



Toxicology Program Trends

FY2023

FY2023 IDAHO STATE POLICE FORENSIC SERVICES:
TOXICOLOGY TRENDS

Overview and Background

This report discusses trends in the toxicology program, as well as the number of toxicology cases submitted to the following Idaho State Police Forensic Services (ISPFS) laboratories for the fiscal year 2023 (FY2023): District 1, Coeur d' Alene; District 5, Pocatello; and District 3, Meridian (volatiles analysis only). A "toxicology case" was any case which has urine or blood submitted to the laboratory for drug analysis and/or volatiles analysis; volatiles analysis may also be performed on vitreous humor samples and beverages suspected of containing ethyl alcohol. Volatiles analysis quantitates ethyl alcohol (drinking alcohol) and detects a wide range of other alcohols or inhalants. Toxicology analysis falls under three major disciplines: alcohol (the level of alcohol in blood, urine, vitreous humor, or unknown liquids), blood toxicology (drugs in blood) and urine toxicology (drugs in urine).

A case may have multiple items submitted for analysis (e.g. blood and urine samples taken from both drivers in a two-car auto accident account for one case with four items). If blood and/or urine was also taken from any passenger(s) in either vehicle, those samples will also be contained under the same case number. The case counts in the Toxicology Tracking Information table do not account for multiple items in one case; this total also applies to any items not analyzed (e.g., insufficient sample for analysis). The results discussions in the Alcohol and Toxicology sections of the report are based solely on actual items tested – so if there are multiple items in a case, each item was accounted for in the results discussion. The Alcohol and Toxicology sections do not account for any items not analyzed.

These statistics were compiled from the Idaho Laboratory Information Management System (ILIMS), which was used to log in and track all evidence submitted to the forensic laboratory system during FY2023. All case information was provided by the submitting agencies to the laboratory.

For the purposes of this and all subsequent years, "juvenile" refers to any subject under age 18 as of the incident date, except for alcohol analyses. Subjects under age 21 as of the incident date are considered juveniles for alcohol analysis statistics. This clarification to the "juvenile" definition for alcohol statistics was based on the per se level of 0.02 g% for persons under age 21.

General Breakdown for FY2023

Statistics included in this report were obtained from the Idaho Laboratory Information Management System (ILIMS). This was the system that was used to log in and track all evidence submitted to the forensic laboratory system during FY2023. The ILIMS system allows for agencies to enter multiple charges instead of forcing the agencies to list only the highest charge; therefore, many cases with a drug charge were also DUI cases. It should be noted that any cases in which a date of birth (DOB) was not provided are classified as “adult” to prevent significant statistical changes to the juvenile category. A summary of the number and types of cases for specific categories are shown in **Table 1**.

	Alcohol/Volatiles	Blood Toxicology	Urine Toxicology	Total	FY2023 Percent
DUI*					
Adult	1282	774	44	2100	68.2%
Juvenile	50	13	1	64	
Drug/Narcotic Violations**					
Adult	39	148	17	204	6.6%
Juvenile	4	1	0	5	
Other***	70	68	15	153	4.8%
Auto Accident Fatalities	58	55	1	114	3.6%
Accident Victim Kits	4	4	0	8	0.2%
Death (non-homicide)	10	15	0	25	0.8%
Murder/Attempted Murder	3	5	1	9	0.3%
Rape****	28	12	48	88	2.8%
Cases Closed Before Analysis*****	34	361	8	403	12.7%
Total:	1582	1456	135	3173	100%

Table 1- Statistical Representation of the Number and Distribution of Toxicology Cases for FY2023.

*Includes Juvenile, Misdemeanor, and Felony; **Includes Possession of Controlled Substances or Paraphernalia, Trafficking, Manufacturing, Delivering, Possession/Distribution/Use by a Minor; ***Includes Assault/Battery (Aggravated or not), Domestic Violence, Probation Violations, Officer Involved Shooting/Accident, Injury Accidents, Injury to Child, Grand Theft, Under the Influence in Public, Unlawful possession of a firearm, Leaving the scene of an accident, Manslaughter, Vehicular Manslaughter, and Lewd Conduct; ****Includes Rape, Male Rape, Sexual Abuse/Battery of Child/Minor, and Penetration with a Foreign Object. *****Cases can be closed either because the testing was no longer necessary per the agency or if other evidence proves to be probative and testing of another type was no longer warranted (i.e. blood alcohol and blood toxicology are both requested but the alcohol result was greater than 0.10 g%, so the blood toxicology request was closed without analysis).

The ISPFS laboratory system received 3,173 toxicology cases for FY2023. This number seems to be on par with what has been submitted in previous years. The 3,173 cases was slightly more (1.1%) than that received in FY2022 and slightly less (2.5%) than the number of cases received in FY2021 (3,253 cases).

Figures 1a and 1b (below) show the ten-year trend for toxicology cases as well as the breakdown of the individual matrices/testing requested. Multiple items for a single case are often submitted but are not accounted for in the totals. Samples may be counted twice because an alcohol sample may also be processed for toxicology. The average number of cases submitted to ISPFS for the last 5 years was 3,127 cases and the average for the last 10 years was 2,921 cases.

There appears to be a general upward trend in the total number of volatiles/toxicology cases submitted in the last ten years. In terms of the individual sample types, urine toxicology is on a downward trend while blood alcohol/volatiles and blood toxicology appear to be on a generally upward trend. The downward trend in urine toxicology is not surprising as more officers have switched from collecting urine for DUI cases to blood, as blood is the preferred specimen for DUI cases since it indicates more recent drug use. The upward trend in blood toxicology is likely due to the number of people being prescribed medications increasing every year, and in turn, the number of people driving while on these medications also going up. Another possible reason for the increase, as well as the rise in blood alcohol/volatiles submissions could be due to an increase in the Idaho population. This trend will likely continue as it is anticipated that the population in Idaho will continue to increase.

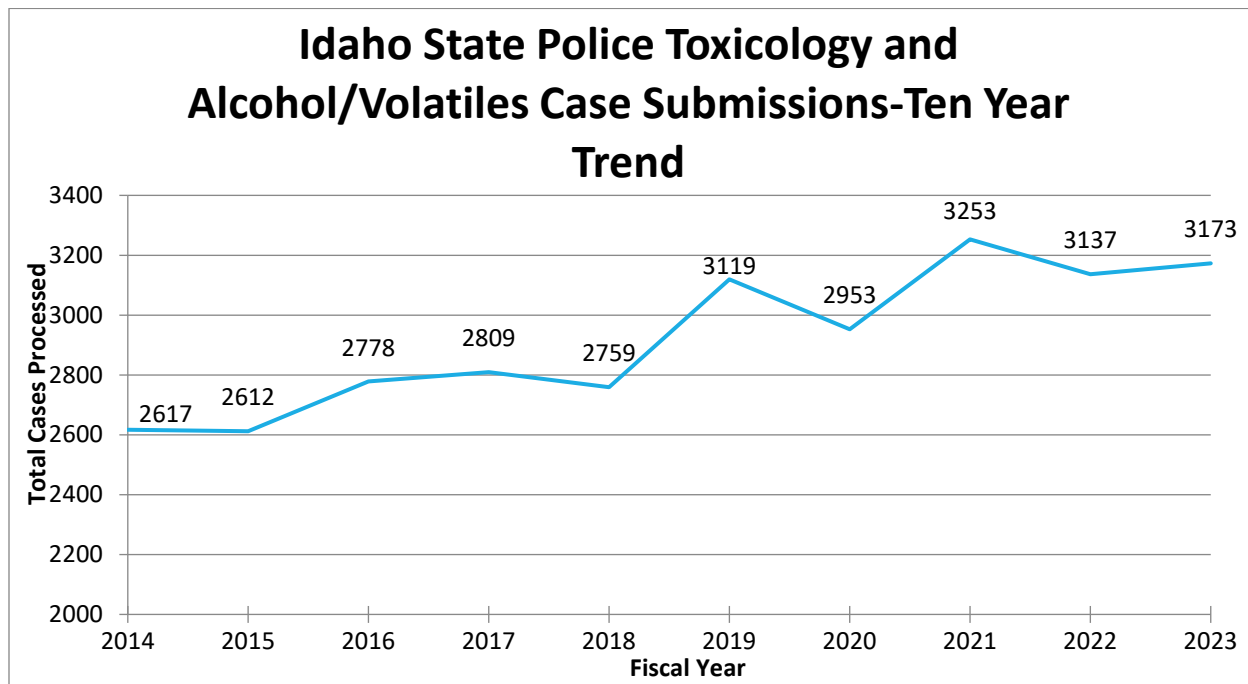


Figure 1a- Ten-Year Trend for Toxicology Case Submissions

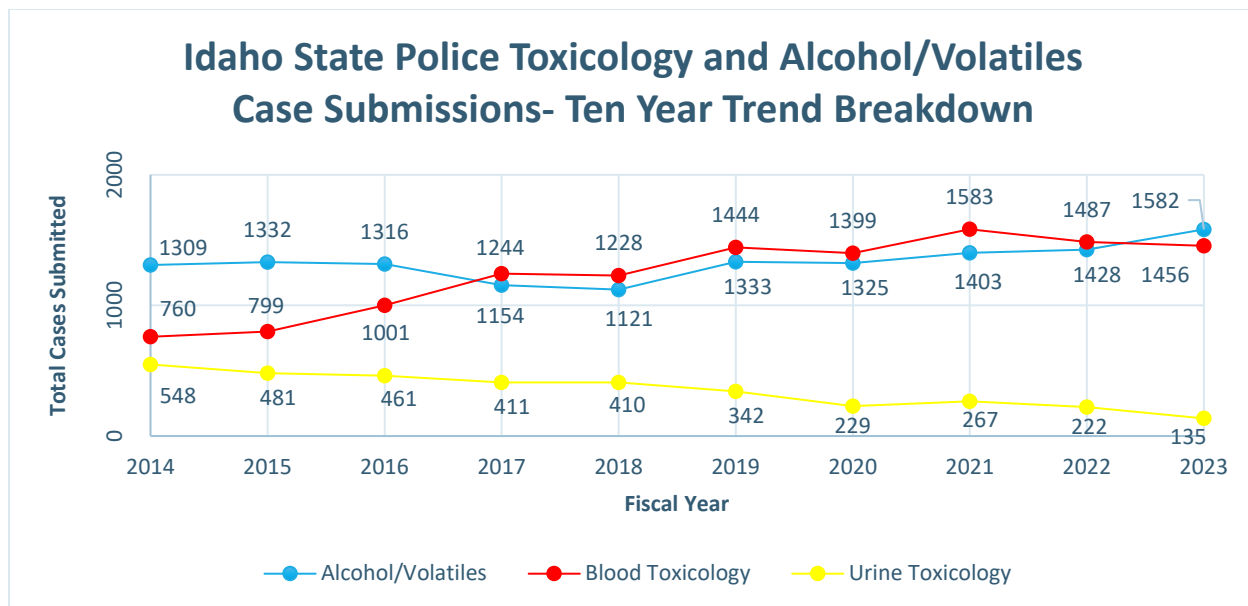


Figure 1b- Breakdown of the Ten-Year Trend for Toxicology Case Submissions

Alcohol and Other Volatiles

The number of alcohol/volatiles case submissions to ISPFS increased by about 10.8% from FY2022 to FY2023. When considering submissions for the last ten years, there was a drop in FY2017 and FY2018 and then the number of cases went back up to what was received in the few years prior and has continued to trend upward since then. A large increase (beyond that expected due to population growth) in the number of cases is not expected since ISPFS provides support for breath testing in Idaho and the scientists working in this discipline have reported a significant increase in breath testing workload. Since breath testing instruments are becoming more widely available and easier to use, it is likely that law enforcement is opting to perform breath tests rather than obtain warrants for blood draws, unless drugs other than alcohol (i.e. inhalants) are also suspected. If any issues arise with the breath testing instruments or laws, it is likely that there will be a large increase in the number of alcohol/volatiles cases submitted.

Ethanol was not the only compound that was detectable during blood/urine alcohol testing. The laboratory also reports cases with positive inhalant results. Investigators suspect inhalation of paint or air duster in most of these cases. Fluorinated hydrocarbons (e.g. 1,1-difluoroethane (DFE)) are the compounds typically detected after air duster inhalation; acetone and toluene are volatiles detected after canned paint inhalation.

Alcohol statistics for this report are expressed in g% units, as not all cases analyzed were blood. The g% unit includes blood (g/100cc blood), urine (g/67mL urine), and vitreous humor (g/100cc vitreous humor). Any liquid alcohol samples have been excluded from the statistical analysis presented here.

Alcohol analysis requests span a wide range of case types: DUI, rape, accident, death investigation, and other offense cases. The alcohol result categories include: none detected/ below reportable limit (<0.02 g%), ≥0.02 g% and <0.08 g%, ≥0.08 g%, and other volatiles (acetone, DFE, toluene, etc.).

Adult Alcohol Results

This section’s statistics are based not on a total number of cases, but on total alcohol results. This may result in different numbers than the previous table, as some cases have multiple items and others were not analyzed, in addition, these are adult cases, not total cases. ISPFS processed 1,439 adult samples for alcohol and inhalants during FY2023. The analysis results are tabulated below. Each sample for which alcohol analysis was requested was simultaneously tested for the presence of inhalants, however, the total 1,439 samples reported in the table below does not include beverage samples, or inhalant results.

Number of Adult Samples (not included in total)	Result Category
233	<0.02 g%
61	≥0.02 g% and <0.08 g%
1,145	≥0.08 g%
1,439	Total (Reflects ethanol results only)

For the purposes of this report, any alcohol result that was reported as “none detected” or “below reportable limit” was categorized as <0.02 g%. If alcohol and toxicology testing are both requested, then a negative alcohol sample was also processed for drugs. Therefore, samples listed as none detected (or <0.1 g%) may be positive for drugs other than alcohol.

Figure 2 was a depiction of the overall adult alcohol results for FY2023; this chart includes DUIs, death investigations, auto accident fatalities, and a wide variety of other case types.

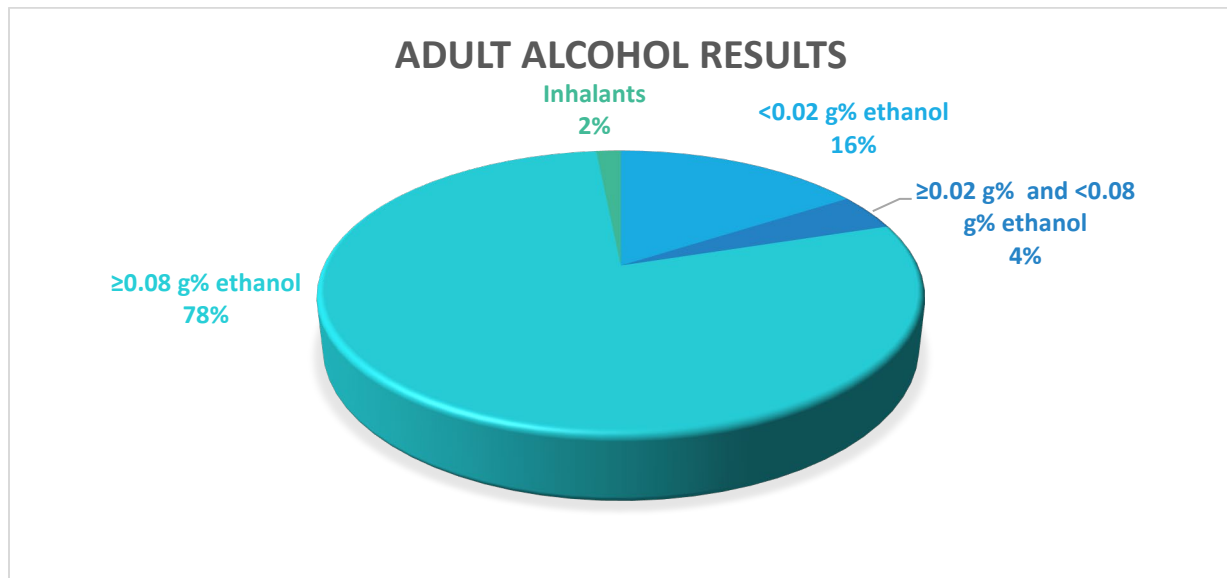


Figure 2- Adult Alcohol/Volatiles Levels for FY2023

Twenty-three adult samples tested positive for inhalants. In terms of significance, considering the 1,463 adult alcohol samples submitted, 23 inhalant samples only accounts for about 2% of the total. However, it was interesting to note that in FY2020 and FY2021, there were 15 adult samples that were positive for inhalants, and in FY2022, there were 18. The inhalants confirmed in the 23 positive samples consisted of 16 samples that were positive for fluorinated hydrocarbons (air duster) and 7 samples that were positive for acetone (nail polish remover, it was also formed in the body during ketoacidosis).

Adult samples submitted for pending DUI charges constituted 1,252 of the total 1,439 alcohol/volatiles cases (78%). Of these 1,252 samples, 85% of them were over the per se limit of 0.08 g%. As stated earlier, if alcohol and toxicology were both requested on submission, any sample with alcohol results below 0.10 g% was automatically forwarded for drug testing. ISPFS also provides toxicology analysis for those cases where the alcohol level was ≥ 0.10 g% if there are extenuating circumstances which may include sexual assault, death investigations, injury to a child, or aggravated offenses.

When urine samples are submitted to ISPFS for alcohol/volatiles testing, a disclaimer statement is included on the report. It states that urine alcohol results are of questionable value. This is due to several reasons. First, bacteria and yeast are common in urine and as these organisms grow, they produce alcohol. Second, urine collection procedures are critical for meaningful interpretation of results. The urine needs to be voided, and then a 15-minute wait period should follow before a fresh urine sample was collected for alcohol analysis. ISPFS discourages the use of urine for alcohol analysis due to the questionable value of results (IDAPA 11.03.01), but urine samples are occasionally submitted for alcohol and/or inhalants analysis.

One category always of particular interest is adult auto accident fatalities. **Figure 3** shows the BAC results for the adult auto accident fatalities. A total of 55 adult auto accident fatality case samples were submitted to ISPFS in FY2023; this was 12 fewer cases than for FY2022. Of the 55 cases, 66% of the cases alcohol results of 0.02 g% or less, about 7% had results between 0.02 and 0.08 g%, and 25% were at or above the legal limit of 0.08 g%. One case was positive for an inhalant (acetone). This distribution was very similar to previous years.

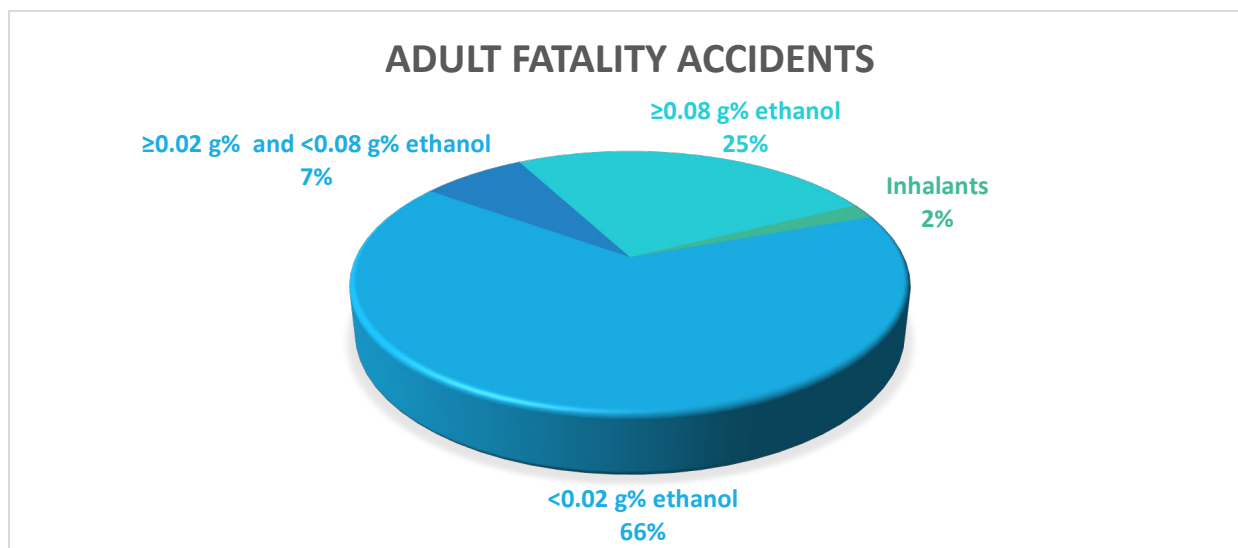


Figure 3- Results for Adult Alcohol Fatality Accidents

The ten-year trend of adult auto accident fatality cases submitted to ISPFS is depicted in **Figure 4**. Interestingly, there is a strange trend seen where the number of cases will go up, one year, then down the next year, then back up, and back down. The only exception with this is FY2016, where if the pattern was being followed, the number should have been lower than 69 cases but it was actually 1 higher, at 70 cases. The average number of adult fatality cases submitted for the last 10 years (including FY2022) was 75 cases.

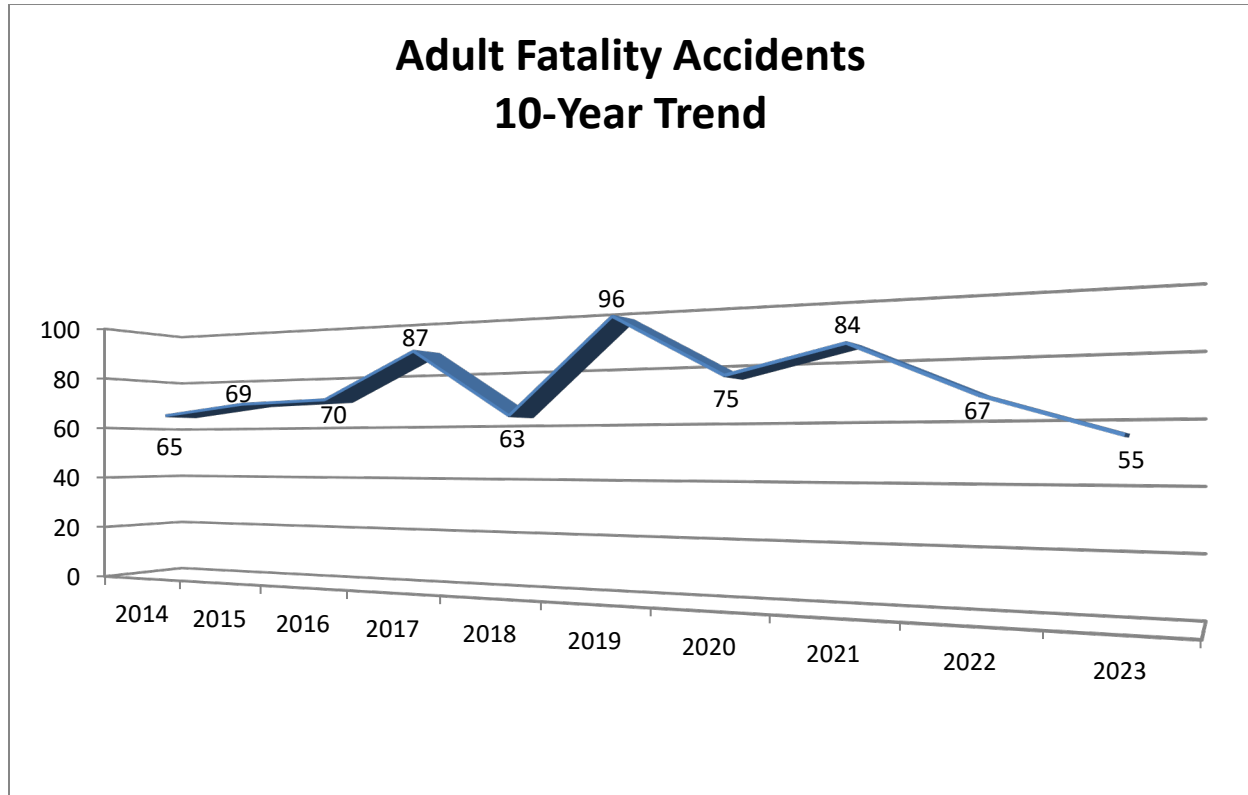


Figure 4- Ten Year Adult Fatality Accident Trend

Other Offense Alcohol Concentrations-Adults

Cases submitted for alcohol analysis in FY2023 also included several other offenses aside from DUI. **Figure 5** is a graphic depiction of offenses (other than DUI) for which samples were submitted for alcohol analysis. **Figure 6** depicts a breakdown of the results for these other offenses. Death investigations (non-homicide) includes suicides, unattended deaths, or any other death that was deemed non-criminal but needs investigating. Many of the cases listed with negative or low alcohol concentrations may have a positive result for other drugs in the toxicology section of this report. It is interesting that there are very few cases that have results between 0.02 G% and 0.08 G% ethanol. In fact, only about 6% of the cases had results in this range.

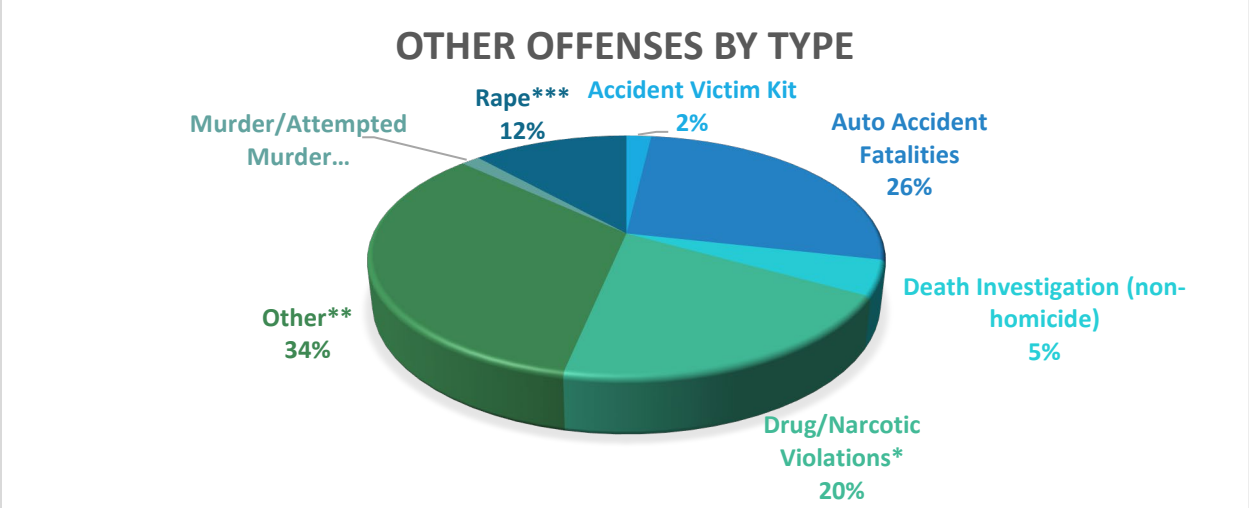


Figure 5 – Alcohol Analysis Requests by Other Offense Types

*Includes Possession of Controlled Substances or Paraphernalia, Trafficking, Manufacturing, Delivering, Possession/Distribution; **Includes Assault/Battery (Aggravated or not), Domestic Violence, Officer Involved Shooting/Accident, Injury Accidents, Injury to Child, Under the Influence in Public, Unlawful possession of a firearm, Leaving the scene of an accident, Manslaughter, Vehicular Manslaughter, and Lewd Conduct; ***Includes Rape, Male Rape, Sexual Abuse/Battery of Child/Minor, and Penetration with a Foreign Object.

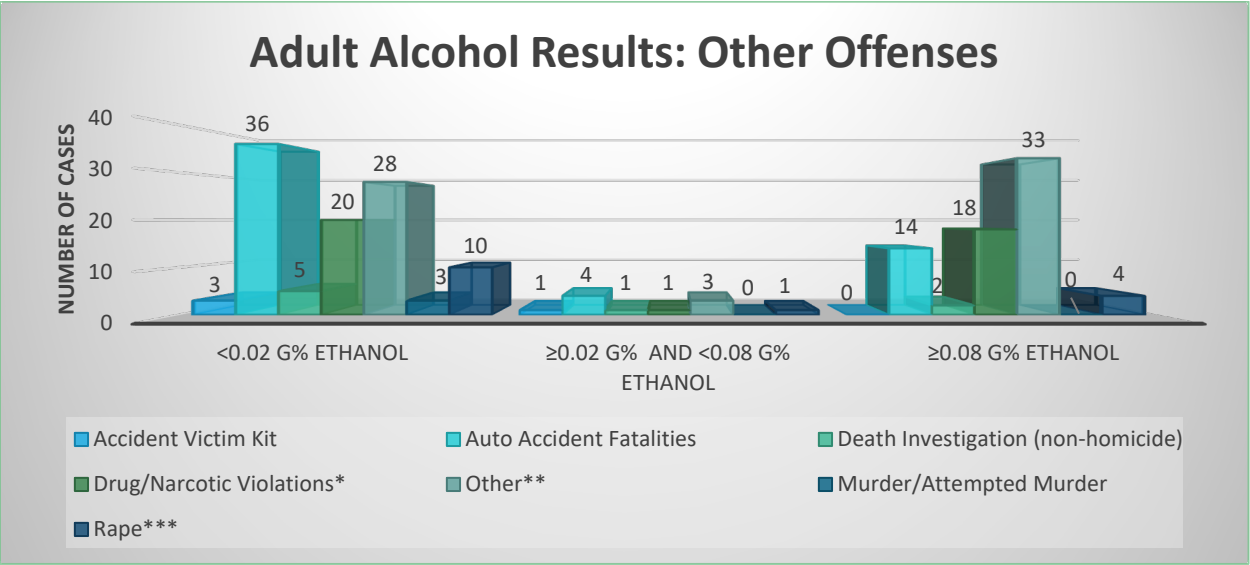


Figure 6- Adult Alcohol Results for Other Offenses

*Includes Possession of Controlled Substances or Paraphernalia, Trafficking, Manufacturing, Delivering, Possession/Distribution; **Includes Assault/Battery (Aggravated or not), Domestic Violence, Officer Involved Shooting/Accident, Injury Accidents, Injury to Child, Under the Influence in Public, Unlawful possession of a firearm, Leaving the scene of an accident, Manslaughter, Vehicular Manslaughter, and Lewd Conduct; ***Includes Rape, Male Rape, Sexual Abuse/Battery of Child/Minor, and Penetration with a Foreign Object.

Juvenile Alcohol Results

ISPFS processed 99 juvenile alcohol cases in FY2023. This was 5 more juvenile alcohol/volatile cases than was processed in FY2022. Of these samples, 61% were over the legal limit for persons under age 21 (0.02 g%). Of the 99 juvenile alcohol samples submitted to ISPFS, 71 were juvenile DUI cases; 53 of these 71 cases (75%) were over the juvenile (under age 21) legal limit of 0.02 g%. Two of the samples tested positive for inhalants (fluorinated hydrocarbons). These percentages are similar to what was seen in previous years.

Figure 7 displays the overall juvenile case results; these results include DUIs, accident fatalities, and various other case types.

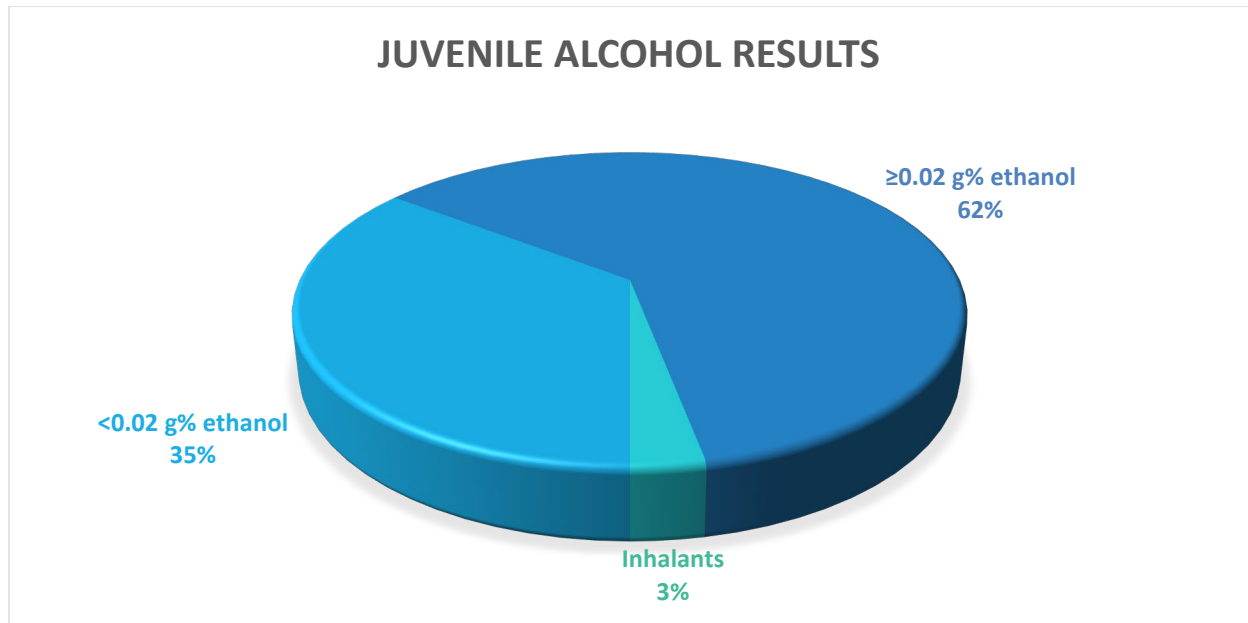


Figure 7- Juvenile Alcohol Levels for FY2023

A large increase in the number of juvenile alcohol samples submitted in fatality cases was seen in FY2020 as it increased from 2 cases in FY2019 to 13 cases in FY2020. That corresponded to a 550% increase. This number increased even more in FY2021 to 17 cases. In FY2022, this number dropped down to 10 cases, and continued to drop to only 3 cases in FY2023. The average number of juvenile auto accident fatality cases submitted in the last ten years was 11. Over the last ten years, the lowest number of cases were FY2019 (2 cases) and this year (FY2023) with 3 cases. There is no obvious explanation for why those years were so much lower than the others.

Figure 8 is a trend chart depicting juvenile auto accident fatality cases submitted over the last 10 years.

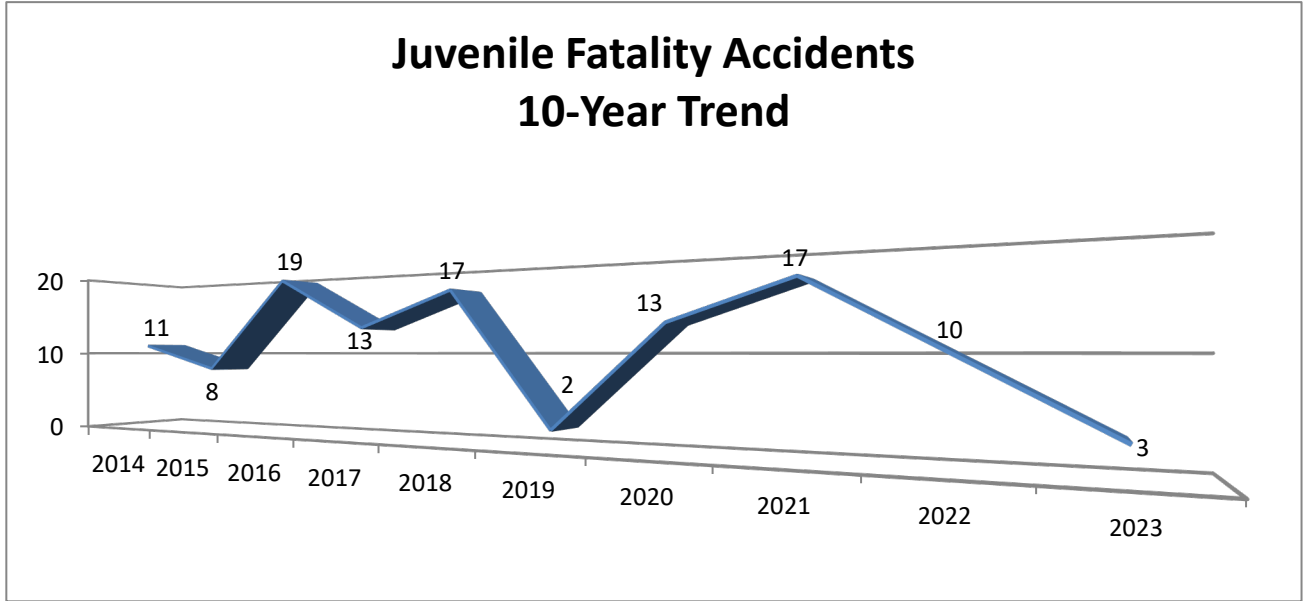


Figure 8- Ten Year Juvenile Fatality Accident Trend

There were a total of 28 juvenile cases submitted for FY2023 that were not DUI cases. The breakdown of the results of those cases is shown in Figure 9. Seventy percent of the cases tested that were not related to a DUI had alcohol results of less than 0.02 G% ethanol.

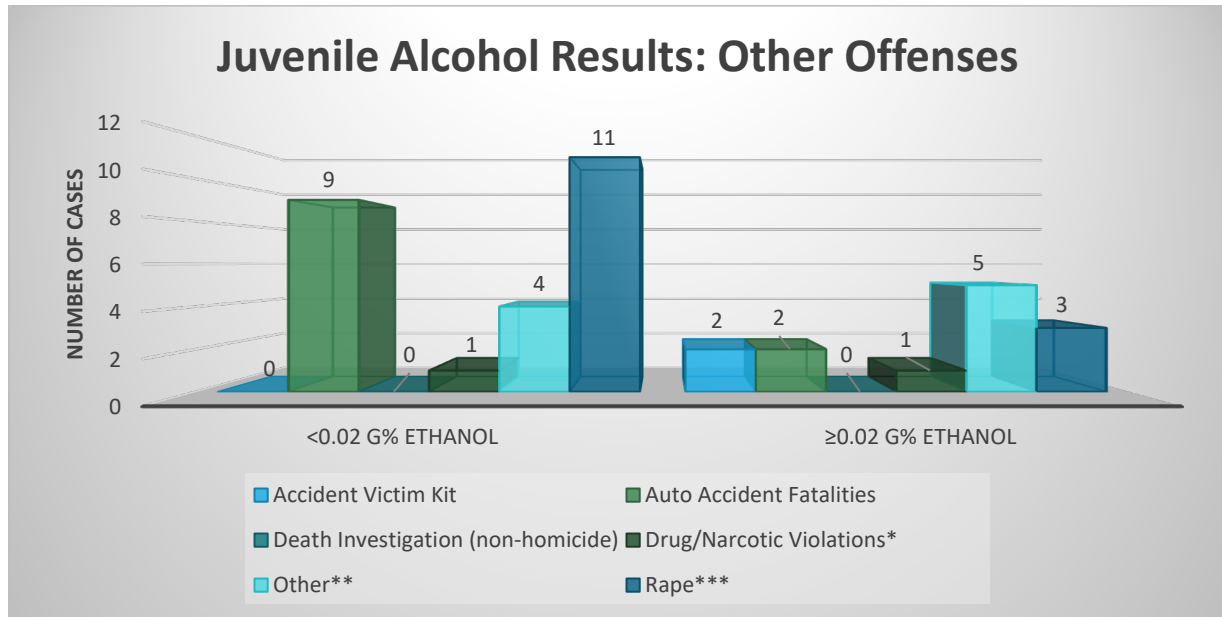


Figure 9- Juvenile Alcohol Results for Other Offenses

*Includes Possession of Controlled Substances or Paraphernalia, Trafficking, Manufacturing, Delivering, Possession/Distribution; **Includes Assault/Battery (Aggravated or not), Domestic Violence, Officer Involved Shooting/Accident, Injury Accidents, Injury to Child, Under the Influence in Public, Unlawful possession of a firearm, Leaving the scene of an accident, Manslaughter, Vehicular Manslaughter, and Lewd Conduct; ***Includes Rape, Male Rape, Sexual Abuse/Battery of Child/Minor, and Penetration with a Foreign Object.

Toxicology (Drugs in Blood and Urine)

Terms and Drug Categories

After a drug enters the body, it starts getting broken down into compounds that are easier for the body to eliminate. This is referred to as metabolism. Compounds that the drugs are broken down into are termed metabolites. Some metabolites do not produce any pharmacological effects (inactive metabolites), while others do have pharmacological properties and can cause effects of their own. During the metabolic process, there will be a combination of both the original drug (or parent drug) and the metabolite(s) present. In the case of active metabolites, both the parent drug and metabolite(s) can simultaneously cause pharmacological effects on the body.

The central nervous system (CNS) is comprised of the brain and spinal cord. Drugs that act to speed up the processes of the central nervous system are called central nervous system stimulants (CNS-S). Highly impairing CNS-S drugs, such as methamphetamine and cocaine, are typically not distributed in prescription form. Amphetamine can be obtained as a prescription but is most commonly seen alongside methamphetamine (which was not surprising since it is an active metabolite of methamphetamine). Since amphetamine is an active metabolite, it will act as its own drug and produce stimulant effects aside from those produced by methamphetamine. While cocaine is a well-known stimulant and is seen in many other states, ISPFS laboratory analysis yields relatively few positive results for cocaine. However, this does not necessarily mean cocaine was not being abused in Idaho. Since cocaine is eliminated from the body very rapidly, if a significant amount of time passes between use and sample collection, cocaine may not be detected in the sample. An inactive cocaine metabolite, benzoylecgonine, has a longer detection window, and can sometimes be detected in samples if the individual has recently used cocaine. This means that toxicology results can support allegations of cocaine use, even if cocaine itself was not detected in the sample.

Drugs that slow the processes of the central nervous system are termed central nervous system depressants (CNS-D). Some of the most impairing drugs fall under the CNS-D category of drugs. Drugs that exhibit CNS-D effects are found in a wide range of therapeutic categories: anti-depressants, anti-anxiety drugs, antihistamines, benzodiazepines, narcotic analgesics (NA), and others.

The psychoactive component of marijuana is tetrahydrocannabinol (THC). There are numerous THC metabolites, including hydroxy-THC and carboxy-THC. The testing done by ISPFS allows THC and hydroxy-THC quantities to be reported (in blood only). For simplification, THC will be listed on graphs and referred to in discussion of graphs, even though the results are referring to cannabinoids and could be THC, hydroxy-THC or carboxy-THC.

Narcotic analgesics are prescribed to relieve pain and to induce profound sleep. If these drugs are taken in excess of the prescribed dose, stupor, convulsions, and coma can result. Some of the most commonly confirmed narcotic analgesics in Idaho DUI cases are morphine and fentanyl. Since fentanyl has become so popular nationwide, it and one of its metabolites (norfentanyl) were added in the last few years to

allow for the reporting of those compounds in blood. Acetyl fentanyl (a designer drug that was similar to fentanyl) and its metabolite, acetyl norfentanyl, were also added.

Drug combinations are discussed in this report because these combinations can cause additive or synergistic effects. Hydrocodone (Vicodin) used in conjunction with carisoprodol (Soma) has greater impairing effects than either drug used alone. An anti-depressant taken alone in therapeutic amounts (prescribed quantities) may not have any impairing effects, but taken in conjunction with other CNS-Ds (e.g. alcohol or other anti-depressants) may display more marked effects. (i.e. $1 + 1 = 2$). These combinations are both examples of additive effects. Some drugs produce synergistic effects. Synergistic means that the drug combination may cause effects much greater than either drug alone (i.e. $1 + 1 = 5$). A common example of this would be the mixture of codeine and acetaminophen for the relief of moderate pain. Taken separately either of these substances will provide relief for a lesser amount of pain, but when taken together the synergistic reaction between the two drugs allows for a greater amount of pain relief than if either drug was taken on its own.

One important factor to keep in mind is that a negative sample result in one discipline (i.e. alcohol, blood toxicology, or urine toxicology) only reflects the testing performed in that discipline; the sample may have a positive result from testing in another discipline. For example, a case may have a negative alcohol result, but a positive result for drugs. ISPFS laboratory policy is to not process a sample for toxicology if the blood alcohol result is above 0.10 g%. In special circumstances, such as sexual assault, death investigations, injury to a child, or possible overdose cases, the toxicology may still be analyzed even if the blood alcohol is above 0.10 g%. An ISPFS policy change in 2013 required toxicology analysis (if requested) on samples from deceased drivers in fatality accidents when the alcohol level was below 0.20 g% of blood.

A negative toxicology result does not necessarily mean that there was no drug in the sample. It could be that there was a drug or drugs in the sample but that we are not able to detect it/them with our methods, or it could also mean that the drug(s) present is/are below our limits of detection. There are, of course, cases in which there was no drug detected because there was no drug present, but it is important to keep in mind that there are testing limitations and these limitations should be considered when a negative result arises.

The difference between the blood and urine matrices submitted for testing drugs (toxicology) depends on many things: pH, methods of analysis, drug metabolism, and many others. Based on this knowledge, some drugs may be found in one matrix and not the other. For instance, carboxy-THC may be found in urine many days or weeks after use, but not in blood. If carboxy-THC was found in the blood, it was typically indicative of more recent use. THC and hydroxy-THC can be found in the blood, but due to rapid metabolism, are typically not found in urine.

The type of fluid sample sent for toxicology analysis may depend on legal considerations. Blood is a better sample for alcohol and can easily be retained for toxicology testing after the alcohol/volatiles analysis is complete. In addition, as stated earlier, urine alcohol results can be of questionable value.

If there is a question of impairment, such as in a DUI case, blood is typically the preferred sample for toxicology because it gives the best indicator for recent use and drugs that were possibly

pharmacologically active at the time of collection. With sexual assault cases, samples are not usually collected for several hours (or even days) after an assault, and by that time any drugs that may have been given will typically be filtered out of the blood or at very low concentrations in the blood. The problem of low drug concentration is much less likely with urine. Since urine pools in the bladder, the drug collects there and provides a much greater drug concentration than in blood. Also, obtaining a urine sample is not an invasive procedure, whereas blood sample collection is invasive. For these reasons, urine is typically the preferred matrix for sexual assault cases.

ISPFs accepted 1456 blood samples and 135 urine samples for toxicology testing in FY2023. This correlates to a decrease of about 2% in the number of blood cases and a 39% decrease in urine cases from FY2022. When considering the number of blood and urine toxicology submissions for the last 10 years, it appears that there is an overall upward trend associated with the blood toxicology samples and an overall downward trend with the urine toxicology samples. This trend can easily be seen when looking at the blood and urine toxicology submission numbers in **Figure 1b**.

Please note that in all toxicology graphs below, red is used for blood, and yellow for urine. Graphical representation of the “Single Drug” category refers to samples that only had a single drug category present – some of these samples had multiple drugs within that same category. For example, diphenhydramine (Benadryl) and zolpidem (Ambien) are both in the CNS-D category; a sample containing both drugs would be placed into the “Single Drug” category despite the presence of multiple drugs in the sample.

Adult

For FY2023, there were 1,172 adult cases tested for toxicology testing. Approximately 65% of the cases had a DUI charge associated with them. The remaining cases were split into eight other categories. They included accident victim kits, auto accident fatalities, non-homicide death investigations, drug/narcotic violations, probation violations, murder or attempted murder, rape, and other. The category of “other offenses” includes charges such as assault and battery, burglary, injury accidents, and under the influence in public.

Of the non-DUI cases, the largest percentage of cases fit into the drug/narcotic violations category (45%). The breakdown of offenses associated with the non-DUI adult toxicology cases is displayed in **Figure 10**.

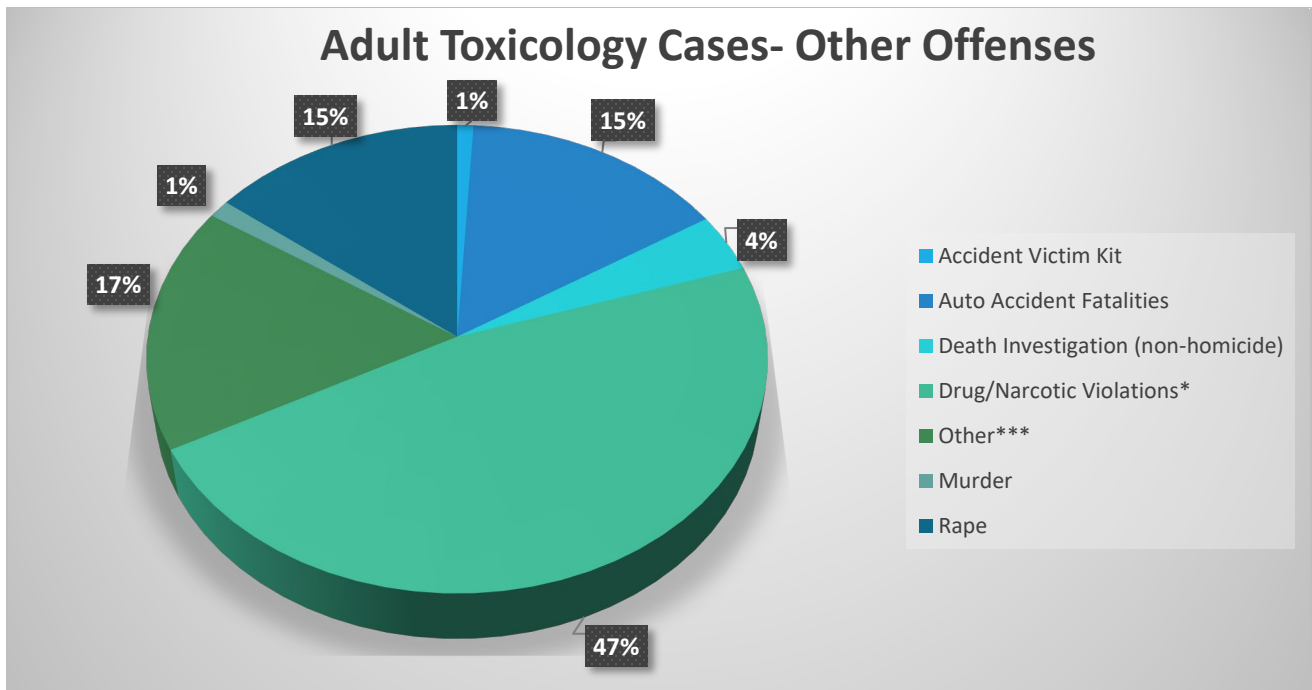


Figure 10- Breakdown of Adult Toxicology Cases Processed for Crimes Other Than DUI

Figure 11a shows the adult blood and urine toxicology results for FY2023 by drug category. **Figure 11b** shows the specific breakdown for the cases that had multiple drugs present in a sample. For example, CNS-S includes drugs such as methamphetamine, cocaine, and others; narcotic analgesics (NA) includes drugs such as morphine or hydrocodone. For the breakdown of the multiple drugs, only those combinations that had 20 or more cases associated with it were displayed in the graphs.

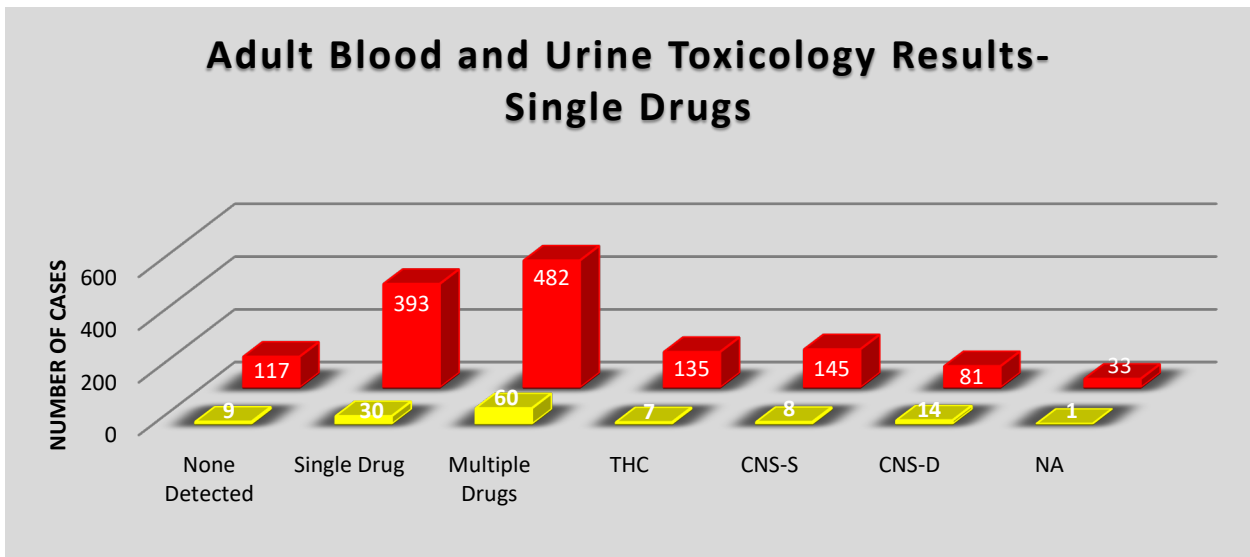


Figure 11a – Adult Blood and Urine Toxicology Results for Single Drug Categories

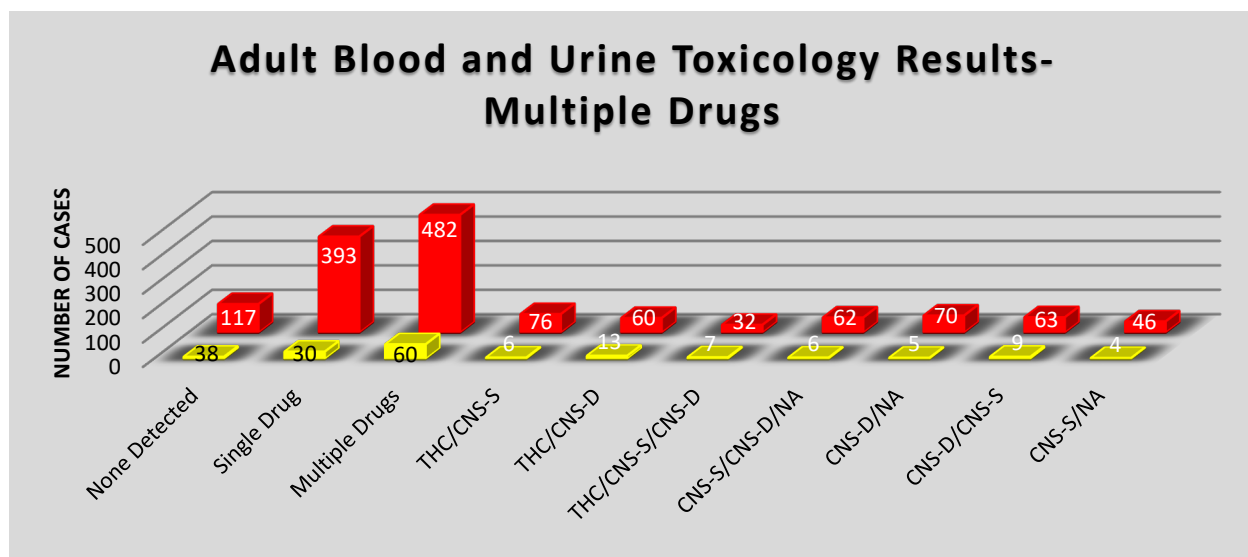


Figure 11b – Adult Blood and Urine Toxicology Results for Multiple Drug Categories

When reviewing blood and urine toxicology results, one thing to consider is that many of the blood samples submitted had a request for both alcohol and toxicology testing, but if the alcohol result was 0.10 g% or higher, the blood sample and urine sample (if present for the same case) was/were returned without toxicology testing in most cases. Therefore, there may have been many more cases that could have been positive for drugs and been included in these categories had those samples been tested.

Prior to FY2021, the prevalence of drugs from a single drug category being higher than that for drugs from multiple drug categories in blood toxicology was always higher. Starting in FY2021, this flipped, and it became more prevalent to have drugs from multiple drug categories in a single sample. This prevalence was what has been seen in the urine toxicology cases for previous years and was not surprising when you think about the fact that drugs stay in the urine much longer than in the blood and are therefore more likely to be detected in the urine than in the blood. There was no obvious explanation for why there was now a higher number of blood samples that belong to the multiple drugs category instead of the single drug category. Of the single category cases, it appeared that cases with CNS stimulants were most prevalent, followed by cannabinoids (can be either THC, hydroxy-THC or carboxy-THC). CNS-Ss include drugs like Adderall (amphetamine), methamphetamine, and cocaine. Of the single drug urine cases, cannabinoids were detected most often, then CNS-S and CNS-D drugs. CNS-Ds can be many different drugs; examples include Valium (diazepam), Xanax (alprazolam), and Ambien (Zolpidem).

There were eleven different combinations that encompassed the majority of the samples. However, only the seven most prevalent combinations were displayed in **Figure 11b**. Of those combinations displayed, CNS-S drugs were present in seven out of the eleven combinations. CNS-D drugs were also present in seven out of the eleven. In previous years, NAs were not very prevalent in blood. This seemed to change in FY2021. For FY2022, three out of the top eleven drug combinations included some type of narcotic analgesic, and for FY2023, this number jumped to seven. When examining what drugs were confirmed in the samples, it appeared that this increase in the prevalence of narcotic analgesics was due to a rise in fentanyl cases.

Around 68 percent of blood and urine toxicology cases were associated with a DUI. As such, the results of just DUI cases shall be highlighted and discussed. This percentage was about the same as it was in previous years. One thing to remember when reading this report and looking at the figures is that often times cases will come into the laboratory and only one charge will be listed but several other charges are associated with the crime (for instance DUI and possession or driving without a license or insurance). For the purposes of this report, the highest charge is the one the results were associated with for the case.

Figure 12 illustrates adult drug results for both blood and urine associated with DUI. Of the adult DUI toxicology cases tested in FY2023, about 92% of them were positive for one or more drugs. This number was about the same as reported in FY2022 (91%) and FY2021 (92%), and much higher than what was reported in FY2020 (70%) and FY2019 (84%).

The percentage of blood toxicology DUI samples that were reported as none detected was about 31% for FY2020 and for FY2021 and FY2022, it was down to about 8.6% and 10%, respectively. For FY2023, it was around 8.3%. The percentage for urine DUI cases that were found to contain no drugs was around 28% in FY2020, less than 2% for FY2021 and around 2.90% in FY2022. In FY2023, there were 29 urine samples submitted for DUI cases and none of them were found to contain no drugs. One possible explanation for this large decrease in the number of DUI cases in which there were no drugs present for FY2021-FY2023 was the hands-free cell phone law that went into effect on July 1, 2020. If people were using their cell phones and getting distracted while driving, this could cause them to get pulled over for a possible DUI, even if they were not under the influence of anything. If there was a decrease in the number of people driving distracted due to their cell phones, then this would make sense as to why there was such a small percentage of DUI cases that have samples that are negative for drugs. Another possible explanation was that the officers pulling people over are getting better at differentiating between someone driving distracted and someone under the influence. This could be due to more/better training, or just more experience.

The trend of multiple drug categories being most prevalent for urine toxicology cases remained true when looking at DUI cases. For the urine cases, 21% of the samples contained drugs from a single category while over 79% of them contained drugs from multiple categories. The trend of blood cases with drugs belonging to multiple drug categories being higher than that with the single drug categories was also seen with the blood DUI cases. For FY2020, about 38% of the cases contained drugs from a single drug category while only 22% contained drugs from multiple categories. For FY2021, the percentage of cases with drugs from a single drug category remained the same (38%) as FY2020 but the percentage of cases with drugs belonging to multiple drug categories increased from 22% to 53%. This trend of more than 50% of the blood DUI cases having drugs from multiple drug categories has remained the same from FY2020 on.

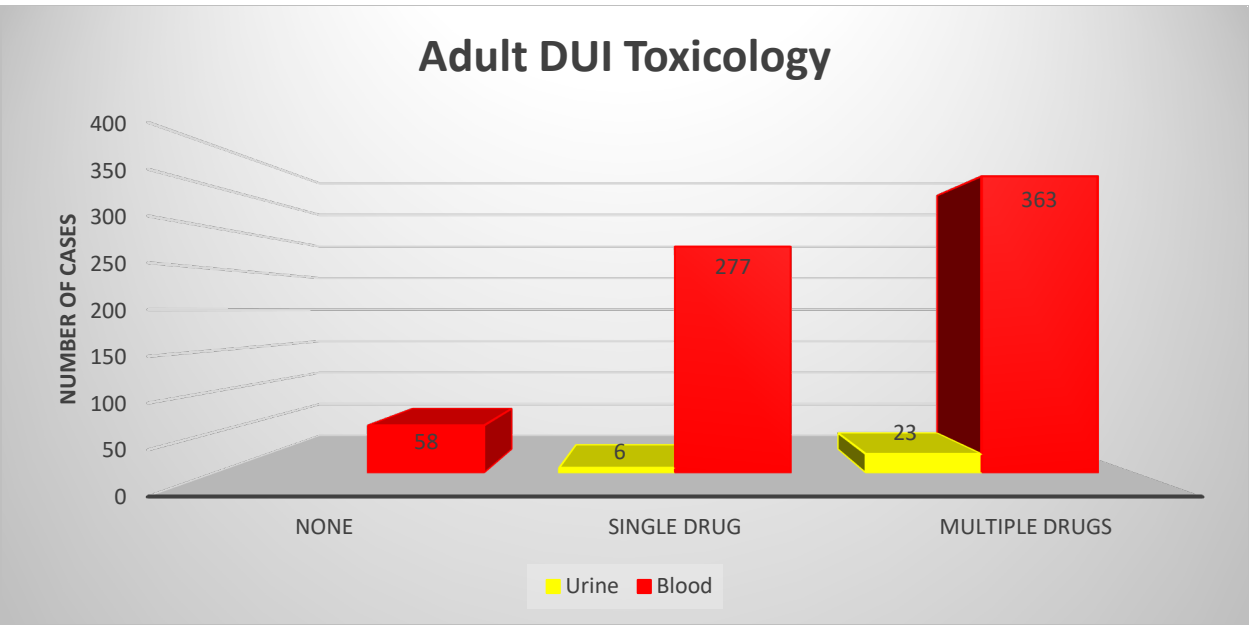


Figure 12 – Adult DUI Toxicology Results

In FY2023, there were 48 adult toxicology cases that were classified as auto accident fatalities. This is quite a bit lower than the 92 cases seen in FY2021 and the 67 cases for FY2022. **Figure 13** shows the result categories for these cases.

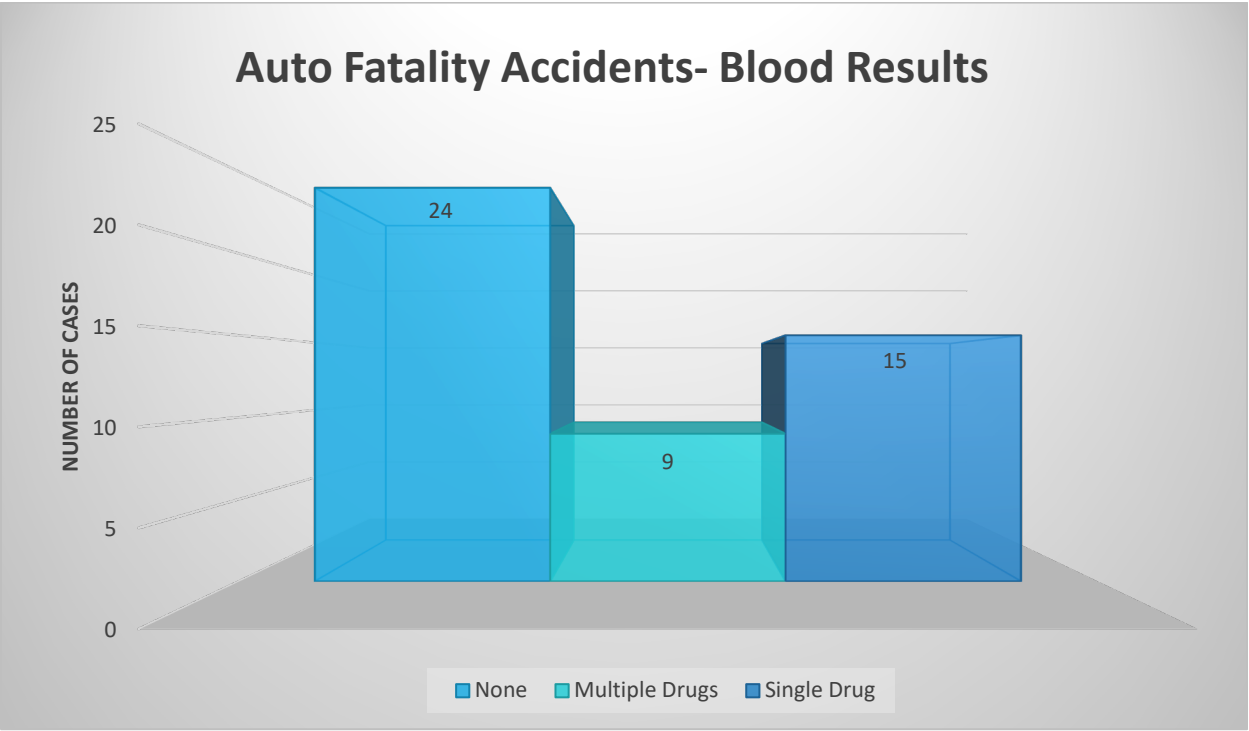


Figure 13–Toxicology Summary for Fatality Accidents, by Category

Although the overall trend for FY2023 was that there were more cases that contained drugs from multiple drug categories rather than a single category, the results for auto fatality accidents did not follow this. For the adult blood auto accident fatality cases, there was a higher percentage of cases that had drugs that belong to a single category than drug belonging to multiple categories. This was consistent with what was noted in previous years. For the adult blood auto accident fatality cases, roughly 31% of the cases contained drugs from a single category while only 18% of the cases had drugs from multiple categories. Unlike the adult DUI cases, half of the adult auto accident fatality cases were found to have no drugs detected. With the single drug adult fatality cases, approximately 46% had cannabinoids, 20% had CNS-S or CNS-D drugs, and about 13% had narcotic analgesics.

The details for the remaining non-DUI charge adult cases are broken down in the table below:

Number of Cases	Offense	Toxicology Results
51	Rape	<ul style="list-style-type: none"> • 9 Negative • 42 Positive – of the 42 positive cases, 28 of them contained CNS-D drugs (either alone or in combination with a drug from another category), and 21 contained cannabinoids (either alone or in combination with a drug from another category)
153	Drug Violations	<ul style="list-style-type: none"> • 2 Negative • 151 Positive – of the 151 positive cases, 106 of them contained CNS-S drugs (either alone or in combination with a drug from another category)
55	Other Offenses	<ul style="list-style-type: none"> • 18 Negative • 37 Positive — of the 37 positive cases, 20 of them contained CNS-D drugs (either alone or in combination with a drug from another category), 13 of them contained cannabinoids (either alone or in combination with a drug from another category)
13	Death Investigations	<ul style="list-style-type: none"> • 4 Negative • 9 Positive — of the 9 positive cases, 5 of them contained CNS-D drugs (either alone or in combination with a drug from another category)
6	Murder/Attempted Murder	<ul style="list-style-type: none"> • 2 Negative • 4 Positive — 1 contained cannabinoids, 1 contained a CNS-S drug, 1 contained a CNS-D drug, and 1 contained a narcotic analgesic

Juvenile

There were sixty juvenile toxicology cases were submitted for toxicology in FY2019. Then in FY2020 and FY2021, this number increased to 83 cases and 85 cases, respectively. At 59 cases, the number of juvenile cases submitted for toxicology testing decreased in FY2022 to about the same as what was seen for FY2019. This number dropped to only 40 cases for FY2022.

Of the 40 juvenile cases that were tested for toxicology, 57% of them had a DUI charge associated with it. The other cases were distributed between four other types of offenses. They included auto accident fatalities, drug/narcotic violations, rape, and other. A large majority (65%) of the non-DUI cases were associated with a rape or sexual assault. The percentages of the other non-DUI charges is displayed in **Figure 14**.

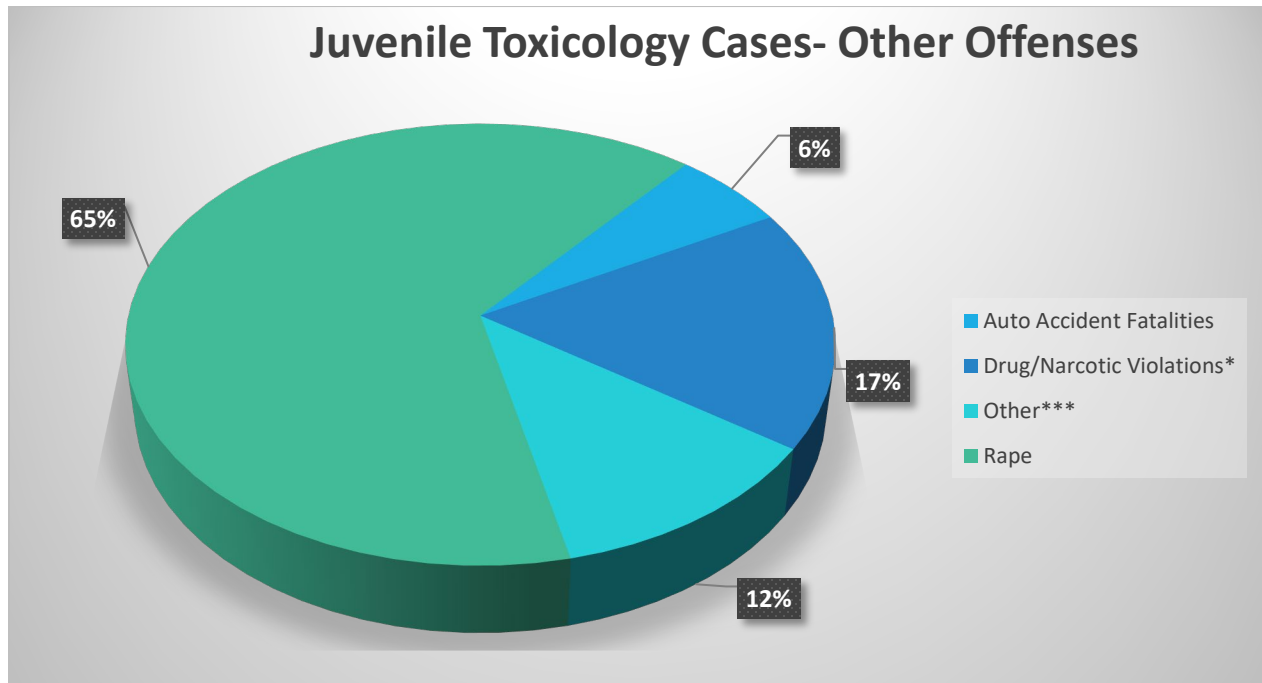


Figure 14- Breakdown of Juvenile Toxicology Cases Processed for Crimes Other Than DUI

Year after year, ISPFS reports cannabinoids are the most commonly detected drug in those juvenile samples containing drugs, and FY2023 was no exception as 60% of the total juvenile cases were positive for either cannabinoids alone or in combination with drugs from another drug category. Of just the cases that contained drugs from one or more drug categories (not taking into account the none detected cases), 71% contained cannabinoids either alone or in combination with another type of drug.

For FY2020, 64% of juvenile blood samples and 50% of juvenile urine samples submitted for toxicology testing contained at least one drug. For FY2023, about 85% of urine cases and about 75% of blood cases were positive for at least one drug. There were four different drug combinations seen for both the blood and urine samples. All of the juvenile urine toxicology cases that contained one or more drugs were positive for CNS-D drugs, 57% were positive for cannabinoids, 29% were positive for CNS-S drugs, and only 14% were positive for narcotic analgesics. Of the juvenile blood toxicology cases, 92%

contained cannabinoids, 33% contained a CNS-D, 16% contained a CNS-S drug, and only about 4% contained a narcotic analgesic. It was interesting to look at the difference between what was being confirmed most often in blood versus urine.

Figures 15a and 15b show the distribution of results in the juvenile blood and urine toxicology categories.

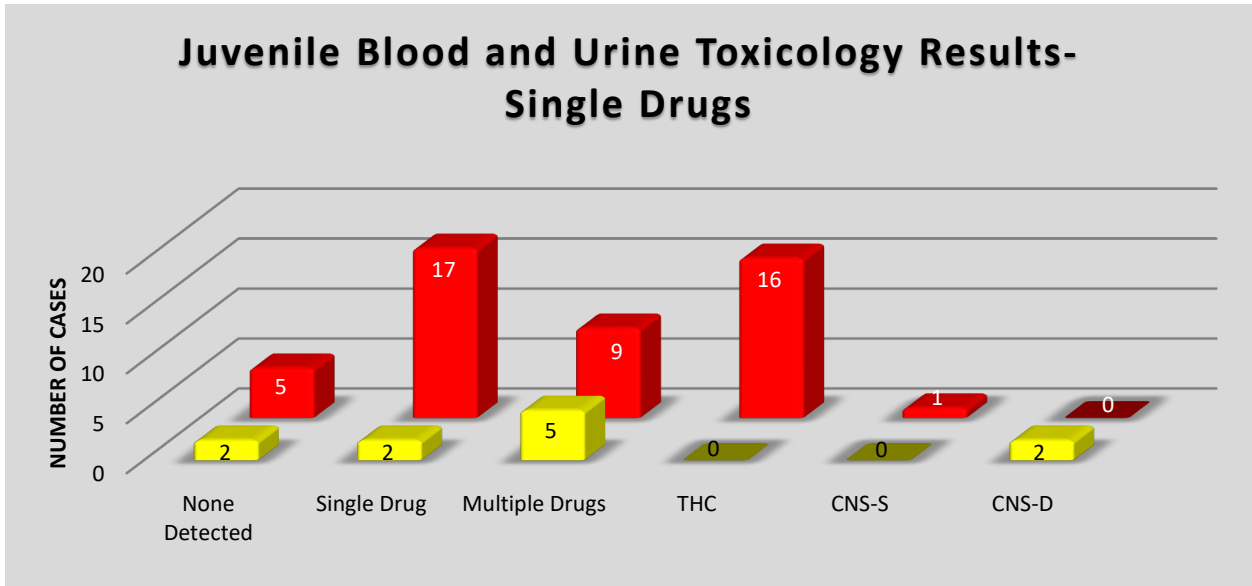


Figure 15a – Juvenile Blood and Urine Toxicology Results by Category

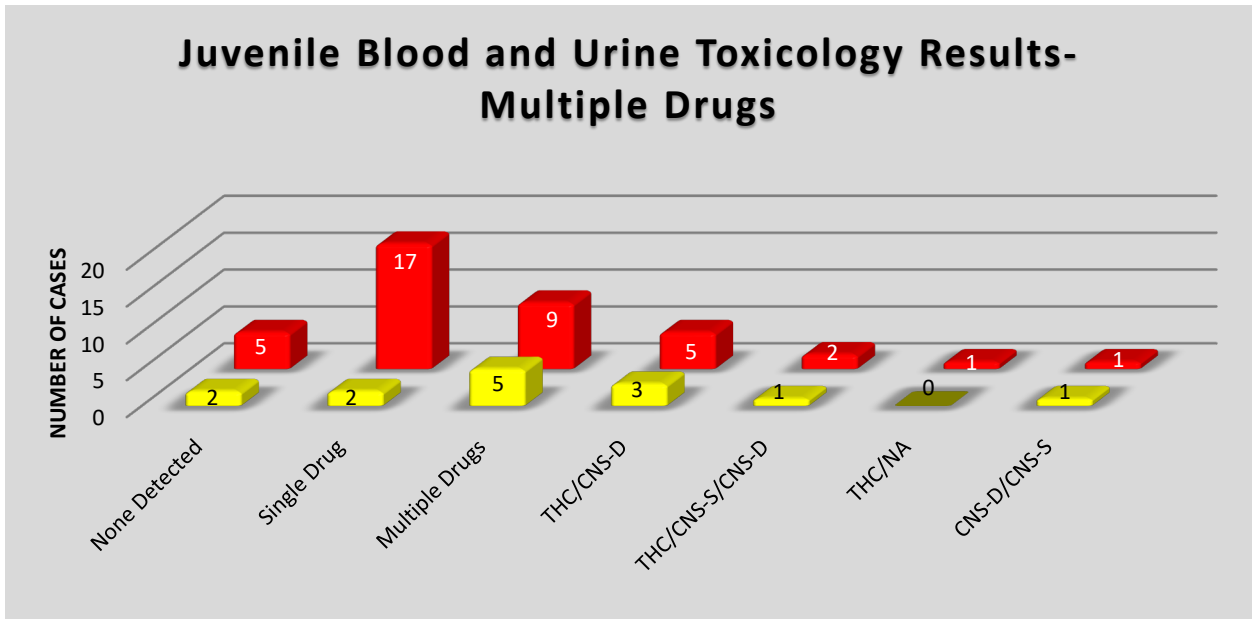


Figure 15b – Juvenile Blood and Urine Toxicology Results by Category

There was a large discrepancy in the number of juvenile fatality cases when you consider the last 10 years. The number of juvenile fatality cases between FY2014 and FY2023 ranged from 1 case (in FY2023)

to 10 cases (in FY2016 and FY2021). There does not seem to be any pattern when looking at the last ten years. The overall trend is displayed in **Figure 16**.

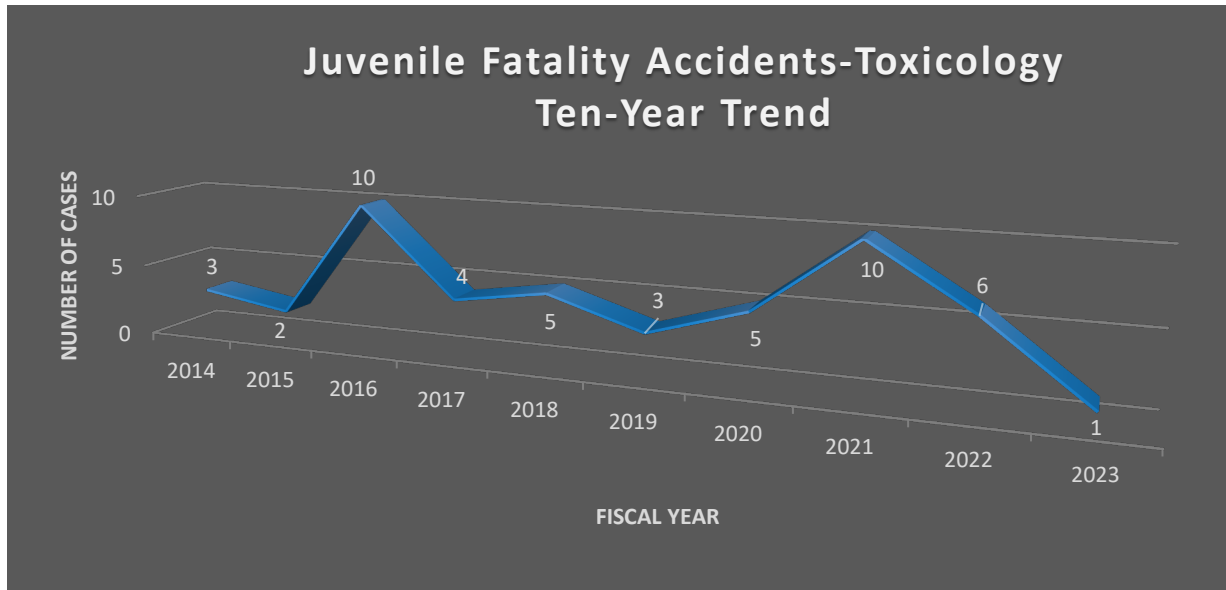


Figure 16 – Juvenile Fatality Accidents Submitted for Toxicology

For FY2017, 65% of the juvenile cases submitted for toxicology were DUI cases. In FY2018, this number dropped to only 38%. By FY2019, that number was up to 68%. For FY2020, FY2021, FY2022, and FY2023, the number had decreased to 52%, 50%, 48% and 57%, respectively. For the FY2023 juvenile blood toxicology DUI cases, 73% of the cases contained drugs belonging to a single drug category while 19% had drugs belonging to multiple drug categories. Of the 23 juvenile DUI toxicology samples tested for FY2023, only one of the urine samples and one blood sample tested negative for drugs. This means that only 4.3% of the juvenile DUI toxicology samples tested were negative for drugs.

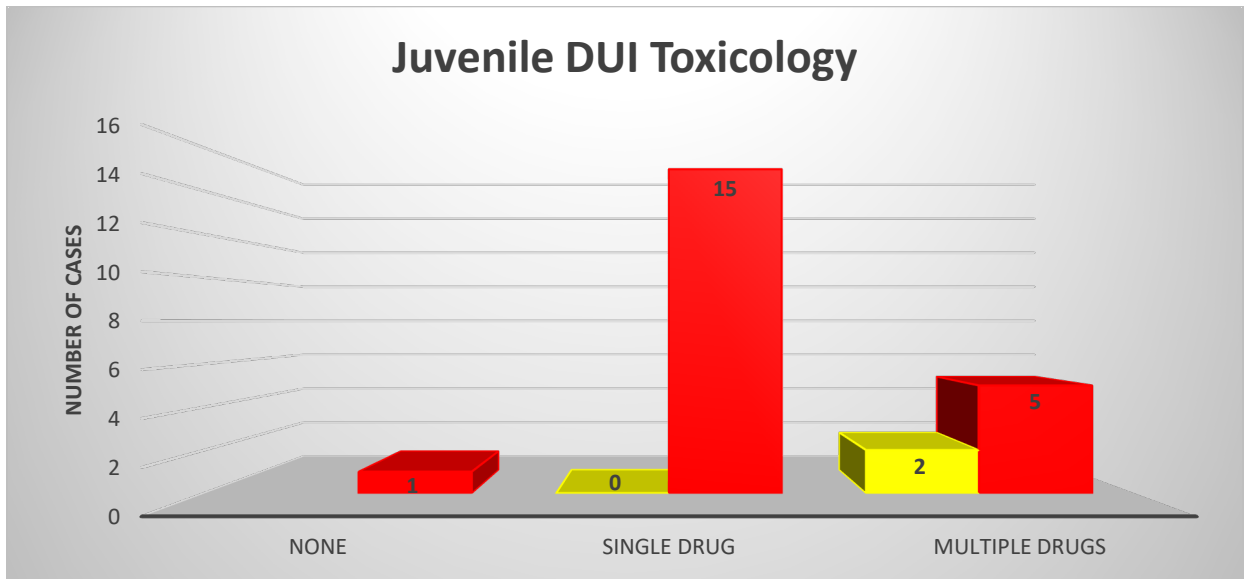


Figure 17- Juvenile DUI Toxicology Results

The details for the remaining non-DUI charge juvenile cases are broken down in the table below:

Number of Cases	Offense	Toxicology Results
11	Rape	<ul style="list-style-type: none"> • 4 Negative • 7 Positive – of the 7 positive cases, all of them contained CNS-D drugs (either alone or in combination with a drug from another category), and 3 contained cannabinoids (either alone or in combination with a drug from another category) and 3 contained CNS-S drugs (either alone or in combination with a drug from another category)
3	Drug/Narcotic Violations	<ul style="list-style-type: none"> • 3 Positive – of the 3 positive cases, two were positive for cannabinoids, and the third was positive for cannabinoids and CNS-D drugs
2	Other Offenses	<ul style="list-style-type: none"> • 1 Sample was negative and the other was positive for CNS-S drugs
1	Auto Accident Fatality	<ul style="list-style-type: none"> • Sample was negative for any drugs

Top ten ISPFS reported drugs for FY2022:

1. Amphetamine (CNS-S)*
2. Methamphetamine (CNS-S)
3. Carboxy-THC (Cannabinoid)
4. Delta-9-THC (Cannabinoid)
5. Fentanyl (Opioid)
6. Norfentanyl (Opioid)
7. Hydroxy-THC (Cannabinoid)
8. Diphenhydramine (CNS-D)
9. Alprazolam (CNS-D)
10. Benzoyllecgonine/Cocaine Breakdown Product (CNS-S)

*Amphetamine may be present as a metabolite of methamphetamine.

In evaluating the top ten drugs for FY2023 and the previous four fiscal years, the majority of the drugs have not changed. In fact, the top four drugs have not changed. The ranking has changed between the years, but methamphetamine, amphetamine, carboxy-THC, and THC have been in the top four spots each year. Alprazolam and diphenhydramine have been in the top ten all 5 years five years but have changed in ranking from year to year. Perhaps the biggest change of all was the inclusion of fentanyl in the top ten drugs for FY2021 and its rise to spot number 5 for FY2022 and FY2023 as well as the addition of norfentanyl to the top ten (spot #6). Fentanyl had not appeared in the top ten (or typically anywhere near the top ten or twenty drugs) for any of the previous years prior to FY2021 but was ranked at number ten for FY2021. This was not surprising as there has been a huge increase in the popularity of fentanyl. It is suspected that fentanyl will stay on the top ten list for future years and likely even increase in its rank. The top 10 drugs for FY2019 – FY2023 are displayed in **Figure 17**.

Rank	FY2019	FY2020	FY2021	FY2022	FY2023
1	Methamphetamine	Amphetamine	Carboxy-THC	Amphetamine	Amphetamine
2	Amphetamine	Methamphetamine	Amphetamine	Methamphetamine	Methamphetamine
3	Carboxy-THC	Carboxy-THC	Methamphetamine	Carboxy-THC	Carboxy THC
4	THC	THC	THC	THC	THC
5	Alprazolam	Alprazolam	Diphenhydramine	Fentanyl	Fentanyl
6	7-aminoclonazepam	Diphenhydramine	Alprazolam	Norfentanyl	Norfentanyl
7	Diphenhydramine	Morphine	Morphine	Alprazolam	Hydroxy-THC
8	Hydroxy-THC	7-aminoclonazepam	7-aminoclonazepam	Diphenhydramine	Diphenhydramine
9	Morphine	Lorazepam	Hydroxy-THC	7-aminoclonazepam	Alprazolam
10	Clonazepam	Citalopram	Fentanyl	Citalopram	Benzoyllecgonine/ Cocaine breakdown product

Figure 17- Ranking of Top 10 Drugs for FY2019 - FY2023

In FY2017, there were a total of 2,590 times that a drug was reported. This was not the number of cases, but the number of times a drug was listed as being confirmed. Keep in mind that many cases had more than one drug listed on the report. This number increased to 3,578 for FY2018, then dropped slightly to 3,383 in FY2019, then it went back up to 3,675 for FY2020. This number was at an all-time high of 4,378 for FY2021. For FY2022, this number dropped slightly to 4,287. Surprisingly, this number dropped to 3,510 in FY2023, with no obvious reason for this drop. For the top ten drugs confirmed in FY2023, amphetamine was confirmed 505 times (641 times in FY2022), methamphetamine was confirmed 472 times (591 times in FY2022), carboxy-THC was confirmed 432 times (512 times in FY2022), THC was confirmed 332 times (367 times in FY2022), fentanyl was confirmed 167 times (164 times in FY2022) and norfentanyl was confirmed 144 times (132 times in FY2022). Interestingly, the number of times amphetamine, methamphetamine, carboxy-THC and THC was confirmed in FY2023 dropped quite a bit from that in FY2022, yet the number of times fentanyl and norfentanyl was confirmed increased slightly. When looking at the number of times a compound was confirmed, it was easy to see why the top compounds stay in the top three or four compounds remain in the top and why the ones below that will move up and down but not reach the top three or four spots.

Summary

The ISPFS laboratory system received 3,173 toxicology cases for FY2023. This number seems to be on par with what has been submitted in previous years. The 3,173 cases was slightly more (1.1%) than that received in FY2022 and slightly less (2.5%) than the number of cases received in FY2021 (3,253 cases).

The number of alcohol/volatiles case submissions to ISPFS increased by about 10.8% from FY2022 to FY2023. When considering submissions for the last ten years, there was a drop in FY2017 and FY2018 and then the number of cases went back up to what was received in the few years prior and has continued to trend upward since then.

Adult samples submitted for pending DUI charges constituted 1,252 of the total 1,439 alcohol/volatiles cases (78%). Of these 1,252 samples, 85% of them were over the per se limit of 0.08 g%.

A total of 55 adult auto accident fatality case samples were submitted to ISPFS in FY2023; this was 12 fewer cases than for FY2022. Of the 55 cases, 66% of the cases alcohol results of 0.02 g% or less, about 7% had results between 0.02 and 0.08 g%, and 25% were at or above the legal limit of 0.08 g%. One case was positive for an inhalant (acetone). This distribution was very similar to previous years.

ISPFS processed 99 juvenile alcohol cases in FY2023. This was 5 more juvenile alcohol/volatile cases than was processed in FY2022. Of these samples, 61% were over the legal limit for persons under age 21 (0.02 g%). Of the 99 juvenile alcohol samples submitted to ISPFS, 71 were juvenile DUI cases; 53 of these 71 cases (75%) were over the juvenile (under age 21) legal limit of 0.02 g%. Two of the samples tested positive for inhalants (fluorinated hydrocarbons). These percentages are similar to what was seen in previous years.

ISPFS accepted 1456 blood samples and 135 urine samples for toxicology testing in FY2023. This correlates to a decrease of about 2% in the number of blood cases and a 39% decrease in urine cases from FY2022. When considering the number of blood and urine toxicology submissions for the last 10 years, it appears that there is an overall upward trend associated with the blood toxicology samples and an overall downward trend with the urine toxicology samples.

For FY2023, there were 1,172 adult cases tested for toxicology testing. Approximately 65% of the cases had a DUI charge associated with them. The remaining cases were split into eight other categories. They included accident victim kits, auto accident fatalities, non-homicide death investigations, drug/narcotic violations, probation violations, murder or attempted murder, rape, and other. The category of "other offenses" includes charges such as assault and battery, burglary, injury accidents, and under the influence in public.

There were eleven different combinations that encompassed the majority of the samples. CNS-S drugs were present in seven out of the eleven combinations. CNS-D drugs were also present in seven out of the eleven. In previous years, NAs were not very prevalent in blood. This seemed to change in FY2021. For FY2022, three out of the top eleven drug combinations included some type of narcotic analgesic, and

for FY2023, this number jumped to seven. When examining what drugs were confirmed in the samples, it appeared that this increase in the prevalence of narcotic analgesics was due to a rise in fentanyl cases.

The percentage of blood toxicology DUI samples that were reported as none detected was about 31% for FY2020 and for FY2021 and FY2022, it was down to about 8.6% and 10%, respectively. For FY2023, it was around 8.3%. The percentage for urine DUI cases that were found to contain no drugs was around 28% in FY2020, less than 2% for FY2021 and around 2.90% in FY2022. In FY2023, there were 29 urine samples submitted for DUI cases and none of them were found to contain no drugs.

There were sixty juvenile toxicology cases were submitted for toxicology in FY2019. Then in FY2020 and FY2021, this number increased to 83 cases and 85 cases, respectively. At 59 cases, the number of juvenile cases submitted for toxicology testing decreased in FY2022 to about the same as what was seen for FY2019. This number dropped to only 40 cases for FY2022.

Of the 40 juvenile cases that were tested for toxicology, 57% of them had a DUI charge associated with it. The other cases were distributed between four other types of offenses. They included auto accident fatalities, drug/narcotic violations, rape, and other. A large majority (65%) of the non-DUI cases were associated with a rape or sexual assault.

Year after year, ISPFS reports cannabinoids are the most commonly detected drug in those juvenile samples containing drugs, and FY2023 was no exception as 60% of the total juvenile cases were positive for either cannabinoids alone or in combination with drugs from another drug category. Of just the cases that contained drugs from one or more drug categories (not taking into account the none detected cases), 71% contained cannabinoids either alone or in combination with another type of drug.

There was a large discrepancy in the number of juvenile fatality cases when you consider the last 10 years. The number of juvenile fatality cases between FY2014 and FY2023 ranged from 1 case (in FY2023) to 10 cases (in FY2016 and FY2021). There does not seem to be any pattern when looking at the last ten years.

In evaluating the top ten drugs for FY2023 and the previous four fiscal years, the majority of the drugs have not changed. In fact, the top four drugs have not changed. The ranking has changed between the years, but methamphetamine, amphetamine, carboxy-THC, and THC have been in the top four spots each year. Alprazolam and diphenhydramine have been in the top ten all 5 years five years but have changed in ranking from year to year. Perhaps the biggest change of all was the inclusion of fentanyl in the top ten drugs for FY2021 and its rise to spot number 5 for FY2022 and FY2023 as well as the addition of norfentanyl to the top ten (spot #6). Fentanyl had not appeared in the top ten (or typically anywhere near the top ten or twenty drugs) for any of the previous years prior to FY2021 but was ranked at number ten for FY2021. This was not surprising as there has been a huge increase in the popularity of fentanyl. It is suspected that fentanyl will stay on the top ten list for future years and likely even increase in its rank.

In FY2017, there were a total of 2,590 times that a drug was reported. This was not the number of cases, but the number of times a drug was listed as being confirmed. Keep in mind that many cases had more than one drug listed on the report. This number increased to 3,578 for FY2018, then dropped slightly to 3,383 in FY2019, then it went back up to 3,675 for FY2020. This number was at an all-time high of 4,378

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Toward the end of FY2019, the toxicology section received two new instruments (LCMS-QTOF). One instrument went to the Pocatello laboratory and the other went to the Coeur d'Alene laboratory. The validation process for those instruments was completed and the instruments were put into service for casework in June 2020. However, instrument issues have delayed the actual use of the instruments for casework. Troubleshooting and verification work is being done on the instruments and as soon as the issues are resolved, the instruments will be used for casework. These instruments will be used for preliminary screening procedures for both blood and urine. The use of these instruments will allow us to follow the best practices guidelines and have two different technologies for screening and confirmatory testing. In addition, unlike the LCMS-QQQ instruments that are currently being used for preliminary testing (screening), the new LCMS-QTOF instruments will allow us to go back and search data that has been run on the instrument for additional compounds that are not covered on our targeted screen. Therefore, if a particular drug starts becoming prevalent in Idaho but it was not something that was covered under our screening method, we can go back and search the data to determine if this compound was present in previous samples we had run.

For FY2023, it continues to be essential that ISPFS get the funding, training, and personnel needed to improve ISPFS scope of drugs and ability to report quantitative values. It was anticipated that many of our current "negative" samples would test positive for designer and/or synthetic drugs that we are currently unable to detect. ISPFS frequently receives requests for analysis of designer drugs in toxicology samples (including many fentanyl analogs). However, with ISPFS scientists working hard to reduce backlogs, continued training and method development for new designer drug methods and/or the addition of designer drugs to current methods was near impossible. Having additional personnel that can take over casework and allow the more senior scientists to focus on method development was essential for adding those types of compounds to our testing panel. In addition to allowing for method development, those scientists will also be needed to keep up with the increasing number of cases submitted as Idaho's population continues to grow. The increasing number of cases will also require additional instruments as the current ones will reach their maximum running capacity and a queue will develop for their use. Additional instruments would allow for multiple scientists to process their cases simultaneously.