

Chemistry

Forensic Biology

Physical Evidence

Toxicology

Forensic Training

Quality Assurance

Research

# DIVISION OF TECHNICAL SERVICES UPDATE

Alka B. Lohmann, Director of Technical Services  
Presented to the Scientific Advisory Committee  
April 9, 2024





## CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

**Virginia Department of Forensic Science  
Crime Laboratory System**

Fulfills the requirements of

**ISO/IEC 17025:2017**

ANAB Forensic Testing & Calibration AR 3125:2019

FBI Quality Assurance Standards for Forensic DNA Testing Laboratories:2020

FBI Quality Assurance Standards for DNA Databasing Laboratories:2020

In the field of

**Forensic Testing & Calibration**

This certificate is valid only when accompanied by a current scope of accreditation document.  
The current scopes of accreditation can be verified at [www.anab.org](http://www.anab.org).

  
Pamela L. Sale, Vice President, Forensics



Expiry Date: 30 September 2026  
Certificate Numbers:  
FT-0051  
FT-0052  
FT-0053  
FT-0054  
FC-0004



# Accreditation

- Surveillance Assessment May 21-23, 2024
- Controlled Substances and Materials (Trace) technical assessors
- Certificates and Scopes are available on the DFS website: <https://www.dfs.virginia.gov/about-dfs/accreditation/accreditation-documentation/>
- Current cycle expires September 30, 2026

# Forensic Training

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- 110<sup>th</sup> FSA Session graduated November 17, 2023
- 3 Short Courses from October to March
  - Impression Evidence Photography, Collection and Preservation for Crime Scene Investigators
  - Special Techniques for Advanced Photographers
  - Basic Crime Scene Photography
- Second Forensic Trainer Senior in recruit
- 111<sup>th</sup> FSA Session graduated March 29, 2024
- Annual Updates scheduled for April
- Annual Retraining – September 4-6

# New Program Managers

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- Forensic Evidence Program Manager
- Provide statewide technical coordination and QA/QC of evidence procedures
- Effective October 25, 2023
- Physical Evidence Program Manager
- Digital & Multimedia Evidence, Firearms & Toolmarks, Latent Prints & Impressions
- Effective February 10, 2024

## **Ellen Spain**

- ~20 years with DFS
- Active with the International Association for Property and Evidence (IAPE)
- Active with the Virginia Association of Property and Evidence Professionals (VAPEP)
- Served on NIST/NIJ Evidence Management Steering Committee (EMSC)

## **Samantha Glass**

- Over 25 years with DFS
- Latent Print examiner
- ANAB Technical Assessor
- Member of AAFS
- Member of International Association for Identification (IAI)



# DFS Representatives on OSAC

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- Digital Evidence Subcommittee – Jesse Lindmar
- Footwear & Tire Subcommittee – Cory Bartoe
- Forensic Toxicology Subcommittee – Rebecca Wagner, Ph.D.
  - Subcommittee Vice Chair
- Human Forensic Biology Subcommittee – Susan Greenspoon, Ph.D.
- Ignitable Liquids, Explosives, & Gunshot Residue Subcommittee – Brenda Christy
  - Subcommittee Chair
- Ignitable Liquids, Explosives, & Gunshot Residue Subcommittee - Mary Keehan
- Video/Imaging Technology and Analysis Subcommittee – Patricia Mullaney
  - Subcommittee Executive Secretary

# New Grant Awards – Chemistry Research

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- New Age Therapeutics: Development and Validation of an Analytical Workflow for the Analysis of Psychedelics in Biological Matrices
  - Method development and validation of screening and confirmation techniques
  - Stability evaluation including long-term storage and extraction
- Pivoting Headspace Ethanol Analysis to Accommodate Modern Day Scenarios
  - Conversion of helium to hydrogen or nitrogen mobile phase
  - Re-evaluation and optimization of sample preparation and analysis conditions (e.g., dilution ratio, vial size, equilibration temperature/time)



# Chemistry Research Update

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- Staffing
  - 4- Full-time Forensic Laboratory Specialists (FLSs) VI
    - 1 on Overdose Data to Action in States (OD2A-S) Funding with OCME
    - 1 response to legislative changes
  - 1- Full-time FLS III (OD2A-S)
- In Recruit
  - 3- Full-time FLS VI (OD2A-S and NIJ)



# Fentanyl Quantitation

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- Fentanyl quantitation for Controlled Substances
- DEA method – verification
- First method using hydrogen carrier gas





# Follow Up

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- Old Business
- Each Program Manager will summarize methods that contain analytical options available to examiners per the request of the SAC Chair at the October 2023 Meeting

# Chemistry Program Update

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Robyn Weimer

Chemistry Program Manager



# Trainee Update – Trace Evidence

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## Central Laboratory:

- One (1) trainee in Tape, expected completion Q2 2024
- Two (2) trainees in Hair, expected completion Q2 2024
- Two (2) trainees in Glass, expected completion Q2 & Q3 2024



# Trainee Update – Controlled Substances

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## Central Laboratory:

- One trainee expected to complete training November 2024

## Western Laboratory:

- One trainee expected to complete training June 2024

## Northern Laboratory:

- One trainee expected to complete training April 2024
- One (1) position in recruit

## Eastern Laboratory:

- One trainee completed training February 2024



# Training – Trace Evidence

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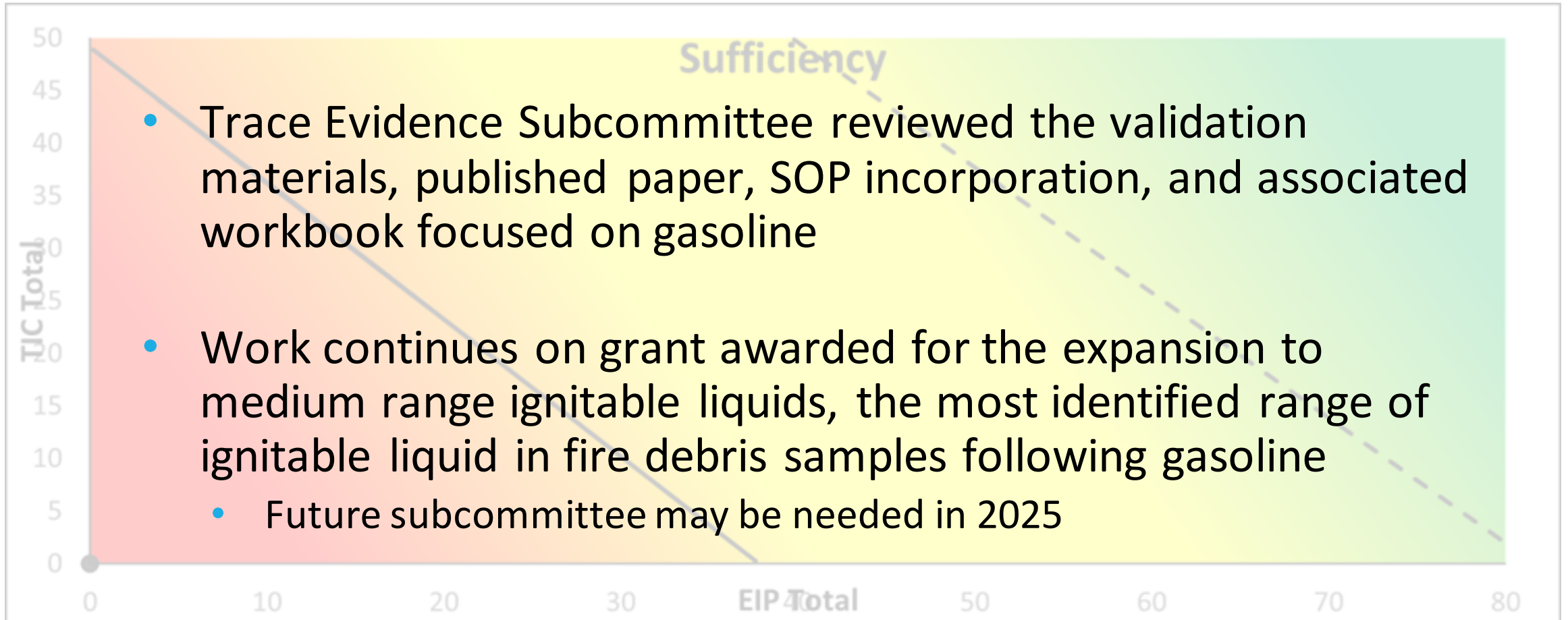
## Statewide Section Meeting

- 2 day training April 17 -18
- To include: tour of conservation department, group discussions on proposed changes, equipment demo, practical exercises, and professional meeting teach-backs

## Fire Debris Workshop – AAFS

- Overview, Use, and Implementation of the Major Revisions to ASTM E1618
- April 19

# Sufficiency of Data for Identification of Ignitable Liquids



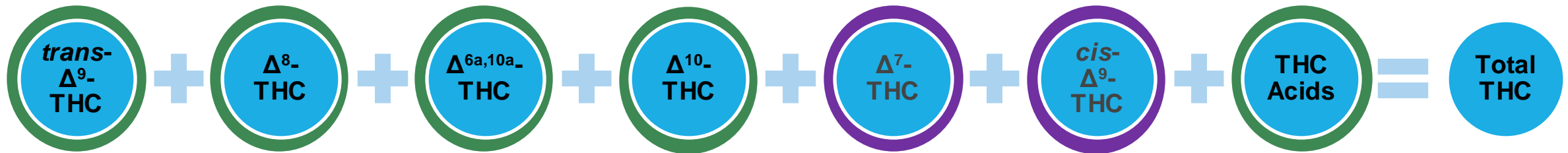


# Training – Controlled Substances

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- Current Trends in Seized Drug Analysis
  - Online, free symposium hosted by CFSRE
  - January 22 – 26, 2024
  - Clandestine Labs (Day 1), Chemical Profiling (Day 2), Cannabis: Life After Legislation (Day 3), Forensic Intelligence (Day 4) and Emerging Technologies (Day 5)
- Statewide Section Meeting: September 17 – 19, 2024

# Total THC includes sum of THC and THC acid for all isomers



- Total THC greater than 0.3% is marijuana
- DFS expanded semi-quantitative method from *trans*- $\Delta^9$ -THC to include the most common THC isomers and their acids
- Most recent validation will add *cis*- $\Delta^9$ -THC and  $\Delta^7$ -THC
  - Will need DX Subcommittee to review validation next meeting





# Cannabis Edibles Update



- DFS will do initial qualitative testing and report identification of cannabinoids present. If evidence is suitable for testing and THC quantitation is needed, DFS will send to NMS for analysis.
- 3 batches sent (14 cases with 21 items total); 2 batches returned
- Predominantly  $\Delta^9$  (0.17% to 3.4%); Few  $\Delta^8$  (3.3% to > 5%)

# Board of Pharmacy Expedited Scheduling

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- DFS recommended two (2) compounds in July 2023. These compounds became scheduled on January 31, 2024. Tianeptine was also scheduled by the Board of Pharmacy on this date.
- DFS recommended two (2) compounds expected to have hallucinogenic properties based on their chemical structure in October 2023. These compounds became scheduled on February 28, 2024.
  - 4-propoxy-3,5-DMA
  - 5-methoxytryptamine



# Board of Pharmacy Expedited Scheduling

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DFS recommended four (4) compounds in January 2024. The compounds were considered at the Board's March 28<sup>th</sup> meeting and are pending final approval.

## **Hallucinogenic Properties:**

- N-isobutylpentylone
- N-tert-butyl pentylone
- N-(1-phenylcyclohexyl)propanamine

## **Cannabimimetic Agent:**

- MDMB-INACA

# Different Methodology Options In Chemistry Program

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## Controlled Substances

- Color Tests
- Screening Methods
  - TLC, DART-TOF
- Confirmatory Technique
  - GC/MS, IR

## Trace Evidence

- Explosives
  - high explosive crystals in C-4: IR or XRD
  - For sulfur confirmation: SEM-EDS or XRD
- Sugar Identification
  - IR, XRD, or GC + GC/MS (with derivatization)

# Forensic Biology Program

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Brad C. Jenkins

Forensic Biology Program Manager

# Examiner/Biologist Trainee Update – Forensic Biology

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## Central Laboratory:

- 6 in training (1 Mito, 5 CW, 2 DB)

## Western Laboratory:

- 1 in training

## Northern Laboratory:

- 1 in training

## Eastern Laboratory:

- Fully staffed



# New Biologist Positions

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- **4** (was 2) Biologist positions **filled** (total of 5 in Central)
- **1 Group Supervisor filled**
  - Will be trained to screen Physical Evidence Recovery Kits (PERKs) for male DNA
  - These kits will be sent to Central for testing
  - Generate STR profiles
  - CODIS uploads and searches
  - Issue basic reports
  - Complex reports issued by examiner staff



# Forensic Biology Staffing continued

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- Data Bank supervisor retired
- New Data Bank supervisor hired
  - Welcome Angela Valle to her new role in the section





# Staff Internal Training Projects

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- True Allele - Training 2 examiners continues
- Future Relationship Stats Training NOVA
- **Dates of STRmix training class for additional staff are being selected**



# Validation Update

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- Real Time PCR instruments and DNA quantitation kit
  - On-line March 2024
  - Validation is being provided for review by DNA subcommittee
- New Thermal cyclers
  - Validation beginning
- New Y-STR Kit evaluation



# Validation Update

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- **Biomek i5**
  - 3 more ordered
  - 2 Richmond, 1 Northern, 1 Eastern
  - Promega coming April to install DNA extraction method
  - Validation will begin after install

# Expanding STRmix cases and Direct Amplification

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- **STRmix analysis will be expanded to all mixtures**
  - **Low level mixtures continue to True Allele**
  - **Customer notice being drafted**
  
- Reference samples direct amplification
  - Finishing manual updates
  - Staff training and competency
  - **Validation to Biology subcommittee next meeting**



# Outsourcing Backlogged Cases

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## Drafting bid request

- Approximately 800 property crime, possession, robbery
- Private lab will issue report
- Ownership reviews and CODIS uploads by DFS
- Customer notice being drafted

# Different Methodology Options In Forensic Biology Program

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## Sexual assault kit processing

- Sperm Identification and acid phosphatase (AP) testing
- Screen cases for male DNA (male attack female)
  
- Transition to allow sperm ID and AP testing on a case by case basis but to require male DNA screening (male attack female)
- July 1 timeframe

# Physical Evidence Program Update

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Samantha M. Glass

Physical Evidence Program Manager

# Latent Prints & Impressions Staffing

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- One Latent examiner newly qualified in Impressions (Central February 2024), one Latent/Impressions examiner retired (Central May 2024).
- In recruit: Central-Supervisor position, Eastern-examiner/trainee
- In training:
  - 1 in Western for Impressions



# Latent Prints & Impressions Continuing Education

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- Section Meeting to be held at the Eastern Laboratory in September.



# Latent Prints

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- The upgrade to the Virginia State Police Automated Fingerprint Identification System (AFIS) was deployed on 2/11/2024. Troubleshooting continues.

# Firearms & Toolmarks Staffing

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- One qualified examiner in Northern - January 2024
- In recruit:
  - 2 in Central (FS NIBIN)
  - 2 in Eastern (Examiner)
- In training:
  - 1 in Eastern (Examiner)
  - 1 in Western (Examiner)
  - 2 in Central (Examiner)
  - 1 in Northern (FS NIBIN)



# Firearms & Toolmarks

## National Integrated Ballistic Information Network (NIBIN)

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As of March 21, 2024, there have been 157 new NIBIN potential associations.

- Western - 41
- Northern - 10
- Eastern - 42
- Central – 64

4 hits have been confirmed thus far this year. 3,928 since this system was received in April 2002.

# Firearms & Toolmarks

## NIBIN

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### Local agencies with NIBIN

- Chesapeake
- Fairfax
- Newport News/Hampton (entry & correlation)
- Norfolk
- Richmond
- Virginia Beach
- VSP (Culpeper and Salem)
- Danville
- Henrico (to come by Summer)

# Digital & Multimedia Evidence Staffing Update

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- In training:
  - 2 in Central
- In recruit: 1 FLS in Central



# Digital & Multimedia Evidence

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- Providing mobile device extractions electronically to Henrico PD and Stafford SO via SharePoint, in addition to traditional means
- This method provides content to the investigator weeks faster than traditional methods
- Introduced the use of read-only USB flash drives for returning examination results as we move away from using multi-layer Blu-ray optical discs

# Different Methodology Options In Physical Evidence Program

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- Latent Prints & Impressions: Case approach sections in manuals delineate recommend processing sequence based on evidence properties.
- Firearms & Toolmarks: Evidence properties will determine type of recovery methods for test firing and processing for serial number recovery or distance determination.
- DME: Software used is the method and there is a core group of software available. Tool chosen is based on exam request.



# Toxicology Program Update

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James W. Hutchings, Ph.D.

Toxicology Program Manager



# Toxicology

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## Methodology - update

- Xylazine and Dexmedetomidine Quantitation
- Qualitative Cannabinoid Additions
  
- In progress
  - Nitazenes – validation in progress



# Staffing

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## Vacancies

- Toxicology
  - C: 2 Forensic Toxicologists (FT)
  - W: 1 FT, 1 Forensic Scientist (FS)
  - E: No vacancies
  - N: 1 Forensic Laboratory Specialist (FLS)

### Breath Alcohol

- No vacancies

## Trainees

- Toxicology
  - Central – 1 FT
  - Western – 1 FS
  - Eastern – Fully trained
  - Northern – 1 FS (completed one FT)

### Breath Alcohol

- Fully staffed

Dr. Wagner completed Toxicology training and will be assisting Central Toxicology



# Grants

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## Applied for DMV Highway Safety Office Grants

- Breath Alcohol
  - To continue to offer licensing and training and to retain one Forensic Scientist
  - Maintain mobile access and electronic processes
- Toxicology
  - Retain two FLS II (part time)
  - Retain/hire six FLS II/III



# Toxicology Statistics

- Cases submitted by examination type

	2021	2022	2023
OCME*	5484	5139	5386
DUID	2838	2583	2825
DUI	2139	2327	28
DUI+THC	-	-	2584
Tox-Other	705	753	673

\*Outsourcing of OCME cases



# Toxicology – Items of Note

- All DUI/DUID samples are now screened for a tetrahydrocannabinol metabolite and alcohol
- Quantitative:  $\Delta^9$ -THC,  $\Delta^9$ -carboxy-THC,  $\Delta^9$ -hydroxy-THC
- Qualitative:  $\Delta^8$ -THC, Cannabidiol

- ~23% of cases with BAC >0.100 % w/v had a quantifiable THC concentration

CY23 DUID and DUI+THC Case Statistics		
	Cases with BAC $\geq$ 0.100% w/v	Cases with BAC <0.100% w/v
Average THC Concentration	0.0053 mg/L	0.0082 mg/L
Median THC Concentration	0.0035 mg/L	0.0045 mg/L

# Different Methodology Options In Toxicology Program

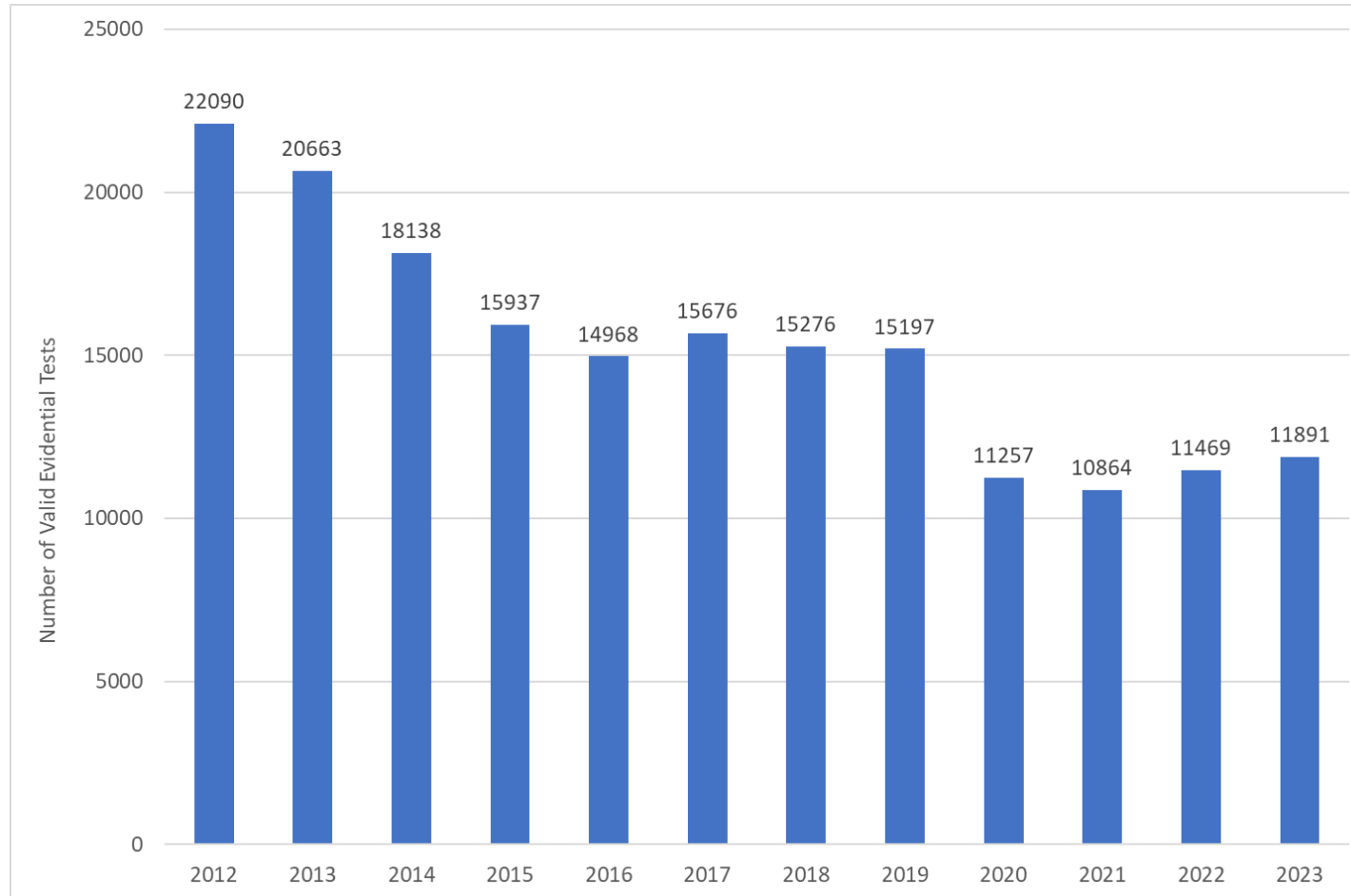
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- Cannabinoids – new methodology developed to separate delta 8 and 9
- Opioids and Cocaine – liquid-liquid extraction, solid phase extraction, automated solid phase extraction
- Acid, Base, Neutral Compounds – used for quantitative and qualitative analysis
  - Liquid-liquid extraction or solid phase extraction
  - Quantitation: GC-NPD or GCMS



# Breath Alcohol Statistics







# Breath Alcohol Updates

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- New Breath Alcohol Instrument
  - Two-step Invitation for Bid (IFB)
  - Evaluating bids for award



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Thank you!