Montana Department of Justice
Forensic Science Division
Annual Report - 2019

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Contents

"If the law has made you a witness, remain a man of science. You have no victim to avenge, no guilty or innocent person to convict or save – you must bear testimony within the limits of science."

Dr. P.C.H. Brouardel
French Pathologist
1837-1906

Executive Summary

The Forensic Science Division spent a great amount of time and energy this past year strengthening its ability to deliver the core goals of our mission to the criminal justice community. Several sections received additional resources, helping them improve services and production. This report presents an overview of the Division, as well as detailed information regarding each of the scientific sections of the laboratory. I believe our team provides a great service to the criminal justice system and the citizens of Montana.

Scott Larson, Administrator

Montana Attorney General Tim Fox and Forensic Science Division Administrator Scott Larson

Forensic Science Division

The Forensic Science Division (FSD), better known as the State Crime Lab, is one of eight Divisions within the Department of Justice. It was established in Montana Code in 1977.

Our Mission is to provide ***accurate, objective, and timely forensic analysis*** in support of the Montana criminal justice community.

The Division has facilities in both Missoula and Billings. The Missoula facility has the following disciplines: medical examiners, DNA/serology, toxicology, chemical analysis, latent prints, firearms/toolmarks, quality assurance, and evidence sections. The Billings facility has the following disciplines: medical examiners, chemical analysis, and evidence sections.

Staff

The Lab continues to recruit a variety of scientists and staff with a broad range of skill sets to contribute to our mission. We have thirty-four scientists, four medical examiners, and nine administrative/support staff. The Division has forty-one staff members with bachelor's degrees; thirteen with master's degrees; four with medical degrees; and eighteen who are nationally board certified. Many of our staff earned multiple degrees.

DOJ Governor's Award Winner

Congratulations to Dana Clark! She was chosen as the DOJ co-recipient for the 2019 Governor's Award. As the Division's lone administrative assistant, Dana is regularly the first voice and face associated with the laboratory. She connects with people across the state by providing courteous service to anyone contacting FSD. Whether it's a law enforcement officer dropping off evidence, a lawyer calling for a report, or a Montanan who has questions about the Lab, Dana goes above expectations. She has a willingness to help co-workers with new projects while bringing a level of humanity that positively affects everyone around her. Dana improves our ability to serve the citizens of Montana.

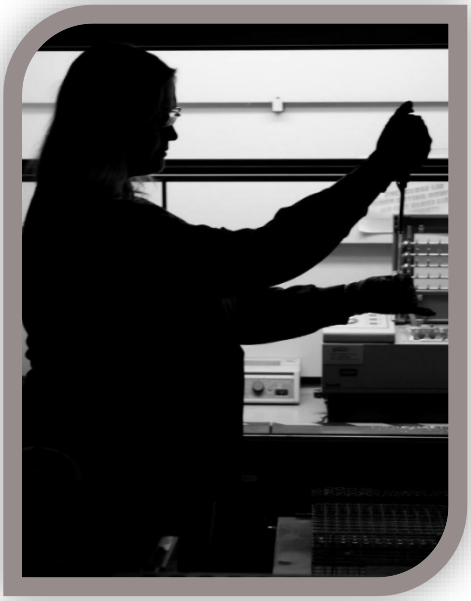
Laboratory Accreditation

Accreditation is the process by which forensic laboratories throughout the world demonstrate they operate to a set of quality assurance standards. In July of 2019, the Division underwent a successful ANAB ISO/IEC 17025 inspection. The lab hosted eleven scientists in six disciplines from across the country as they assessed the quality of our testing and quality programs. By continuing to pass our annual inspections, we now hold accreditation until November of 2023.

The Lab was originally accredited under ASCLD/LAB's Legacy program in 2005. In 2010, we attained a higher level of accreditation to ISO/IEC 17025 standards for testing laboratories, which are the current standards for forensic labs, as well as ASCLD/LAB-*International* Supplemental Requirements. In 2017, the Breath Alcohol Section was accredited to ISO/IEC 17025:2005 standards for calibration laboratories. ASCLD/LAB merged with ANAB in 2016.

Outreach

We continue to expand our interactions with a broad cross-section of legislators, citizens, citizen groups, and criminal justice agencies and organizations across Montana. In 2019, Lab representatives attended conferences or met with boards for the Montana Sheriffs and Peace Officers Association, the Montana Association of Chiefs of Police, the Montana County Attorneys Association, the Montana Coroners Association, and the Attorney General's Law Enforcement Advisory Committee. The Lab holds open house events for legislators and the public and provides regular tours for the public. Overall, our staff spent over 300 hours in 2019 training law enforcement, prosecutors, defense attorneys, judges, and the public in matters tied to the forensic sciences.



National Matters

The Organization of Scientific Area Committees (OSAC) for Forensic Science works to strengthen the nation's use of forensic science by facilitating the development of technically sound forensic science standards and by promoting the adoption of those standards by the forensic science community. These standards are written documents that define minimum requirements, best practices, standard protocols, and other guidance to help ensure that the results of forensic analysis are reliable and reproducible. The Lab is proud to have multiple personnel that have served on national committees critical to the advancement of technological standardization of forensic sciences.

Forensic Science Laboratory Advisory Board

The Forensic Science Laboratory Advisory Board was established in 1996 by Attorney General Joe Mazurek and has met nearly every year since. The Board serves as an advisory council and as an independent body to investigate complaints of negligence or misconduct. It also serves as a communication link between the Lab and its stakeholders. The board met in April of 2019 for a Lab update and to discuss the general direction of FSD. Board members include:

- Attorney General Tim Fox
- District Judge Greg Pinski
- Yellowstone County Attorney Scott Twito
- Public Defender Division Administrator Peter Ohman
- DOJ's Division of Criminal Investigation Administrator Bryan Lockerby
- Bureau of Indian Affairs Assistant Special Agent-in-Charge William LeCompte
- Broadwater County Sheriff/Coroner Wynn Meehan
- Cascade County Sheriff/Coroner Bob Rosipal
- Yellowstone County Coroner Cliff Mahoney
- Fergus County Coroner Richard Brown
- Department of Corrections Quality Assurance Manager Kurt Aughney

We are grateful for the time and dedication of these members; their input helps improve the Crime Lab and its services.

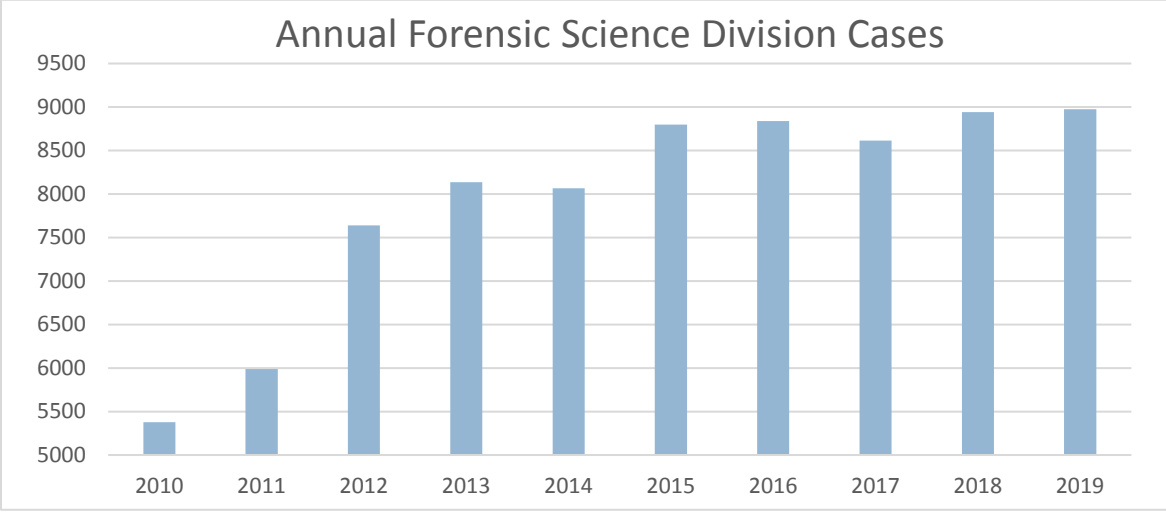
Grant Funding

FSD takes advantage of federal grant funding whenever possible. In 2019, the following grants were received, totaling over $1.3 million. Without this financial assistance, many of these projects would not have happened.

1. **NIJ Paul Coverdell Forensic Science Improvement Grant**
   - $263,963: Training/equipment/supplies/coroner education/chemistry backlog outsourcing
2. **NIJ DNA Capacity Enhancement and Backlog Reduction Grant**
   - $346,657: Funding for personnel/training/supplies
3. **NIJ "Strengthening the Quality and Consistency of the Medical Examiner/Coroner System"**
   - $309,086: Remodel Missoula morgue facility/equipment/national accreditation
4. **National Highway Safety Administration Grant** *(awarded through the Montana Department of Transportation)*
   - $199,775: Purchase of twenty-five breath alcohol Instruments
5. **Centers for Disease Control "Overdose Data to Action (OD2A): Increasing Surveillance and Prevention to Reduce Opioid Misuse in Montana" Grant** *(awarded through the Montana Department of Public Health and Human Services)*
   - $186,662: Toxicology results portal into death case management system/drug-related autopsy reimbursement for counties/enhanced toxicology testing in complex postmortem cases/instrument maintenance

Caseloads

As with many crime labs nationwide, FSD has seen a steady influx in cases over the last decade. Cases can be further divided into requests for testing within specific sections. One case may generate multiple requests for services throughout the Lab or within a section. For example, a single handgun may involve test requests for the presence of latent prints, for DNA, and for firearms analyses. Cases can contain anywhere from one to more than one-hundred items of evidence. Section specific workloads are covered below.



State Medical Examiner's Office

In 2019, the Montana Medical Examiner's Office employed four forensic pathologists and two autopsy assistants. In late 2018, a new morgue facility in Billings was built; operations started in January of 2019. This new facility improved the efficiency and overall capabilities of the death investigation system.

The Medical Examiner's Office has focused on improving casework information and statistics. The Office releases an annual report, which summarizes annual case results based on manner of death, age of the decedent, deaths involving firearms, deaths attributable to alcohol or drugs, natural deaths, and report turn-around time performance. **The full report is available on the Montana Department of Justice's website under the Forensic Science Division tab.**

In 2019, we performed 657 postmortem examinations: 359 in Missoula and 298 in Billings. This represents a 7.3% increase over 2018. Our pathologists responded to a limited number of scene investigations and recoveries. They also testified in court and gave educational presentations at the annual Montana Coroner Advanced and Basic Coroner trainings. In addition, consultations with coroners, law enforcement, county attorneys, organ and tissue procurement agencies, and funeral directors were common.

Staff

Dr. Robert Kurtzman	Chief Medical Examiner, Billings
Dr. Andrea Orvik	Deputy Chief Medical Examiner, Billings
Dr. Sunil Prashar	Deputy Chief Medical Examiner, Missoula
Dr. Aldo Fusaro	Deputy Chief Medical Examiner, Missoula
Heather Krell	Autopsy Assistant, Missoula
Heather Beeler	Autopsy Assistant, Billings

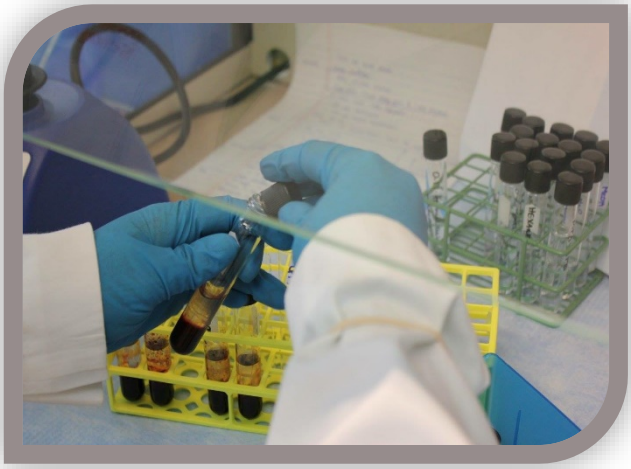
Successes

1. Remodeled Missoula morgue
2. Worked toward national accreditation in 2020

Challenges

1. Statewide utilization of death case management system by county coroners

Toxicology Section



The Toxicology Section performs drug and alcohol testing in Driving Under the Influence cases (DUI or DUID), postmortem cases (assisting the medical examiner/coroner system in the determination of cause/manner of death), urinalysis testing (Department of Corrections probation/parole system and drug endangered children cases), and sexual assault cases. This section also oversees the breath alcohol calibration program, including maintaining and certifying the breath testing instruments used to detect the presence of alcohol in DUI cases. Section staff also provide over 300 hours of training per year to law enforcement, judges, prosecutors, and defense attorneys.

This report contains graphs/figures used to track the results on cases submitted by many agencies throughout Montana. This is not an exhaustive list of drugs detected and confirmed by the Lab; simply the most frequently confirmed drugs.

Staff

Beth Smalley, Toxicology Supervisor	April Mitchell, Forensic Toxicologist
Scott Schlueter, Forensic Toxicologist Diplomate-ABFT-FT	Gavin Lawson, Forensic Toxicologist
Michelle Duffus, Forensic Toxicologist Diplomate-ABFT-FT	Ben Vetter, Breath Alcohol Manager
Eric Miller, Forensic Toxicologist Diplomate-ABFT-FT	Justin Lyndes, Forensic Toxicologist and Breath Alcohol Toxicologist
Crystal Everett, Forensic Toxicologist	Elizabeth Holom, Toxicology Technician
Doug Lancon, Forensic Toxicologist	

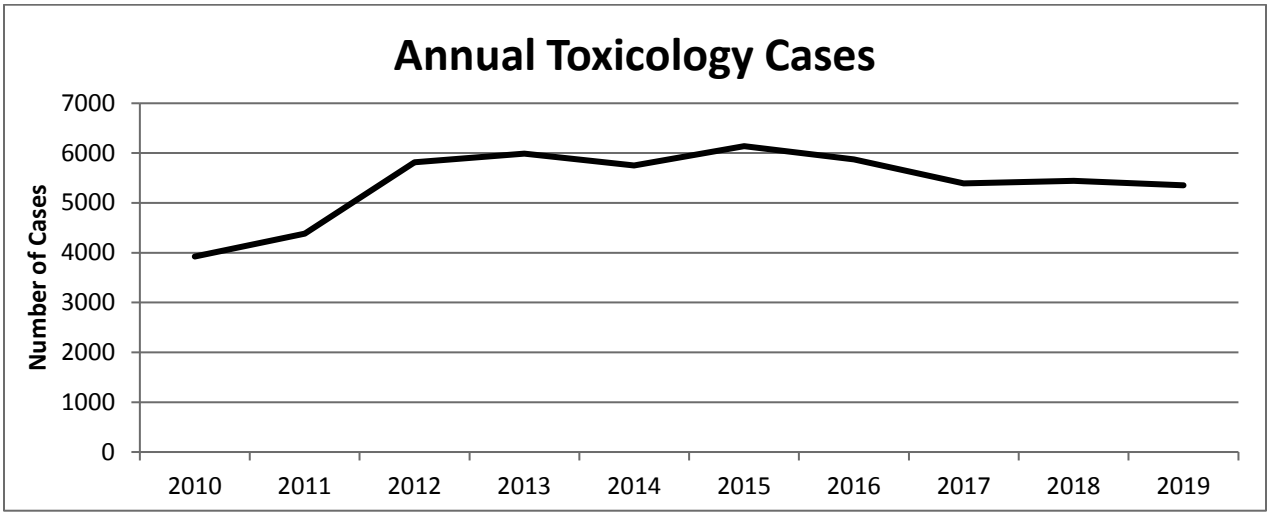
Successes

1. Validation of six new methods and the installation of three new instruments.
2. Retirement of aging equipment to save space without causing any service gaps.
3. Fully trained section toxicologists for the first time since 2014.
4. Utilization of video testimony lowered in-person appearances to forty percent or less. This was possible thanks to more equipment and training for stakeholders like judges, prosecutors, and law enforcement officers.
5. Distribution of quarterly DUI statistical reports to stakeholders.
6. Support of staff pursuing personal/professional goals like graduate work.

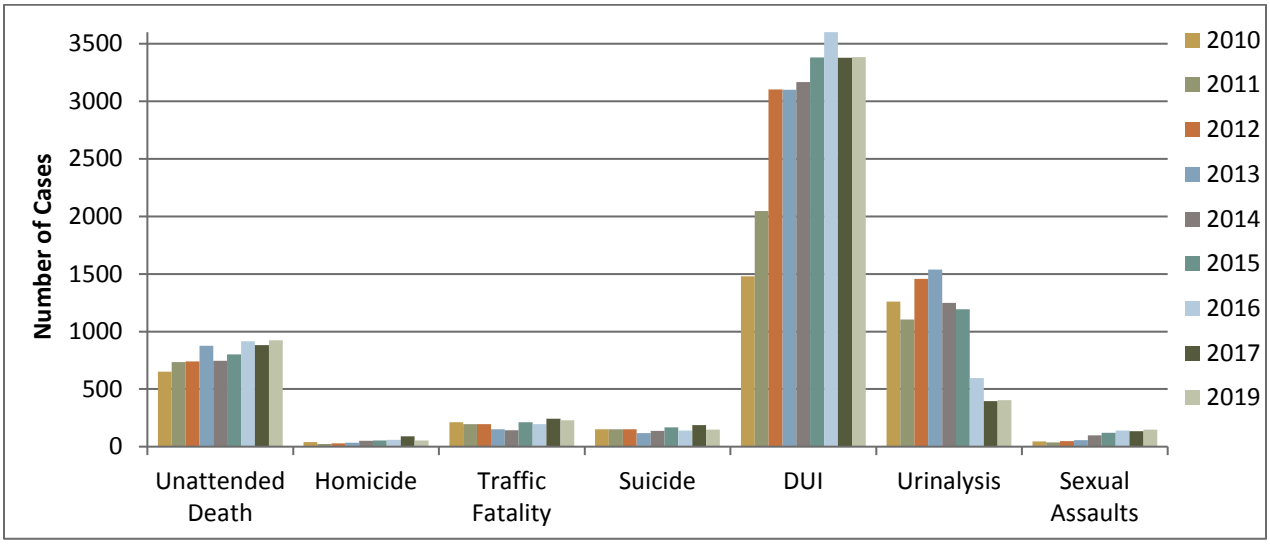
Challenges

1. Several more methods are set for validation. We intend to focus on new lab techniques and/or the expansion of the number of drugs we can detect.
2. Completion and implementation of a synthetic opiate panel for suspected drug overdose cases.
3. More postmortem cases of increased complexity means more analyst time and instrumentation must be shifted to that subset.
4. In the spring of 2020, the breath alcohol group should receive finalized software for new instruments. This delay has pushed their implementation into late summer and early fall.

2010-2019 Total Toxicology Cases



2010-2019 Toxicology Results per Case Type



2019 Performance Summary

This chart reflects the median turn-around time and average number of cases per toxicologist for both Montana and national averages.

Type of Case	Median 2017	Median 2018	Median 2019	*Median National Average	2019 Cases per Montana Toxicologist	*Cases per National Average Toxicologist
Postmortem	32	30	**39**	38	**452**	148
DUI Drugs	43	40	**47**	44	**383**	169
DUI Ethanol	15	15	**17**	14	**900**	640
Miscellaneous (UA, SA, DEC, etc.)**	30	27	**31**	Not Available	**2,444**	Not Available

***Numbers are based on **"Project FORESIGHT Annual Report, 2017-2018,"** from the Forensic Science Initiative, College of Business & Economics, West Virginia University
**UA= Probation/Parole, SA=Sexual Assault, DEC=Drug Endangered Children

Another standard metric within forensics is determining the percentage of cases done within a given timeframe. The current goal at this laboratory is to complete 95% of the postmortem cases within 75 days; DUI drug cases within 75 days; DUI ethanol-only cases within 30 days; and urinalysis cases within 60 days. This demonstrates that most of the cases are completed within a timeframe that fulfills our mission.

Type of Case	95% of cases completed in this timeframe			
	2016	2017	2018	2019
Postmortem	77 Days	68 Days	68 Days	75 Days
DUI Drugs	75 Days	90 Days	75 Days	77 Days
DUI Ethanol	35 Days	25 Days	27 Days	28 Days
Urinalysis	119 Days	59 Days	57 Days	58 Days

Drugs of Interest

Note: It is important to recognize that a drugs presence in a postmortem death does not necessarily mean that it was part of the cause of death. That determination is done by the Medical Examiners and coroners as part of the death certificate.

Methamphetamine: Methamphetamine, a central nervous system stimulant, has been very prevalent in Montana over the last several years. In 2019, methamphetamine intoxication was listed by the medical examiner as the cause of death in 20 cases and in 29 mixed drug intoxications. This was a substantial increase over 2018, even with the total number of methamphetamine positive cases remaining stable. It was also found in eight percent of all drug driving under the influence cases.

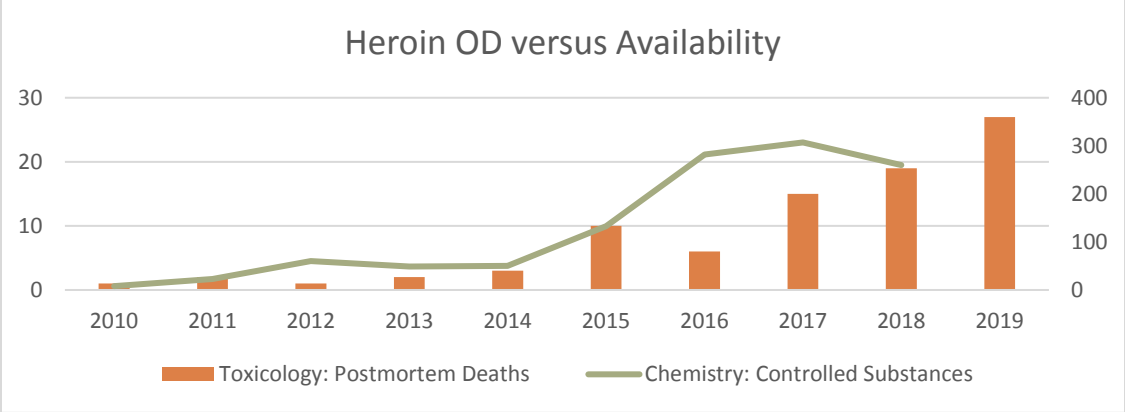
Case Type	2019 Cases	2018 Cases	2017 Cases	2016 Cases
Postmortem Deaths (Blood results only)	88 cases Mean: 1.2 mg/L Range: 0.02*-9.9 mg/L	93 cases Mean: 1.5 mg/L Range: 0.02*-54 mg/L	77 cases Mean: 0.9 mg/L Range: 0.02*-12 mg/L	78 cases Mean: 1.0 mg/L Range: 0.02-11 mg/L
DUID	302 cases Mean: 0.39 mg/L Range: 0.02*-3.0 mg/L	319 cases Mean: 0.35 mg/L Range: 0.02*-3.3 mg/L	310 cases Mean: 0.33 mg/L Range: 0.02*-2.2 mg/L	301 cases Mean: 0.34 mg/L Range: 0.02-1.8 mg/L
Probation/Parole Urinalysis	229 cases (54% of all positive cases)	232 cases (51% of all positive cases)	239 cases (60% of all positive cases)	307 cases (51% of all positive cases)

*Version 1 of this report incorrectly stated the low end of range at 0.2 mg/L

Heroin: Since 2014, Montana has experienced a significant rise in heroin cases.

Case Type	2019	2018	2017	2016	2015	2014
Postmortem Deaths	27	19	15	6	10	3
Probation/Parole Urinalysis	4	5	8	3	4	2

This graph compares Montana's heroin overdose deaths (left axis and bar graph) versus the number of cases that the Chemistry Section identified it in seized drug cases (right axis and line graph). It illustrates that increased availability of heroin leads to increased overdose deaths.



Fentanyl: Historically prescribed to cancer patients or others in extreme pain, fentanyl has become increasingly available on the illicit markets. It is considered a synthetic opiate narcotic analgesic. Since 2016, America has experienced a large increase in overdose deaths as a result of fentanyl being substituted for heroin in illicit markets and because it is 40-50 times more potent than heroin.

Case Type	2019 Cases	2018 Cases	2017 Cases
Postmortem Deaths (Blood results only)	19 Mean: 10 ng/mL Range: 2.9-31 ng/mL	11 Mean: 13 ng/mL Range: 0.83-29 ng/mL	10 Mean: 6.2 ng/mL Range: 0.6-16 ng/mL
DUID	8	1	2
Probation/Parole Urinalysis	1	1	0

Mitragynine (Kratom): Extracted from the leaves of plants commonly found in southeast Asia, Kratom is an alkaloid herbal drug. It is marketed as a dietary supplement due to its stimulant

effects when used in low doses, but it can have significant sedative and euphoric effects when used in higher doses. In 2016, the DEA decided against scheduling this compound while obtaining more data on its potential medical uses. It is currently legal and can be easily purchased in Montana. The Lab saw a substantial increase in the number of postmortem and DUI cases in 2019 involving Kratom.

Case Type	2019 Cases	2018 Cases	2017 Cases	2016 Cases
Postmortem Deaths (Blood results only)	14 Mean: 538 ng/mL Range: 21-2600 ng/mL	4 Mean: 737 ng/mL Range: 490-960 ng/mL	7	4
DUID	17	6	2	2
Probation/Parole Urinalysis	1	1	0	1

Buprenorphine: Used for pain management and the treatment of opiate addiction, buprenorphine is a synthetic opiate.

Case Type	2019 Cases	2018 Cases	2017 Cases
Postmortem Deaths (Blood results only)	14 Mean: 2.1 ng/mL Range: 0.6-7.8 ng/mL	4 Mean: 4.5 ng/mL Range: 1-7.9 ng/mL	5 Mean 2.6 ng/mL Range: 1-5 ng/mL
DUID	10	3	6
Probation/Parole Urinalysis	4	5	10

Cocaine: A central nervous stimulant which has historically not been used much in Montana, cocaine is increasing in prevalence here. The numbers below include cocaine and its main metabolite, benzoylecgonine.

Case Type	2019 Cases	2018 Cases	2017 Cases	2016 Cases
Postmortem Deaths	16 (3 traffic fatality)	7 (3 traffic fatality)	5 (1 traffic fatality)	5 (1 traffic fatality)
DUID	31	25	19	14
Probation/Parole Urinalysis	7	5	4	2

Designer Drugs: This term refers to a subclass of drugs that are structurally similar to controlled substances with comparable pharmacodynamics effects. Typically, these drugs are illicitly manufactured and have no approved medical uses. Over the years, drugs within each class have evolved; forensic laboratories are constantly trying to keep testing relevant to what is on the market. Because testing for most of these drugs is not standard, we must rely heavily on investigative information for detection.

Designer Opiates: In 2013, a national increase in synthetic opiate deaths began. This trend hit Montana in 2016 - 2017 when there were multiple overdose fatalities involving carfentanil, furanyl-fentanyl, and U-47700. There were no confirmed cases in 2018 or 2019, despite targeted testing for these drugs in high-risk cases. FSD will increase the number of tests run in 2020 to better understand the prevalence of this subclass, with a focus on fentanyl-related compounds.

Designer Benzodiazepines: In 2016, an increase in the use and detection of this subclass began nationwide. This is the fastest growing designer drug category in Montana. Most of these cases are found in drug DUI cases. These drugs are central nervous system depressants that are typically not available as prescriptions in the United States. In general, these compounds produce euphoria, drowsiness, sedation, depression, and slurred speech

when used at higher concentrations. FSD published findings in the March 2020 issue of *ToxTalk* on three DUI cases involving Etizolam.

The Toxicology Section recently validated a method for 23 benzodiazepines, including many of the designer drugs seen in Montana and across the country. Many of 2019 cases were poly-drug mixtures.

Case Type	2019 Cases	2018 Cases	2017 Cases	2016 Cases
Postmortem Deaths	Desalkylflurazepam: 1 case Clobazam: 2 cases (200ng/mL)	Diclazepam: 1 case	Etizolam: 1 case	None Found
DUID	Etizolam: 4 cases (24, 42, 308, and 618 ng/mL) Flualprazolam: 8 cases (Detected) Bromazepam: 1 case (740 ng/mL) Clonazolam: 1 case (10 ng/mL) Flubromazolam: 1 case (6.2 ng/mL)	Diclazepam: 1 case Etizolam: 2 cases	Etizolam: 7 cases	Etizolam: 2 cases

Synthetic Cannabinoids: The number of cases tested for these compounds over the last four years has decreased. In 2018, nine cases were tested; three were positive for ADB-Fubinaca (Mean 8.2 ng/mL and range of 1.9-15 ng/mL). In 2019, four cases were tested; all were negative.

Tetrahydrocannibinol/THC (Marijuana): The percentage of DUI cases testing positive for marijuana or its metabolites increased from 13% in 2018 to 17% in 2019. The mean THC concentration in those cases trended upward over the last three years.

Case Type	2019 Cases	2018 Cases	2017 Cases	2016 Cases
Unattended Deaths (Blood results only)	95 cases Mean: 10.3 ng/mL Range: 1-86 ng/mL	85 cases Mean: 8.7 ng/mL Range: 1-170 ng/mL	49 cases Mean: 10 ng/mL Range: 1-97 ng/mL	36 cases Mean: 11 ng/mL Range: 3*-35 ng/mL
DUID	464 cases Mean: 9.4 ng/mL Range: 1-75 ng/mL Concentration / % of Cases: 1-2.99 ng/mL — 31% 3-4.99 ng/mL — 19% 5-9.9 ng/mL — 17% 10-19.9 ng/mL — 19% >20 ng/mL — 13%	454 cases Mean: 8.6 ng/mL Range: 1-160 ng/mL	284 cases Mean: 7.8 ng/mL Range: 1-47 ng/mL	297 cases Mean: 10 ng/mL Range: 3*-82 ng/mL *LOD on old method

Probation/Parole Urinalysis	128 cases (30% of all positive cases)	111 cases (25% of all positive cases)	112 cases (28% of all positive cases)	137 cases (23% of all positive cases)

Inhalants: 1,1-Diflouroethane is a compound found in "canned air" used for huffing. In 2019, this drug was among the top 20 most detected drugs in DUI cases.

Case Type	2019 Cases	2018 Cases	2017 Cases	2016 Cases	2015 Cases
Postmortem Deaths	3 (0 traffic fatality)	4 (2 traffic fatality)	10 (4 traffic fatality)	8 (0 traffic fatality)	2 (0 traffic fatality)
DUID	16	12	20	14	12

Gabapentin: This drug is prescribed as an alternative or in conjunction with opiates. Over the last few years, the Toxicology Section has increasingly found it in postmortem deaths. Many instances have been mixed drug intoxications combined with various opiates.

Case Type	2019 Cases	2018 Cases	2017 Cases	2016 Cases	2015 Cases
Postmortem Deaths	21	38	42	17	16
DUID	2	3	3	2	1

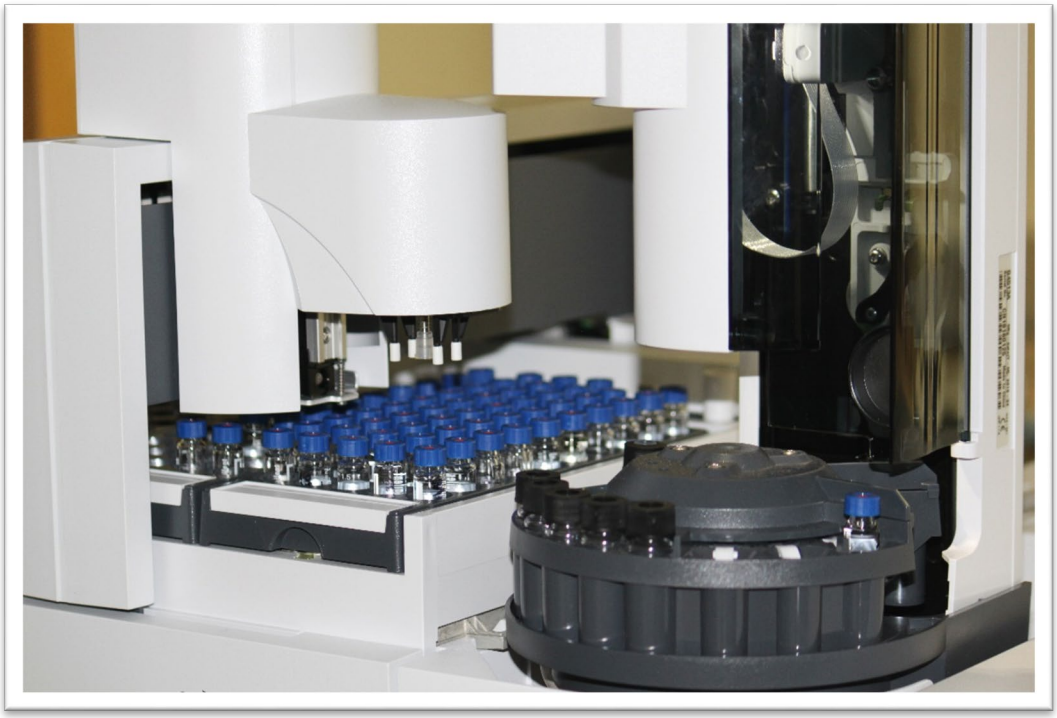
Summary of Alcohol and Drug Prevalence in Drivers *(including fatal crashes)*

In 2013, a new laboratory policy was implemented, ensuring drugs were only tested in DUI cases *if requested* and the blood alcohol was less than 0.100 g/100mL. Case reports are released with a note stating that no drug testing was performed. If a client requests drug testing be performed on a case, contact information is provided. This policy is necessary to manage increased workloads and to reduce reporting delays for the majority of DUI cases. Cases involving a drug recognition expert (DRE) or a fatal crash are exempt from this policy.

To request quarterly updates of this summary, email mduffus@mt.gov.

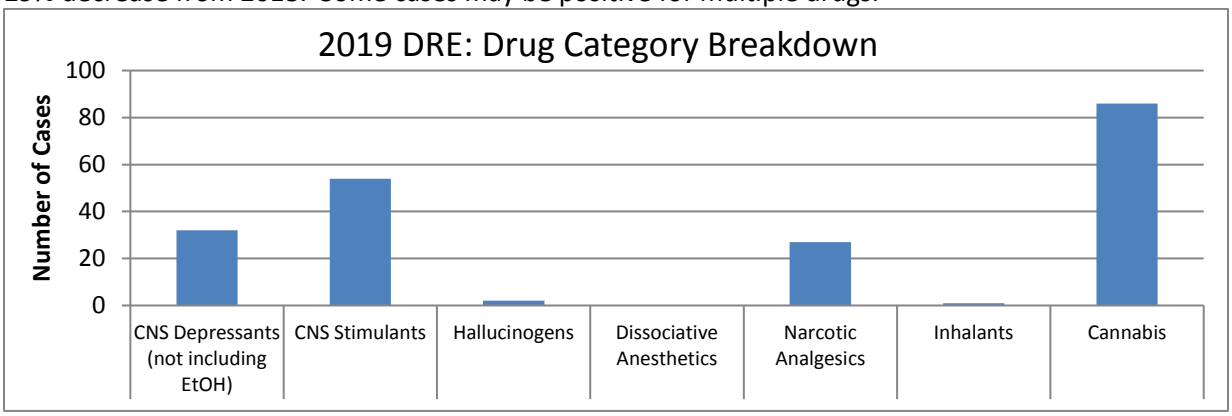
Alcohol and Drug Prevalence in Driver Blood Samples *(includes fatal crashes)*	
Blood Samples Submitted	3614
Blood Samples Positive for Alcohol	75%
Blood Samples Positive for Drug(s) other than Alcohol	27%
Alcohol Detected Only	67%
Alcohol + Drug(s)*	8%
Drug(s) Detected Only*	19%
No Drug(s) or Alcohol Detected	5%
BAC Greater than 0.100%	66%
BAC 0.020% - 0.100%	9%
Average BAC	0.185, Range: 0.020 – 0.495

Most detected Drugs*
1. Cannabinoids** – 17% (all), 46% (drug) (Delta-9-THC: Avg = 9.4 ng/mL, Range: 1.0–75 ng/mL)
2. Methamphetamine – 8% (all), 23% (drug) (Avg = 0.429 mg/L, Range: 0.02-3.0 mg/L)
3. Morphine – 1% (all), 3% (drug) (Avg = 0.069 mg/L, Range: 0.021-0.29 mg/L)
4. Alprazolam (Xanax) – 1% (all), 3% (drug) (Avg = 0.079 mg/L, Range: 0.021-0.35 mg/L)
4. Citalopram/Escitalopram – 1% (all), 3% (drug) We do not currently quantitate this drug
5. Benzoylecgonine (Cocaine Metabolite) – 1% (all), 3%(drug) Avg = 0.345mg/L, Range: 0.03-2.1mg/L)
5. Clonazepam (Klonopin) – 1% (all), 3% (drug) (Avg = 0.040 mg/L, Range: 0.022-0.086 mg/L)
6. Diazepam (Valium) – 1% (all), 2% (drug) (Avg = 0.177 mg/L, Range: 0.021-0.97 mg/L)
7. Zolpidem (Ambien) – 1% (all), 2% (drug) (Avg = 0.174 mg/L, Range: 0.025-0.71 mg/L)
7. Diphenhydramine – 1% (all), 2% (drug) (Avg = 0.155 mg/L, Range: 0.020-0.81 mg/L)



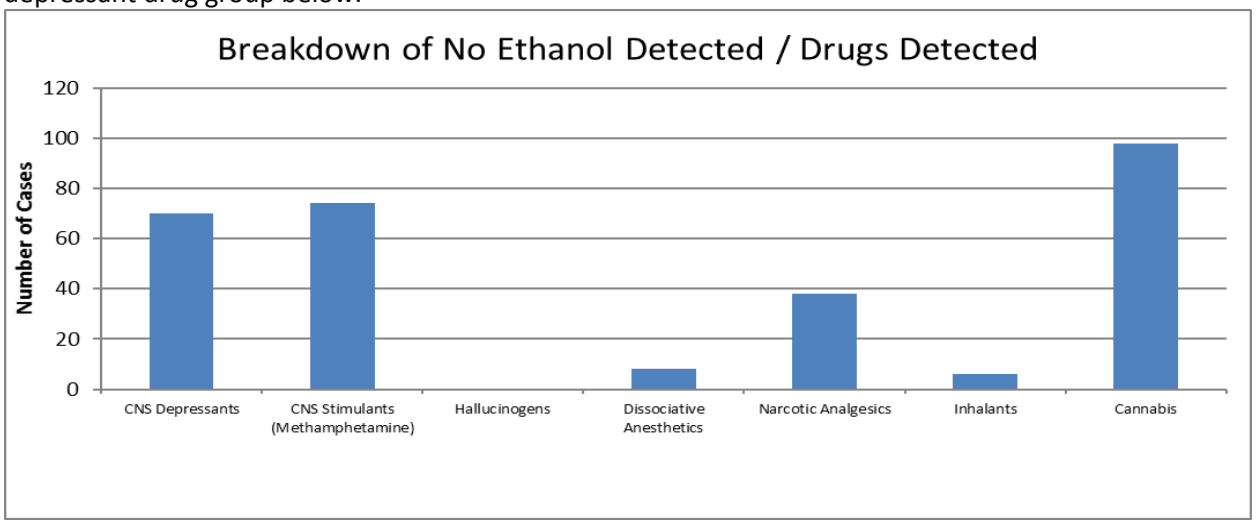
DRE (Drug Recognition Expert) Summary

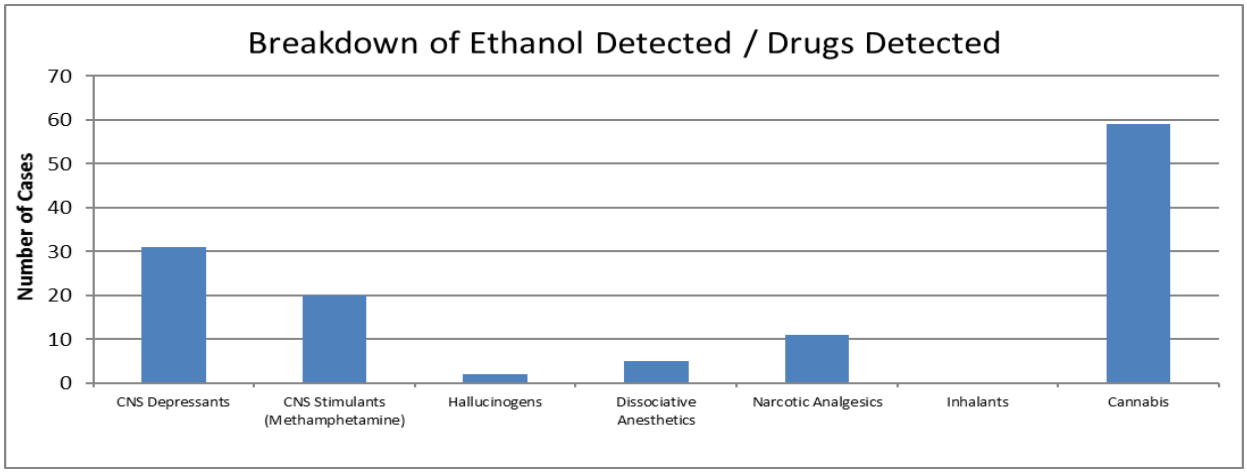
Drug testing is performed on all DRE submitted cases. In 2019, 140 DRE cases were submitted, a 29% decrease from 2018. Some cases may be positive for multiple drugs.



Crash/DUI Summary

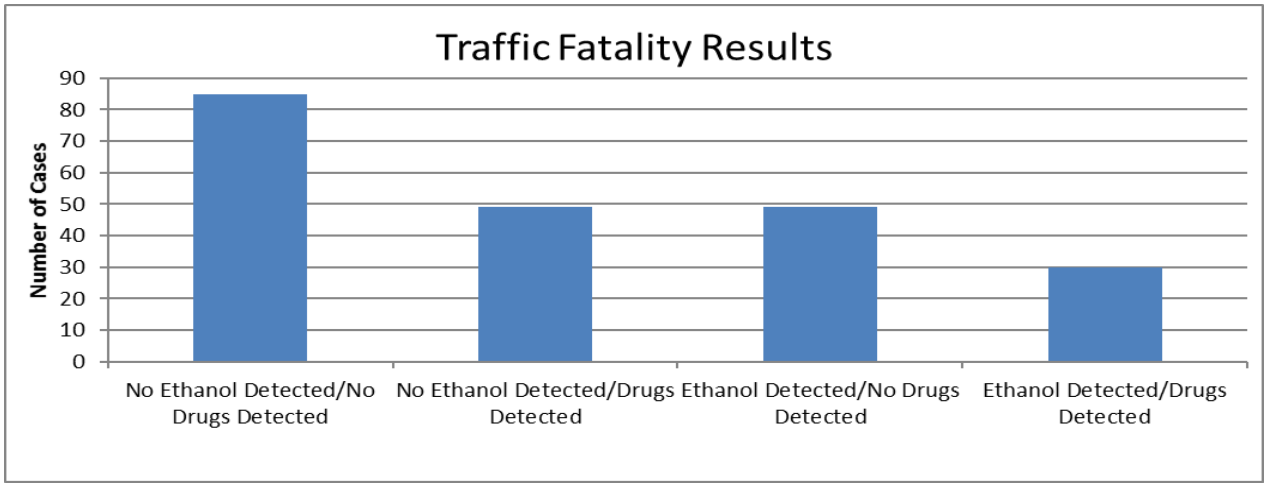
The Laboratory received 1,050 crash cases in 2019. The mean ethanol concentration was 0.187 g/100mL. The mean THC concentration was 8.1 ng/mL. Drug testing was performed on 368 of these cases. Some cases may be positive for multiple drugs. Ethanol is not included in the CNS depressant drug group below.

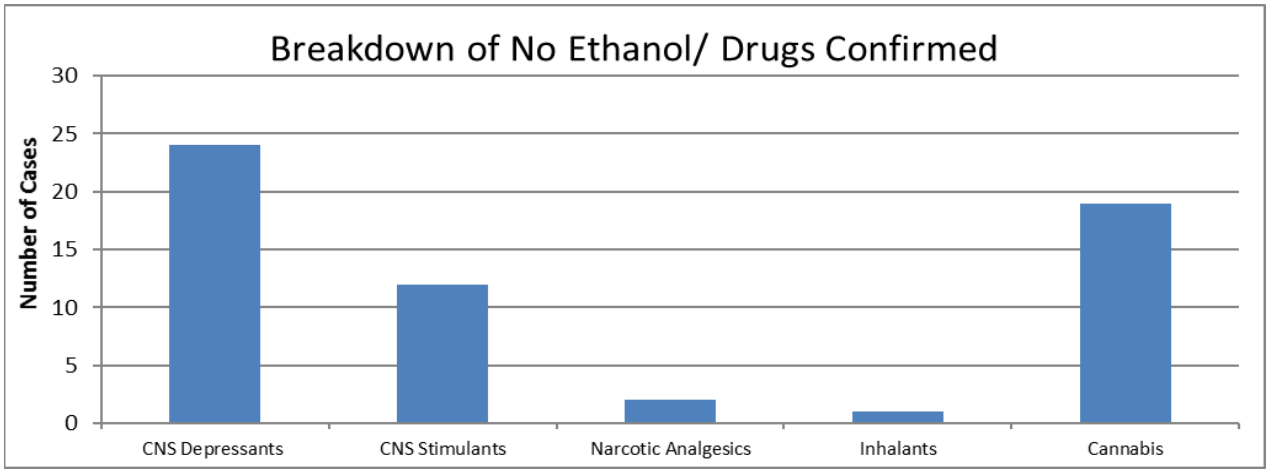


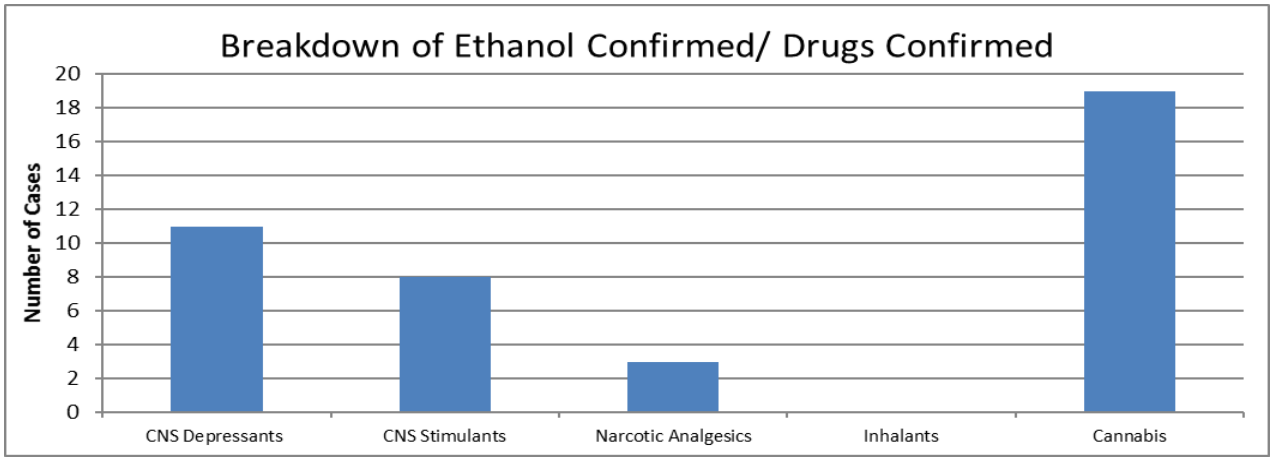


Traffic Fatalities Summary

The Laboratory received 202 traffic fatality cases and performed toxicology testing on 198 cases. There is no distinction between a driver and a passenger in the following data. The mean ethanol concentration was 0.18 g/100mL in cases when it was detected. When it was detected, the mean THC concentration was 10.1 ng/mL. Some cases may be positive for multiple drugs. Ethanol is not included in the CNS depressant drug group below.







Postmortem Toxicology Summary

A routine postmortem toxicology testing panel analyzes volatile compounds (ethanol, methanol, acetone, and isopropanol), illicit drugs, and prescription medications. Case history and requests from the submitting agency determine the final testing panel of each case. All positive drug results were screened and confirmed by different scientific methods. All significant drug results were quantitated unless directed otherwise.

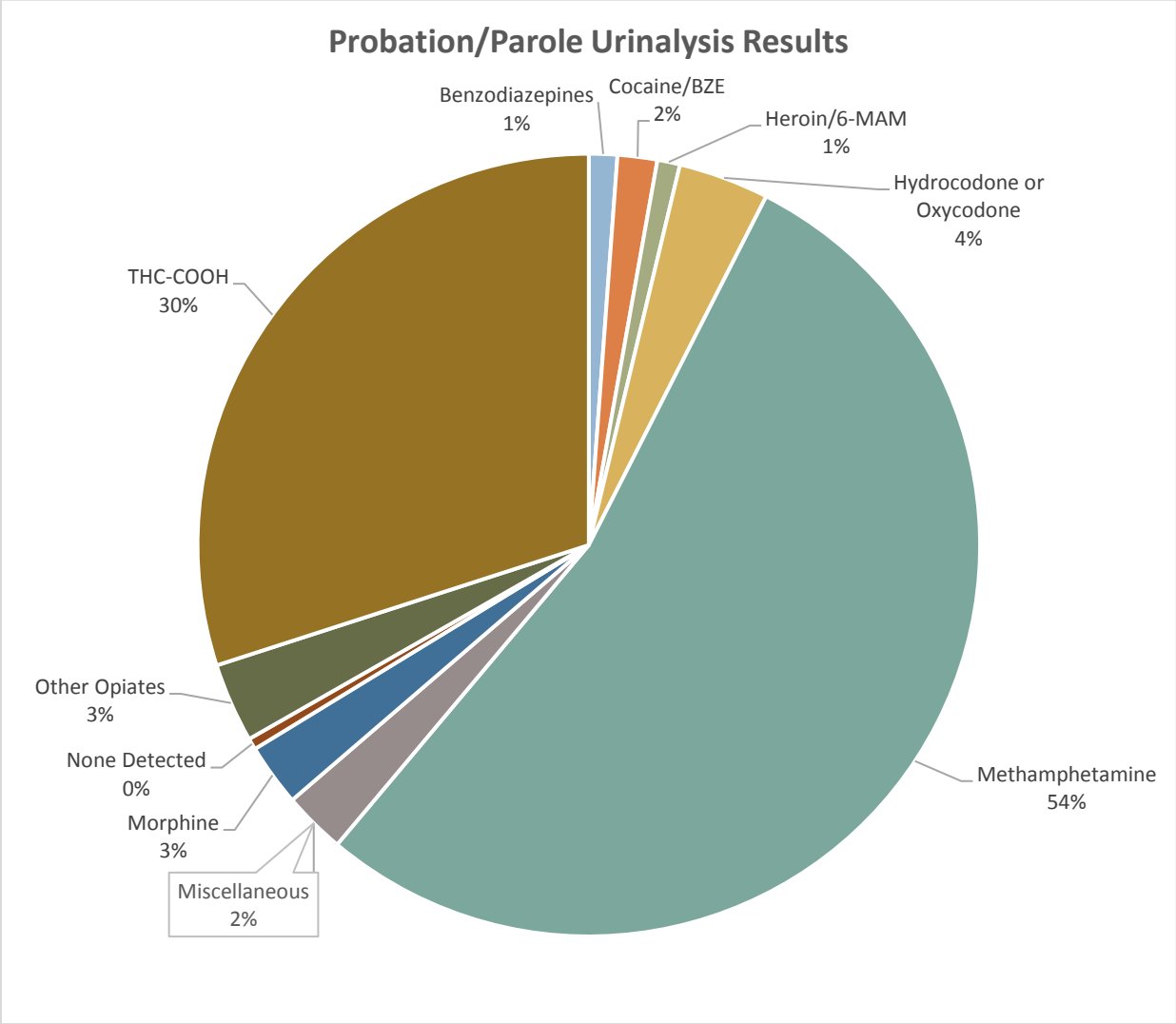
Medical examiners performed 657 autopsies in death investigation cases. The Toxicology Section performed testing on a majority of those cases. It was determined that 140 of them had drugs or alcohol tied to the cause of death. A breakdown of the identified substances and corresponding drug results is below. This data does not include deaths where the coroner did not have an autopsy performed.

Toxicology Related Case Breakdown by Cause of Death (Autopsied cases only)

Cause of Death	# of cases	Comments
Acute Ethanol Intoxication	2	Mean Ethanol: 0.49 g/dL
Complications of chronic ethanol use	30	----
Acute, Single Drug Intoxication		
1. Methamphetamine	21	Mean: 3.1 mg/L / Range: 0.23-9.9 mg/L
2. Heroin	9	Determined by 6-momoacetylmorphine confirmation
3. Fentanyl	1	12.2 ng/mL
4. Oxycodone	1	0.35 mg/L and ethanol at 0.041 g/dL
5. Methadone	1	1.7 mg/L
6. Mitragynine	1	180 ng/mL
7. Buprenorphine	1	7.8 ng/mL
8. Cocaine	1	Detected
9. Clozapine	1	2900 ng/mL
10. Diphenhydramine	2	6.6 mg/L and 40 mg/L
11. Salicylate	1	1300 microgram/mL
12. Hydroxyzine	1	2.2 mg/L
Acute, Poly-Drug Combinations	59	*Some cases may fall into multiple categories* Methamphetamine found in 29 cases (mean: 0.94 mg/L) Heroin use found in 15 cases Methamphetamine and Heroin combo in 10 cases Cocaine and Heroin combo in 2 cases Fentanyl found in 8 cases (mean: 12 ng/mL) Oxycodone found in 7 cases (mean: 0.25 mg/L) Hydrocodone found in 3 cases (mean: 0.21 mg/L) Methadone found in 9 cases (mean: 0.36 mg/L) Mitragynine found in 7 cases (mean: 765 ng/mL) Miscellaneous CNS depressants found in 13 cases
Drug and Weather Combinations	7	Hypothermia associated with Methamphetamine (1 case) or and Cocaine intoxication (1 case) Hypothermia associated with acute ethanol intoxication (5 cases)
Inhalant Intoxication	2	1,1-Difluoroethane

Probation/Parole Urinalysis Summary

We confirm drugs the submitting agency requested on the submission form based on their screening results. Due to policy changes at the Department of Corrections, submissions to the Laboratory have decreased over the last five years. In 2019, 404 cases were submitted. This chart outlines the drugs detected and the percentage found of each. Methamphetamine continues to be detected most often (54%) in this subset of cases.



Breath Alcohol Summary

Thanks to a grant administered by the Montana Department of Transportation through the Department of Justice and the National Highway Traffic Safety Administration, the Breath Alcohol Section replaced all its instruments statewide. Validation of the software and instruments will be completed in mid-2020 and deployed in the field later in the year. More locations will have instruments, meaning shorter drives for law enforcement officers to administer tests in rural areas. Implementation of the new instruments will also result in multiple efficiencies to the Section, including data collection and the annual certification process.

The Section has three main duties it performs regularly. The first is the maintenance, repair, and calibration of all breath analysis instruments. These instruments are given to local, county, state, and federal law enforcement agencies statewide. Montana Administrative Rules require the return of all instruments to the Laboratory at least once a year for annual certification, which returns the instruments to above factory standards using the most modern forensic techniques available.

The second duty of the Breath Alcohol Section involves the training and recertification of all law enforcement officers. As part of their Montana Law Enforcement Academy requirements, all officers must pass a comprehensive 40-hour course in DUI detection, arrest, and processing. Officers from all types of law enforcement agencies, including local, county, state, and federal attend these courses. They include basic alcohol pharmacodynamics and pharmacokinetics, breath analysis instrument infrared theory and operation, and standardized field sobriety testing (SFST). All students are exposed to live alcohol dosed individuals for 'real world' hands-on training and must pass a written and practical test. This course typically has nearly 50 students and is offered at least five times each year. After achieving this level of certification, all officers must get recertified annually in order to maintain their DUI certification status.

The Section's third responsibility is to teach various groups across the state about breath alcohol testing, including prosecutors, defense attorneys, and judges. Additionally, Section personnel testify in court, for both the prosecution and the defense, in city, justice, district, and federal courts across Montana.

Chemical Analysis Section

The Chemistry/Trace Unit analyzes controlled substances, suspected clandestine laboratory evidence, and gunshot residue casework. Forensic chemists analyze samples seized in cases involving dangerous drugs and clandestine labs, including the identification of previously unseen analogues now flooding the recreational drug market. The advent of synthetic compounds and an increase in marijuana/hemp cases have increased case complexity. Since 2011, submissions to this section have more than doubled.

Staff

Misty Icard Section Supervisor – Billings ABC Board Certified	**Bahne Klietz** Forensic Chemist – Missoula ABC Board Certified
Mark Winslow Forensic Chemist – Billings	**Amber Trochta** Forensic Chemist – Missoula
Brook Knapp Forensic Chemist – Billings ABC Board Certified	**Travis Doria** Forensic Chemist – Missoula ABC Board Certified
Tanna Brown Forensic Chemist – Missoula ABC Board Certified	**Alyssa Stulz** Forensic Chemist - Missoula

Successes

1. Training of two new FTE and the replacement of two hires, who will be fully trained by May of 2020.
2. Implementation of new functions in our informational management system to make casework more efficient.
3. Validation of a new cannabinoid method to confirm the presence of delta-9-THC from other cannabinoids, such as delta-8-THC, CBD, and CBN.

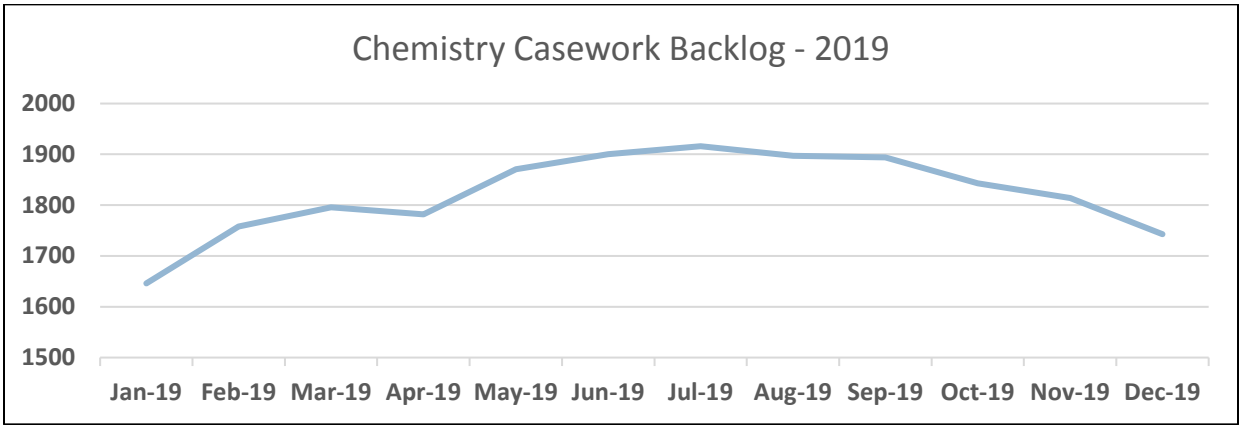
Challenges

1. Backlog reduction: Average case turnaround time has increased from 31 days in 2017 to 175 days in 2019. The section makes monthly improvements, but the backlog reduction plan will not be fully realized until mid to late 2020. Our goal is a 60-day turn-around time.

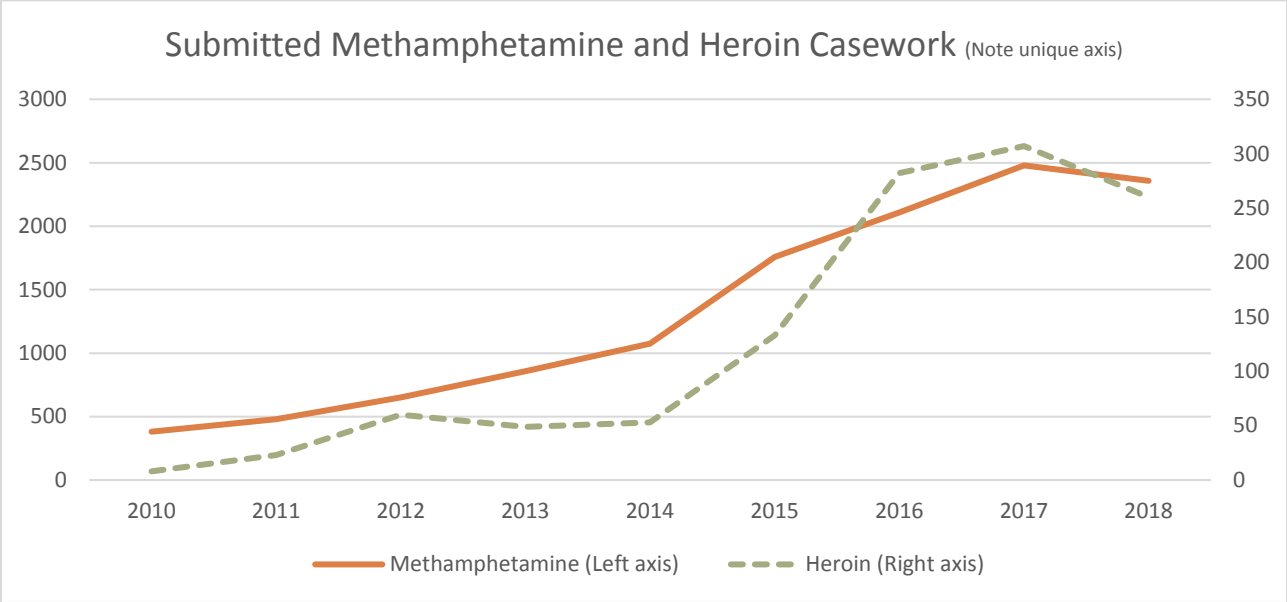
Casework Summary

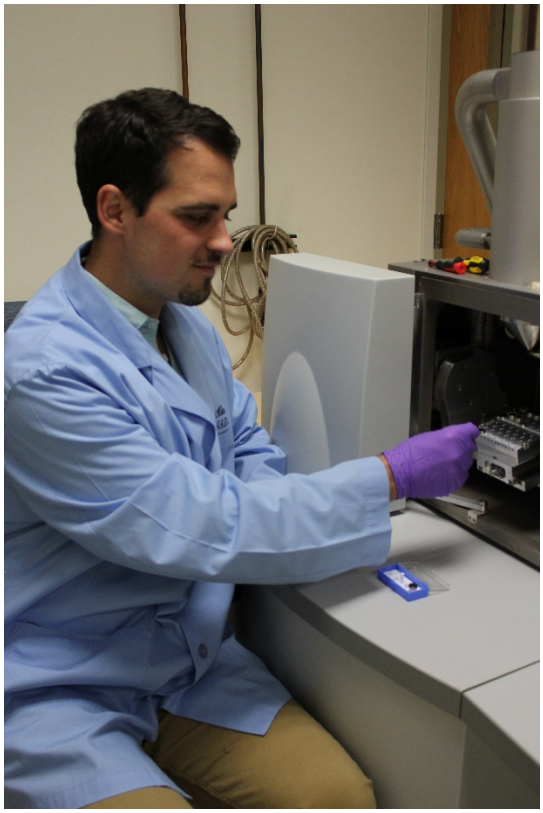
Year	Number of Cases Submitted Missoula/Billings	Samples Analyzed for Completed Cases	Turnaround Time for Completed Cases (Days)
2011	1,375	1,961	60
2012	1,577	2,149	104
2013	1,348	1,819	162
2014	1,482	1,854	224
2015	2,221	2,772	120
2016	2,024/565	3,392	67
2017	2,047/911	3,947	31
2018	1,434/1,322	3,721	175
2019	1,339/1,236	*	*

*Will be updated when all 2019 cases are finalized



Year	No Controlled Substance Identified	Meth	Heroin	Fentanyl	Hydrocodone	Oxycodone	Morphine	Buprenorphine	Cocaine
2011	**238**	**480**	**23**	**6**	**84**	**117**	**49**	**19**	**104**
2012	**225**	**651**	**60**	**4**	**103**	**87**	**45**	**19**	**50**
2013	**177**	**858**	**49**	**5**	**75**	**72**	**27**	**14**	**37**
2014	**134**	**1,074**	**53**	**9**	**47**	**63**	**21**	**18**	**20**
2015	**169**	**1,758**	**133**	**4**	**37**	**65**	**26**	**21**	**49**
2016	**216**	**2,109**	**282**	**8**	**39**	**80**	**26**	**19**	**56**
2017	**249**	**2,479**	**307**	**20**	**52**	**56**	**22**	**44**	**68**
2018	**274**	**2,357**	**260**	**13**	**43**	**48**	**16**	**33**	**93**
2019	Will be updated when all 2019 cases are finalized								





Forensic Chemist Travis Doria analyzes controlled substances in the Chemical Analysis Section.

Latent Print/Impression Evidence Section

The Latent Print/Impression Evidence Section analyzes evidence for the presence of latent fingerprints. Staff then compares them to known prints when possible. The Lab participates in Automated Fingerprint Identification System (AFIS), a fingerprint database.

Staff

Kaitlin Delphy Technical Lead Forensic Scientist IAI Board Certified
Stephanie Shappee Forensic Scientist IAI Board Certified

Successes

1. 81% reduction of backlogged cases.
2. Entire section is board certified through the International Association for Identification.

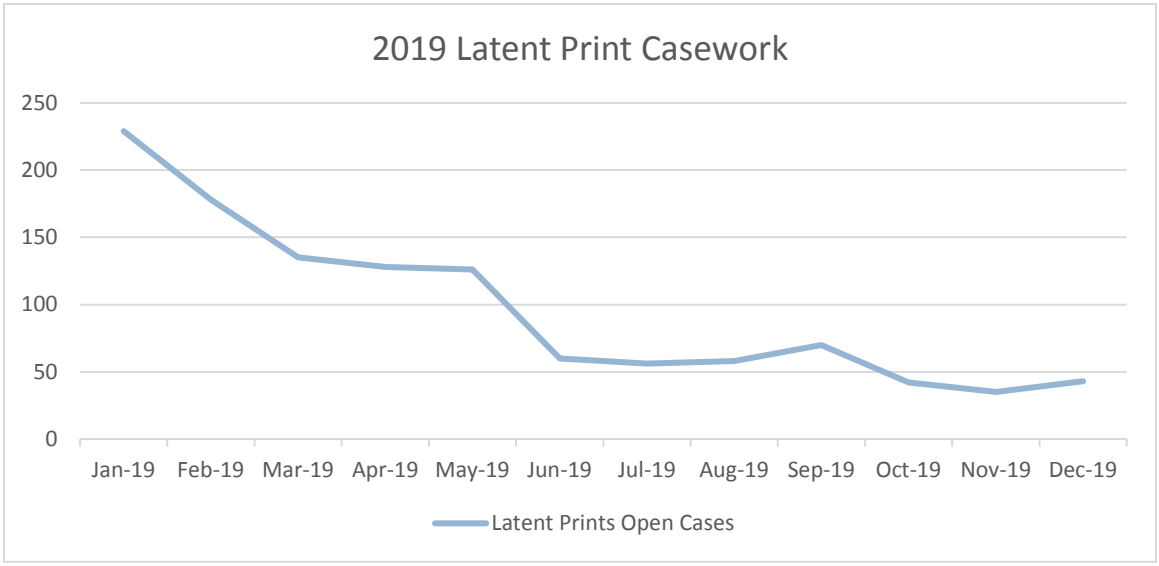
Challenges

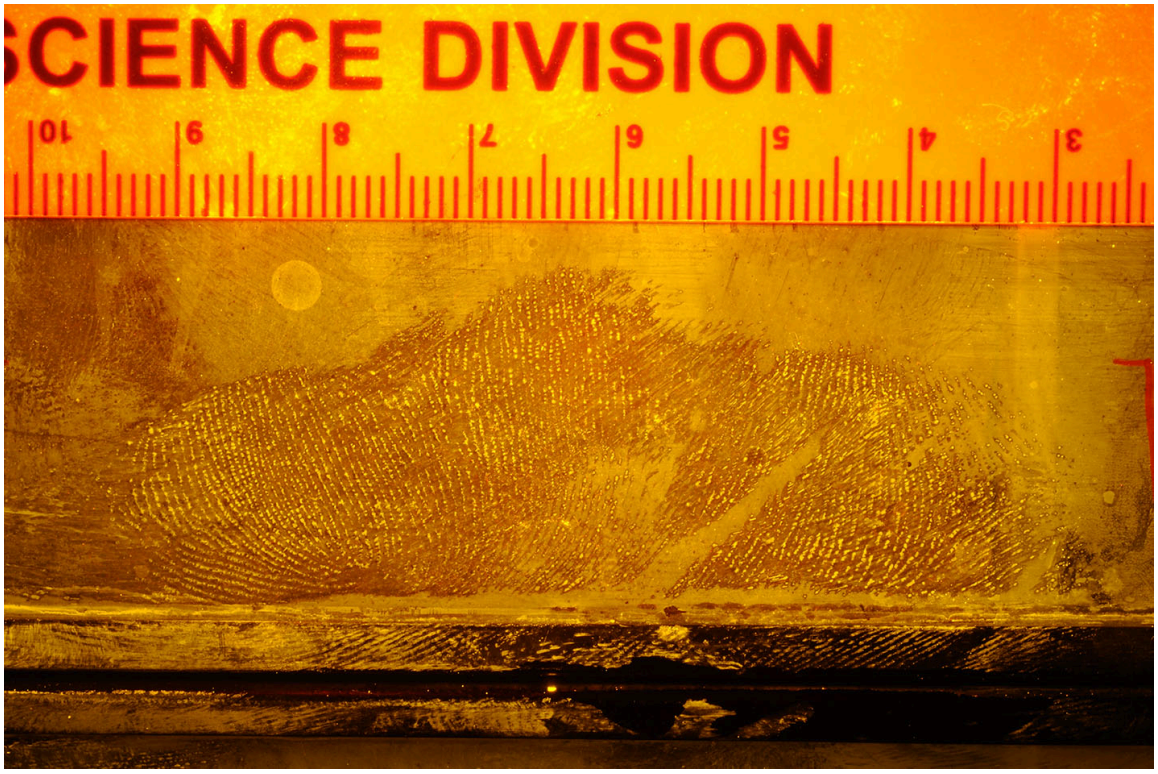
1. Limited redundancies with only two trained analysts.

Casework

The Section had a two-year goal of eliminating its casework backlog. In 2019, it reduced the backlog by 81%, thanks to having two trained analysts onboard for an entire year and to outsourcing a large number of older cases.

Year	2019
Total cases submitted	164
Total cases completed	323 152 cases completed in house 171 cases outsourced
Median TAT (days)	45 (in house cases)
95% of cases worked (days)	1,043 (Due to clearing out historic cases)
Results	
1. 408 latent impressions of value were reported 2. 289 unidentified latent impressions were reported as AFIS suitable 3. Search and supplemental analysis of the remaining unidentified latent prints resulted in 109 additional identifications	


2019 Latent Print Casework
250
200
150
100
50
0
Jan-19
Feb-19
Mar-19
Apr-19
May-19
Jun-19
Jul-19
Aug-19
Sep-19
Oct-19
Nov-19
Dec-19
Latent Prints Open Cases


SCIENCE DIVISION

Biology Section

The Biology Section provides quality, accurate, and timely analysis of evidence for the presence of biological fluids and further characterization of those samples using state of the art DNA technologies. Additionally, Section staff testify at trials regarding analysis conclusions.

Joe Pasternak, DNA Supervisor and Technical Leader
Megan Ashton, CODIS Administrator
Jamie Bray, DNA Analyst
Andrew Zeigler, DNA Analyst (in training)
Jen Revis-Siegfried, DNA Analyst* (part-time)
Lacey Van Grinsven, Serologist
Andrew Bishop, Serologist/CODIS Technician
Rachel Fife, Serologist
Kate Posner, DNA Technician*
Phil Reiner, DNA Technician*
Nolan Cassell, DNA Technician
Kendra Bertrand, DNA Technician

**Position funded by federal grant*

Successes

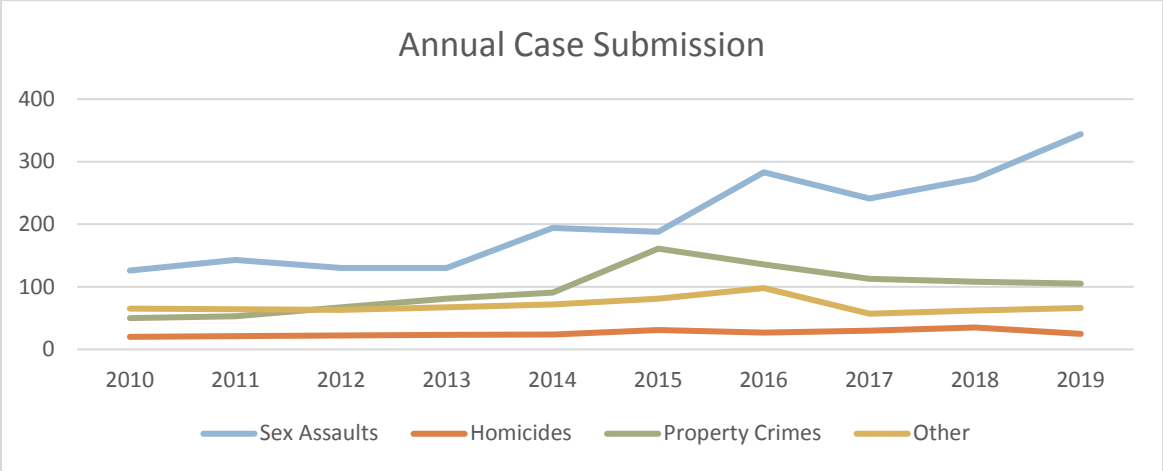
1. Completion of testing for all pre-2015 SAKI cases.
2. Validation and implementation of Y-screen (male specific) testing program for sexual assault kits using robotics.
3. Validation of Y-STR analysis method for male specific DNA analysis. It will be implemented in the fall of 2020.
4. Two DNA technicians trained and online for Y-screen processing of sexual assault kits.

Challenges

1. Reduction of Section staffing by 25% throughout 2019, creating workflow challenges.
2. Increase in submitted cases as a result of the 2019 passage of SB52.

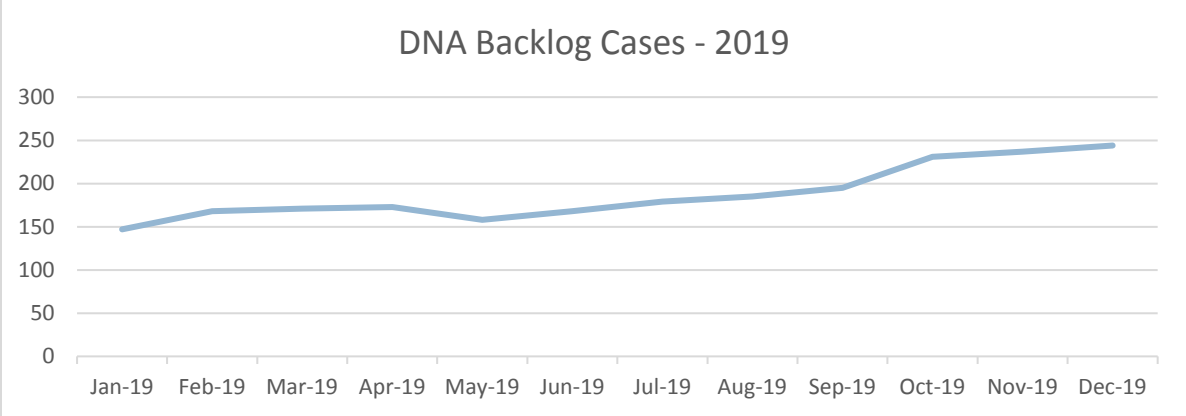
Annual Case Submission

In 2019, casework submissions rose by 13%; this included a 26% increase in sexual assault cases. The following graph does not include 247 historical SAKI kits that were outsourced for analysis; however, follow up work was performed by our lab. These SAKI case results were submitted to us to verify CODIS eligibility of profiles, to enter DNA profiles into the CODIS database, and to review and issue reports regarding these entries. The Section also performed confirmation sample DNA analysis for CODIS hits, reviewed and issued CODIS hit reports, and ultimately wrote and reviewed final DNA comparison reports for those cases where the perpetrator is identified. FSD must acquire additional resources to keep pace with the Section's increased workload.



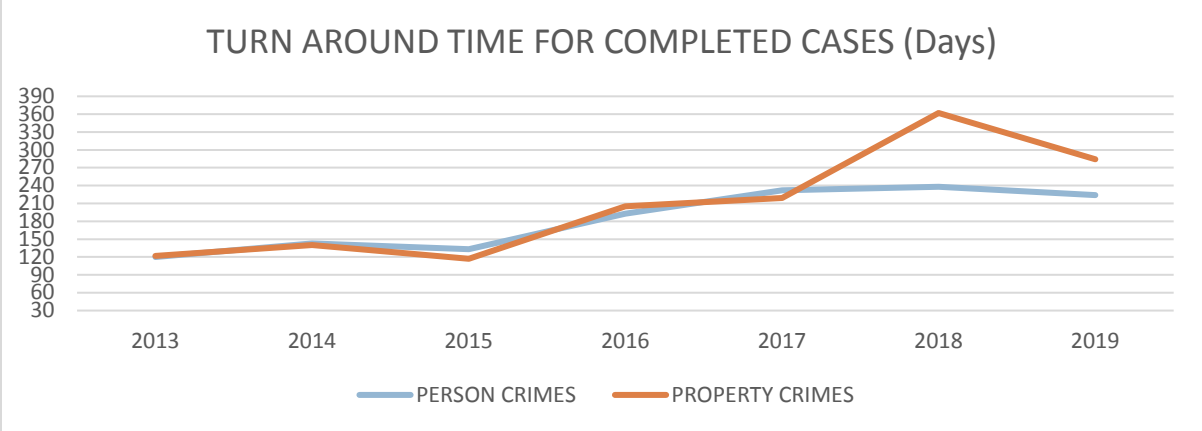
DNA Backlogged Cases

Due to an increase in case submissions and a 25% decrease in staffing over the year, the DNA backlog rose in 2019. By mid-2020, the Section will be completely trained and this trend should decrease.



Turnaround Times

Increasing turnaround times are correlation increases in submitted cases; it takes time to ramp up production through new instrumentation or staff.

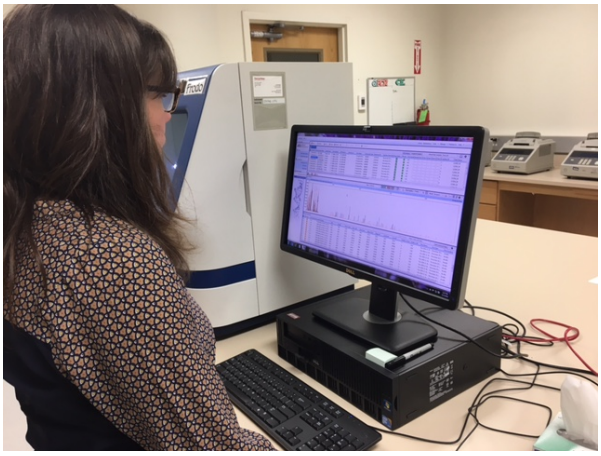


CODIS

The CODIS database allows forensic laboratories the ability to compare DNA profiles from violent crimes to known offenders. The Sexual Assault Kit Initiative (SAKI) program has created a large increase in the number of profiles entered into the database and positive comparisons or hits. Theoretically, this will lead to more violent crimes being solved in the future. This increased work is very time consuming and comes at the expense of new casework and CODIS offender sample processing.

CODIS Totals – Casework and SAKI

	2017	2018	2019
Casework Forensic Unknowns	105	124	71
SAKI Only Forensic Unknowns	N/A	129	237
Total Profiles Entered	**105**	**253**	**308**
CODIS HITS	**31**	**138 (41 SAKI)**	**140 (107 SAKI)**



DNA Analyst Jamie Bray works on DNA profile data at the State Crime Lab.

Sexual Assault Kit Initiative (SAKI)

The statewide SAKI project has continued to move forward and produce many results. Statewide, 1,252 previously unsubmitted sexual assault kits were collected by DOJ's Division of Criminal Investigation and outsourced to a private lab for DNA analysis using grant funds. In addition, a statewide kit tracking system was developed; now, every kit can be tracked. The next phase includes the testing of 217 unsubmitted kits that originated between 2016-2018. These cases will be tested at FSD; some may be outsourced to a private lab through grant funding. The passage of SB52 required all sexual assault kits to be submitted to FSD, causing a large increase in the number of cases absorbed by this section.

For SAKI cases, FSD is responsible for verifying CODIS eligibility of profiles, DNA profile entry into the CODIS database, reviewing and issuing reports regarding the CODIS entries, performing confirmation sample DNA analysis for CODIS hits, reviewing and issuing CODIS hit reports, and ultimately authoring and reviewing final DNA comparison reports for cases in which the perpetrator is identified. These SAKI processes are conducted by Section staff in addition to their other casework responsibilities.

Firearms/Toolmarks Section

The Firearms/Toolmark Section examines firearms and ammunition from crime scene evidence. In addition, its staff examines toolmarks by request. They can determine whether a bullet was fired from a particular gun, and whether a particular tool was used at a crime scene. Within a certain range, they can estimate the distance between a gunshot victim and the gun.

Staff

Travis Spinder Section Supervisor – Missoula AFTE Board Certified	**Lynette Lancon** Forensic Scientist – Missoula AFTE Board Certified

Successes

1. Developed uncertainty of measurement plan for distance determination.
2. Maintained the Section's quick turnaround time on cases.

Challenges

1. Submissions have decreased since 2018. Section staff will outreach to law enforcement officers to ensure they understand the Section's capabilities and timelines.

Casework

Year	2016	2017	2018	2019
Total cases worked	91	87 (978 items of evidence worked)	89 (1,212 items of evidence worked)	65 (597 items of evidence worked)
Median TAT (Days in Firearms section)	67	21	21	25
95% of cases worked (Days in Firearms section)	293	156	77	73

Quality Assurance

The Quality Assurance Section maintains the Laboratory's international accreditation and continually improves its management system. The quality assurance manager is responsible for ensuring the management system related to quality is implemented and followed at all times. This includes ensuring compliance with ISO 17025, ANAB *International* Supplemental Requirements for Testing and Calibration Laboratories and Forensic Science Division policies.

Staff

Stacey Wilson Quality Assurance Manager

Successes

1. Completion of full accreditation assessment to new standards (ANAB and ISO/IEC 17025-2017).
2. Working toward implementing Qualtrax, a compliance management system.

Challenges

1. Maintaining policies (current revisions, revision history, archiving).
2. Notifying staff of policies changes and tracking notifications.
3. Assisting with NAME accreditation (different type of requirements vs forensic laboratory testing and calibration requirements).

Evidence Section

The Evidence Section ensures evidence is accurately and efficiently transferred to maintain the integrity of all evidence submitted and to protect it from loss and cross contamination.

Staff

Alysa Nichols Evidence Technician - Missoula
Marina Contreraz Evidence Technician - Billings

Casework

In 2019, the evidence technicians processed 8,975 cases. Most of them have multiple pieces of evidence, some totaling over one hundred individual items. It is an essential and often overlooked role within the Division to document, log, and track the tens of thousands of unique pieces of evidence submitted each year.

Successes

1. Large volumes of evidence continue to enter the laboratory without any backlogs.

Challenges

1. Having only one evidence technician in Missoula and Billings creates difficulties when that person is out of the office or leaves the position.