2023

Forensic Science Laboratory Annual Report

SEDGWICK COUNTY, KANSAS

REGIONAL FORENSIC SCIENCE CENTER
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MISSION

The Forensic Science Center strives to provide the highest quality medicolegal and advanced forensic laboratory services to Sedgwick County. Death Investigation and Forensic Autopsy services are conducted in a compassionate and objective manner to achieve accurate certification of cause and manner of death. The Forensic Laboratory services provide unbiased and accurate analytical testing to support the resolution of criminal cases. As an independent agency operating under the Division of Public Safety, the Forensic Science Center collaborates with public health and criminal justice stakeholders to reduce crime and prevent deaths.

LABORATORY LEADERSHIP

Director

Shelly Steadman, Ph.D.

Quality Assurance and Compliance Manager, LIMS Administrator

Robert C. Hansen II, M.S.F.S

Toxicology Laboratory Manager

Kimberly Youso, M.S., D-ABFT-FT

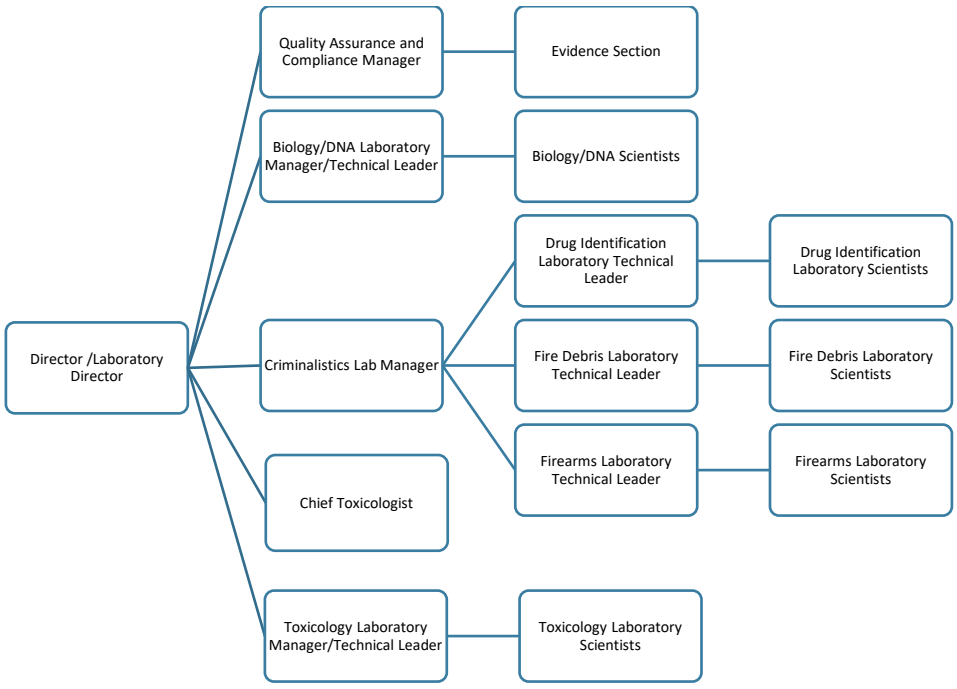
Criminalistics Laboratory Manager

Lana Goodson

Forensic Biology / DNA Laboratory Manager

Sarah Geering, M.S.

LABORATORY ORGANIZATION



INTRODUCTION

The Regional Forensic Science Center (RFSC) officially opened on December 21st, 1995. The Center houses the Office of the District Coroner and the Forensic Science Laboratories. The Forensic Science Laboratories are comprised of three major sections: Criminalistics (Drug Identification, Firearms, and Fire Debris), Biology/DNA, and Toxicology (Antemortem and Postmortem).

The Forensic Science Laboratory is staffed with highly trained and experienced forensic scientists, many of whom have advanced scientific degrees (MS, MSFS, PhD). For 2023, the laboratory staff consisted of 22 scientists and 2 support personnel.

In April of 1996, the Forensic Science Laboratory began accepting cases for firearms examinations. Three months later, the Biology Laboratory provided forensic examinations for the identification of biological fluids. The Toxicology Laboratory began producing comprehensive examinations in postmortem toxicology in support of the Sedgwick County District Coroner (District Coroner) in September of 1996. This was followed by the Forensic Science Laboratories providing forensic drug identification for local and regional law enforcement agencies. In November of 1996, fire debris analysis was added to the Criminalistics Section. In January of 1997, the Biology/DNA Laboratory became the first short tandem repeat-deoxynucleic acid (STR-DNA) testing laboratory in the State of Kansas.

In 2003, the Forensic Science Laboratory first became accredited by the American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB) under the ASCLD/LAB-Legacy program.

In February 2014, the Forensic Laboratory was granted ASCLD/LAB-International accreditation for Forensic Testing Laboratories in the categories of Controlled Substances, Quantitative Analysis, Antemortem Toxicology, Postmortem Toxicology, DNA-Nuclear, Body Fluid Identification, Fire Debris, Firearms, and Serial Number Restoration. The ASCLD/LAB-International accreditation program evaluates the laboratory's management system, and technical procedures and practices against criteria set forth in ISO/IEC 17025:2005, and the testing laboratory requirements of the ASCLD/LAB-International Supplemental Requirements.

In 2018, the Forensic Science Laboratory completed an ANAB ISO/IEC 17025:2017, AR3125 full assessment. The laboratory was the first in the state and among the first in the nation to undergo assessment for these new international accreditation standards. This enhanced accreditation program is based upon the latest set of requirements against which a forensic testing laboratory can be evaluated.

Striving for and meeting these accreditation requirements demonstrates the Forensic Laboratory's commitment to excellence in the services we provide to submitting agencies.

FORENSIC SCIENCE LABORATORIES SERVICE OVERVIEW

Case Submissions

The Forensic Science Laboratory continues to experience a significant demand for expert services. **Figure 1** illustrates the number of forensic laboratory cases first submitted for examination over the past 5 years, the average of which is 2913.

The Center staff encourages law enforcement contributors and attorneys to be mindful in the cases that are submitted to the laboratories for analysis. This better utilizes Center resources for reporting case information that is critical to an investigation and/or prosecution in a more timely manner. However, with the increase in sexual assault cases and emerging designer drugs, the cases submitted have been increasingly complicated, often with more exhibits associated.

As illustrated in **Figure 1**, the laboratories received evidence for examination from 2458 newly generated cases in 2023.

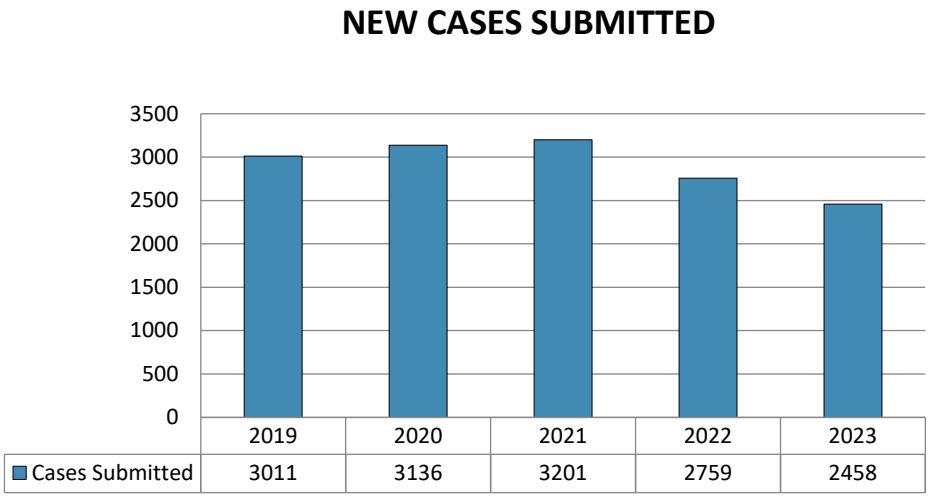


Figure 1: Number of initial forensic laboratory cases submitted for examination (law enforcement and District Coroner postmortem evidence submissions) from 2019 through 2023.

As illustrated in **Figure 2**, the number of exhibits examined by the Forensic Laboratory was increase approximately 32.0% in 2023 when compared to 2022 and was the highest total in the last 5 years.

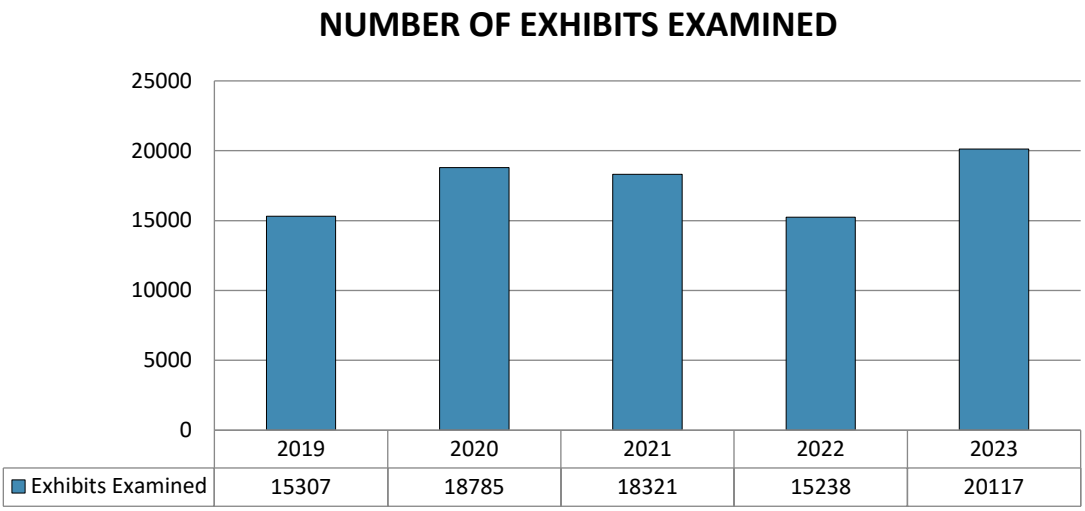
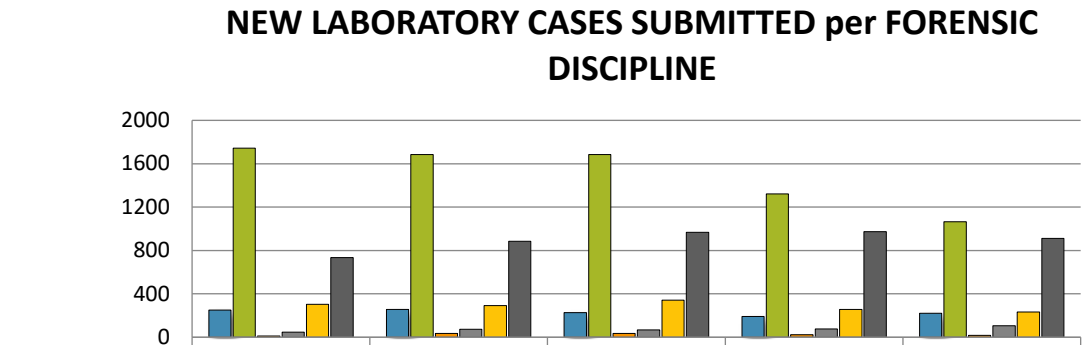


Figure 2: The number of forensic exhibits examined between 2019 and 2023.

Law enforcement agencies submit criminal cases to the Forensic Laboratory for analysis. **Figure 3** illustrates the number of cases submitted to the Forensic Laboratory for the first time each year per laboratory section.



	2019	2020	2021	2022	2023
Biology/DNA	251	258	227	192	220
Drug ID	1743	1684	1684	1321	1065
Fire Debris	12	34	35	23	18
Firearms	48	73	67	77	106
Toxicology HPT	303	293	342	256	234
Toxicology PM	735	886	967	975	911
Aggregate Total	3092	3228	3322	2844	2554

Figure 3: Number of cases submitted for the first time each year per laboratory section. Abbreviation Key (HPT = Human Performance Testing, PM = Postmortem).

A listing of the agencies that submitted evidence to the laboratory division for forensic analysis and the number of new cases that were submitted by each in 2023 is provided in **Figure 4**. The District Coroner's Office submits evidence for analysis in support of the regional autopsy service. Out of county agencies that submit evidence for analysis are subject to a fee schedule set forth by the Sedgwick County Board of County Commissioners.

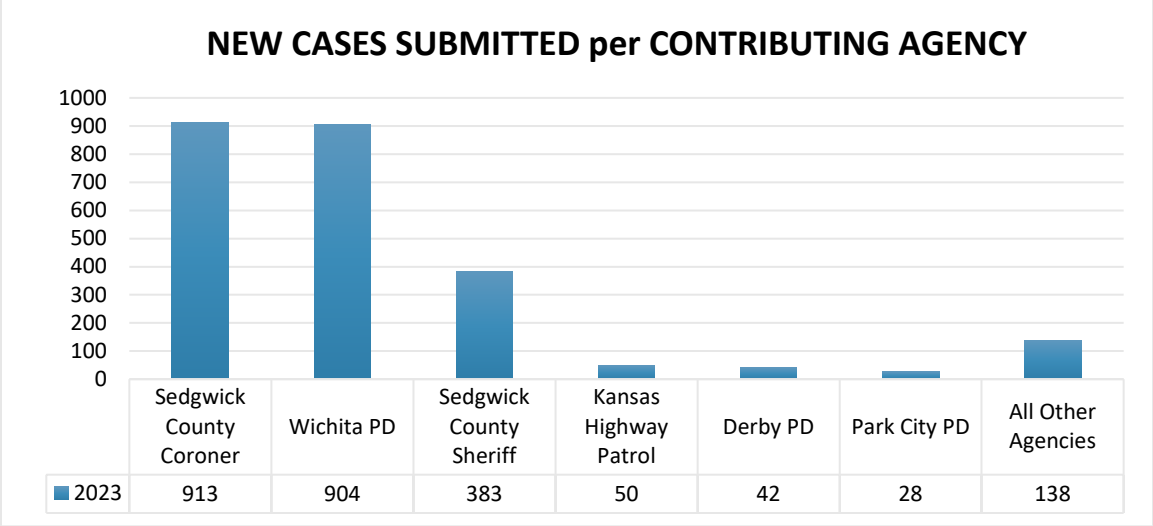


Figure 4: Count of new case submissions received from each contributing law enforcement agency. Abbreviation Key (PD = Police Department).

Cases are submitted for forensic examination under five analytical disciplines, Biology / DNA, Drug ID, Firearms, Fire Debris, and Toxicology (postmortem and antemortem [HPT]). Toxicology receives antemortem evidence from law enforcement and postmortem specimens from the District Coroner.

The number of case submissions associated with each laboratory is illustrated in **Table 1**. The aggregate submission count of 2658 includes all submissions from contributing agencies, which includes submissions from the aggregated 2554 new cases (the sum of all new cases submitted to each laboratory) generated in year 2023 **(see Figure 3)** and submissions from cases generated in previous years in support of on-going investigations by law enforcement.

Laboratory	2023 Aggregate Case Submissions Count
Biology / DNA	263
Drug ID	1118
Firearms	110
Fire Debris	18
Toxicology Antemortem	235
Toxicology Postmortem	914
Sum of Submission Count	2658

Table 1: Number of case submissions per laboratory.

The relative percentage of cases submitted to each laboratory section is illustrated in **Figure 5**. The Drug Identification Laboratory continues to receive the majority of evidence submitted, followed by submissions to the Toxicology Laboratory, which in 2023, had all-time highs for postmortem case submissions.

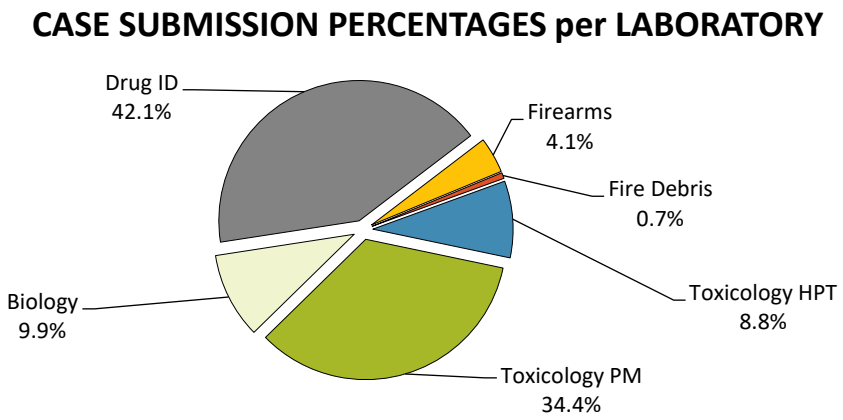
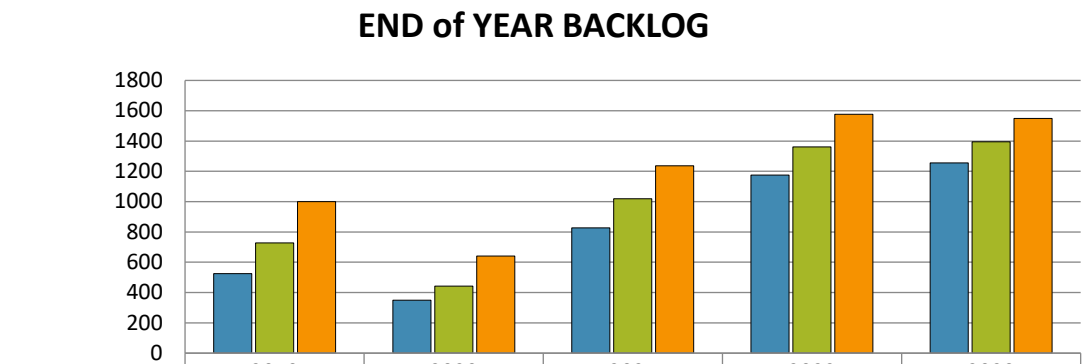


Figure 5: Percentage of case submissions per laboratory.

Backlog

Nationally, the target turn-around time for case completion is 30 days from submission. The Forensic Laboratory has set an internal goal of 60 days, which is acceptable to the vast majority of our contributors according to annual contributor surveys. As of December 31, 2023 the Forensic Laboratories had a 60 day backlog of 1255 cases and a 30 day backlog of 1396 cases **(see Figure 6)**.



	2019	2020	2021	2022	2023
60 Day Backlog	524	350	827	1176	1255
30 Day Backlog	727	443	1019	1361	1396
Total Backlog	999	642	1237	1577	1550

Figure 6: The number of the total, the 30 day, and the 60 day backlogged cases on December 31 of each of the last five years.

Expert Testimony

The professional staff is frequently called upon to present expert testimony in court. The amount of time spent by staff preparing for testimony, waiting to testify at courthouses, and on the stand providing testimony is significant.

In 2023, the Forensic Science Laboratories received 494 subpoenas for court appearances. This resulted in laboratory staff appearing in court to provide expert testimony in 44 criminal cases.

Agencies Served

The Forensic Science Laboratory provides expert testing services and consultation for a variety of law enforcement agencies within and outside of Sedgwick County. In 2023, the Forensic Science Laboratory provided expert testing services and consultations to 40 law enforcement agencies, fire departments, and district coroners. In **Figure 7**, the shaded counties indicate jurisdictions within the state for which forensic laboratory services were provided.

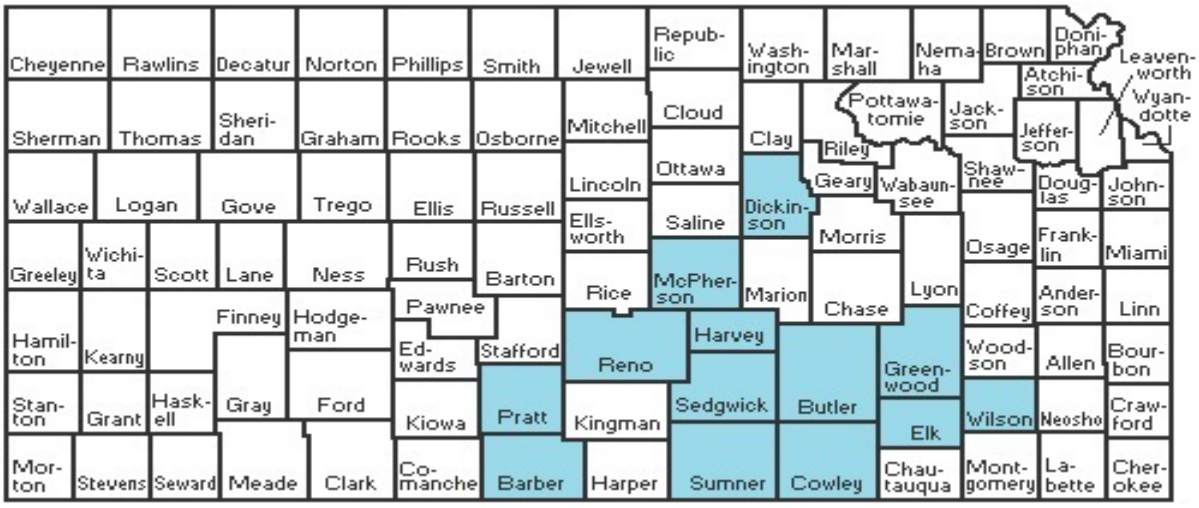


Figure 7: Counties that had forensic laboratory services provided to them by the Sedgwick County Regional Forensic Science Center in 2023 (shaded).

Sedgwick County vs. Out-of-County Cases

The Regional Forensic Science Center serves as the principle forensic (crime) laboratory for all Sedgwick County law enforcement agencies and provides forensic services to many other counties and municipalities within the state of Kansas; however, the vast majority of forensic laboratory services were provided for Sedgwick County law enforcement agencies and the Sedgwick County Coroner. A significant portion of the out-of-county casework was in support of the District Coroner's out-of-county autopsies. Municipalities and counties served in 2023 are listed in **Table 2**.

Barber County Coroner	Goddard USD 265 Police Department	Sedgwick County Coroner
Bel Aire Police Department	Greenwood County Coroner	Sedgwick County Courthouse Police Department
Bentley Police Department	Haysville Police Department	Sedgwick County Fire Department
Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF)	Harvey County Coroner	Sedgwick County Sheriff
Butler County Coroner	Kansas Department of Corrections	Sumner County Coroner
Butler County Sheriff's Office	Kansas Highway Patrol	United States Probation
Clearwater Police Department	Kechi Police Department	Valley Center Police Department
Cowley County Coroner	Maize Police Department	Wichita Fire Department
Derby Police Department	Marion County Coroner	Wichita Police Department
Dickinson County Coroner	McPherson County Coroner	Wichita State University Police Department
Drug Enforcement Agency (DEA)	Mount Hope Police Department	Wilson County Coroner
Elk County Coroner	Mulvane Police Department	
Garden Plain Police Department	Park City Police Department	
Goddard Police Department	Pratt County Coroner	
	Reno County Coroner	

Table 2: List of law enforcement agencies, fire departments, and county coroners for which the forensic science laboratories provided services in 2023.

Cases Completed

Cases completed every year may include cases that are submitted for the first time that year, or backlogged cases from previous years, or they may be cases that were originally submitted in previous years but have additional examination(s) requested. **Figure 8** illustrates the number of cases completed by the Forensic Science Laboratories in the given year.

The Forensic Laboratory has faced staffing challenges throughout the past five years. This was especially true for the Firearms, Drug Identification, and Toxicology Laboratories, which accounts for a drop in the number of cases completed for these years.

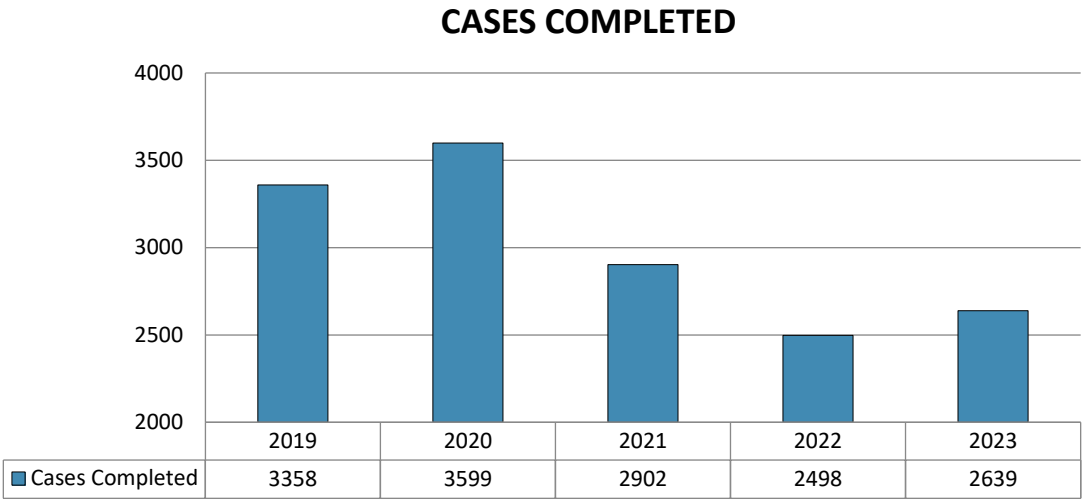


Figure 8: Number of cases completed per year.

Case Submission Turn-Around Time

One metric of the Forensic Laboratory casework output is the amount of time it takes for a case to be completed following submission. As illustrated in **Figure 9**, 24% of cases submitted to the Laboratory Division in 2023 were completed within 60 days of submission.

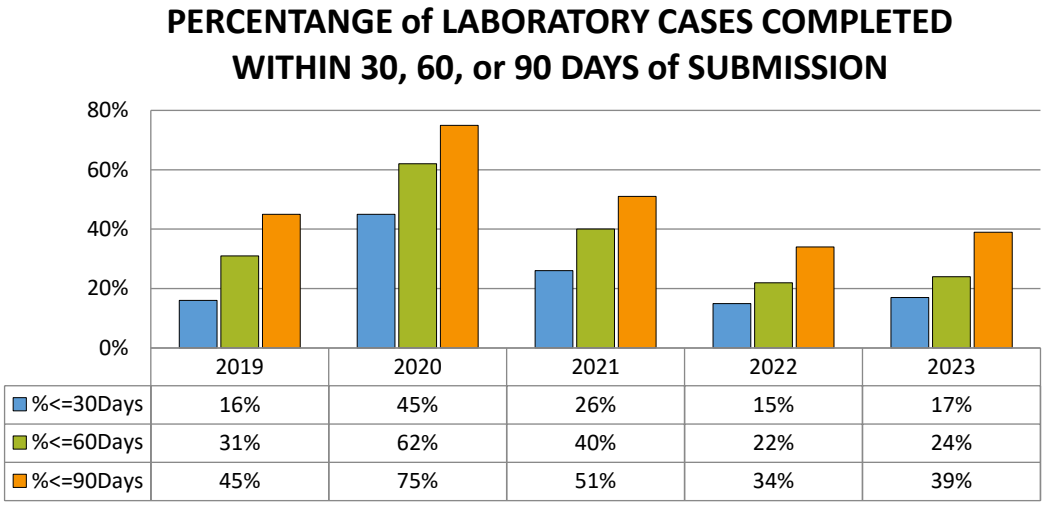


Figure 9: Percentage of laboratory cases completed within 30, 60, or 90 days of submission.

CRIMINALISTICS

The Criminalistics Unit receives the majority of the cases submitted to the Forensic Science Laboratories. The Criminalistics Unit provides forensic examinations in Drug Identification, Firearms, and Fire Debris. **Figure 10** illustrates the trend in forensic case volume submitted to the Criminalistics Unit, and **Figure 11** illustrates the number of exhibits examined by the Criminalistics Unit.

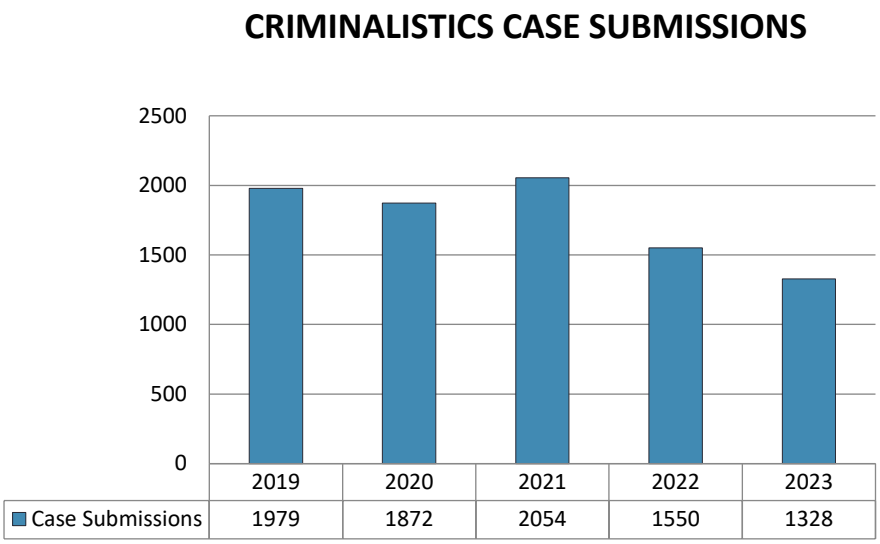


Figure 10: Number of case submissions to the Criminalistics Section (Drug ID, Firearms, and Fire Debris) over 5 year period from 2019 through 2023. These include all new cases submitted to the Center for the first time and submissions from cases with subsequent submissions.

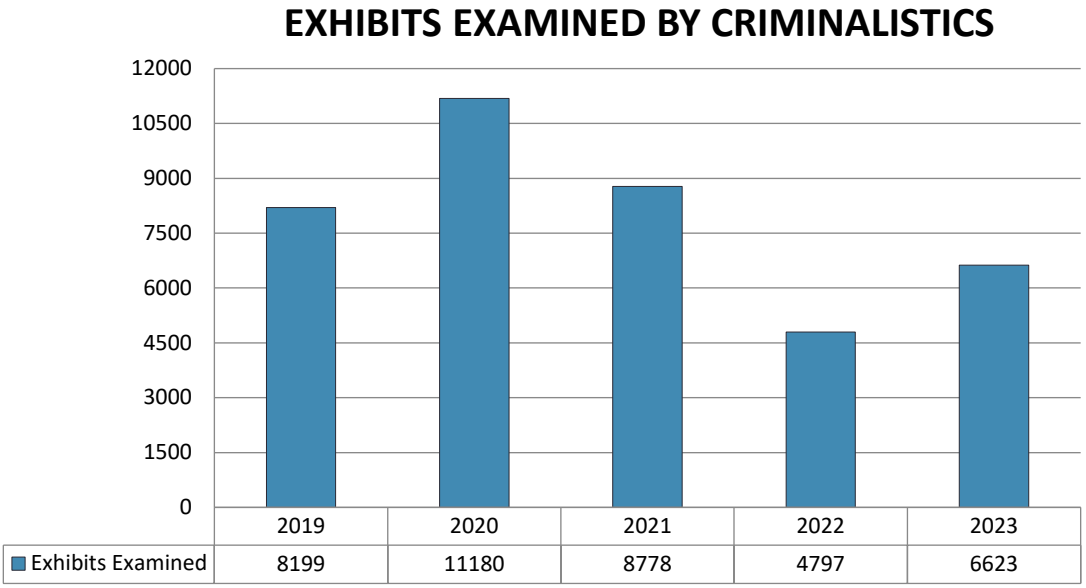


Figure 11: The number of exhibits examined from 2019 through 2023 by the Criminalistics Section (Drug ID, Firearms, and Fire Debris).

The volume and percentage of cases submitted to each laboratory of the criminalistics section is illustrated in **Figure 12**.

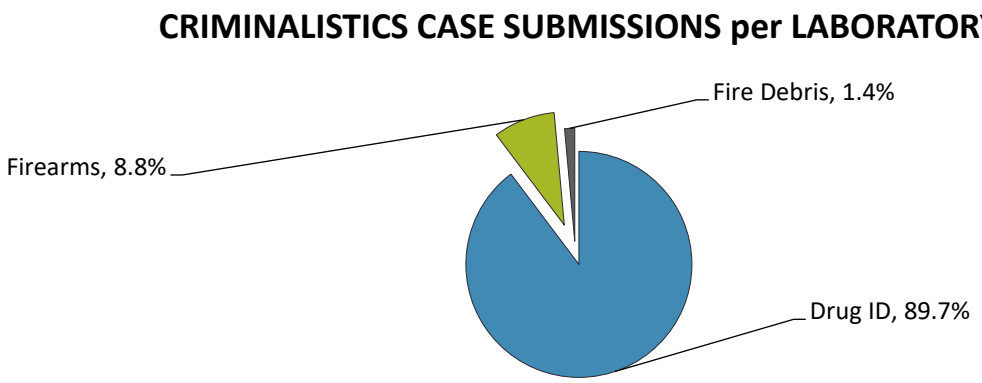


Figure 12: Volume and percentage of cases submitted to each Criminalistics Laboratory Unit.

DRUG ID

Examination requests for the identification of illicit drugs accounted for approximately 90% of the cases submitted to Criminalistics, as depicted in **Figure 12** above.

The agency that submits the greatest volume of evidence to Drug ID is the Wichita Police Department (WPD). This is apparent in **Figure 13**, as nearly 68% of cases received are from WPD. Agencies other than WPD and the Sedgwick County Sheriff's Office (SGSO) are responsible for approximately 15% of the total cases submitted.

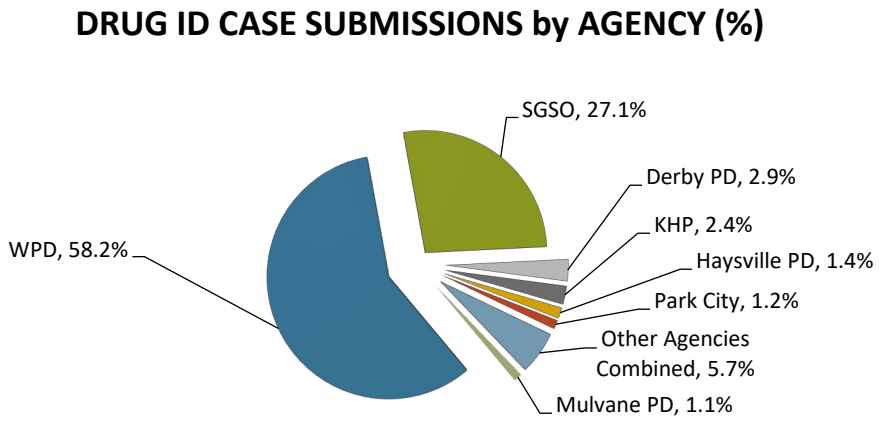
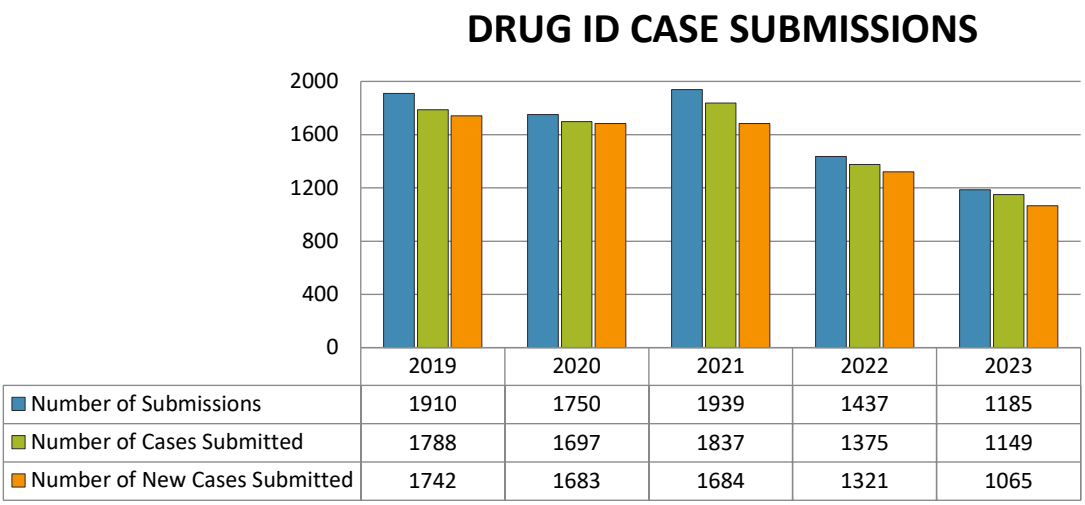


Figure 13: Percentages of Drug ID cases submitted per contributing agency.

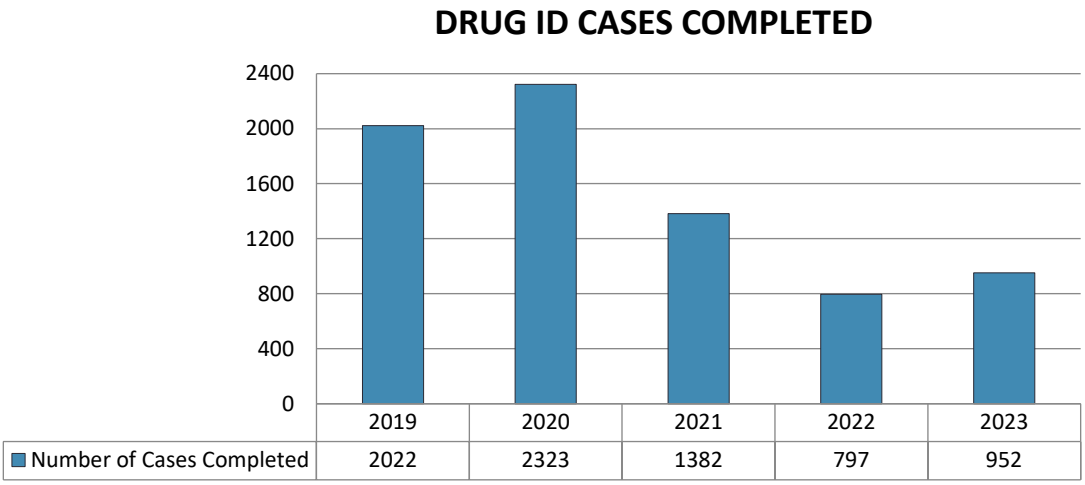
The number of submissions, the number of cases submitted, and the number of new cases submitted to the Drug ID Laboratory over the last five years is illustrated in **Figure 14**.



	2019	2020	2021	2022	2023
Number of Submissions	1910	1750	1939	1437	1185
Number of Cases Submitted	1788	1697	1837	1375	1149
Number of New Cases Submitted	1742	1683	1684	1321	1065

Figure 14: The number of case submissions to the Drug ID Laboratory over a five year period.

The number of cases completed by the Drug Identification Laboratory over the last 5 years is illustrated in **Figure 15**.



	2019	2020	2021	2022	2023
Number of Cases Completed	2022	2323	1382	797	952

Figure 15: The number of cases completed by the Drug Identification Laboratory over the last 5 years. The count includes Forensic Examination and Supplemental request types.

Noteworthy Drug Trends

Below is drug trend information on several key drugs that were noted as a result of analysis by the RFSC Drug Identification Laboratory. Of interest were the trends observed during analysis of fentanyl, methamphetamine, cocaine, tetrahydrocannabinol, clonazolam, and eutylone.

Fentanyl

As illustrated in **Figure 16** the number of cases examined that had fentanyl detected increased from 21 in 2019 to 256 in 2023, which equates to an approximate 1,119% increase. Additionally, for the 952 cases completed in 2023, approximately 27% of them had at least 1 fentanyl positive exhibit.

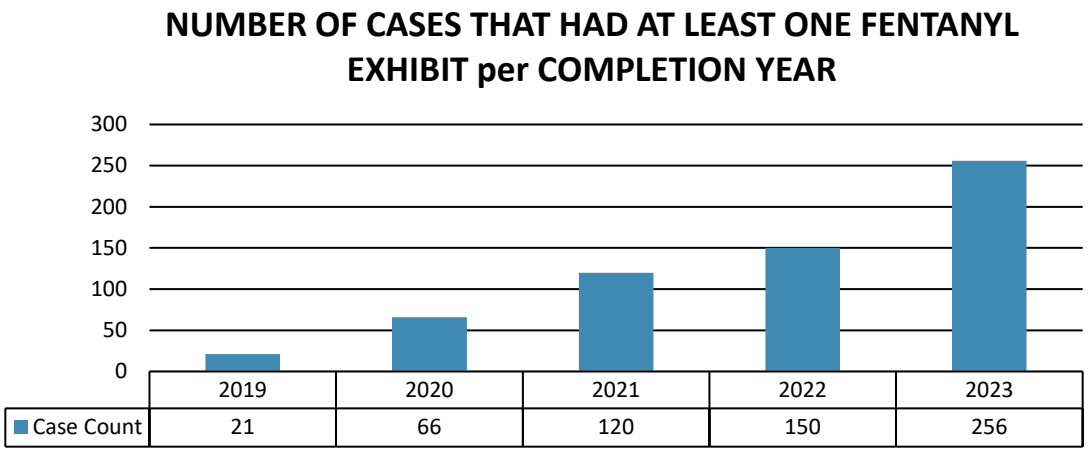


Figure 16: Graph depicting the number of cases that were completed that had at least one fentanyl positive exhibit associated with it over the past 5 years.

As illustrated in **Figure 17** the number of cases testing positive for fentanyl submitted has increased from 23 in 2019 to at least 361 in 2023, which equates to an approximate 1,469% increase. Additionally, for the 1118 cases submitted in 2023 approximately 32.2% of them had at least 1 fentanyl positive exhibit.

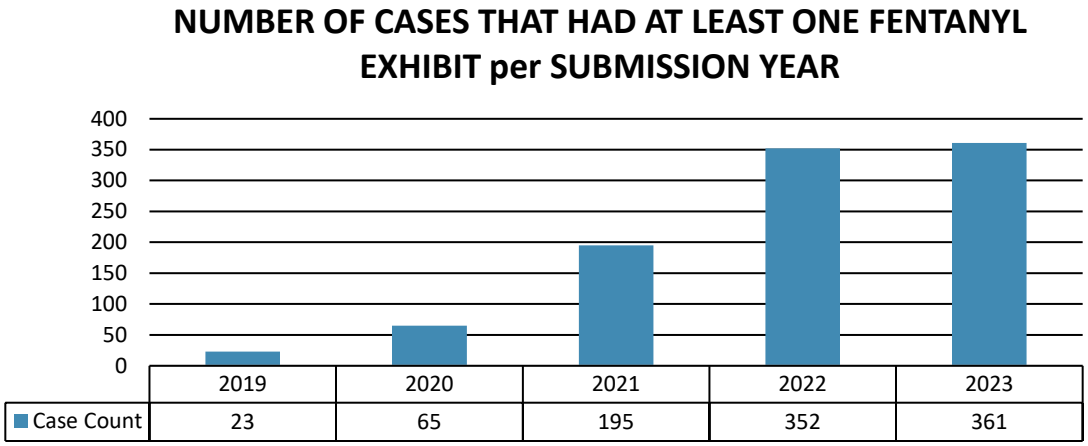


Figure 17: Graph depicting the number of cases that were submitted that had at least one fentanyl positive exhibit associated with it over the past 5 years.

Methamphetamine

Methamphetamine is a highly addictive stimulant drug with a high risk for dependence. It can cause irregular heartbeat, delirium, panic, psychosis, and heart failure. It is a synthetic drug that takes the form of a white, odorless, bitter-tasting crystalline powder that easily dissolves in water or alcohol. It has more rapid and lasting effects than amphetamine, used illegally as a stimulant and as a prescription drug to treat narcolepsy and maintain blood pressure.

As illustrated in **Figure 18** the number of cases completed that had methamphetamine detected has decreased from 1151 in 2019 to 594 in 2023, which equates to an approximate 48.3% decrease. Additionally, for the 946 examined cases completed in 2023 approximately 62.7% of them had at least 1 methamphetamine positive exhibit.

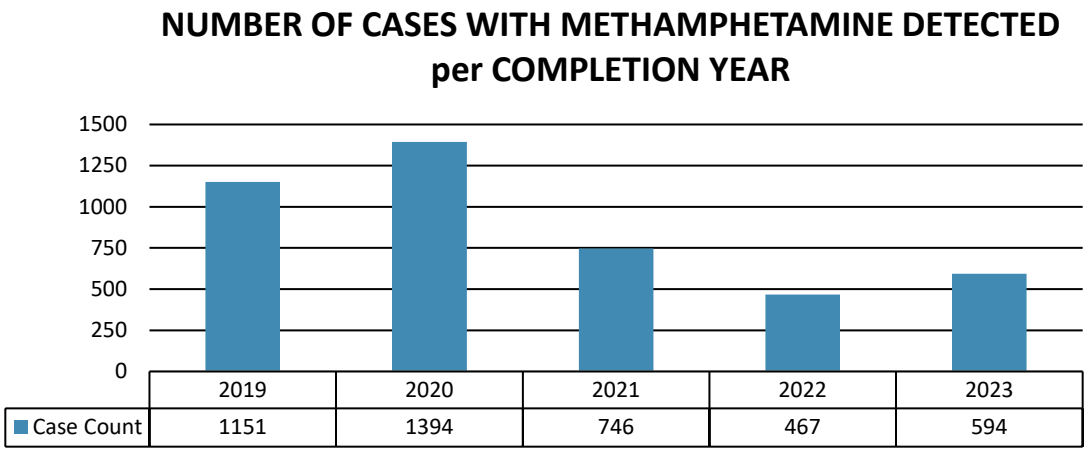


Figure 18: Graph depicting the number of cases that were completed that had at least one methamphetamine positive exhibit associated with it over the past 5 years.

As illustrated in **Figure 19** the number of cases completed that had methamphetamine detected has generally decreased over the 5-year period. Additionally, for the 1118 cases submitted in 2023 approximately 52.0% had at least 1 methamphetamine positive exhibit.

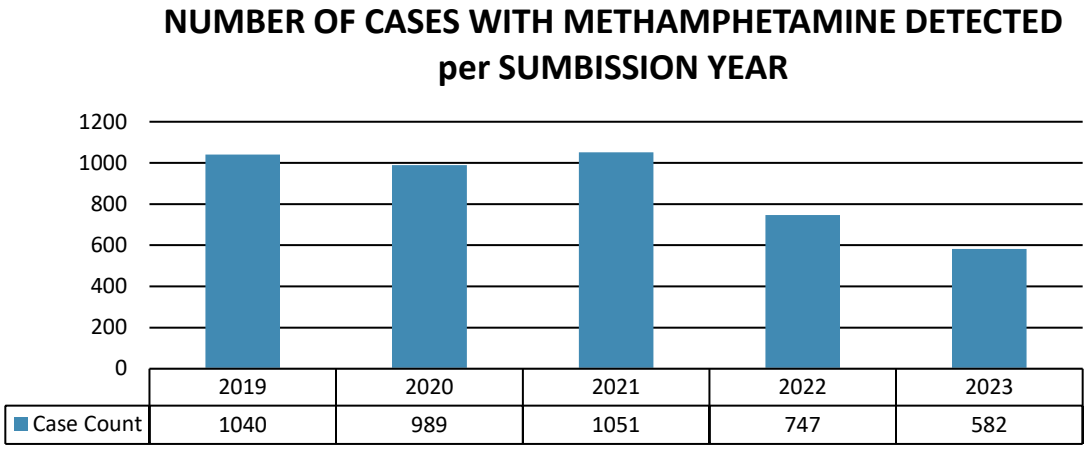


Figure 19: Graph depicting the number of cases that were submitted that had at least one methamphetamine positive exhibit associated with it over the past 5 years.

Cocaine

Cocaine is an addictive stimulant drug obtained from the leaves of two different coca plant species. It is submitted to the laboratory in the form of a white powder, or it can be in the form that looks like a small irregularly shaped rock (cocaine base). It may also be found mixed with other illicit drugs. It speeds up the body making the user feel full of energy, happy, and excited; however, the person's mood might change, and they can become angry, nervous, and afraid. The long-term adverse effects include heart attacks or strokes.

As illustrated in **Figure 20** the number of cases completed that had cocaine detected has decreased from 231 in 2019 to 128 in 2023, which equates to an approximate 44.5% decrease. Additionally, for the 952 cases completed in 2023 approximately 13.4% of them had at least 1 positive cocaine exhibit.

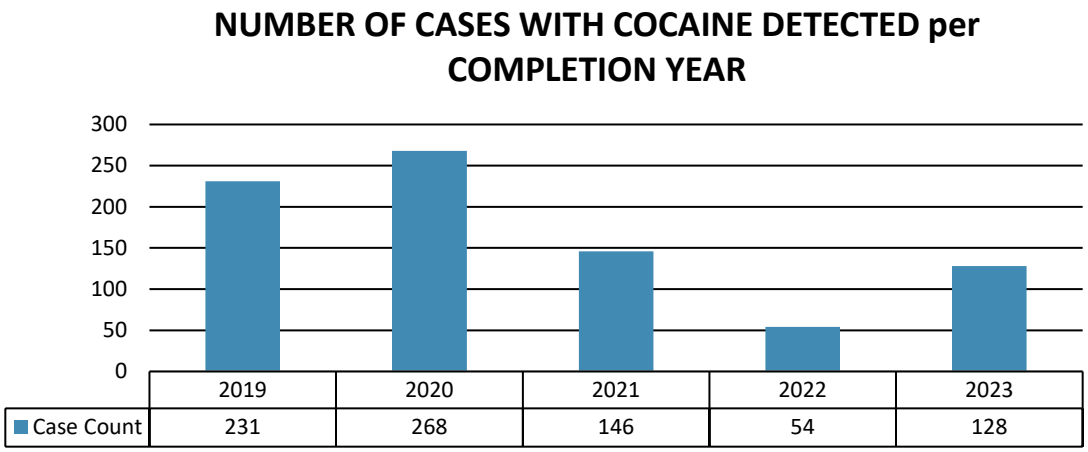


Figure 20: Graph depicting the number of cases that were completed that had at least one cocaine positive exhibit associated with it over the past 5 years.

As illustrated in **Figure 21** the number of cases submitted that had cocaine detected has decreased from 237 in 2019 to 153 in 2023, which equates to an approximate 35.4% decrease. Additionally, for the 1118 cases submitted in 2023 approximately 13.6% of them had at least 1 positive cocaine exhibit.

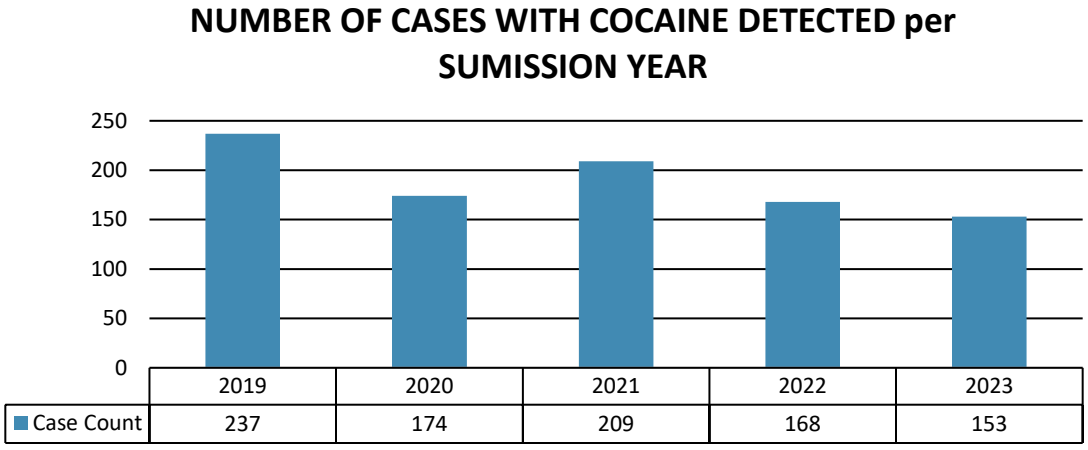


Figure 21: Graph depicting the number of cases that were submitted that had at least one cocaine positive exhibit associated with it over the past 5 years.

Tetrahydrocannabinol

Tetrahydrocannabinol (THC) is a psychoactive substance found in the cannabis sativa plant, of which marijuana and hemp are two varieties. Tetrahydrocannabinol can be detected when analyzing a marijuana plant, in oil form, or mixed with other drugs of abuse. THC can be confirmed by the laboratory even when marijuana is not able to be confirmed via microscopy.

As illustrated in **Figure 22** the number of cases completed that had THC detected has decreased from 826 in 2019 to 381 in 2023, which equates to an approximate 53.8% decrease. Additionally, of the 952 cases completed in 2023 approximately 40.0% of them resulted in at least 1 tetrahydrocannabinol positive exhibit.

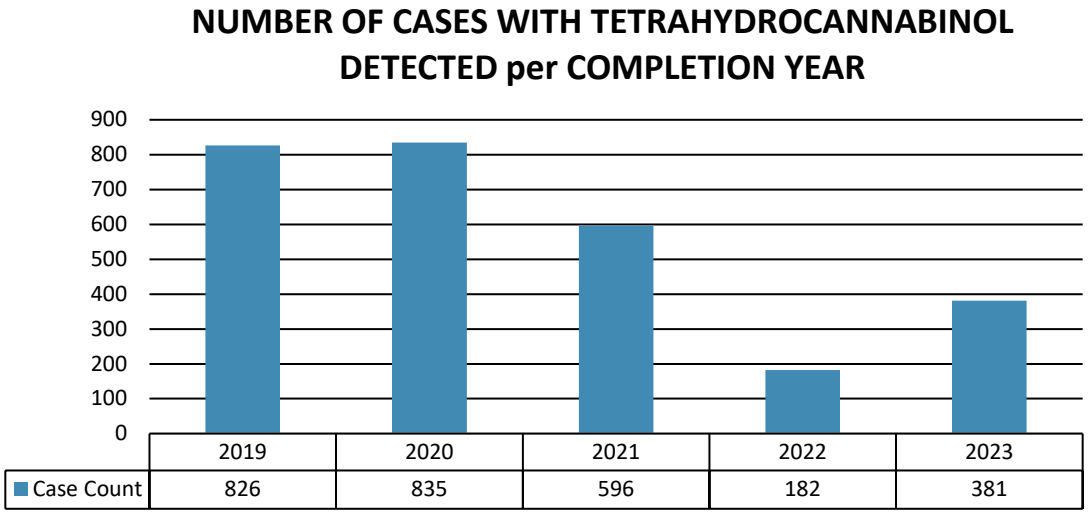


Figure 22: Graph depicting the number of cases that were completed that had at least one tetrahydrocannabinol positive exhibit associated with it over the past 5 years.

As illustrated in **Figure 23** the number of cases submitted that had THC detected has decreased from 656 in 2019 to 394 in 2023, which equates to an approximate 39.9% decrease since 2019. Additionally, of the 1118 cases submitted in 2023 approximately 35.2% of them at least 1 tetrahydrocannabinol positive exhibit.

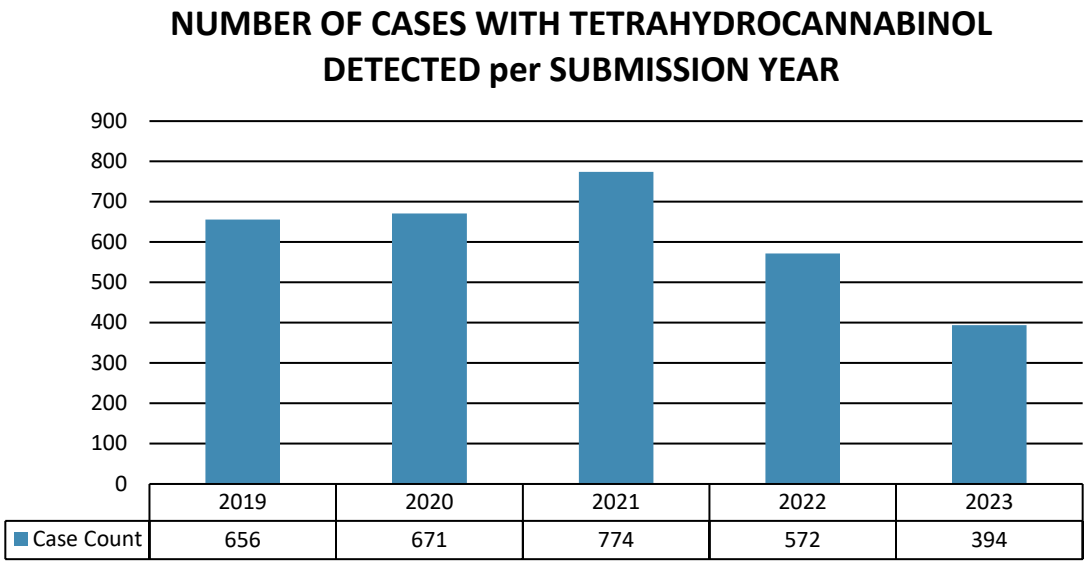


Figure 23: Graph depicting the number of cases that were submitted that had at least one tetrahydrocannabinol positive exhibit associated with it over the past 5 years.

Clonazolam

Clonazolam is the most potent of a series of 1-4 triazolobenzodiazepines that may cause severe sedation. Clonazolam is a triazolo-analogue of the registered drug clonazepam. Clonazolam is sold in powdered form as well as in blotter, liquid, and tablet form. In recent years clonazolam has been increasingly sold as falsified designer benzodiazepines (commonly as diazepam and alprazolam).

As illustrated in **Figure 24** the number of cases completed that had clonazolam detected has increased from 2 in 2019 to 30 in 2023. Additionally, for the 952 cases completed in 2023 approximately 3.1% of them had at least 1 clonazolam positive exhibit.

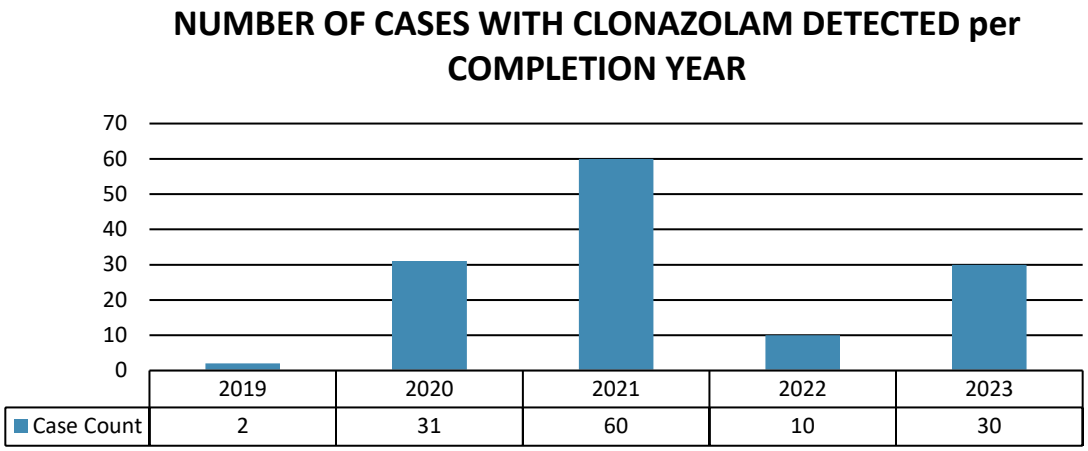


Figure 24: Graph depicting the number of cases that were completed that had at least one clonazolam positive exhibit associated with it over the past 5 years.

As illustrated in **Figure 25** the number of cases submitted in 2023 that had clonazolam detected has increased from 3 in 2019 to 20 in 2023, which equates to an approximate 566.7% increase. However, it is an approximate 74.1% decrease from 2021. Additionally, for the 1118 cases submitted in 2023 approximately 1.7% of them had at least 1 clonazolam positive exhibit.

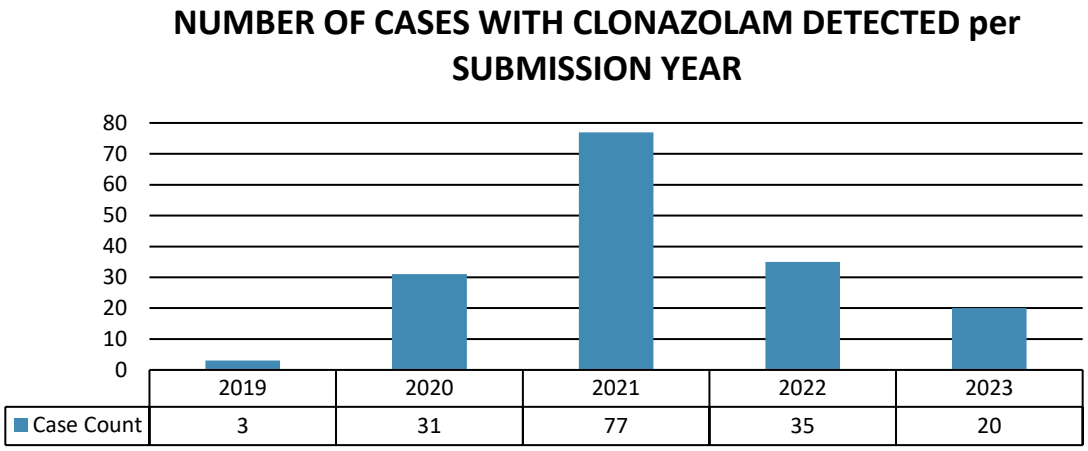


Figure 25: Graph depicting the number of cases that were submitted that had at least one clonazolam positive exhibit associated with it over the past 5 years.

Eutylone

Eutylone is a substituted cathinone which is a category of drugs related to cathinone, which is found naturally occurring in the khat plant. Eutylone is an empathogen, which increases an individual's feeling of empathy and benevolence and increases the feeling of being socially accepted by and connected with others. The effects are similar to other stimulant and empathogenic drugs such as MDMA, cocaine and amphetamines.

As illustrated in **Figure 26** the number of cases completed that had eutylone detected has decreased from 9 in 2020 to 7 in 2023, which equates to a 22.2% decrease. Additionally, for the 952 cases completed in 2023 approximately 0.7% of them had at least 1 eutylone positive exhibit.

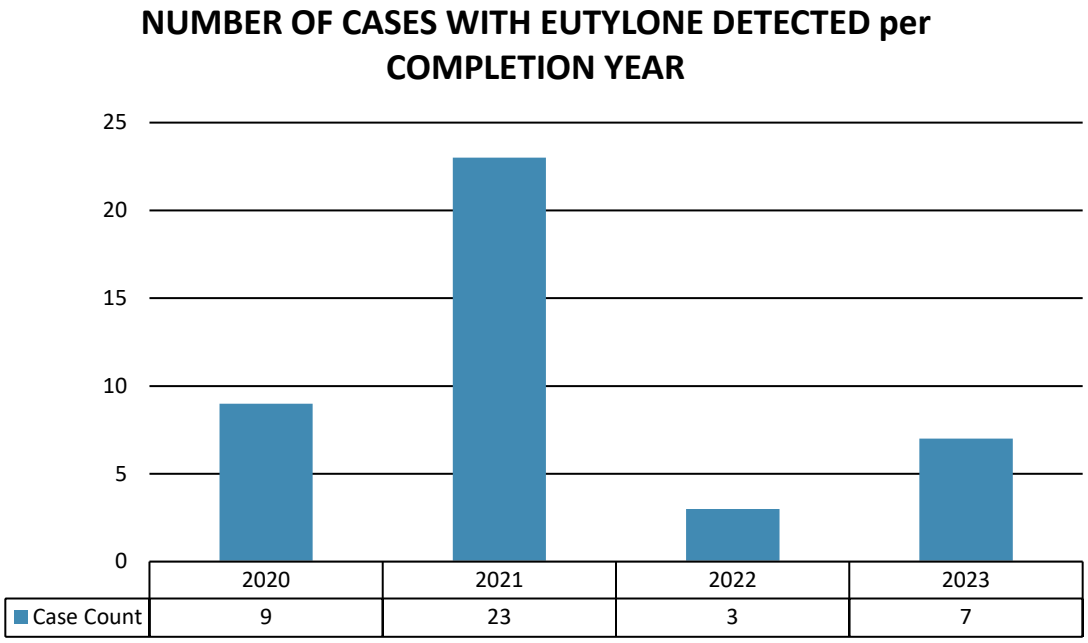


Figure 26: Graph depicting the number of cases that were completed that had at least one eutylone positive exhibit associated with it over the past 4 years.

As illustrated in **Figure 27** the number of cases completed that had eutylone detected has decreased from 11 in 2020 to 5 in 2023, which equates to a 54.5% decrease. Additionally, for the 1118 cases submitted in 2023 approximately 0.4% of them had at least 1 eutylone positive exhibit.

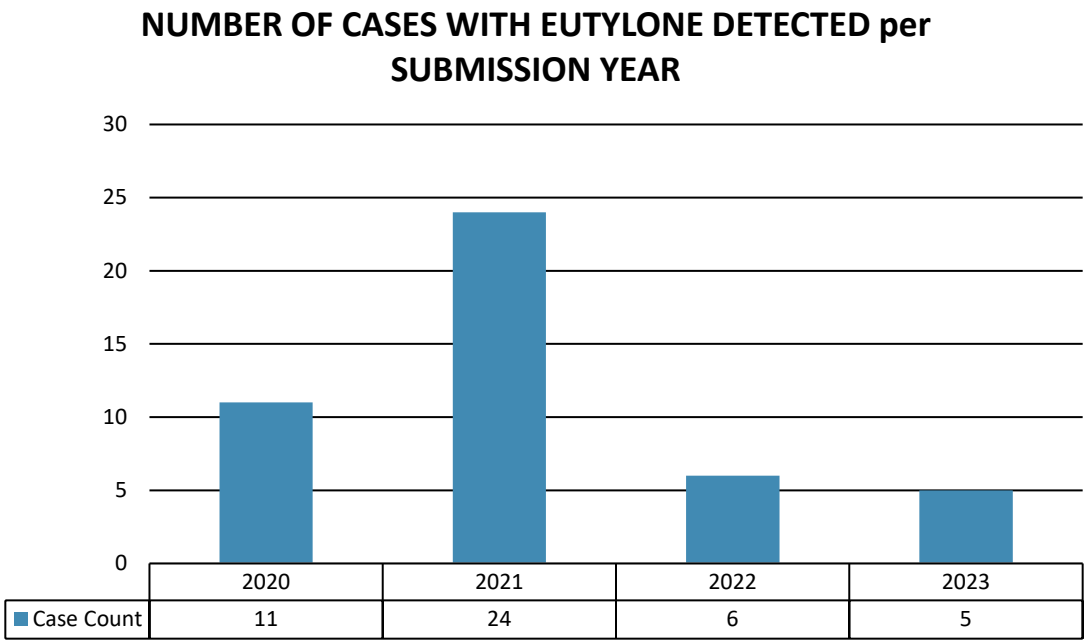


Figure 27: Graph depicting the number of cases that were submitted that had at least one eutylone positive exhibit associated with it over the past 4 years.

FIRE DEBRIS

The Fire Debris Laboratory examines fire debris evidence in support of fire investigations. The information provided to the investigator aides in determining if a fire was accidentally or intentionally set for purposes ranging from insurance fraud to homicide.

In 2023, the Fire Debris Laboratory received evidence from 18 cases with a total of 18 submissions. The trend of case submissions over the last five years is illustrated in **Figure 28**.

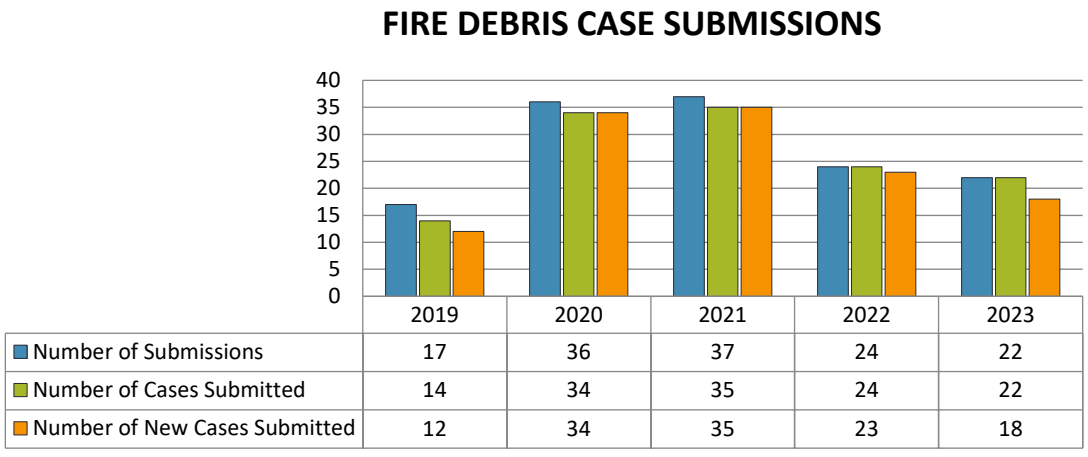
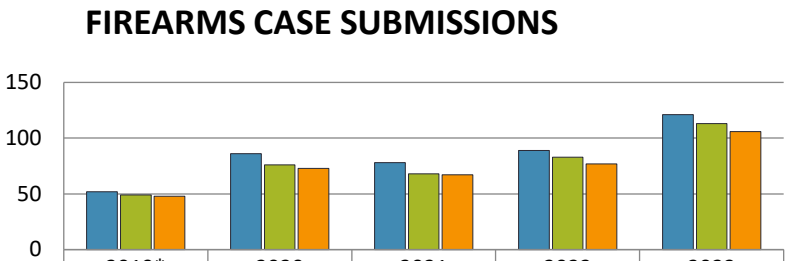


Figure 28: Number of fire debris cases submitted over a five-year period.

FIREARMS

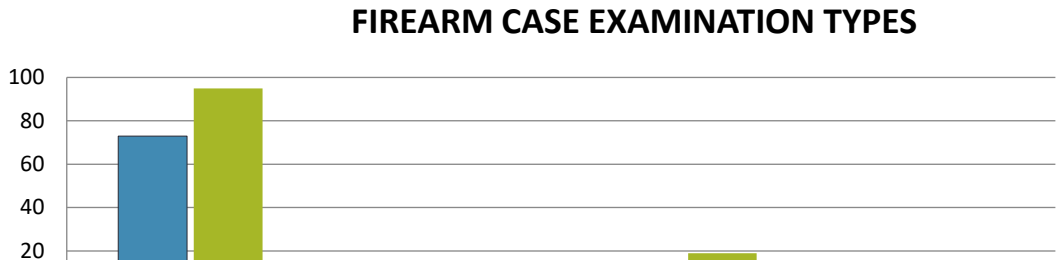
Firearm examination is conducted in support of state and federal law enforcement. The Firearms Laboratory conducts many types of forensic examinations. The majority of examinations involve operability (function) tests on the submitted firearms. Other exams performed by the Firearms Laboratory include bullet comparisons, cartridge case comparisons, and serial number restorations. In 2023, the Firearms Laboratory received evidence from 110 cases with a total of 117 submissions. The trend of case submissions over the last five years is illustrated in **Figure 29**.



	2019*	2020	2021	2022	2023
Number of Submissions	52	86	78	89	121
Number of Cases Submitted	49	76	68	83	113
Number of New Cases Submitted	48	73	67	77	106

Figure 29: Firearm case submissions from 2019 through 2023. *In 2019, the Firearms Laboratory lost both qualified scientists. This required the laboratory to suspend receiving evidence for approximately 6 months.

Case examination types (function test, bullet/projectile comparison, cartridge case comparison, serial number restoration) that were requested in 2023 are illustrated in **Figure 30**. Illustrated in **Figure 31** are the number of requested items that were examined per case examination type. As a component of examinations the laboratory performed test fires on 91 cases that were requested for examination in 2023.



	Function Test	Bullet/Projectile Comparison	Cartridge Case Comparison	Serial Number Restoration
2022	73	3	5	5
2023	95	14	19	2

Figure 30: Case examination type requested; classified as test fires, bullet comparisons, cartridge case comparisons, and serial number restorations.

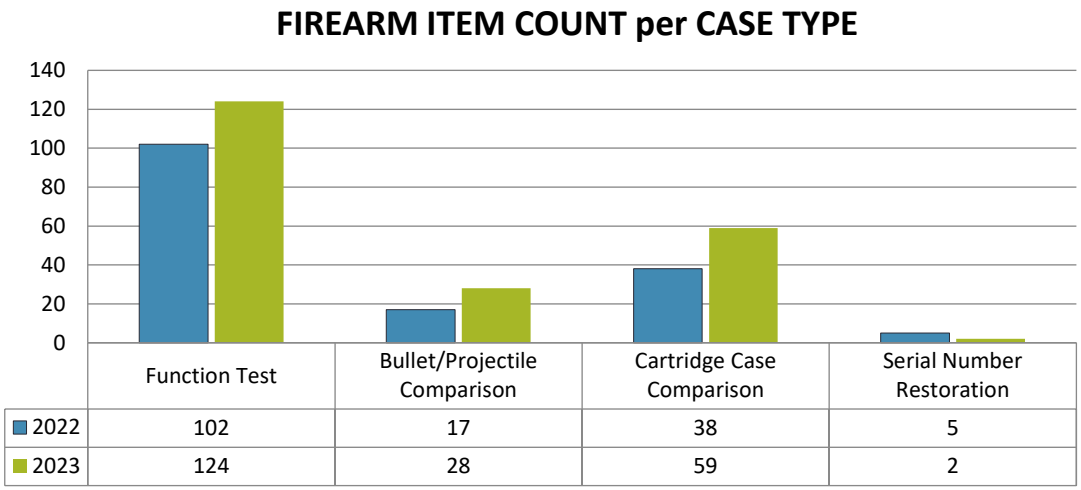


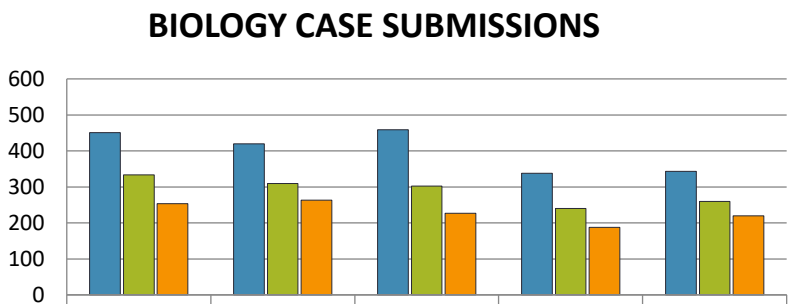
Figure 31: Item count requested per submitted case examination type; classified as function test, bullet comparison, projectile, cartridge case comparison, and serial number restoration.

BIOLOGY/DNA

The Biology/DNA Laboratory examines evidence from a variety of cases including sex crimes (rape, indecent liberties, incest, etc.), homicides, property crimes, assaults, and forensic identifications (unidentified bodies).

The laboratory screens evidence for the presence of biological material (blood, semen, and saliva). For DNA analysis, the laboratory generates short tandem repeat (STR) profiles from the scene exhibits, those profiles can then be compared to reference standards collected from individuals believed to be associated with the scene (victims, suspects, or other known individuals). Ultimately results are interpreted, and a conclusion is obtained as to whether the reference standard profiles are consistent with or excluded from the crime scene profiles. The nature of forensic samples collected at crime scenes vary greatly. Under optimal circumstances (fresh blood stains), high quality single source profiles may result. Alternatively, the samples may have been left by multiple individuals or exposed to environmental elements, which can lead to low quantity/degraded samples. All these factors affect the laboratory's ability to obtain a comparable profile. If a profile is suitable for comparison, statistical analysis may be performed by analysts so that power of discrimination can be clearly presented to a jury when an association is made between a reference sample and a scene exhibit.

In 2023, the Biology/DNA Laboratory received evidence from 232 cases with a total of 329 submissions. The trends of case submissions over the past five years are illustrated in **Figure 32**.



	2019	2020	2021	2022	2023
Number of Submissions	451	420	459	338	343
Number of Cases Submitted	333	309	302	240	260
Number of New Cases Submitted	253	263	227	188	220

Figure 32: Number of cases submitted to the Biology/DNA Laboratory over a five-year period.

Figure 33 illustrates the percentage of case type categories submitted for biological testing. For crimes against persons, sex crime cases were the most common case type submitted for examination. Property crimes continue to have a high likelihood of resulting in a profile suitable for CODIS entry. Given that these crimes have a high recidivism rate they have an exceptional solvability factor when crime scene profiles are searched against the database. In support of the District Coroner, the laboratory identified 22 human remains through DNA analysis.

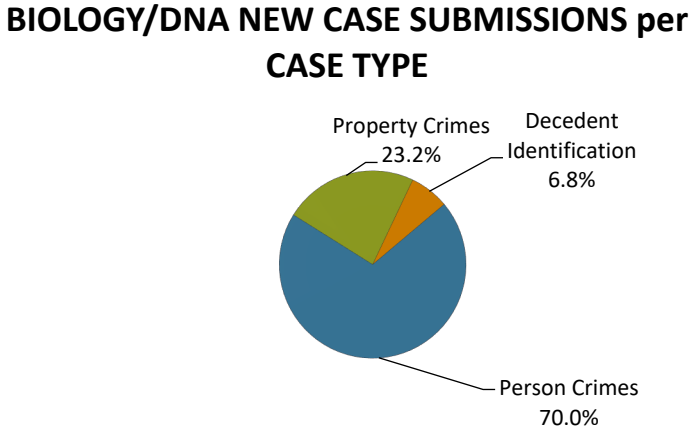
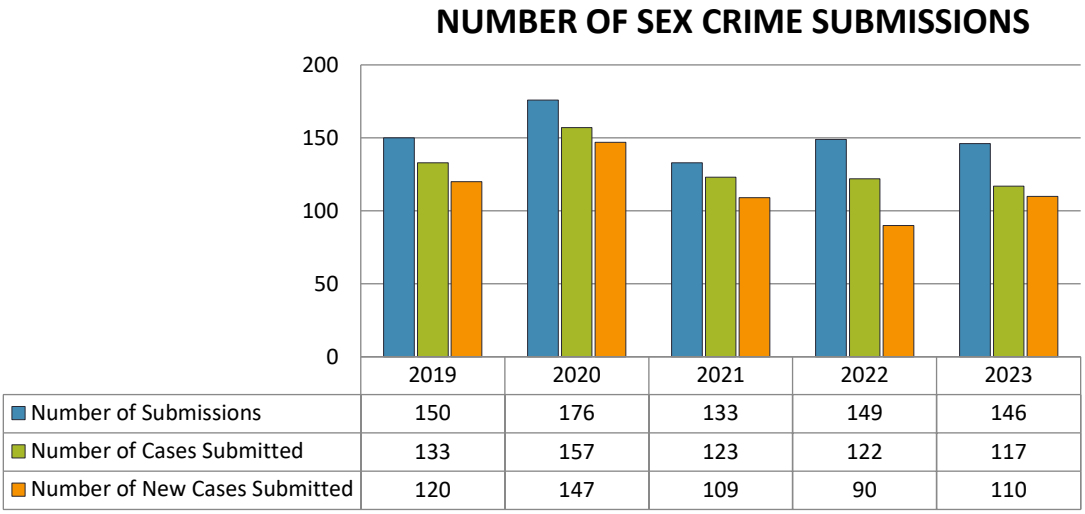


Figure 33: Classification of cases submitted for Biology/DNA analysis.

The number of sex crime cases submitted to the Biology/DNA Laboratory over the last five years is illustrated in **Figure 34**. In 2023, the Biology/DNA Laboratory received evidence from 118 sex crime cases with a total of 146 submissions.



	2019	2020	2021	2022	2023
Number of Submissions	150	176	133	149	146
Number of Cases Submitted	133	157	123	122	117
Number of New Cases Submitted	120	147	109	90	110

Figure 34: The number of sex crime case submissions to the Biology/DNA Laboratory over the last five years.

CODIS

The Combined DNA Index System (CODIS) is database software used to compare DNA profiles within and between crime laboratories throughout the nation. In 2007 Kansas became an all arrestee state, meaning that law enforcement collects DNA samples for any person arrested for qualifying offenses. DNA profiles generated from an arrestee/offender are entered into the state database in Topeka, KS and is available to be searched against the unknown profiles the Sedgwick County laboratory enters into the local database. In late 2009, the DNA Laboratory adopted new procedures for the release of investigative lead information to include formal written and reviewed notifications for database associations.

Over the years, the increased number of associations identified through CODIS resulted in an increase in reports generated, as well as an increase in the number of known samples processed to confirm these additional CODIS hits. The number of CODIS entries, associated hits generated, and oversight of this database, entails a large amount of scientist time. Samples compared as a function of database management are not reflected in the number of cases submitted or accounted for as a separate “case type” in the figures describing case submissions.

Trends in CODIS activity are illustrated in **Figure 35 and Figure 36**. In the last 5 years, the average number of case profiles entered into CODIS is 120, the average number of hits per year is approximately 82, and the average number of investigations aided per year is approximately 69.

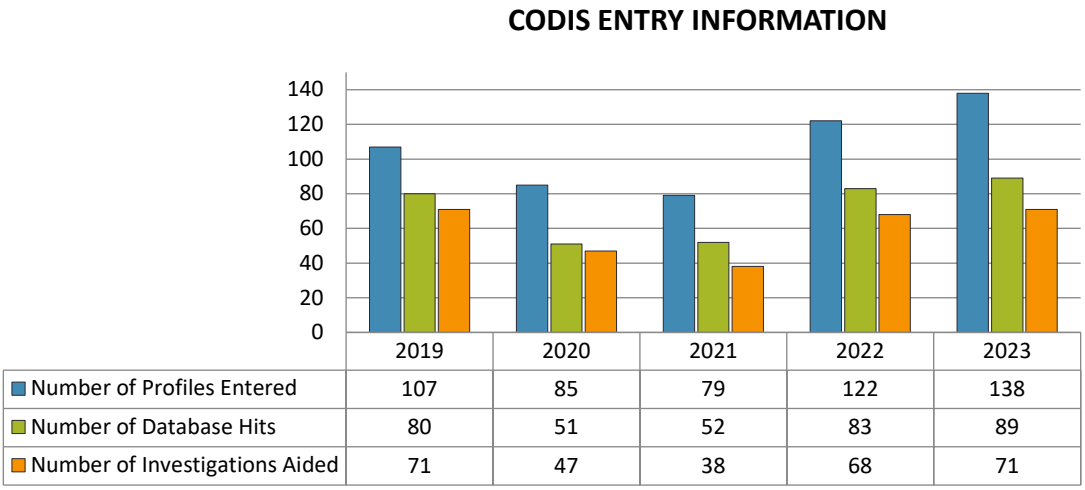


Figure 35: Five (5) year depiction of the number of DNA profiles entered into CODIS as well as the number of database hits and number of investigations aided.

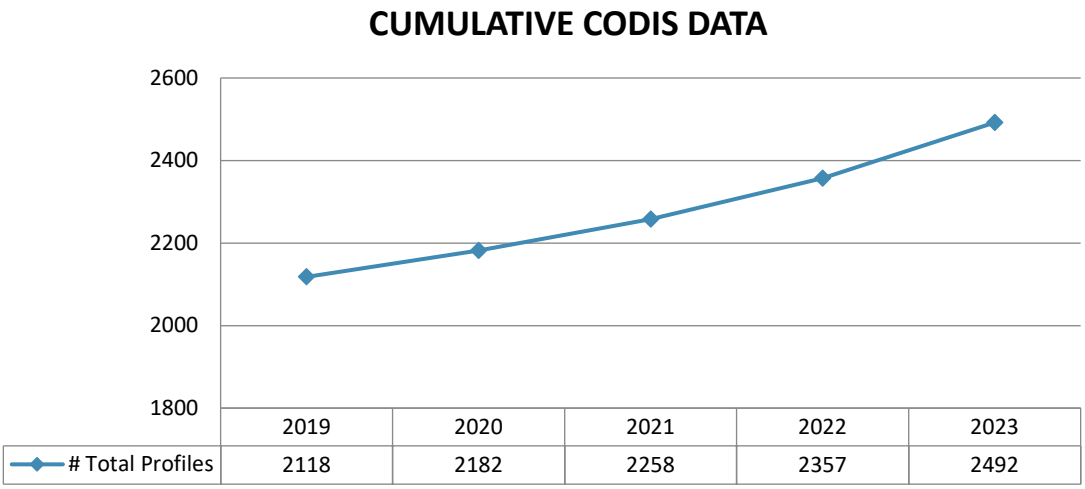
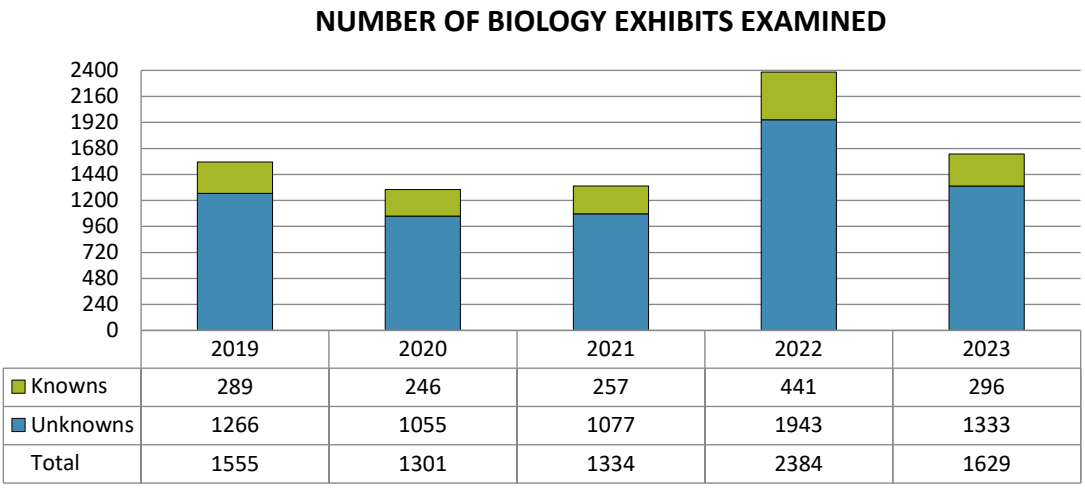


Figure 36: The graph and chart depicts the total number of profiles residing in the local database at the end of each year.

Unknown and Known Exhibits Examined

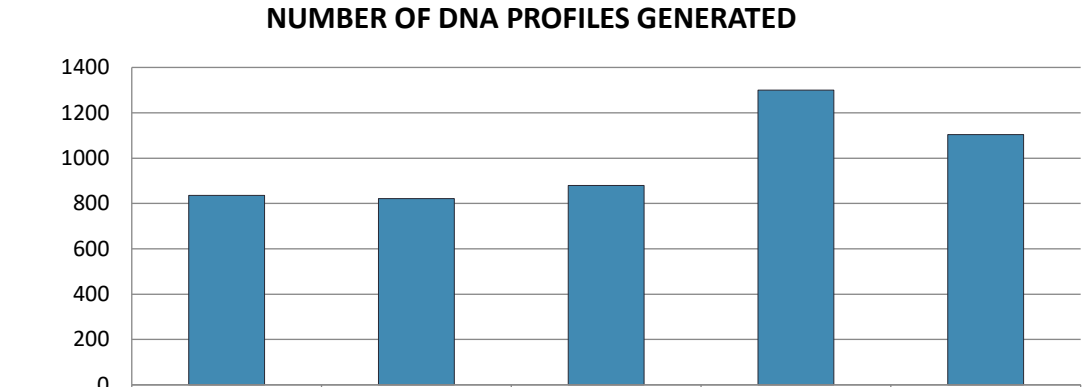
The Biology/DNA Laboratory examines unknown samples (Qs) from crime scene exhibits and known samples (Ks) collected from known individuals. The number of exhibits submitted in any given case can vary greatly. Some investigations may involve multiple scenes and individuals, while others require the testing of a single sample. Therefore, to reflect the workload of the section, it is often useful to also capture data involving the number of exhibits the section has tested or processed and the number of DNA profiles that required scientist interpretation and comparison.

Figure 37 below illustrates the number of unknown and known exhibits examined by the laboratory over the past five years. **Figure 38** below illustrates the number of DNA profiles generated by Polymerase Chain Reaction (PCR) from the unknown and known exhibits over the same period.



	2019	2020	2021	2022	2023
Knowns	289	246	257	441	296
Unknowns	1266	1055	1077	1943	1333
Total	1555	1301	1334	2384	1629

Figure 37: The number of unknown and known exhibits examined by the Biology/DNA Laboratory in each of the past five years.



	2019	2020	2021	2022	2023
Amplified	836	822	879	1300	1104

Figure 38: The number of profiles generated from PCR amplification by the Biology/DNA Laboratory in each of the past five years.

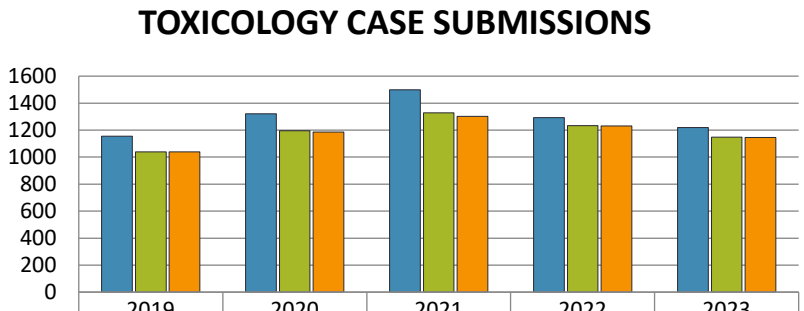
TOXICOLOGY

The Toxicology Laboratory provides comprehensive examinations of postmortem (autopsy) samples to assist in the determination of cause and manner of death. Specimens collected during the investigation of driving under the influence of drugs and/or alcohol cases and drug-facilitated sexual assault cases are also examined by the Toxicology Laboratory. The Toxicology Laboratory also provides drug testing on children removed from clandestine methamphetamine laboratories.

Due to the continuously emerging drugs that are available for use and/or abuse, the laboratory is continuously expanding the number of drugs and poisons it can detect and quantitate.

A significant portion of samples submitted are from postmortem (PM) cases, the number of which is dependent upon the number of autopsies performed at the Center by the Pathology Division. The remaining portion of the cases are antemortem cases submitted for analysis by law enforcement agencies. These include DUI (driving under the influence), DUID (driving under the influence of drugs), DFSA (drug facilitated sexual assault) and other antemortem cases submitted by law enforcement agencies.

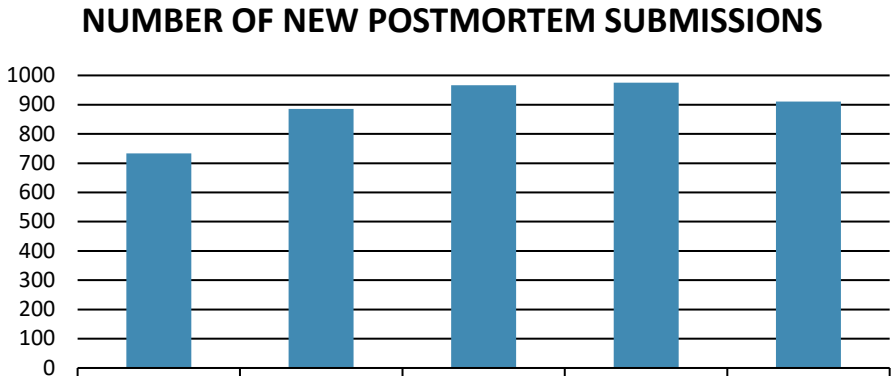
Illustrated in **Figure 39** is the total number of case submissions, the number of cases submitted, and the number of new cases submitted to the Toxicology Laboratory over a 5-year period. The average number of new cases being submitted to the laboratory over the past 5 years is 1180.



	2019	2020	2021	2022	2023
Number of Submissions	1156	1320	1498	1292	1218
Number of Cases Submitted	1039	1196	1328	1234	1149
Number of New Cases Submitted	1038	1185	1303	1230	1145

Figure 39: The number of case submissions, the number of cases submitted, and the number of new cases submitted to the Toxicology Laboratory for analysis over a five-year period.

As illustrated in **Figure 40** the number of new postmortem case submissions has increased from 734 in 2019 to 911 in 2023, which equates to an increase of approximately 24.1% of new postmortem case submissions since 2019.



	2019	2020	2021	2022	2023
Number of Submissions	734	886	967	975	911

Figure 40: The graph depicts the number of new postmortem case submissions to the Toxicology Laboratory.

As illustrated in **Figure 41** the number of new antemortem case submissions has decreased from 309 in 2019 to 234 in 2023, which equates to a decrease of approximately 24.2% of new antemortem case submissions since 2019.

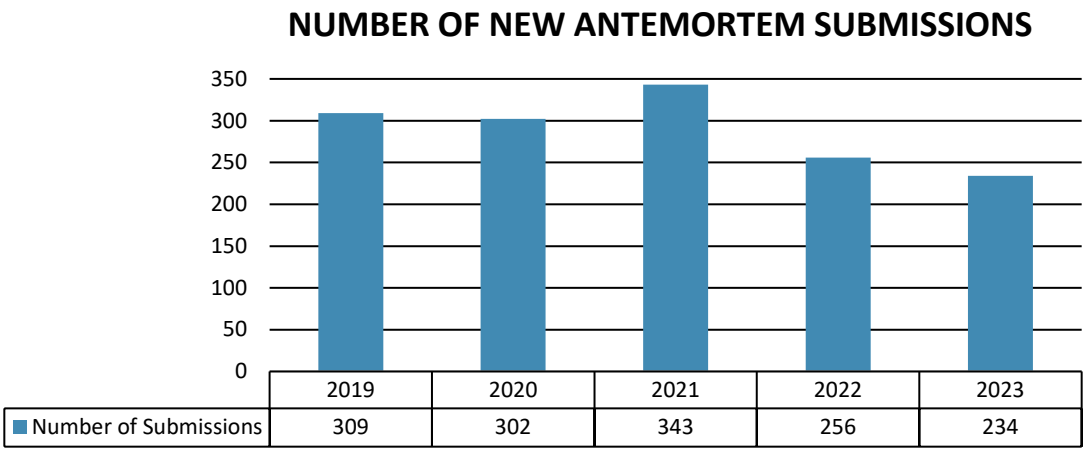


Figure 41: The graph depicts the number of new antemortem case submission to the Toxicology Laboratory.

As illustrated in **Figure 42** the number of total new case submissions to the Toxicology Laboratory has increased from 1043 in 2019 to 1145 in 2023, which equates to an increase of approximately 9.7% of new case submissions since 2019.

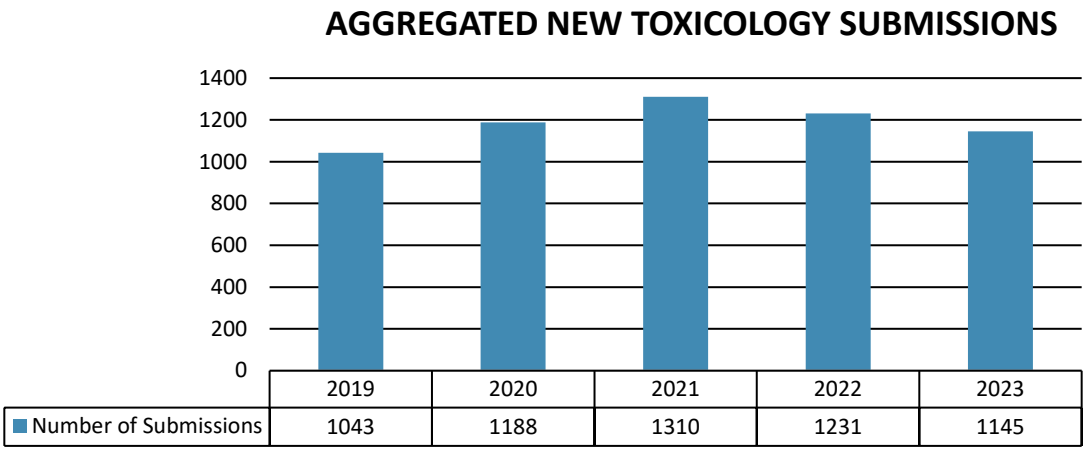


Figure 42: The graph depicts the number of total new case submissions to the Toxicology Laboratory.

The percentage of toxicology cases submitted by case type is illustrated in **Figure 43**. Postmortem (PM) toxicological examinations in support of the District Coroner account for approximately 79.6% of the forensic case work performed by the laboratory.

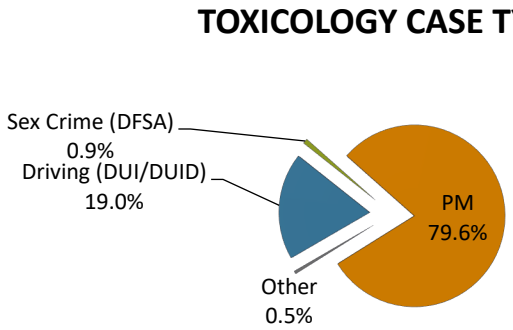


Figure 43: Submission of toxicology cases, sorted by case type. DUI (driving under the influence of alcohol), DUID (driving under the influence of drugs), PM (postmortem), DFSA (drug facilitated sexual assault), and Other (Aggravated Battery, Aggravated Assault, Drug, etc.).

Postmortem Drugs Detected

Hundreds of different drugs can be detected in Postmortem Toxicology cases, including a wide range of illicit, prescription, and over the counter drugs. New drugs are constantly emerging on the illicit drug market providing a challenge to the toxicology laboratory. **Table 3** illustrates the number of 2023 Postmortem Toxicology cases where the most frequently detected drugs and/or metabolites were detected. Of the 901 cases tested, there were a total of 157 different drugs and/or metabolites detected in 648 cases with confirmed analytical results.

Drugs Detected in Postmortem Cases	**Case Count**	**Percent of Positive Cases**	**Percent of All Cases**
Ethanol	189	29.1	20.9
Methamphetamine	177	27.3	19.6
Fentanyl	171	26.3	18.9
Amphetamine	168	25.9	18.6
Norfentanyl	143	22.0	15.8
Delta-9 THC	111	17.1	12.3
Benzoylecgonine	69	10.6	7.6
Delta-9 Carboxy-THC	62	9.5	6.8
Naloxone	61	9.4	6.7
Oxycodone	39	6.0	4.3
Carboxytetrahydrocannabinol	36	5.5	36
Hydrocodone	34	5.2	3.7
Cocaine	32	4.9	3.5
Diphenhydramine	30	4.6	3.3
Hydromorphone	28	4.3	3.1
*Morphine**	27	4.1	2.9
Gabapentin	25	3.8	2.7
4-ANPP	23	3.5	2.5
Oxymorphone	23	3.5	2.5
Amiodarone	21	3.2	2.3
Citalopram/Escitalopram	20	3.0	2.2
Lorazepam	20	3.0	2.2
Acetaminophen	19	2.9	2.1
Alprazolam	18	2.7	1.9
EDDP	17	2.6	1.8
Methadone	17	2.6	1.8
Trazodone	17	2.6	1.8
Caboxyhemoglobin [HbCO]	16	2.4	1.7
Hydroxyzine	16	2.4	1.7
7-Aminoclonazepam	15	2.3	1.6
Cocaethylene	15	2.3	1.6
Desmethylsertraline	15	2.3	1.6
Sertraline	13	2.0	1.4
Quetiapine	12	1.8	1.3
Metoprolol	11	1.6	1.2
Tramadol	11	1.6	1.2
Alpha-OH-alprazolam	10	1.5	1.1
Cyclobenzaprine	10	1.5	1.1

Delta-8 THC	10	1.5	1.1
Dihydrocodeine	10	1.5	1.1
Midazolam	10	1.5	1.1

Table 3: The most frequently detected drugs and/or metabolites detected in 2023 Postmortem Toxicology cases, with the percent of positive cases that each was detected. The remaining drugs and/or metabolites were detected in less than 10 cases. *Some positive morphine cases may be due to a delayed heroin related death.

Overdoses/Drug Related

Overdose/Drug related deaths can be either accidental or intentional. Methamphetamine or an opioid are very commonly detected by the Toxicology Laboratory in the specimens collected at autopsy. In 2023, there were a total of 243 overdose/drug related fatalities, which equates to an approximate 74.8% increase from 2019 [**Figure 44**].

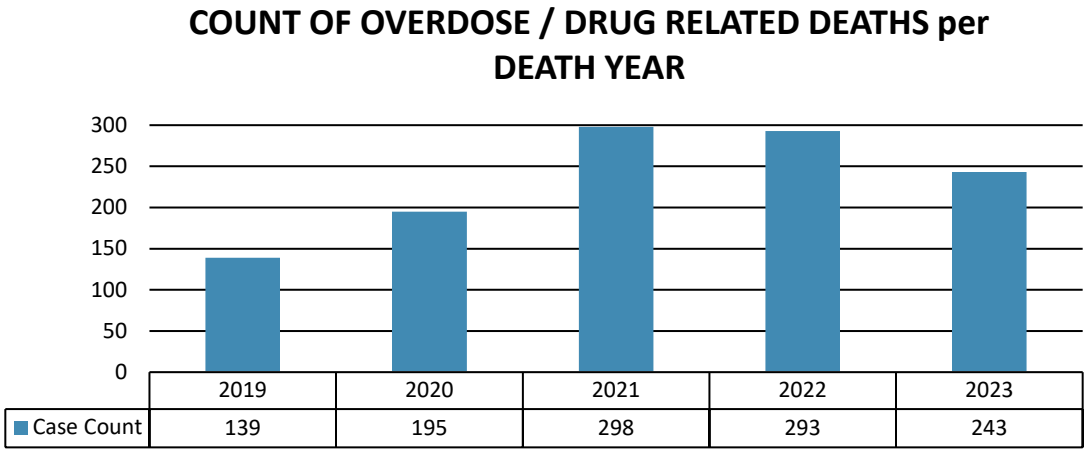


Figure 44: Number of overdose / drug related deaths per year.

Opioid Positive Drug Related Deaths

Figure 45 illustrates the number of drug related deaths that tested positive for an opioid between 2019 and 2023. As illustrated, in 2023 the number of opioid deaths continued to trend downwards when compared to 2021 and 2022.

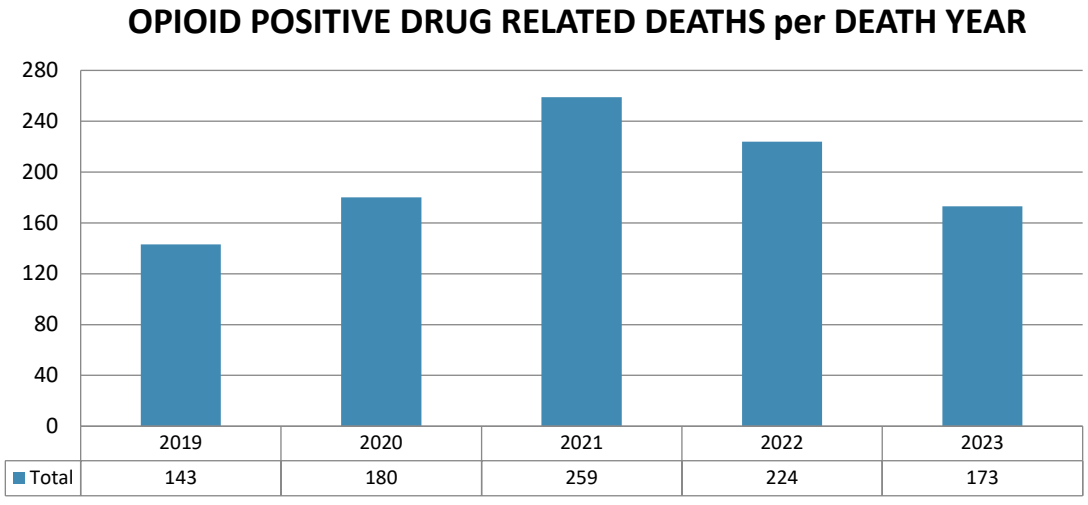


Figure 45: Opioid positive drug related deaths detected in postmortem toxicology cases.

Figure 46 illustrates the number of fentanyl-related deaths per submission year since 2019; fentanyl is the most commonly detected opioid in postmortem cases.

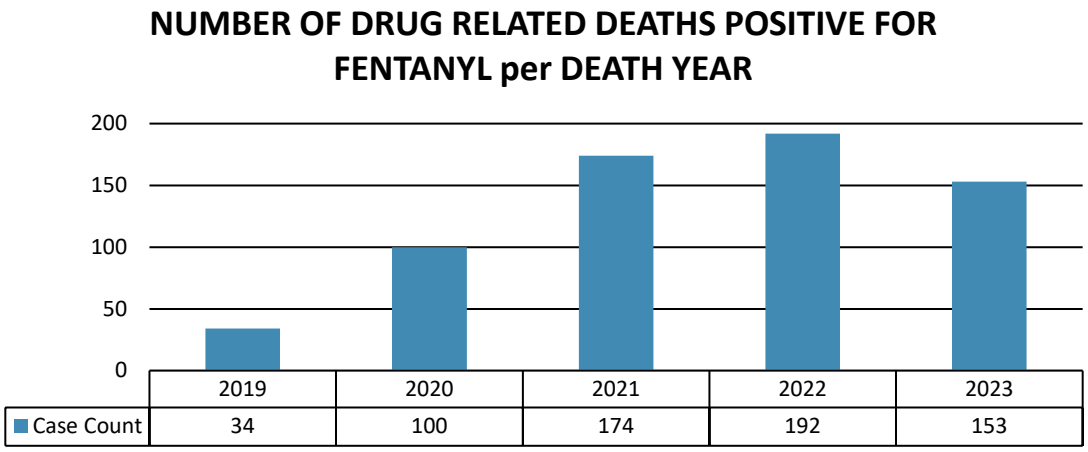


Figure 46: illustrates the number of fentanyl-related deaths per submission year.

Listed in **Table 4** is the number of cases that each opioid was detected in Postmortem Toxicology specimens per submission year.

Opioids Detected in Postmortem Specimens	**2019**	**2020**	**2021**	**2022**	**2023**
6-Monoacetylmorphine (Heroin metabolite)	17	22	21	11	1
6-Beta-Naltrexol	0	0	0	0	1
Acetyl fentanyl	0	0	0	1	0
Buprenorphine	1	0	0	1	3
Codeine	7	6	11	10	7
Dihydrocodeine	0	0	5	3	10
Dihydrocodeine/Hydrocodol	0	0	0	0	4
EDDP	2	0	0	9	17
Fentanyl	32	100	174	269	173
Fluorofentanyl	0	0	0	0	3
Hydrocodone	27	25	25	44	34
Hydromorphone	4	8	12	10	28
Loperamide	0	0	0	1	2
Methadone	21	11	15	23	17
Mitragynine	1	4	1	5	7
*Morphine**	40	38	42	30	27
N-Desmethyltramadol	0	0	2	0	0
Norbuprenorphine	0	1	8	2	1
Norfentanyl	3	78	140	213	143
O-Desmethyltramadol	0	0	7	7	8
Oxycodone	19	24	38	39	39
Oxymorphone	3	2	7	13	23
Para-Fluorofentanyl	0	0	0	0	1
Propofol	2	0	1	0	0
Tramadol	10	9	10	10	11

Table 4: Opioids detected in death cases over the last 5 years. *Some positive morphine cases may be due to a delayed heroin related death.

Table 5 illustrates the count of fentanyl related deaths in 2023 within each age group and whether the death occurred within Sedgwick County or another jurisdiction. The greatest number of deaths related to fentanyl occurred in the 30- to 39-year-old age group.

	Age Group	Number of Deaths (All Counties)	Number of Deaths (Sedgwick County)
2023	0-18	3	3
	19-29	19	18
	30-39	41	41
	40-49	24	24
	50-59	25	25
	60-69	9	8
	70-79	1	1

Table 5: Illustrates the number of drug related fentanyl positive deaths within each age group for all cases examined and how many of those were from Sedgwick County.

Methamphetamine Positive Drug Related Deaths

Drug related deaths that test positive for methamphetamine continue to be a significant portion of the drug related deaths that occur. **Figure 47** illustrates the number of drug related deaths that tested positive for methamphetamine since 2019 per death year.

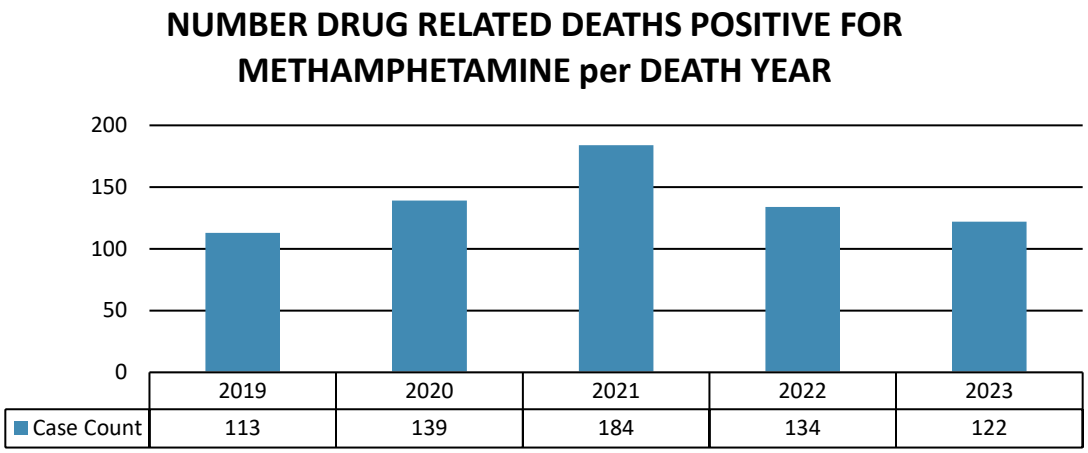


Figure 47: Illustrates the number of methamphetamine related deaths per submission year.

Drugs and Alcohol in Driving Cases

Many driving cases involve drivers that are under the influence of drugs and/or alcohol (ethanol). **Table 6** provides the number of positively identified drugs from the 201 Blood Draw Kits submitted for analysis in 2023. Driving case violations may include, but not limited to, DUI/DUID (Driving Under the Influence of Alcohol/Drugs), various drug violations, vehicular homicide, vehicular fatality, evading police, and hit and run. In total there were 37 uniquely identified individual drugs, drug metabolites, and/or alcohol totaling 497 substances from the 201 cases submitted.

Drugs Detected in Antemortem Driving Cases	**2019**	**2020**	**2021**	**2022**	**2023**
11-Hydroxy-Delta-9-THC	0	0	0	1	0
7-Aminoclonazepam	8	9	6	5	5
a-Hydroxyalprazolam	0	0	0	0	6
Alprazolam	18	18	20	11	14
Amphetamine	40	43	40	41	45
Benzoylecgonine	9	9	21	13	9
Bromazolam	0	0	1	1	3
Butalbital	0	1	1	2	0
Cannabidiol [CBD]	0	0	0	0	3
*Carboxytetrahydrocannabinol^*	2	1	0	0	0
Carisoprodol	2	0	3	2	1
Clonazolam	0	3	0	0	0
Clonazepam	9	10	5	3	5
Cocaethylene	1	0	0	1	3
Cocaine	4	0	3	5	5
Codeine	0	0	2	1	0
*Delta-8-Carboxy-THC^*	0	0	0	5	16
*Delta-8-THC^*	0	0	0	3	11
*Delta-9-Carboxy-THC^*	0	0	0	16	71
*Delta-9-THC^*	0	0	0	13	70
Diazepam	1	0	6	0	2
Difluoroethane	2	3	1	2	1
Doxylamine	0	1	0	0	0
EDDP	0	0	0	0	4
Es/Citalopram	0	1	0	0	0
Ethanol	115	106	125	69	81
Etizolam	1	3	0	0	0
Fentanyl	7	17	57	33	30
Flualprazolam	7	13	0	0	0
Flubromazepam	2	1	0	0	0
Flubromazolam	2	3	0	0	0
Fluoxetine	0	0	1	0	0
Gabapentin	1	1	2	0	0
Hydrocodone	3	3	5	10	2
Hydromorphone	0	0	1	0	2
Lamotrigine	0	0	1	0	0
Levetiracetam	1	0	0	0	0
Lorazepam	2	0	2	4	1

Meprobamate	2	2	5	2	1
Methadone	8	8	13	9	5
Methamphetamine	34	52	60	52	50
Methylenedioxyamphetamine	0	2	1	0	0
Methylenedioxymethamphetamine	0	1	2	0	0
Midazolam	0	0	0	0	1
Mitragynine	1	0	0	0	0
Morphine	4	8	6	1	1
Norbuprenorphine	0	1	0	0	0
Nordiazepam	3	3	7	0	2
Norfentanyl	1	14	49	30	28
Norfluoxetine	0	0	1	0	0
O-Desmethyltramadol	0	2	0	0	1
Oxazepam	1	1	0	0	0
Oxycodone	6	7	9	2	5
Oxymorphone	1	1	0	0	0
Phenazepam	1	0	0	0	0
Phencyclidine	3	5	5	1	2
Phenobarbital	1	0	0	1	1
Quetiapine	1	0	0	0	0
Sertraline	0	1	0	0	0
Temazepam	0	2	1	0	1
Tetrahydrocannabinol (THC)	74	81	84	49	0
Tramadol	0	1	0	0	1
Trazodone	0	0	1	0	0
Venlafaxine	0	1	0	0	0
Zolpidem	5	3	3	5	8

Table 6: List of the positively identified drugs, drug metabolites, and/or alcohol in driving cases and the number of times the Toxicology Laboratory detected each drug, drug metabolite, and/or alcohol per case submission year. ^ Prior to 2022, the laboratory did not have a method to differentiate between delta-8 and delta-9 tetrahydrocannabinol.

Drug-Facilitated Sexual Assaults

Drug-facilitated sexual assaults (DFSA) are a demanding type of forensic investigation. The cases often involve a perpetrator who will surreptitiously administer a drug to a victim to render them unconscious and sexually assault them. As illustrated in **Table 7**, in 2023 there were 10 DFSA cases submitted for analysis.

Year	**Cases Submitted**
2019	26
2020	15
2021	18
2022	10
2023	10

Table 7: DFSA cases submitted and completed each year since 2019.

DFSA case specimens often have several different drugs present. **Table 8** illustrates the number of positively identified drugs, drug metabolites, and/or alcohol detected in DFSA specimens. For comparison purposes the number of positive results for the drugs, drug metabolites, and/or alcohol is provided for each of the last 5 years. In total there were 24 individual drugs, drug metabolites, and/or alcohol detected for a total of 46 drugs, drug metabolites, and/or alcohol for cases submitted in 2023.

Drugs Detected in Drug Facilitated Sexual Assault Cases per Submission Year	2019	2020	2021	2022	2023
7-Aminoclonazepam	1	2	1	2	0
a-Hydroxyalprazolam	1	0	1	0	1
Acetone	-	-	-	2	3
Alprazolam	1	0	0	0	1
Amitriptyline	1	0	0	0	0
Amphetamine	5	1	8	4	3
Anhydroecgonine methyl ester	0	0	0	0	1
Benzoylecgonine	3	3	4	1	2
Bupropion	0	0	0	1	0
Bupropion threo amino alcohol	0	0	1	0	0
*Carboxytetrahydrocannabinol^*	13	5	9	5	5
Chlorcyclizine	1	1	2	0	0
Clonazepam	0	1	0	1	0
Cocaethylene	0	0	1	0	1
Cocaine	0	0	2	0	2
Codeine	1	0	0	0	0
*Delta-8-Carboxy-THC^*	0	0	0	0	2
*Delta-8-THC^*	0	0	0	0	1
*Delta-9-Carboxy-THC^*	0	0	0	0	4
*Delta-9-THC^*	0	0	0	0	3
Desmethyl(es-)citalopram	1	1	2	0	2
Dextromethorphan	0	0	0	0	1
Diphenhydramine	4	4	1	1	2
Doxylamine	0	0	0	1	1
Ecgonine ethyl ester	0	0	2	0	1
Ecgonine methyl ester	0	0	2	0	0
Es/citalopram	1	1	2	0	2
Ethanol	8	5	4	2	3
Fentanyl	0	0	0	1	0
Flubromazolam	1	0	0	0	0
Fluoxetine	1	0	2	2	0
Gabapentin	2	0	0	1	0
Hydrocodone	0	0	1	0	0
Hydromorphone	0	0	1	0	0
Hydroxybupropion	0	0	0	1	0
Hydroxyzine	1	0	0	0	0
Lamotrigine	0	0	0	2	0
Lidocaine	0	1	1	0	0
Lorazepam	2	2	0	2	1
m-Chlorophenylpiperazine	0	0	0	1	0
Methamphetamine	7	1	7	4	1
Morphine	1	0	0	1	0
N-Desmethyltramadol	1	0	0	0	0
Norcocaine	0	0	0	0	1
Nordiphenhydramine	3	4	1	1	2
Norfentanyl	0	0	1	1	0
Norfluoxetine	1	0	2	2	0
Norquetiapine	0	0	1	0	0

O-Desmethyltramadol	2	0	0	1	0
O-Desmethylvenlafaxine	0	0	1	1	0
Oxazepam	1	0	0	1	0
Oxycodone	1	0	0	1	0
Oxymorphone	1	0	0	1	0
Phencyclidine	0	1	0	0	0
Promethazine	2	2	0	1	0
Quetiapine	0	0	0	1	0
Salicylic Acid	1	0	0	0	0
Sertraline	1	0	0	1	0
Temazepam	1	0	0	0	0
Tetrahydrocannabinol	1	0	0	0	0
Toluene	0	1	0	0	0
Tramadol	2	2	0	1	0
Trazodone	0	0	0	1	0
Tyramine	0	0	0	1	0
Venlafaxine	1	0	1	1	0

Table 8: List of the positively identified drugs, drug metabolites, and/or alcohol in DFSA cases and the number of times the Toxicology Laboratory detected each drug, drug metabolite, and/or alcohol per case submission year. ^ Prior to 2022, the laboratory did not have a method to differentiate between delta-8 and delta-9 tetrahydrocannabinol.