)

## DEFINITIONS

Identified Child: These exact hash values are associated with an image/video which appears to depict at least one (1) child previously identified by law enforcement. Please be advised that these hash values may be associated with apparent child pornography images/videos as well as files that do not contain apparent child pornography.

Recognized Hash Values: These exact hash values are associated with files previously submitted to the National Center for Missing & Exploited Children (NCMEC's) Child Recognition and Identification System. However, NCMEC has no additional information regarding these files, which may or may not contain apparent child pornography or depict identified children. As a result, these hash values will not be listed in the pdf version of the NCMEC Initial Hash Value Comparison Report.

Unrecognized Hash Values: These exact hash values are associated with images/videos that have not yet been submitted to NCMEC's Child Recognition and Identification System.



# Toxicology Program Update

James W. Hutching, Ph.D.  
Toxicology Program Manager



# Toxicology



- Midwest Association for Toxicology and Therapeutic Drug Monitoring (MATT)
  - Virtual Meeting in late April 2021
  - Approximately 12 staff are attending
  - Virtual formats allow for more attendees with the low prices
- Hamilton Automated Liquid Handling Systems
  - Online
  - Enhancement of methodology

# Toxicology



- Methodology
  - Miscellaneous Basic Drugs Quantitation and Confirmation by LCMSMS
  - Barbiturates Quantitation and Confirmation by LCMSMS
- Cannabinoids by LCMSMS
  - Funded by NIH grant – Dr. Wagner
  - Updating current method to move towards automation, separation of isomers

# Toxicology Statistics during 2020



- Update - During pandemic, major reduction in vehicle miles traveled
- However...looking at the cases submitted:

	2019	2020	% Change
OCME	4239	5059	+19.3
DUID	2429	2892	+19.1
DUI	2283	2103	-7.9
Tox-Other	658	728	+10.6

# Staffing



- Toxicology - Update
  - Retirement of Dr. James Kuhlman (Supervisor – W-TX)
  - New Hires
    - W-TX Supervisor – Dr. Trista Wright
    - Forensic Scientist in C-TX
    - In background check, FS and FLS in C-TX
  - Trainees
    - W – Forensic Toxicologist
    - C – 2 FS
  - In Recruit
    - W – Forensic Toxicologist
- Breath Alcohol (BA) – fully staffed

# Breath Alcohol



- In-Person Training Continues with great success
- With decreased class size, DFS had to increase the number of classes offered

# Grants



- DMV Highway Safety Office – just reapplied
  - Awarded to continue to offer licensing training and to retain one Forensic Scientist
  - Purchase replacement classroom engagement tools
  - Maintain paperless capabilities
- Dept. of Criminal Justice Services Coronavirus Grant
  - Awarded grant to ensure continuity of operations during pandemic/closures
  - Purchased smartphones and Adobe software
  - Allows for paperless processing of instrument installation and removal

# BA Statistics – COVID-19



- Update - Compared to 2019, January and February 2020 were on track to have a comparable number of breath tests
- Starting in March 2020, there was a marked reduction in breath tests
- March 2021 compared to March 2020 = -5.4%\*
- March 2021 compared to March 2019 = -25%

Month	% Change
March 2020	-29.4
April	-51.0
May	-32.4
June	-33.4
July	-23.1
August	-23.1
September	-19.3
October	-12.2
November	-26.4
December	-34.0
January 2021	-19.6
February	-27.1
March*	-5.4



**THANK YOU!**