2014

Forensic Laboratories Annual Report

Sedgwick County, Kansas

Regional Forensic Science Center
p (316) 660-4800

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Wichita, Kansas 67214

LABORATORY LEADERSHIP

All laboratory managers are case-working and proficiency tested scientists.

Director and Chief Toxicologist
Timothy P. Rohrig, Ph.D., F-ABFT

Chief of Criminalistics
Justin Rankin

Toxicology Lab Manager
Lydia Harryman / Autumn Massiello, Ph.D.

Forensic Biology/DNA Manager
Shelly Steadman, Ph.D.

Quality Assurance Manager
Robert Hansen, M.S.F.S.

HIGHLIGHTS

The Forensic Laboratory Division was granted ASCLD/LAB-*International accreditation* in the field of Forensic Science Testing for Controlled Substances, Quantitative Analysis, Human Performance Forensic Toxicology, Post-Mortem Forensic Toxicology, DNA-Nuclear, Body Fluid Identification, Fire Debris, Firearms, and Serial Number Restoration on February 28, 2014. This accreditation demonstrates the laboratory's conformance to the ISO/IEC 17025:2005 standards, all applicable ASCLD/LAB Supplemental requirements, as well as conformance to the laboratory's own documented management system.

The Forensic Science Center Laboratory Division receives 95% of its casework from law enforcement agencies within Sedgwick County.

Methamphetamine/Amphetamine, Marijuana, and Cocaine continued to be the most commonly detected drugs by the Drug Identification Laboratory.

Four of the top seven drugs identified by the Drug ID Laboratory were prescription drugs (Hydrocodone, Alprazolam, Oxycodone, and Clonazepam).

The Combined DNA Indexing System [CODIS] continued to be a valuable tool by providing law enforcement agencies with investigative leads for cases that may otherwise go unsolved.

Sex Crimes are the most commonly worked type of crime against person in the Biology / DNA Section. They account for 28% of all casework in the section.

The Toxicology Laboratory saw a 2% increase in the number of cases submitted for analysis. This is due to both an increase in the number of post mortem and human performance case submissions.

Seventy percent of DUID cases worked were positive for alcohol in the blood; and, 83% of DUID cases worked were positive for drugs.

Eleven percent of all alcohol positive drivers were under 21 years old.

In approximately 62% of the toxicology alcohol positive DUI cases and 16% of the toxicology alcohol positive DUID cases, the driver was greater than twice the legal limit (0.08 gm%).

The Forensic Laboratory started training a second scientist in the Fire Debris Laboratory to better serve our contributing agencies.

A trainee in the Firearms Section completed the ATF National Firearms Examiner Training Academy (NFEA). The examiner is the first in the State of Kansas to complete the NFEA training.

LABORATORY MISSION

To serve the citizens of the Sedgwick County Kansas Region, by ethically providing accurate and unbiased scientific analysis of evidence to the law enforcement and judicial communities.

INTRODUCTION

The Regional Forensic Science Center officially opened on December 21st, 1995. The Center houses the District Coroner and the Forensic Science Laboratories [FSL]. The Forensic Science Laboratories are comprised of three major sections: Criminalistics, Forensic Biology/DNA and Forensic Toxicology. Within the Criminalistics Section are the Drug Identification Unit, Firearms / Tool Mark Unit, and the Trace (Fire Debris) Unit. The laboratory staff consisted of 18 scientific personnel and 3 support staff.

The FSL is staffed with highly-trained and experienced forensic scientists, many who have advanced scientific degrees [MS, MSFS, Ph.D.]. The technical staff has well over 200 years of combined professional experience.

In April of 1996, the Forensic Science Laboratories began accepting cases for firearms examinations. Three months later, the Biology Section provided forensic examinations for the identification of biological fluids. After mandatory accreditation by the State of Kansas, the Toxicology Laboratory began producing comprehensive examinations in post-mortem toxicology in support of the District Coroner in September of 1996. This was followed by the FSL 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 Center opened the first STR DNA Laboratory in the State of Kansas.

Since 2003, the Forensic Science Laboratories have been accredited by the American Society of Crime Laboratory Directors/Laboratory Accreditation Board [ASCLD/LAB] under the ASCLD/LAB-*Legacy* program.

In February 2014, the Laboratory Division was granted ASCLD/LAB-*International* accreditation for Forensic Testing Laboratories in the categories of Controlled Substances, Quantitative Analysis, Human Performance Forensic Toxicology, Post-Mortem Forensic 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,* the testing laboratory requirements of the *ASCLD/LAB-International* Supplemental Requirements.

Striving for and meeting the requirements of the ASCLD/LAB-*International* program demonstrates the Center's commitment to excellence in the services we provide to our submitting agencies.

SIGNIFICANT ACHIEVEMENTS

- The laboratory presented :
  - T. P. Rohrig, January, 2014, lectured 25 hours, Post-mortem Toxicology: Interpretive Considerations and Challenges, University of Lincoln (United Kingdom).
  - MidAmerica 2014 Forensic DNA Conference, Columbia, MO, April 9, 2014. Oral presentation: *S. Steadman*, "An assessment of court proceedings involving defense advocate observation of consumption DNA testing."
  - T.P. Rohrig, July 2014 IACP Training Conference, Phoenix, AZ, "Oral Fluid as a Test Specimen: Guidelines for Implementing a Data Collection Program".
  - T.P. Rohrig, October 2014, Prosecuting Attorney's Seminar: 21st Century Prosecution: The New and Novel, "Oral Fluid: Utilization in Detecting Drugged Drivers".

- Laboratory Staff enhanced their technical/professional expertise by attending several workshops / training sessions at conferences / symposiums:
  - ASCLD Webinar Series: Managing Customer Expectations and Education, January 8, 2014.
  - ASCLD Webinar Series: Case Acceptance Policies and Guidelines, January 22, 2014.
  - ASCLD Webinar Series: Efficiency Improvements, February 5, 2014.
  - 66th Annual Scientific Meeting of the American Academy of Forensic Sciences, February 17 – 22, 2014, Seattle, WA.
  - ASCLD Webinar Series: Developing a Statewide Approach to Backlog Management, March 12, 2014.
  - Mid-America 2014 DNA Conference, April 9 & 10, 2014, Columbia, Missouri.
  - Approaches for Optimizing Hydrolysis of Cannabinoids, Cannabidiol and Synthetic Cannabinoids, April 30, 2014.
  - AFTE 2014 Technical Session, May 11 – 16, 2014.
  - DNA Analyst Webinar Series: Probabilistic Genotyping & Software Programs, May 28, 2014.
  - DNA Mixture Interpretation Software Workshop, June 9 -13, 2014.
  - Method Validation for Quantitation and Confirmation of Amphetamines, Phentermine, and Designer Stimulants by LC/MS/MS, July 24, 2014.
  - The Utility and Features of Expert Systems for Interpreting DNA Data, September 16 & 17, 2014, Pittsburgh, PA.
  - SOFT 2014 Annual Meeting, October 22 – October 24, 2014.
  - 20th National CODIS Conference, November 18 & 19, 2014.
  - Ethics and Science, Sedgwick County Chief Attorney, Justin Edwards, December 9, 2014.

- 2014 Grant Funding:
  - Justice Assistance Grant [JAG] - $40,700
    - Centrifuge and Weighing Balance for Toxicology
    - FT-IR Spectrometer for Drug Identification
  - NFSIA Coverdell - $31,159
    - Service Agreement on LC/MS for Toxicology

FORENSIC SCIENCE LABORATORIES SERVICE OVERVIEW

Case Submissions

The Forensic Science Laboratory continues to experience a significant demand for its expert services. The five year average of cases submitted is 4780. **Figure 1** illustrates the number of forensic laboratory cases submitted for examination for the past 5 years.

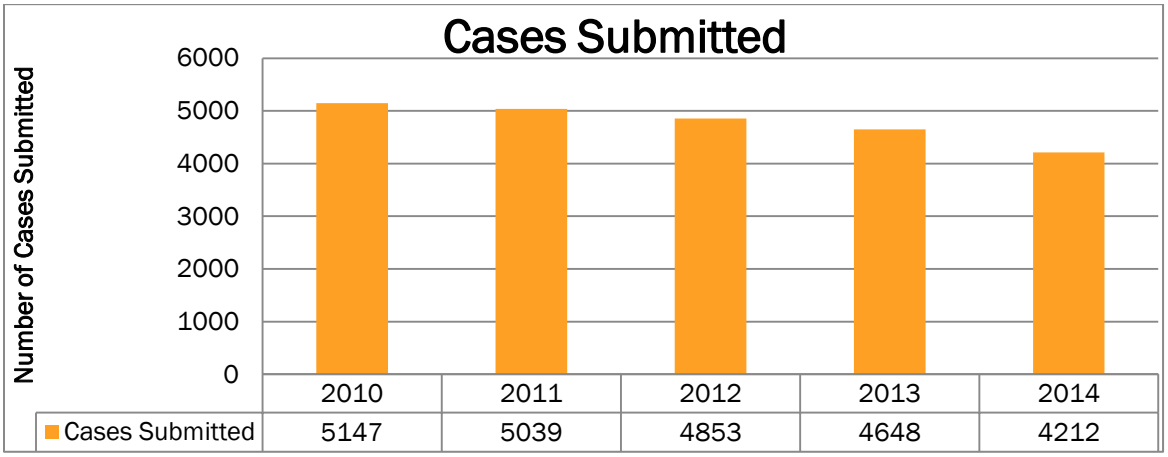


Figure 1 Number of forensic laboratory cases submitted for examination (law enforcement and District Coroner post-mortem evidence submissions).

2014 Case Submissions

Cases are submitted for forensic examination to our three analytical sections, Criminalistics, Biology / DNA, and Toxicology **[Figure 2]**. Toxicology receives evidence from law enforcement through the evidence unit and post-mortem submission from the District Coroner.

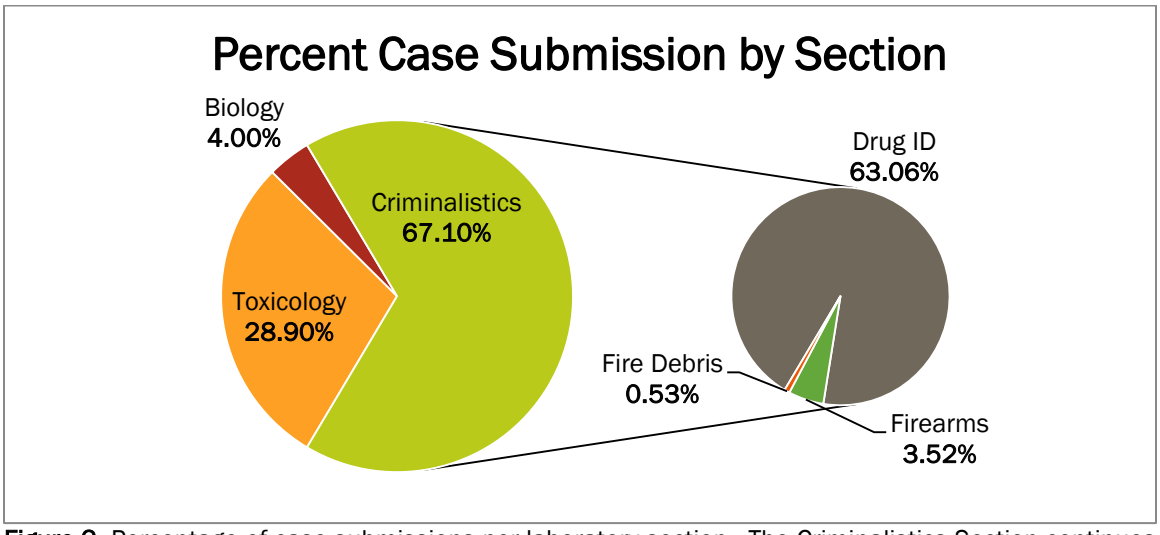


Figure 2 Percentage of case submissions per laboratory section. The Criminalistics Section continues to receive the majority of evidence submitted.

Expert Testimony

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

In 2014, the FSL received 1895 subpoenas for court appearances. The Center, in conjunction with the District Attorney's Office, worked on having the DA's Office only submit subpoenas for cases that have a high likelihood of needing expert testimony.

Agencies Served

The Forensic Science Laboratories provides expert testing services and consultation for a variety of law enforcement agencies within and outside Sedgwick County. In 2014, the FSL provided expert testing services and consultations to 40 Law Enforcement Agencies, Fire Departments, and District Coroners. **Figure 3** indicates [yellow highlight] the counties within the state in which forensic laboratory services were provided.

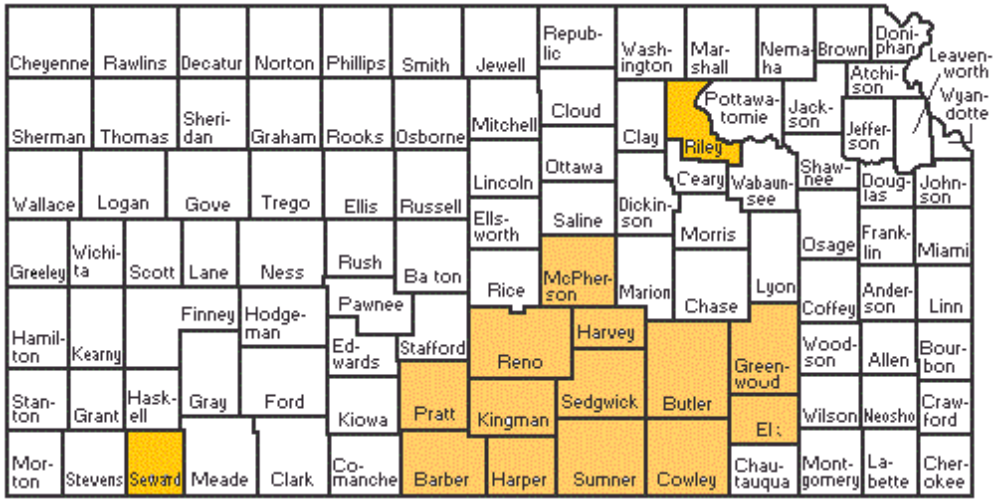


Figure 3 Counties that had forensic laboratory services provided to them by the Sedgwick County Regional Forensic Science Center in 2014 (highlighted).

Sedgwick County vs. Out-of-County Cases

The Sedgwick County Regional Forensic Science Center serves as the principle Forensic [Crime] Laboratory for all of Sedgwick County Law Enforcement Agencies and provides forensic services to many other counties and municipalities within the state of Kansas **[Table 1]**. However, the vast majority of forensic laboratory services were provided for Sedgwick County Law Enforcement agencies (~95%). A significant portion of the out-of-county cases was in support of the Sedgwick County Coroner's out-of-county autopsies.

Table 1: Contributing Agencies

Alcohol Tobacco and Firearms	Greenwood County Coroner	Riley County Police Department
Arkansas City Police Department	Harper County Coroner	Sedgwick County Coroner
Barber County Coroner	Harvey County Coroner	Sedgwick County Fire Dept.
Bel Aire Police Department	Haysville Police Department	Sedgwick County Sheriff
Butler County Coroner	Kansas Dept. of Corrections	Seward County Coroner
Cheney Police Department	Kansas Highway Patrol	Sumner County Coroner
Clearwater Police Department	Kingman County Coroner	Udall Police Department
Drug Enforcement Agency	Maize Police Department	Valley Center Police Department
Derby Police Department	Maize USD266 Police Dept.	Wichita Fire Department
Eastborough Police Department	McPherson County Coroner	Wichita Police Department
Elk County Coroner	Mulvane Police Department	Wichita State Univ. Police Dept.
Garden Plain Police Department	Park City Police Department	Winfield Corrections
Goddard Police Department	Pratt County Coroner	
Goddard USD 265 Police Dept.	Reno County Coroner	

Table 1 Is a list of law enforcement agencies, fire departments, and county coroners the forensic laboratories provided services for in 2014.

CRIMINALISTICS SECTION

The Criminalistics Section receives the majority of the cases submitted to the Forensic Laboratories. The Criminalistics Section provides forensic examinations in Drug Identification, Open Container [Beverage Alcohol] Analysis, Firearms & Tool Marks, Serial Number [Firearms] Restoration and Trace Evidence [Fire Debris]. **Figure 4** illustrates the trend in forensic case volume submitted to the Criminalistics Section.

Starting in 2012, each section of the Center started counting cases in a more uniform manner, so that cases with subsequent submissions only get counted once per unit. This accounts for the majority of the case submission count drop between 2011 and 2012.

In 2013/2014, the Center worked with the District Attorney's Office and our Law Enforcement contributors to submit cases for analysis that were in the need of further investigative information and/or had a high likelihood of being held for a criminal trial. This increased the efficiency of the criminalistics section, especially the Drug ID Unit, by allowing scientists to focus on the cases that had a greater impact on the judicial process of a case. This accounts for some of the apparent decrease in case submissions. While this increased efficiency, the complexity of cases is ever increasing with the advent of new and novel drugs.

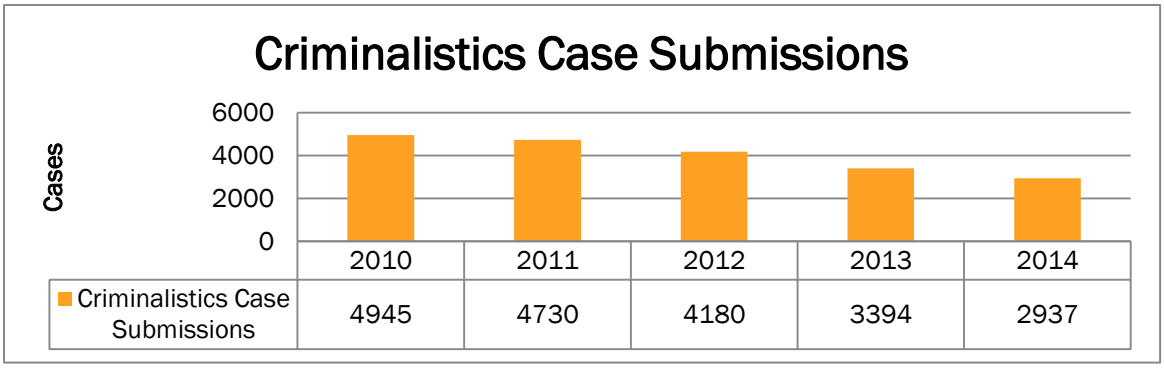


Figure 4 Number of cases submitted for analysis to the Criminalistics Section, which includes Drug ID, Firearms / Tool Marks, and Fire Debris over a five year period.

Figure 5 illustrates the volume and percentage of cases submitted to each unit of the criminalistics section.

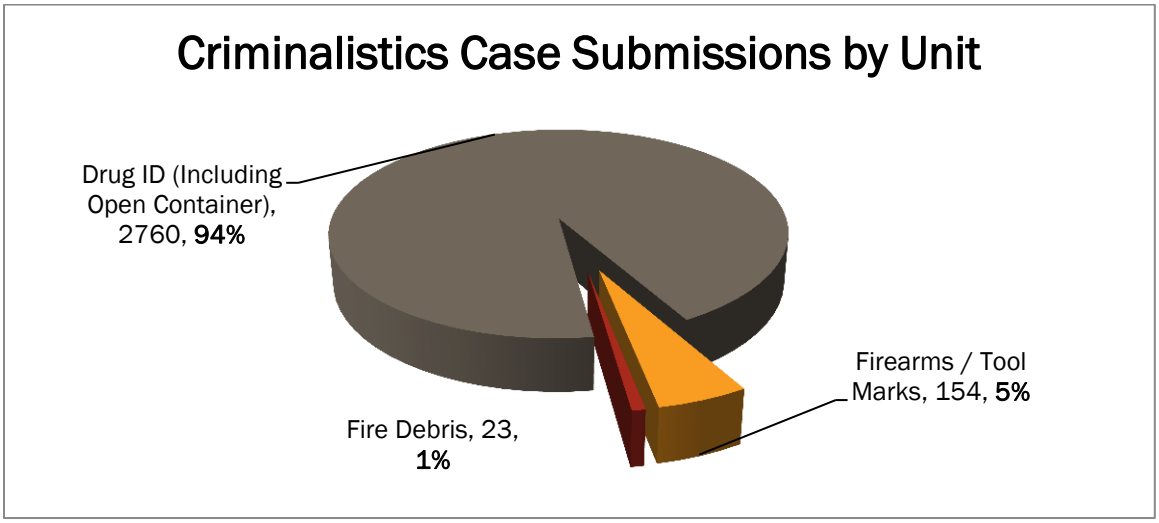


Figure 5 Volume and percentage of cases submitted for each Criminalistic Laboratory Section.

Drug ID Unit

The largest number of cases submitted to the Criminalistics Section [**Figure 5**] were for illicit drug identification. Open Container is the second most abundant case type, accounting for approximately 11% of the cases submitted for analysis to the section, and includes cases with and without associated drug evidence. Open container cases submitted without associated drugs accounted for 3.7% of total cases submitted to Drug ID.

The agency that submits the greatest volume of drug evidence is the Wichita Police Department [WPD]. This is apparent in **Figure 6**, as nearly 88% of cases received are from the Wichita Police Department. Agencies other than the Wichita Police Department [WPD] and the Sedgwick County Sheriff's Office [SGSO], such as the Kansas Highway Patrol [KHP] and the Derby Police Department [Derby] comprise approximately 5.2% of the total cases submitted.

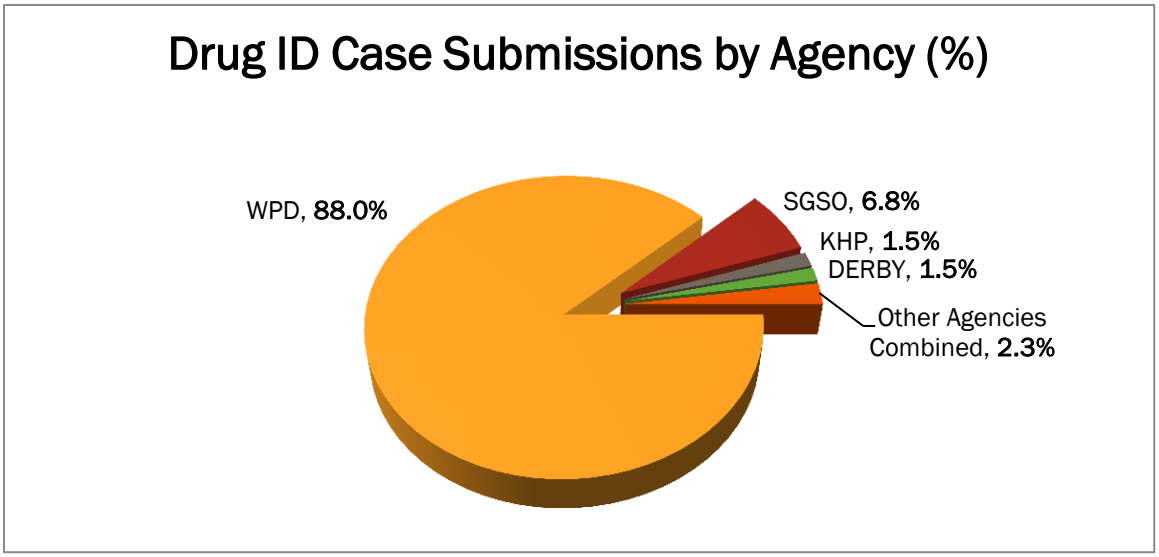


Figure 6 Percentages of Drug ID cases submitted from the largest contributing agencies.

In 2014, the Drug Identification Unit examined thousands of exhibits for the presence of controlled substances. Consistent with years past, the majority of drug exhibits were identified as marijuana, cocaine, and methamphetamine. The section continues to see a steady submission of synthetic cannabinoids ("K2", "spice", "potpourri") and designer stimulants (substituted cathinones aka "bath salts"). Also, the unit performed 86 methamphetamine quantitations and 50 cocaine base / salt form determinations (FTIR), which are required for federally charged cases. **Table 2** illustrates the count for each of the seven most commonly detected drugs by the Drug ID Unit.

Table 2: Most Commonly Detected Drugs by Drug ID

Drugs	Number Detected
Marijuana	4235
Methamphetamine / Amphetamine	2231
Cocaine	947
Hydrocodone	234
Alprazolam	195
Synthetic Cannabinoids	116
Oxycodone	115
Heroin	99
Clonazepam	64
Designer Stimulants	50

Table 2 Ten most commonly detected drugs from 2014 examinations.

Open Container / Beverage Alcohol

Open Container/Beverage Alcohol analysis is conducted in support of the state and local DUI laws, prohibition of minors to possess alcohol, and other liquor law violations. As shown in **Figure 7**, the number of open containers submitted remains somewhat constant over the most recent five year period.

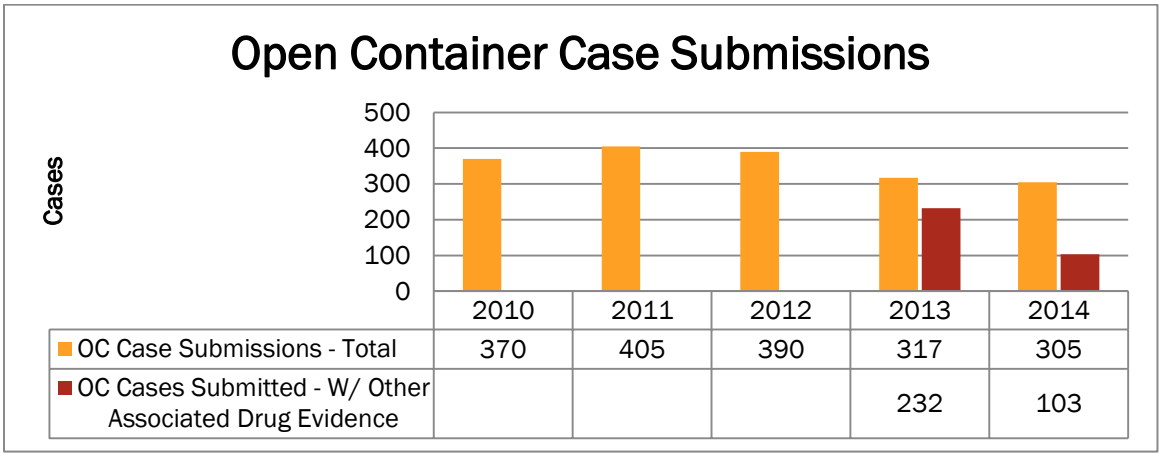


Figure 7 Number of open container cases submitted. Data for 2014 includes the number of open container cases submitted that also had other controlled substances submitted (i.e. marijuana, cocaine, etc.). The blanks in the chart indicate that there is no data for this calculation for the previous three years.

Firearms/Tool Marks Unit

Firearm and Tool Mark examination is conducted to support state and federal laws. The Firearms/Tool Marks Unit conducts many types of forensic examinations. The majority of examinations involve operability (function) tests on the submitted firearms. As shown in **Figure 9**, the number of cases submitted to the unit has remained relatively constant over the last several years.

The "drop" in the number of cases from 2011 to 2012 is due to the use of an updated / uniform method of calculating case submissions. Subsequent submissions under the same case number are no longer included when counting case submissions within this Unit.

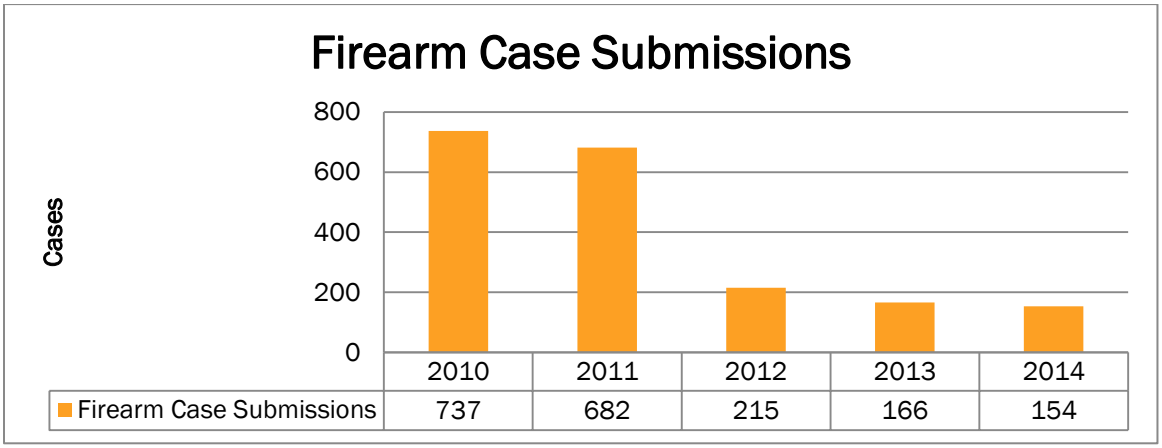
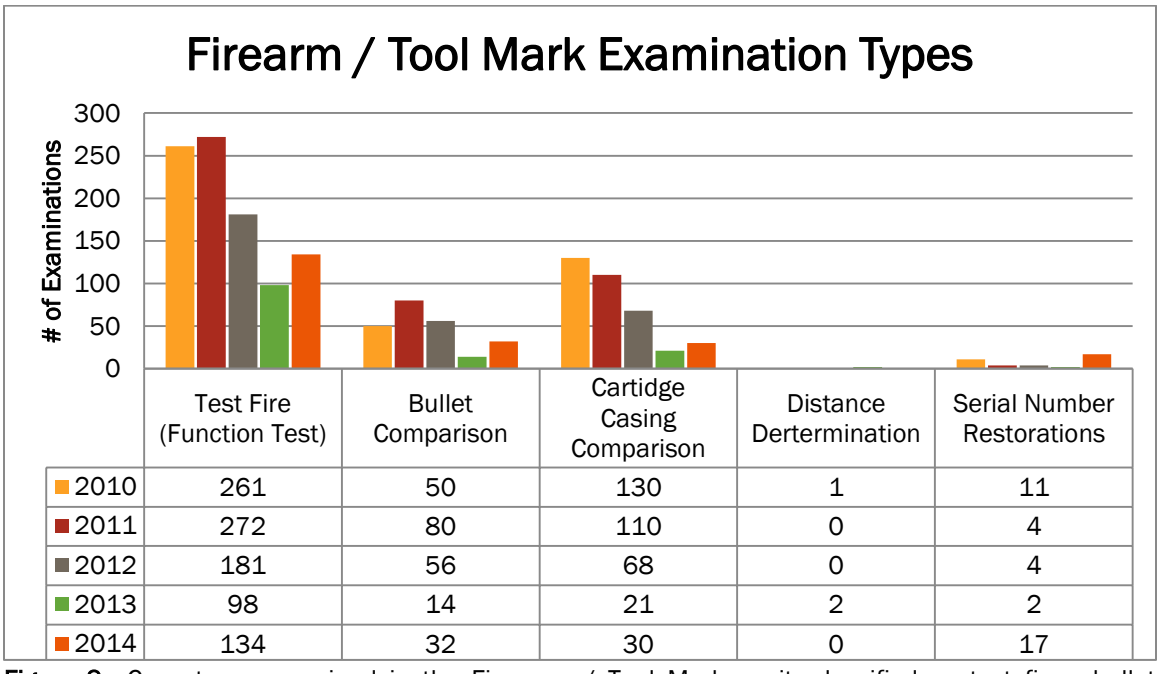


Figure 8 Firearm / Tool Mark case submissions from 2010 through 2014.

Figure 9 outlines the case types (test fire, bullet comparison, cartridge casing comparison, distance determination, serial number restoration) that were examined during the year. Omitted from the figure is Tool Marks, which consisted of one examination.



	Test Fire (Function Test)	Bullet Comparison	Cartidge Casing Comparison	Distance Dertermination	Serial Number Restorations
2010	261	50	130	1	11
2011	272	80	110	0	4
2012	181	56	68	0	4
2013	98	14	21	2	2
2014	134	32	30	0	17

Figure 9 Case types examined in the Firearms / Tool Marks unit; classified as test fires, bullet comparisons, cartridge case comparisons, distance determinations, and serial number restorations.

Trace Evidence Unit

The Trace Evidence Unit at the Center examines fire debris cases in support of fire investigations (Arson). 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 the first full year of performing casework since reinstating the section, Fire Debris reported 23 cases. The trend of case submissions over the last five years is illustrated in **Figure 10**.

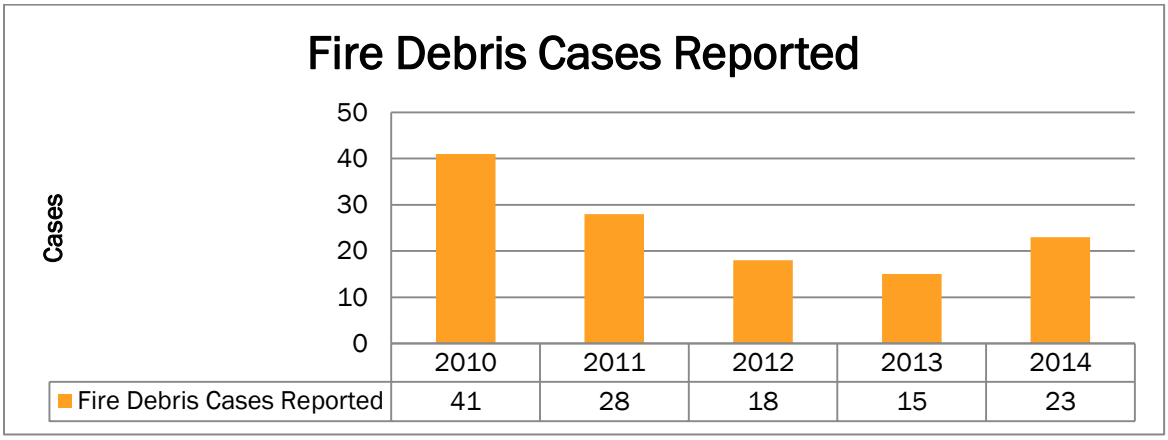


Figure 10 Number of fire debris case reports issued over a five year period.

FORENSIC BIOLOGY/DNA SECTION

The Biology/DNA Section 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 section screens evidence for the presence of biological evidence (blood, semen, saliva, feces, and urine). For DNA analysis, the section generates short tandem repeat (STR) profiles from biological material left at crime scenes. Once profiles are established from the scene exhibits, they can be compared to reference standards collected from individuals believed to have some association to the scene (victims, suspects, or other known individuals). Ultimately, results are interpreted and a conclusion drawn 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 and can result in high quality single source profiles (fresh blood stains). Alternatively, the samples may have been left by multiple individuals or exposed to environmental elements (low quantity/degraded samples). All of these factors affect the laboratory's ability to obtain a comparable profile and statistical analysis is 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 2014, the Biology/DNA section received 175 cases for forensic DNA examination. The trends of case submissions over the past five years are illustrated in **Figure 11**. While there has been a decline in the number of cases submitted since 2011, this does not reflect the number of exhibits per case, nor does it reflect the complexity of those exhibits.

The challenging nature of the DNA samples submitted for DNA analysis is illustrated by the routine need to consume the evidence for testing due to the limited size and/or compromised nature of samples collected at crime scenes. In 2014, 37% of Biology Section cases involved consumptive testing and 31% of all forensic questioned items submitted were consumed. Notification processes involved with consumptive testing lengthen the timeline for conducting the analysis, and the associated judicial processes generally commence after the submission to the lab has been made.

Also, 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 below.

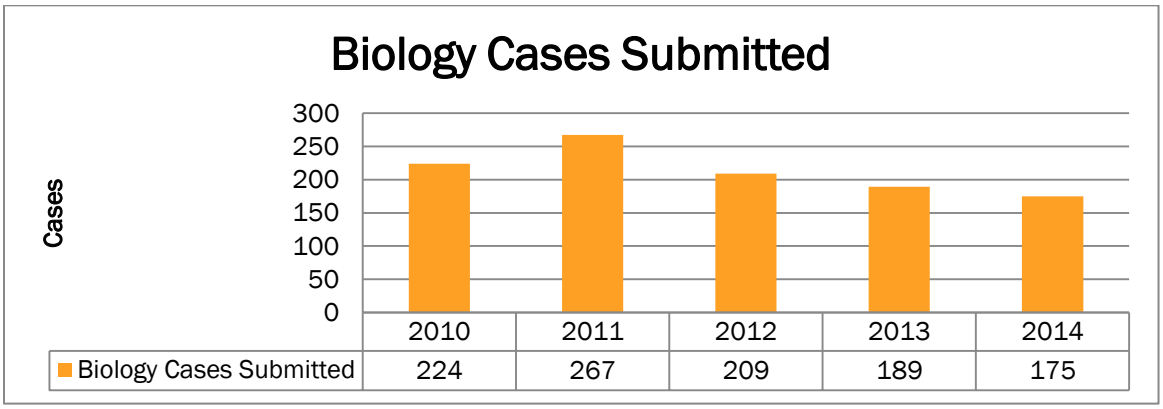


Figure 11 Number of cases submitted to the Biology / DNA Section over a five year period.

As depicted in **Figure 12**, over half of the cases submitted for biological examination are robbery/burglary with sex crimes being the second overall.

Property crimes continue to be processed if the evidence submitted has 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.

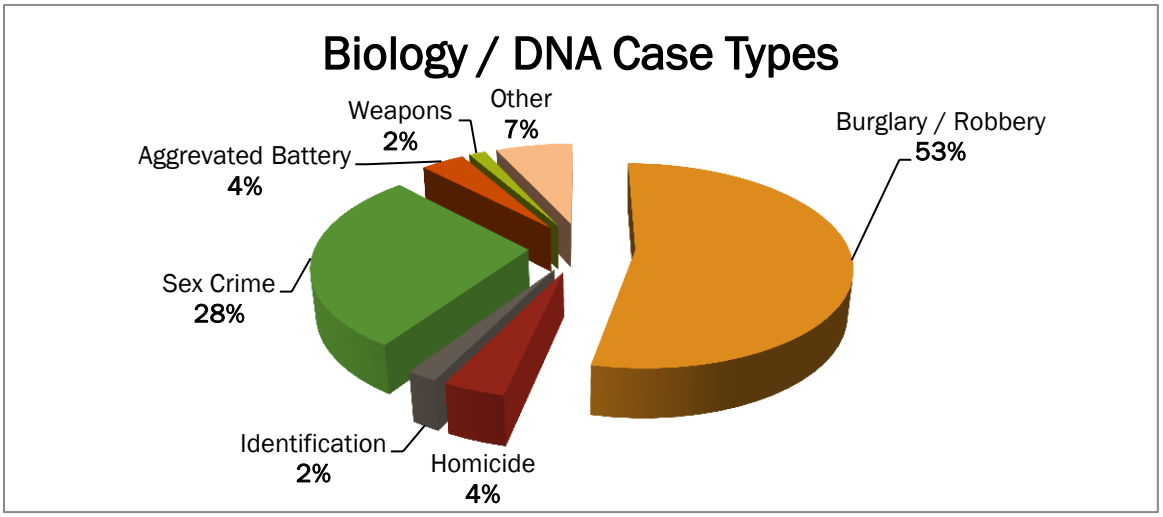


Figure 12 Classification of cases submitted for Biology/DNA analysis. Six percent of the case types are categorized as other. This category may include cases involving arson, vandalism, auto theft, attempted murder, vehicular homicide, narcotics, stalking, etc. The section identified human remain(s) in four cases through Forensic DNA analysis.

Combined DNA Indexing System (CODIS)

In 2007 Kansas became an all arrestee state, meaning that law enforcement will collect DNA samples for any person arrested for qualifying offenses. The DNA profile generated from the arrestee/offender is inputted into the state database (SDIS) in Topeka, KS and is available to be searched against with the unknown profiles the section enters into our local database (LDIS). As a result of this and the anticipation of new national database (NDIS) participation requirements, in late 2009, the Sedgwick County DNA Laboratory adopted new procedures for the release of investigative lead information, to include formal written and reviewed notifications for database associations.

Ultimately, the increased number of associations resulted in an increase in reports generated, as well as an increase in the number of known samples processed to confirm and prosecute these additional CODIS hits. All factors taken together caused a spike in workload that was realized in 2010 and continued throughout 2011. By 2012, the vast majority of the backlogged offender samples had been added to the database and the increase in workload due to CODIS investigative leads begins to level off. As the CODIS database expands at the local, state, and national level, the number of reports issued will increase accordingly. Trends in CODIS activity are illustrated in **Table 3**.

Table 3: CODIS Data

	2010	2011	2012	2013	2014
Number of Profiles Entered	146	149	142	110	116
Number of Hits	164	95	89	78	74
Number of Investigations Aided	58	86	82	68	63

Table 3 The number of profiles entered, number of hits, and number of investigations aided over the last five years.

Biology/DNA Reporting

The Biology / DNA section issued 299 reports in 2014. As outlined in **Table 4**, 55 were Offender Hit Notifications, which is when a forensic unknown sample hits to a convicted offender sample at the state or national level, 25 confirmation reports, and 31 were Local DNA Index System (LDIS) match reports, which is when a local forensically unknown sample hits to another sample previously entered into the local database.

Each report and associated case record goes through a review process. While the process has always included a technical review when a record contains technical data and an administrative review on all case records, accreditation requirements mandate that with each hit a formal notification be provided to the investigating agency. This requirement has increased the time spent reviewing case records substantially.

Table 4: CODIS Reporting

Year	Total Reports	Offender Hit Notifications	Local DNA Index System Match Reports	Confirmation Reports
2013	331	59	19	22
2014	299	55	31	25

Table 4: Total reports issued and the number of CODIS related reports / notifications for 2013 and 2014.

FORENSIC TOXICOLOGY SECTION

The Forensic Toxicology Section provides comprehensive examinations of post-mortem [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/alcohol cases and drug-facilitated sexual assault cases are also examined by this section. The Toxicology Laboratory also provides drug testing on children removed from clandestine methamphetamine laboratories.

The section continues to expand the number of drugs and poisons it can detect and quantitate.

The Forensic Toxicology Section has experienced a moderate increase in casework over the last few years. As illustrated in **Figure 13**, the number of cases submitted in 2014 was the highest in the most recent five year period.

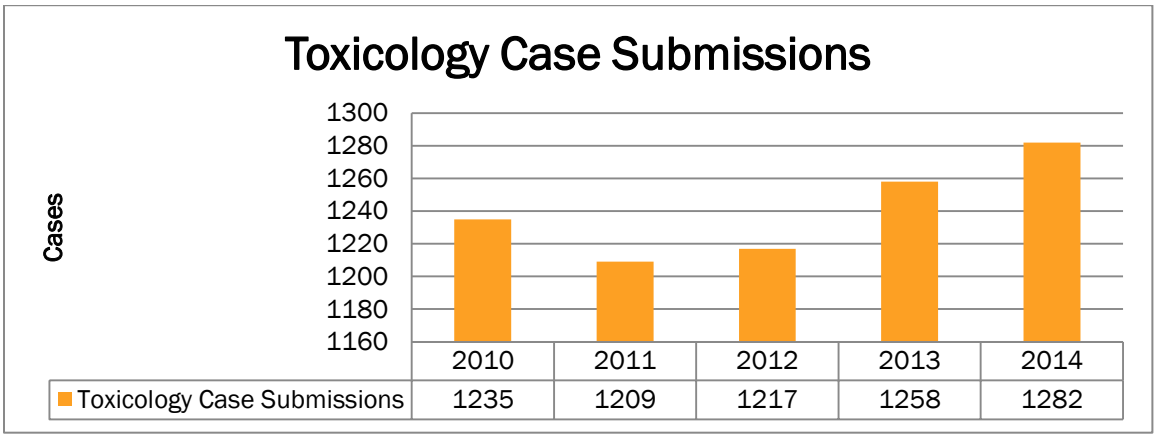


Figure 13 Number of cases submitted to the Toxicology Section for analysis over a five year period. A significant portion of samples submitted are post-mortem cases, the number of which is dependent upon the number of autopsies performed at the Center.

Figure 14 depicts the percentage of toxicology cases submitted by case type. Toxicological examinations in support of the District Coroner (PM) account for approximately two-thirds of the forensic case work performed by the section.

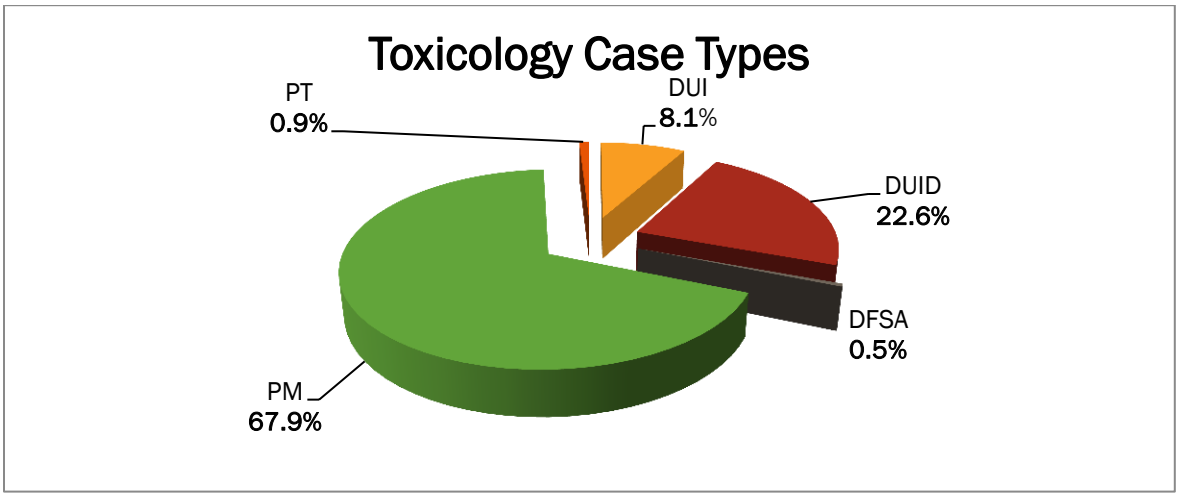
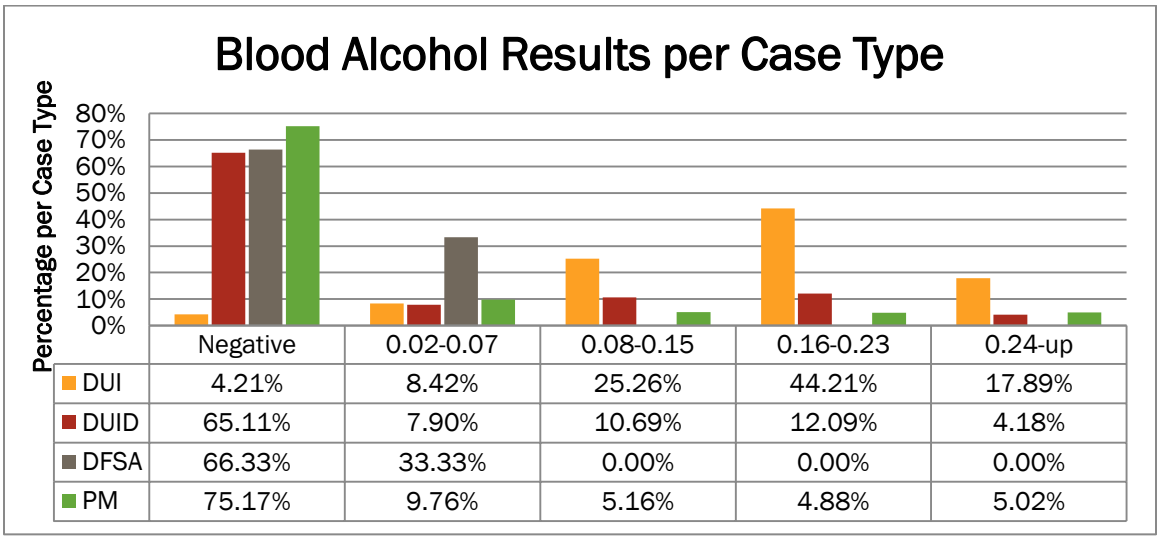


Figure 14 Submission of toxicology cases, sorted by case type. DUI (Driving Under the Influence of Alcohol), DUID (Driving Under the Influence of Drugs), PM (Post-Mortem), DFSA (Drug Facilitated Sexual Assault), and Proficiency Tests (PT).

Alcohol and Drugs

Alcohol continues to play a significant role in all of the FSL toxicology case types [**Figure 15**]. In approximately 62% of the toxicology alcohol positive DUI cases and 16% of the toxicology alcohol positive DUID cases, the driver was greater than twice the legal limit (0.08 gm%).



	Negative	0.02-0.07	0.08-0.15	0.16-0.23	0.24-up
DUI	4.21%	8.42%	25.26%	44.21%	17.89%
DUID	65.11%	7.90%	10.69%	12.09%	4.18%
DFSA	66.33%	33.33%	0.00%	0.00%	0.00%
PM	75.17%	9.76%	5.16%	4.88%	5.02%

Figure 15 Percentage of alcohol test result ranges for each category of cases.

As illustrated in **Figure 16**, the vast majority of samples submitted in Driving-Under-the-Influence [DUI] cases were found to have alcohol concentrations at or above the legal limit of 0.08 gm%.

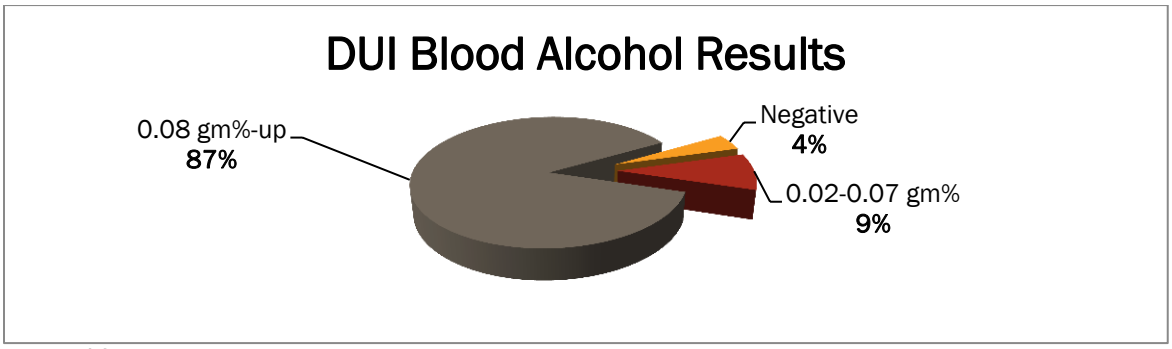


Figure 16 DUI blood alcohol results.

In approximately 25% of the postmortem (PM) case investigations there was a positive finding of alcohol **[Figure 17]**.

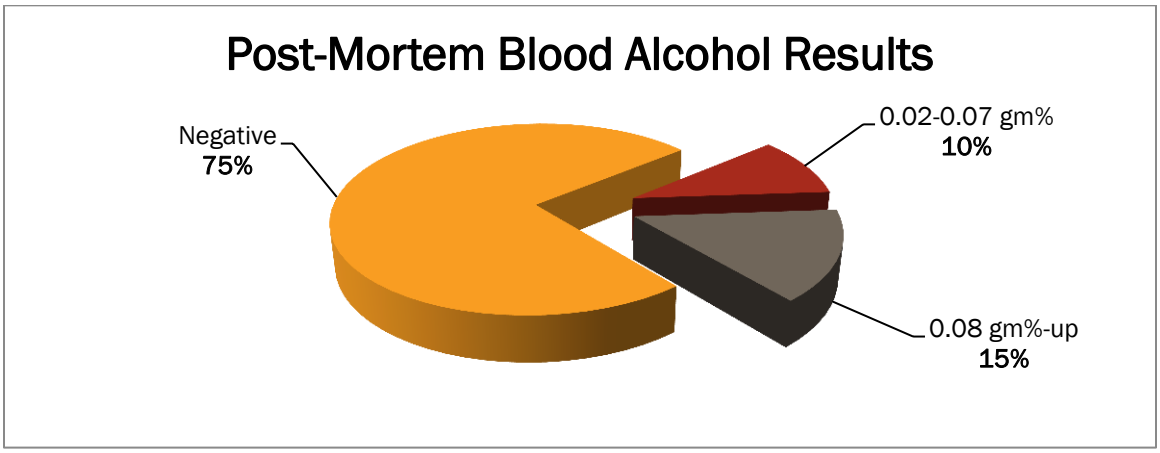


Figure 17 Post-mortem blood alcohol results for 2014.

Drug-Related Deaths

Aside from alcohol, tetrahydrocannabinol [THC: psychoactive ingredient found in marijuana] / carboxytetrahydrocannabinol is the most commonly found drug in post-mortem cases. Drug(s) and ethanol toxicity / abuse was a factor in the cause of death in 88 Accidental, Suicide, or Undetermined Post-Mortem Toxicology cases **[Table 5]**.

Table 5: Count of Cases with Drug and Ethanol Toxicity / Abuse

Manner of Death	Count of Drugs and Ethanol Toxicity / Abuse
Accidental	79
Suicide	6
Undetermined	3

Table 5 Count of cases with drug(s) and ethanol toxicity / abuse as a factor in the cause of deaths.

Table 6 depicts the 10 most common drug findings in post-mortem Toxicology cases [excluding ethyl alcohol] for 2014.

Table 6: 10 Most Commonly Detected Drugs / Metabolites (Post-Mortem)

Drugs / Metabolites Detected (Alphabetically)	Number Detected
Alprazolam / a-Hydroxyalprazolam	49
Amphetamine / Methamphetamine	58
Citalopram / Desmethylcitalopram	19
Cocaine / Benzoylecgonine / Cocaethylene	32
Diazepam / Nordiazepam	25
Hydrocodone / Hydromorphone / Dihydrocodeine	60
Methadone / Normethadone / EDDP / EMDP	45
Morphine / Codeine	41
Oxycodone	32
Tetrahydrocannabinol / Carboxytetrahydrocannabinol	99

Table 6 The 10 most commonly detected drugs / metabolites (Post Mortem) detected in 2014.

Alcohol Positive Drivers

Alcohol plays a significant role in driving under the influence cases. In 2014, 45% of tested samples in DUI and DUID cases were negative for the presence of alcohol. **Figure 16** shows that approximately 85% of alcohol positive drivers were at or above "per se" limit of 0.08 gm%.

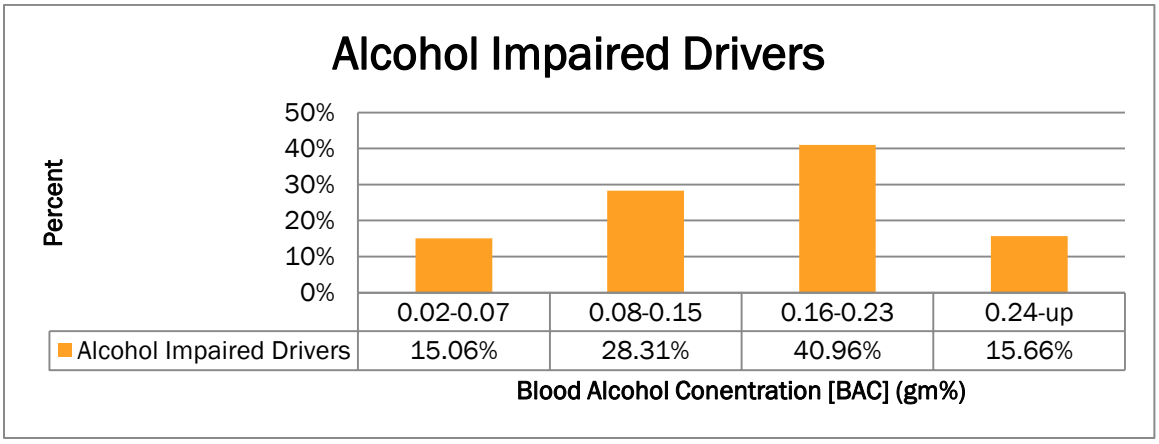


Figure 16 Alcohol test result ranges of positively tested samples submitted for DUI and/or DUID.

Alcohol Positive Drivers – Under the Age of 21

The legal age for possession of alcohol is 21 years old. In 2014, 11% of all motor vehicle drivers testing positive for alcohol were under the age of 21. **Figure 17** Illustrates the percentages of suspected alcohol impaired drivers by age and the blood alcohol levels for minors vs. legal drinking age.

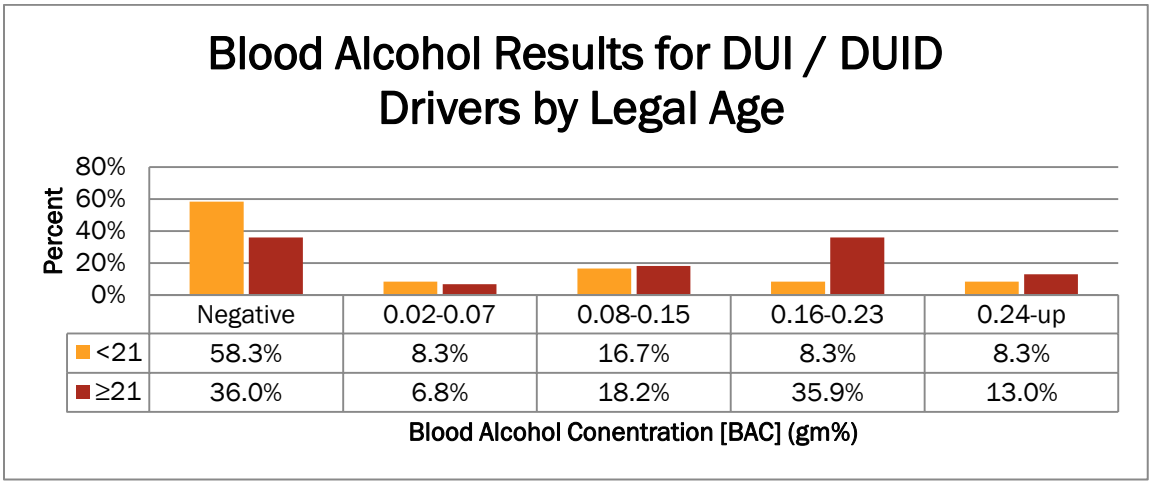


Figure 17 DUI and DUID results sorted by age (minors vs. ≥21 y/o). For drivers tested that were <21, 7% had alcohol concentrations ≥0.08 gm%.

Drugs and Driving

Thirty percent of DUID cases were found to be negative for alcohol upon pre-screening, 7% were cases involving blood alcohol levels at or below the legal limit and 63% of the cases were above the legal limit (0.08 gm% and up) **[Figure 18].**

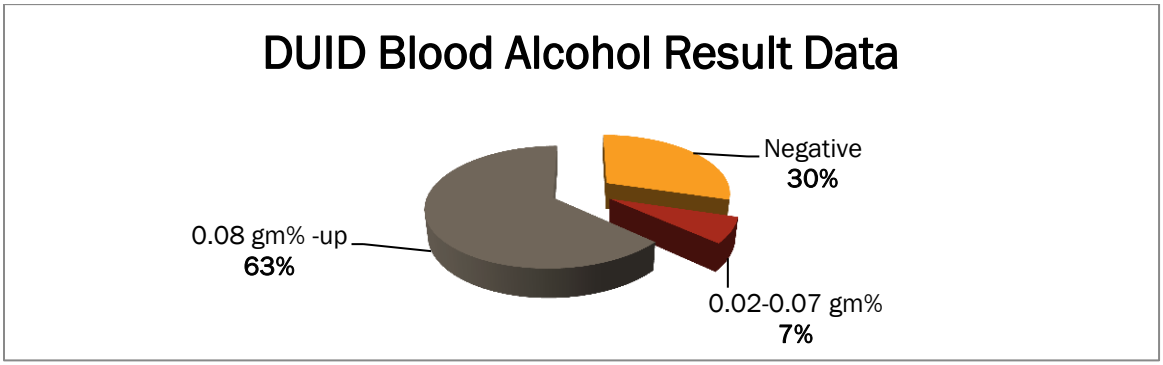


Figure 18 General alcohol testing result ranges for DUID submitted cases.

Not all drivers tested for the presence of alcohol tested positive. Also, not all positive alcohol cases were over the legal impairment limit of 0.08 gm%. **Figure 19** illustrates the number and percentage of drivers, both under 21 and over 21, that tested either negative or positive (≥ 0.02 gm%).

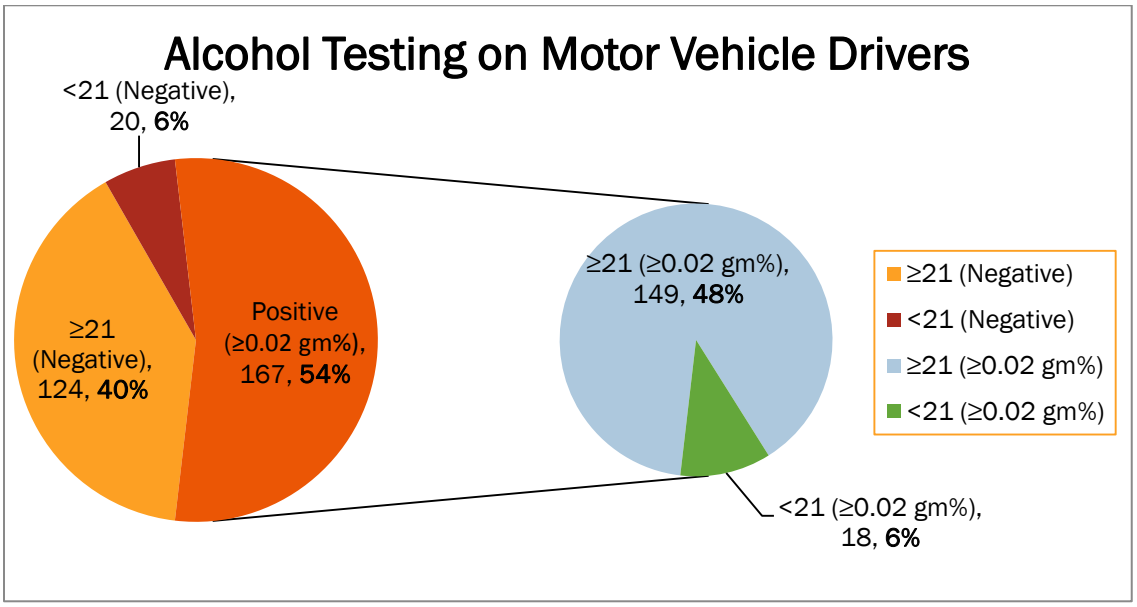


Figure 19 Illustrates the number and percentage of negative and positive alcohol cases tested by age group.

Drugs play a significant role in driving under the influence cases and can cause different levels of impairment. As depicted in **Figure 20**, the majority of DUID cases tested positive for the presence of drugs.

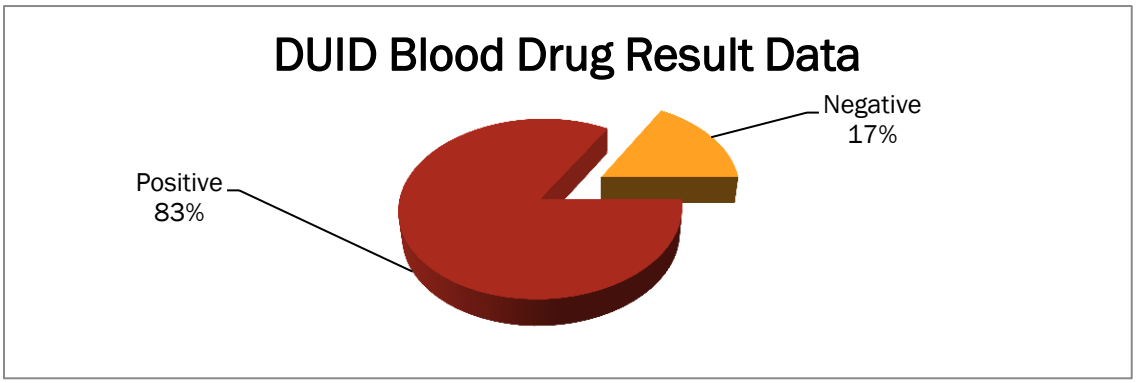


Figure 20 DUID blood drug results. It was concluded that 83% of individuals suspected of driving under the influence of drugs tested positive.

Driver Drug Usage: Prescription and Other Controlled Drugs

Table 7 depicts the 10 most common drug detected in driving-under-the-influence-of-drugs [DUID] toxicology cases [excluding ethyl alcohol] in 2014. Citalopram / Escitalopram / Desmethylcitalopram and morphine / codeine were equally detected and were the tenth most common.

Table 7: 10 Most Commonly Detected Drugs / Metabolites (DUID)

Drugs (Alphabetically)	Number Detected
Alprazolam / a-Hydroxyalprazolam	18
Amphetamine / Methamphetamine	11
Carisoprodol / Meprobamate	4
Diazepam / Nordiazepam	5
Difluorethane and Oxazepam and Morphine / Codeine	3 each
Hydrocodone / Hydromorphone / Dihydrocodeine	5
Oxycodone	4
Temazepam	5
Tetrahydrocannabinol / Carboxytetrahydrocannabinol	23
Zolpidem	4

Table 7 The ten most commonly detected drugs / metabolites detected in DUID cases in 2014.

Heroin Positive Cases

The Toxicology Laboratory has examined several Heroin related cases. The Laboratory identified these cases by detecting 6-Acetylmorphine (6-AM), a specific marker for Heroin. Heroin is rapidly converted to 6-Acetylmorphine (6-AM), and further to morphine therefore in many Heroin cases only the secondary metabolite, Morphine was detected. **Table 8** illustrates the case types and count of positive tests for each.

Table 8: Count of Heroin and it's Metabolites Detected.

Case Type	Heroin (6-AM)	Morphine*
DUID	1	11
Post-Mortem	8	45

Table 8 Case types and count of positive tests for Heroin and it's metabolites. * Cannot rule out use / abuse of morphine versus heroin.

Drug-Facilitated Sexual Assaults

Drug-Facilitated Sexual Assaults [DFSA] continue to be difficult forensic investigations. The cases often involve a perpetrator who will surreptitiously administer a drug to a victim to render them unconscious and sexually assault them. In 2014, the Toxicology Laboratory detected Ethanol [alcohol] in two and Quetiapine in another of the five DFSA cases worked.

LOOKING FORWARD TO 2015

The Forensic Laboratories will continue to serve the citizens of the Sedgwick County Kansas Region by ethically providing accurate and unbiased scientific analysis of evidence to the law enforcement and judicial communities.

In 2015, the Forensic Science Laboratories will complete the training of scientists in Fire Debris and Firearms / Tool Marks Laboratories, which will be the first time in several years that either section will be fully staffed with qualified scientists. This will have a positive impact on our contributing agencies, by providing a decrease in casework turn-around times and backlogs. Not only will each section have more qualified scientists to perform the casework, there will be a time savings in the peer review process, since the reviews will be able to be completed in-house.

The Drug ID Laboratory will continue to work on getting the drug case backlog down close to a 60 day turn-around time average.

Hire scientist in Toxicology Laboratory to provide support in reducing the DUI/DUID backlog and to maintain the DFSA cases at a zero backlog.

In 2015, the Forensic Science Center Laboratories will undergo our first ASCLD/LAB-*International* Surveillance Assessment and the Biology / DNA Laboratory will undergo an external QAS Audit for DNA Testing Laboratories.