
# Toxicology Program Trends

# FY2022

FY2022 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 2022 (FY2022): 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 FY2022. 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.

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.

**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 was 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 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). 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 was 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 was 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 was not to process a sample for toxicology if the blood alcohol result was 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 was 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 was important to keep in mind that there are testing limitations and these limitations should be considered when a negative result arises.

# General Breakdown for FY2022

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 FY2022. 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 | FY2022 Percent |
|---|---|---|---|---|---|
| **DUI*** | | | | | |
| Adult | 1074 | 801 | 101 | 1976 | 64.84% |
| Juvenile | 40 | 15 | 3 | 58 | |
| **Drug/Narcotic Violations**** | | | | | |
| Adult | 34 | 152 | 20 | 206 | 6.72% |
| Juvenile | 2 | 2 | 1 | 5 | |
| **Other***** | 122 | 70 | 32 | 224 | 7.14% |
| **Auto Accident Fatalities** | 76 | 73 | 0 | 149 | 4.75% |
| **Accident Victim Kits** | 4 | 4 | 0 | 8 | 0.26% |
| **Death (non-homicide)** | 10 | 11 | 5 | 26 | 0.83% |
| **Murder/Attempted Murder** | 4 | 4 | 0 | 8 | 0.26% |
| **Rape****** | 42 | 14 | 60 | 116 | 3.69% |
| **Cases Closed Before Analysis******* | 20 | 341 | 0 | 361 | 11.51% |
| Total: | 1428 | 1487 | 222 | **3137** | 100% |

**Table 1- Statistical Representation of the Number and Distribution of Toxicology Cases for FY2022.**

*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 3,137 toxicology cases for FY2022, which was slightly less (3.5%) than that received in FY2021. This was slightly more than the number of cases received in FY2020 (2,953 cases).

Topics covered in this report include:

| | |
|---|---|
| **Alcohol and Other Volatiles** | Adult and Juvenile Trends |
| | Fatality Accidents |
| | Other Offenses |
| **Toxicology** | Adult and Juvenile Trends |
| | DUI Related Trends |
| | Other Offenses |

**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 3,044 cases and the average for the last 10 years was 2,950 cases.

There was a much higher number of cases submitted in FY2013 than there was between FY2014 and FY2022, although the number of cases submitted for FY2022 appears to be generally trending upward. One possible explanation for the large number of cases submitted in FY2013 could be due to the Supreme Court ruling on Missouri vs. McNeely in which it was decided that if an evidentiary blood draw was desired, a warrant must be obtained prior to collecting the blood. **Figure 1** further supports this hypothesis as the rapid decline in the number of alcohol/volatiles was seen. There were over 2000 cases submitted for alcohol/volatiles analysis in FY2013, then in 2014, this number plummeted to just over 1300 and has remained fairly stable from then on. The Supreme Court ruling on Missouri vs. McNeely was issued just before FY2014. If this hypothesis was correct, one would expect to see an increase in the number of breath alcohol cases, starting in FY2014.

Interestingly, the number of cases submitted for FY2019 increased substantially from the previous five years, then went back down, slightly in FY2020, back up in FY2021, then slightly back down again for FY2022. The number of cases for blood alcohol/volatiles analysis has been fairly consistent since FY2014 but there were very different trends seen with the blood and urine toxicology case submissions. The number of blood toxicology cases submitted was on an upward trend, while the number of urine toxicology cases submitted was on a downward trend. Starting in FY2014, the number of blood toxicology cases has continued to increase, nearly every year. The number of cases submitted for blood toxicology for FY2022 was nearly double what it was in FY2014. As mentioned previously, the opposite trend was seen with urine toxicology cases drastically decreasing. The number of urine toxicology cases submitted in FY2022 was less than half of what was submitted in FY2013. One explanation for the increase in blood toxicology and decrease in urine toxicology cases was that 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. Another explanation for the increase in blood toxicology cases could be that since the number of people being prescribed medications goes up every year, the number of people driving while on these medications also goes up. Since some medications can impact driving performance, more people driving while on prescription medications could cause the number of DUI

cases submitted to increase. Another possible reason for the increase could be due to an increase in the Idaho population. This trend will likely continue in future years as it was anticipated that the population in Idaho will continue to increase.

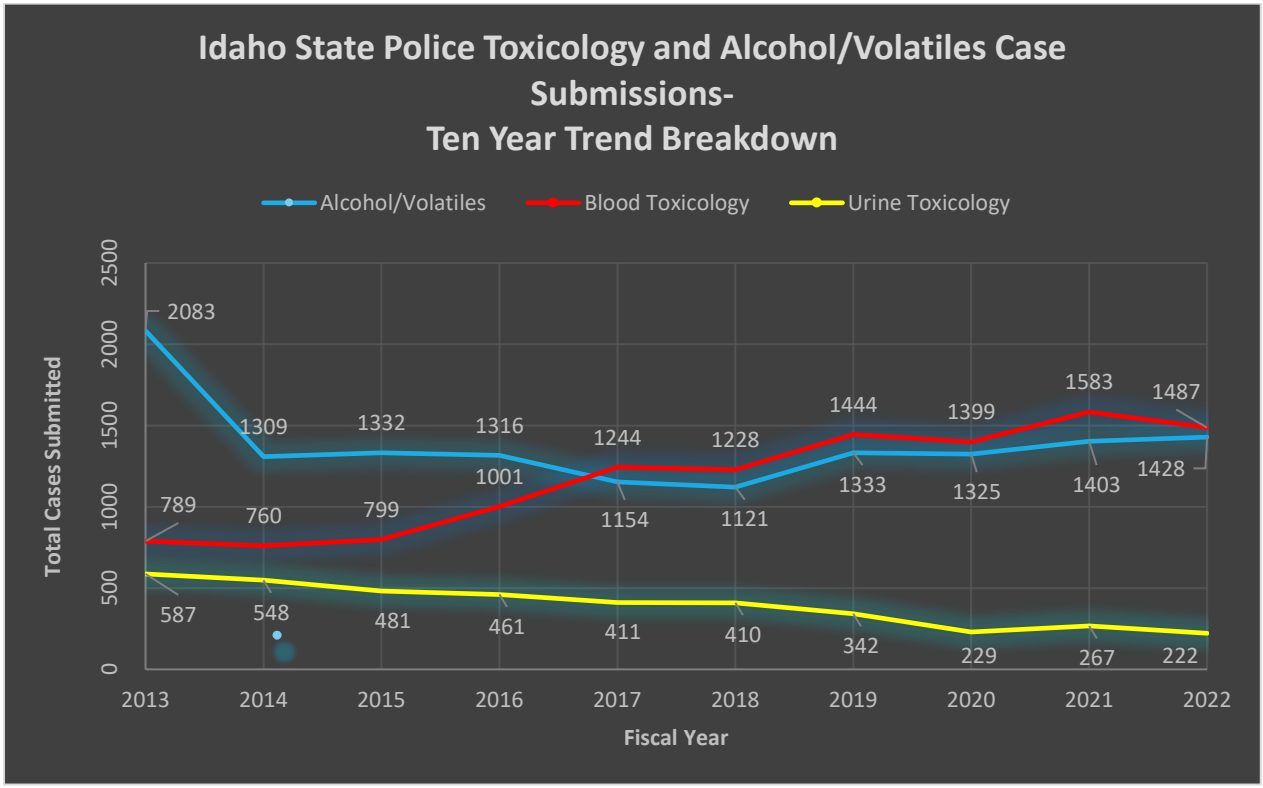


**Figure 1- Breakdown of the Ten-Year Trend for Toxicology Case Submissions**

# Alcohol and Other Volatiles

The number of alcohol/volatiles case submissions to ISPFS increased by 25 cases from 1,403 in FY2021 to 1,428 in FY2022. This change corresponds to only about a 1.8% increase. There were significantly more alcohol/volatiles cases submitted prior to the McNeely decision in 2013. Then in FY2014, there was a dramatic decline in the number of alcohol/volatiles cases submitted and since then, the number has stayed fairly consistent. A large increase (beyond that expected due to population growth) in the number of cases was 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 officers are opting to perform breath tests rather than obtain warrants for blood draws, except in cases where 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 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 Concentrations**

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 1,322 adult samples for alcohol and inhalants during FY2022. 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 1,322 samples reported in the table below does not include beverage samples, or inhalant results.

| Number of Adult Samples | Result Category |
|---|---|
| (not included in total) | Not analyzed |
| 277 | <0.02 g% |
| 56 | ≥0.02 g% and <0.08 g% |
| 989 | ≥0.08 g% |
| 1,322 | 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 FY2022; this chart includes DUIs, death investigations, auto accident fatalities, and a wide variety of other case types.

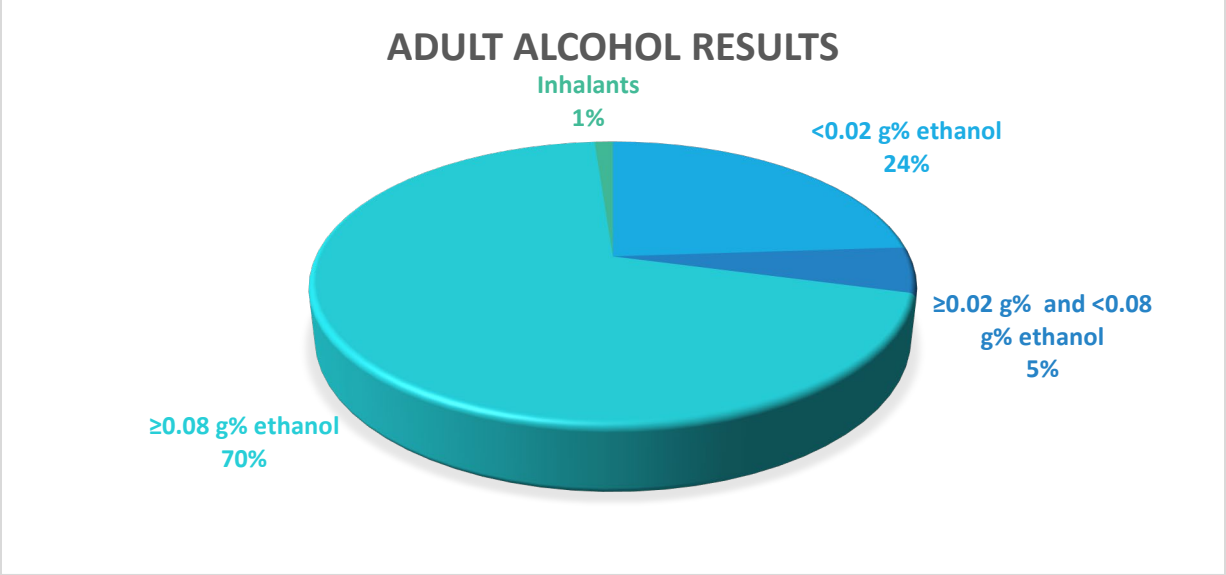


**Figure 2- Adult Alcohol/Volatiles Levels for FY2022**

Eighteen adult samples tested positive for inhalants. In terms of significance, considering the 1,322 adult alcohol samples submitted, eighteen inhalant samples was not a significant percentage. However, it was interesting to note that in FY2020 and FY2021, there were 15 adult samples that were positive for inhalants. For FY2019, the number of inhalants reported was thirty-five. This difference corresponds to a 133% decrease for FY2020 and FY2021. The inhalants confirmed in the 18 positive samples included: 8 samples that were positive for fluorinated hydrocarbons (air duster), 7 samples that were positive for acetone (nail polish remover, it was also formed in the body during ketoacidosis), 2 that were positive for isopropanol (rubbing alcohol) and 1 that was positive for toluene (found in paints, lacquers, and glues).

Adult samples submitted for pending DUI charges constituted 1,096 of the total 1,322 alcohol/volatiles cases (83%). Of these 1,092 samples, 913 were over the per se limit of 0.08 g% (83%). 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 67 adult auto accident fatality case samples were submitted to ISPFS in FY2022; this was 17 fewer cases than for FY2021. Of the 67 cases, 52 (70%) contained <0.02 g% alcohol, one (~8%) was between 0.02 and 0.08 g%, and 14 (22%) were at or above the legal limit of 0.08 g%. This distribution was very similar to previous years.

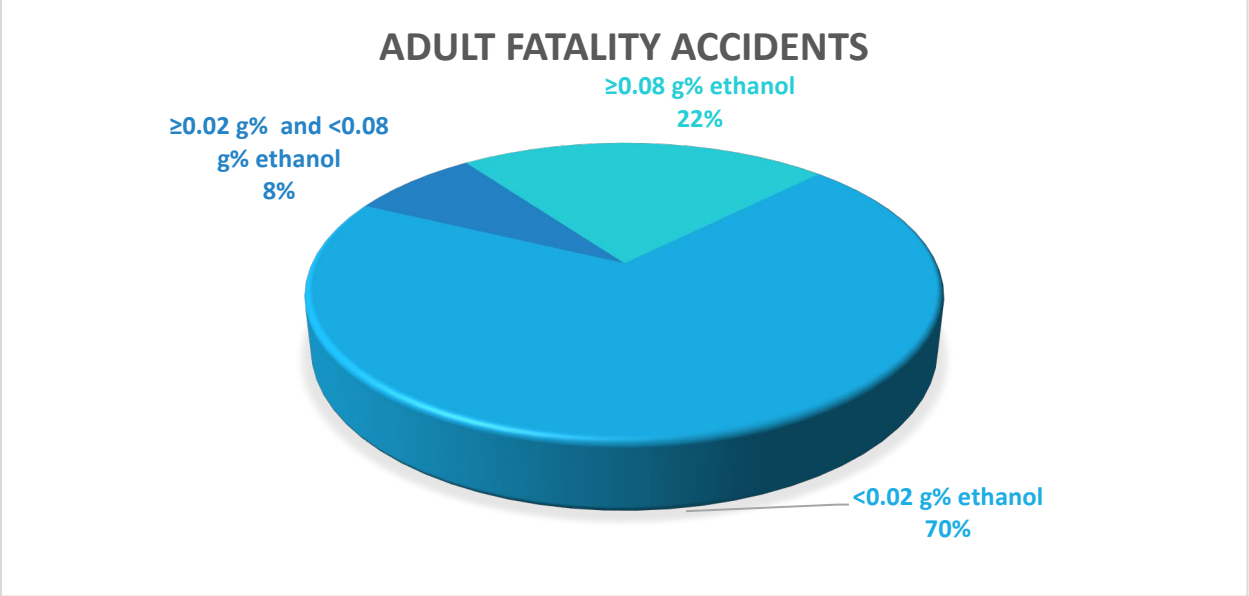


**Figure 3- Results for Adult Alcohol Fatality Accidents**

The ten-year trend of adult auto accident fatality cases submitted to ISPFS was 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.

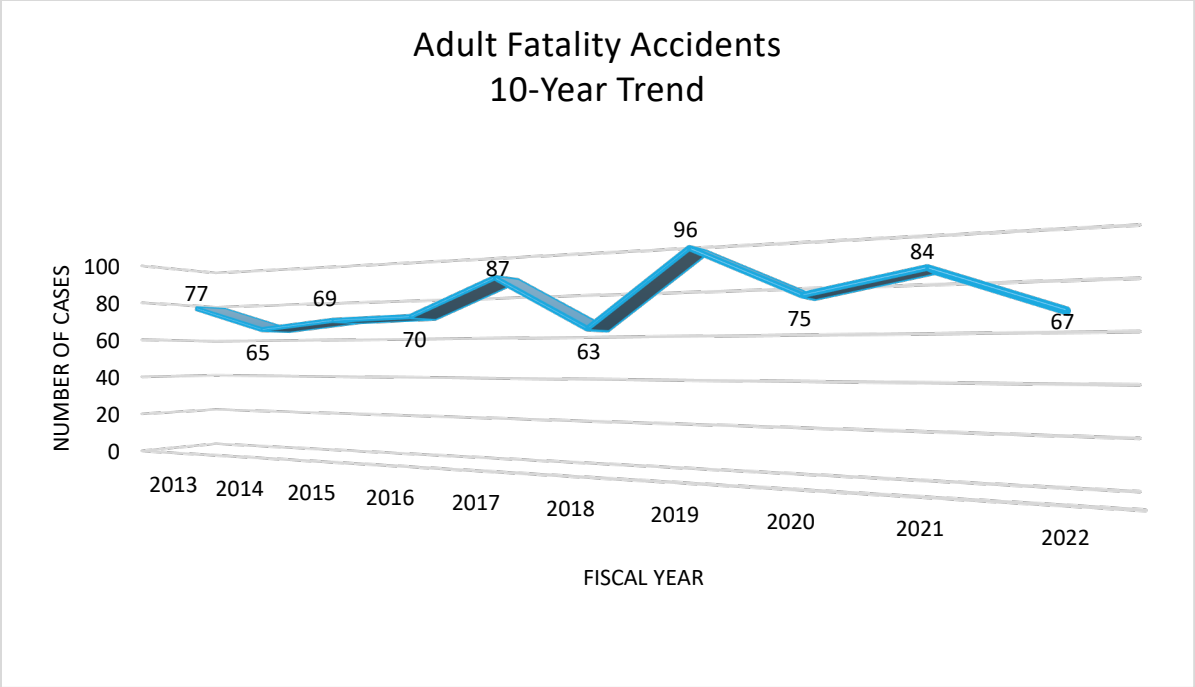


**Figure 4- Ten Year Adult Fatality Accident Trend**

## Juvenile Alcohol Concentrations

ISPFS processed 94 juvenile alcohol cases in FY2022. This was 27 fewer juvenile alcohol/volatile cases than was processed in FY2021. Of these samples, 62% were over the legal limit for persons under age 21 (0.02 g%). Of the 94 juvenile alcohol samples submitted to ISPFS, 57 were juvenile DUI cases; 42 of these 57 cases (74%) were over the juvenile (under age 21) legal limit of 0.02 g%. This was a similar percentage to what was seen in FY2021.

**Figure 5** displays the overall juvenile case results; these results include DUIs, accident fatalities, and various other case types.

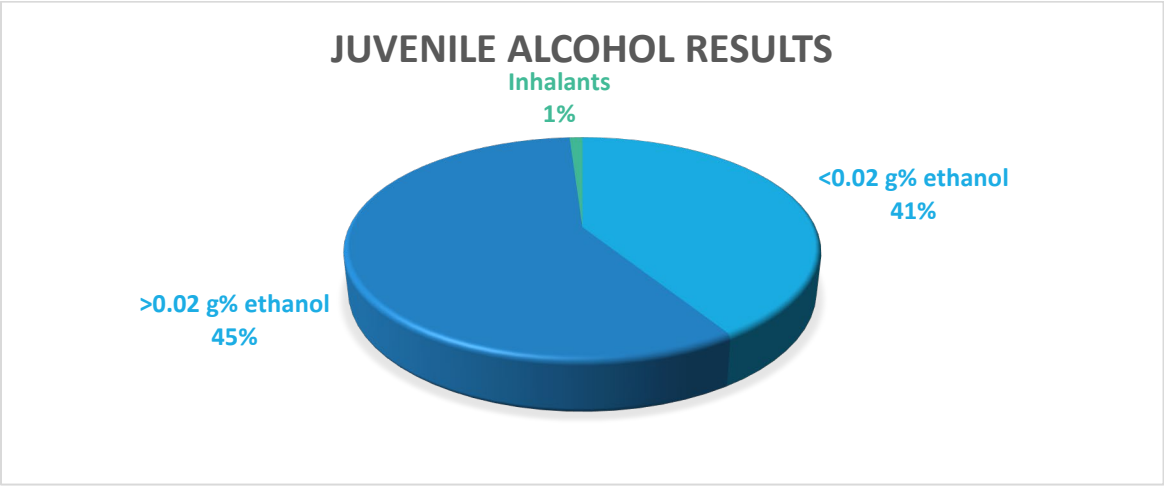


**Figure 5- Juvenile Alcohol Levels for FY2022**

A significant 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. The average number of juvenile auto accident fatality cases submitted in the last ten years was 13. Over the last ten years, the lowest number of cases were in FY2015 (8 cases) and FY2019 (2 cases). There was no obvious explanation for why those years were significantly lower.

**Figure 6** was a trend chart to show the juvenile auto accident fatality cases submitted over the last 10 years.

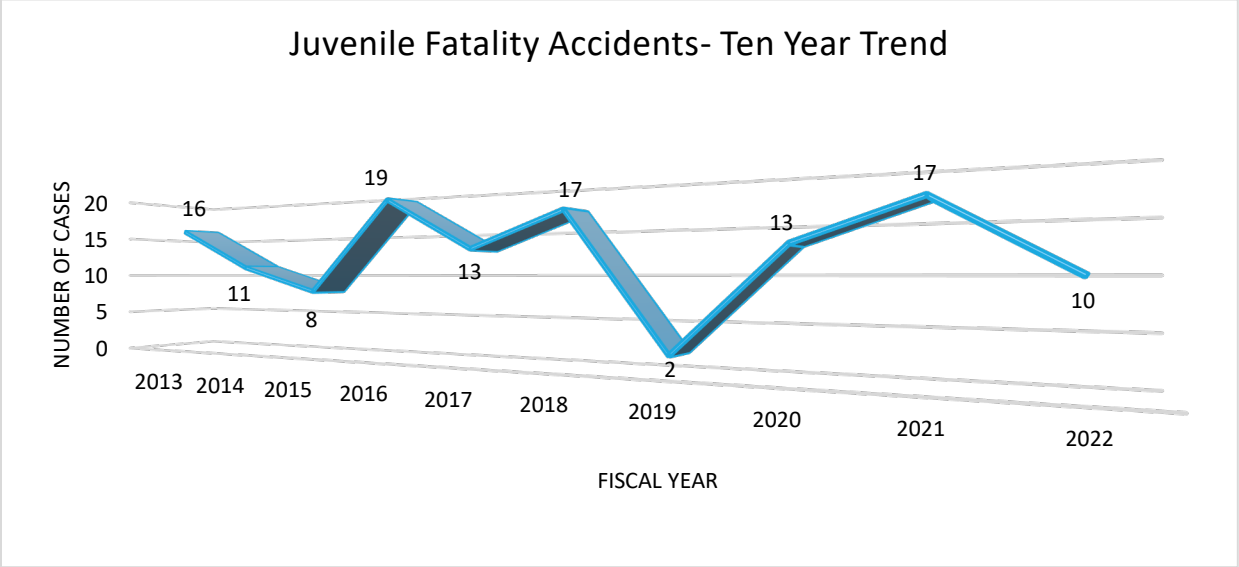


**Figure 6- Ten Year Juvenile Fatality Accident Trend**

## Other Offense Alcohol Concentrations

Cases submitted for alcohol analysis in FY2022 also included several other offenses aside from DUI. **Figures 7** was a graphic depiction of offenses (other than DUI) for which samples were submitted for alcohol analysis. **Figures 8 and 9** depict the results breakdowns for these other offenses for adults and juveniles, respectively. 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.

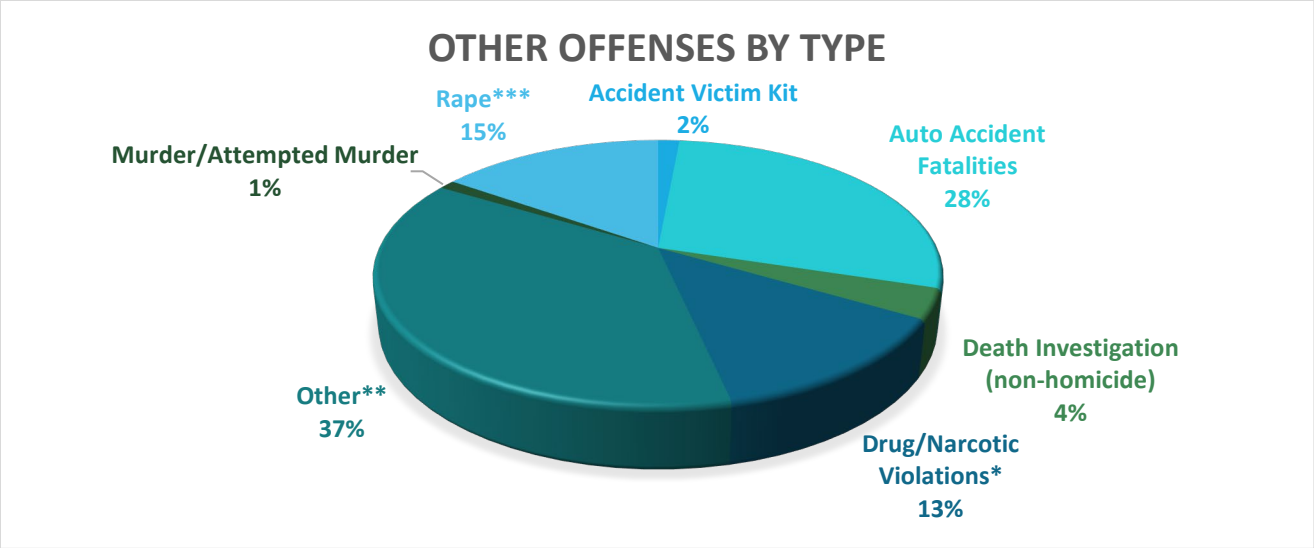


**Figure 7 – Alcohol Analysis Requests by Other Offense Types**

*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.

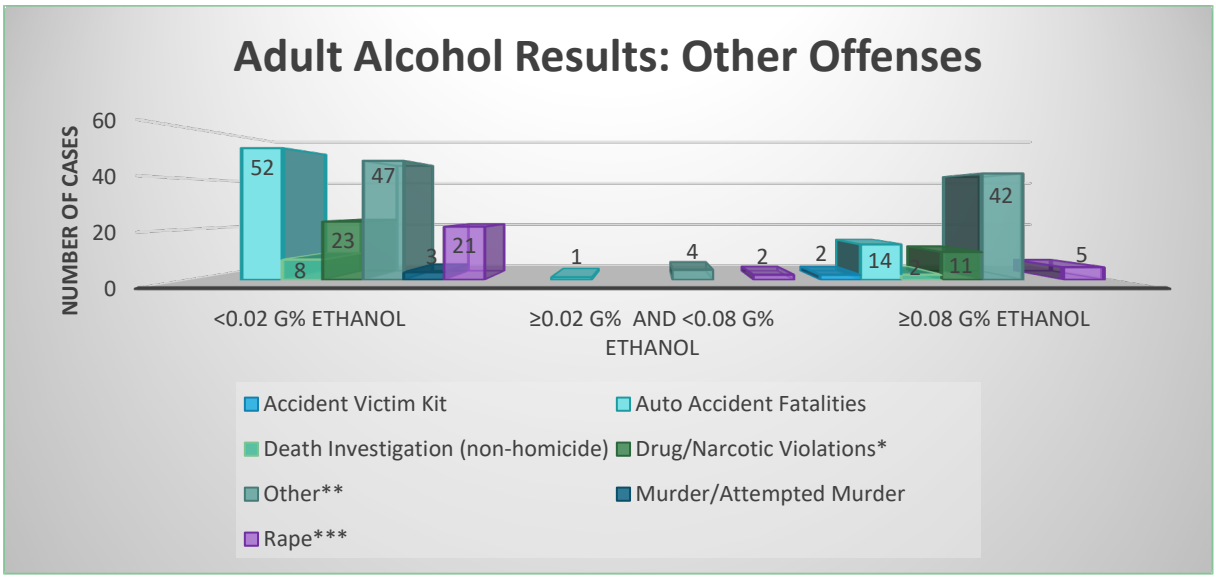


**Figure 8- Adult Alcohol Results for Other Offenses**

*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.

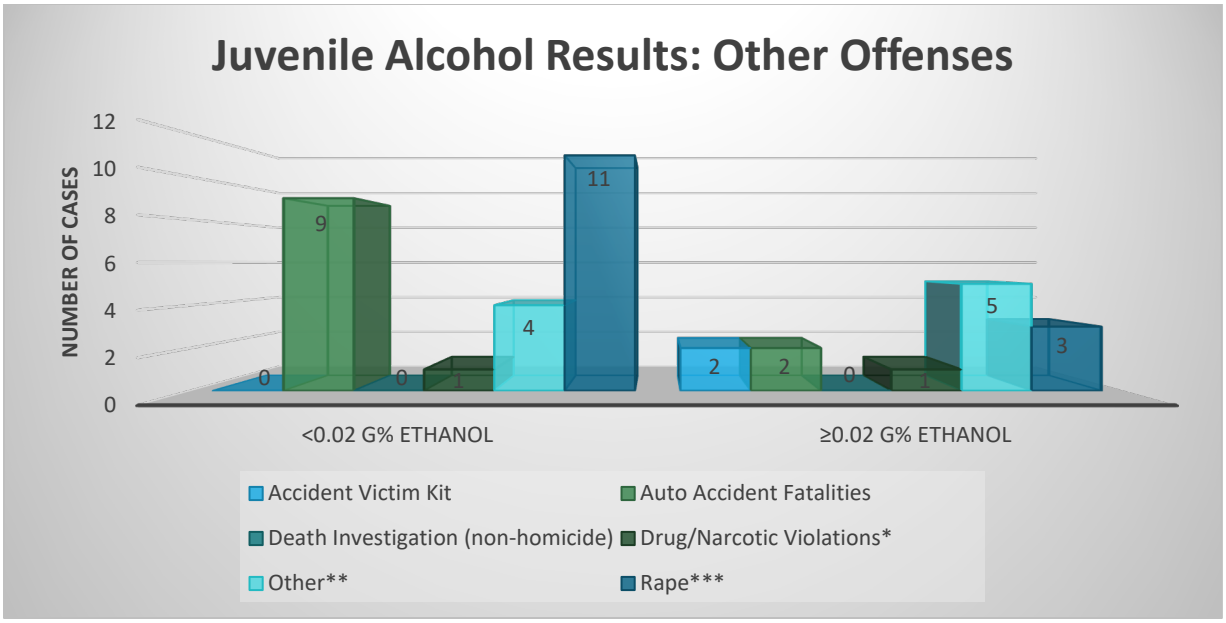


**Figure 9- Juvenile Alcohol Results for Other Offenses**

*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.

It should also be noted that ISPFS annually provides each analyst one proficiency test in each discipline in which s/he was certified. The successful completion of this annual test was required for analysts to be permitted to continue performing analyses on casework. Furthermore, analysts are also provided a competency test prior to becoming approved to perform analysis. The proficiency and competency test statistics are not applicable to this report, and therefore not included.

# Toxicology (Drugs in Blood and Urine)

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 taken 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 1487 blood samples and 222 urine samples for toxicology testing in FY2022. This correlates to a decrease of about 6% in the number of blood cases and a 16.9% decrease in urine cases from FY2021. When considering the number of blood and urine toxicology submissions for the last 10 years, it appears that there was an 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 was used for blood, 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 FY2022, there were 1,302 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**.

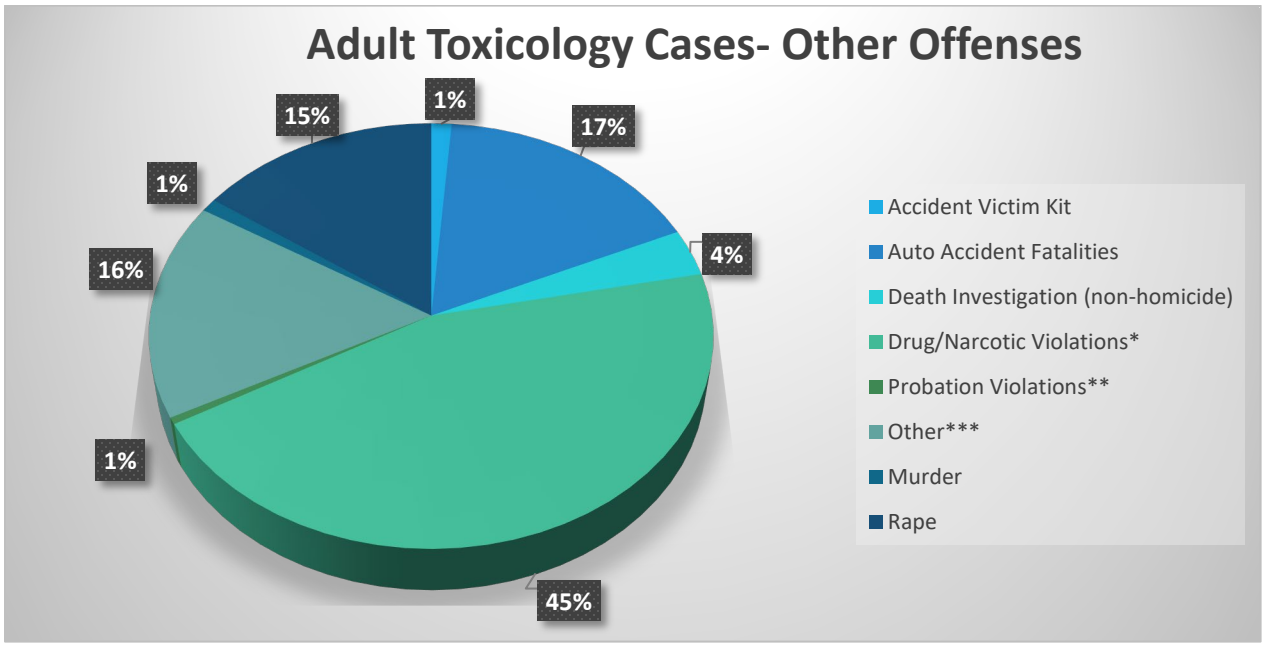


**Figure 10- Breakdown of Adult Toxicology Cases Processed for Crimes Other Than DUI**

**Figure 11a** shows the adult blood and urine toxicology results for FY2022 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.

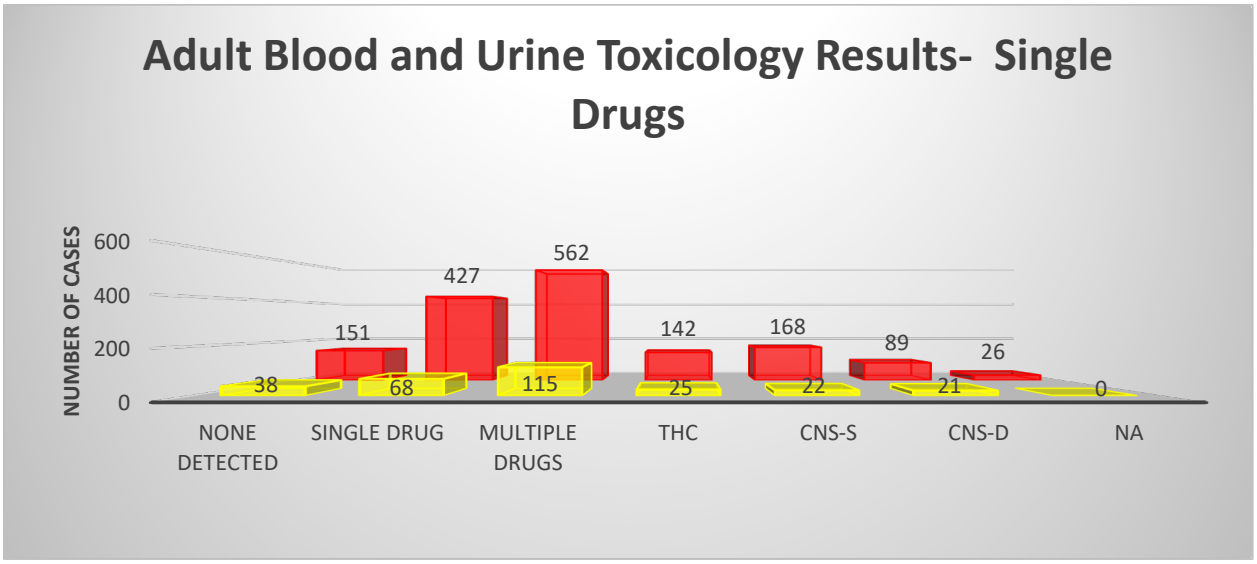


**Figure 11a – Adult Blood and Urine Toxicology Results for Single Drug Categories**

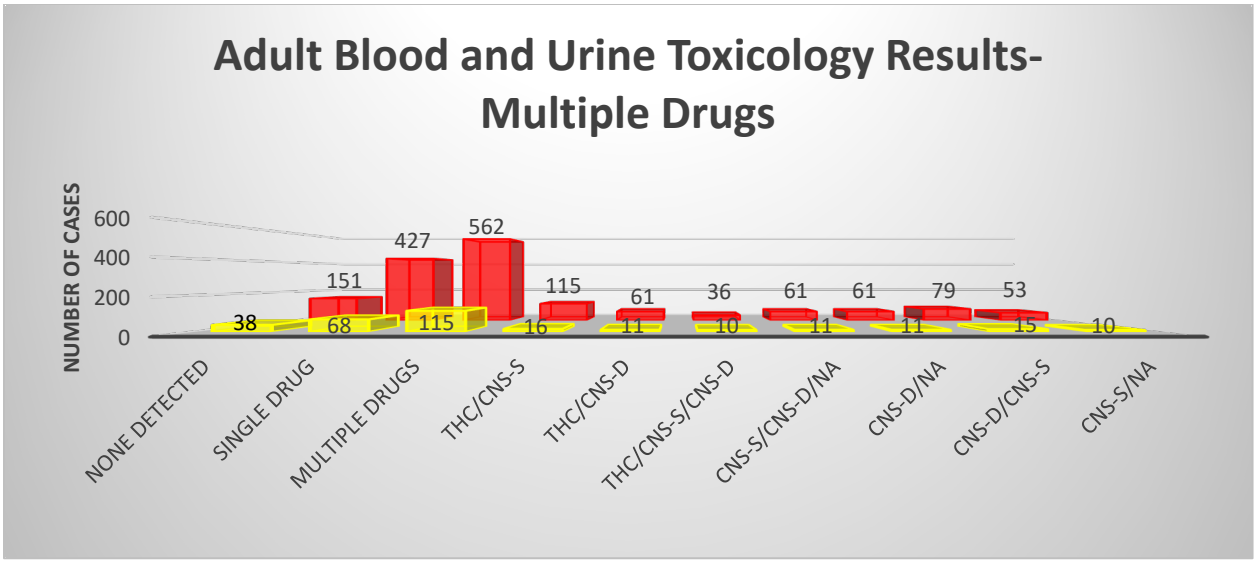


**Figure 11b – Adult Blood and Urine Toxicology Results for Multiple Drug Categories**

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.

The data for adult blood and urine samples (**Figure 11a**) showed an interesting difference from previous years. Data from the previous five years had shown that single-category drug use was more prevalent than multiple drug category combinations for blood toxicology. For FY2021 and FY2022, this changed as there was a much higher number of blood cases in which there were drugs present from multiple drug categories. 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. However, the drug most often seen in the cases where there were multiple drug categories present was THC (**see Figure 11b**). So, perhaps an increase in the use of THC in combination with other drug categories was responsible for the increase in multiple drug categories in FY2021 and FY2022. For instance, if someone who had been taking a CNS-D drug for depression now also started smoking marijuana, the drugs in their blood would show as multiple drug categories. 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 six out of the ten combinations. CNS-D drugs were present in five out of the

seven. In both blood and urine, CNS-S combined with carboxy-THC and CNS-S combined with CNS-D were the most common combinations. In previous years, NAs were not very prevalent in blood. This seemed to change in FY2021. For FY2022, three out of the top seven drug combinations included some type of narcotic analgesic. 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 65 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 FY2022, 93% of them were positive for one or more drugs. This number was about the same as reported in 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, it was down to about 8.6%. For FY2022, up slightly at about 10%. The percentage for urine was around 28% in FY2020 and less than 2% for FY2021 and around 2.90% in FY2022. One possible explanation for this large decrease in the number of DUI cases in which there were no drugs present for FY2021 and FY2022 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, 26% of the samples contained drugs from a single category while over 70% of them contained drugs from multiple categories. For the blood toxicology DUI cases, the change that was seen last year, where the number of cases with drugs belonging to multiple drug categories was 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%. The trend seen for FY2022 was the same as that for FY2021. Thirty-four percent of the cases had drugs from a single drug category, while 55% had drugs from multiple drug categories.

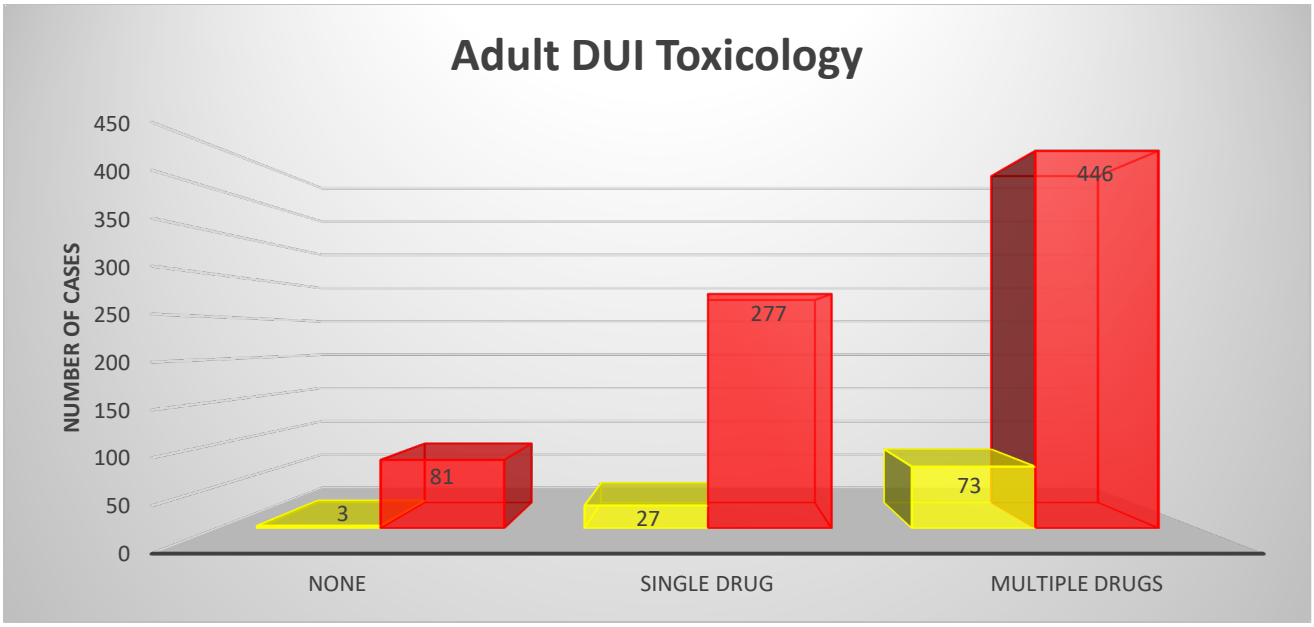


**Figure 12 – Adult DUI Toxicology Results**

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

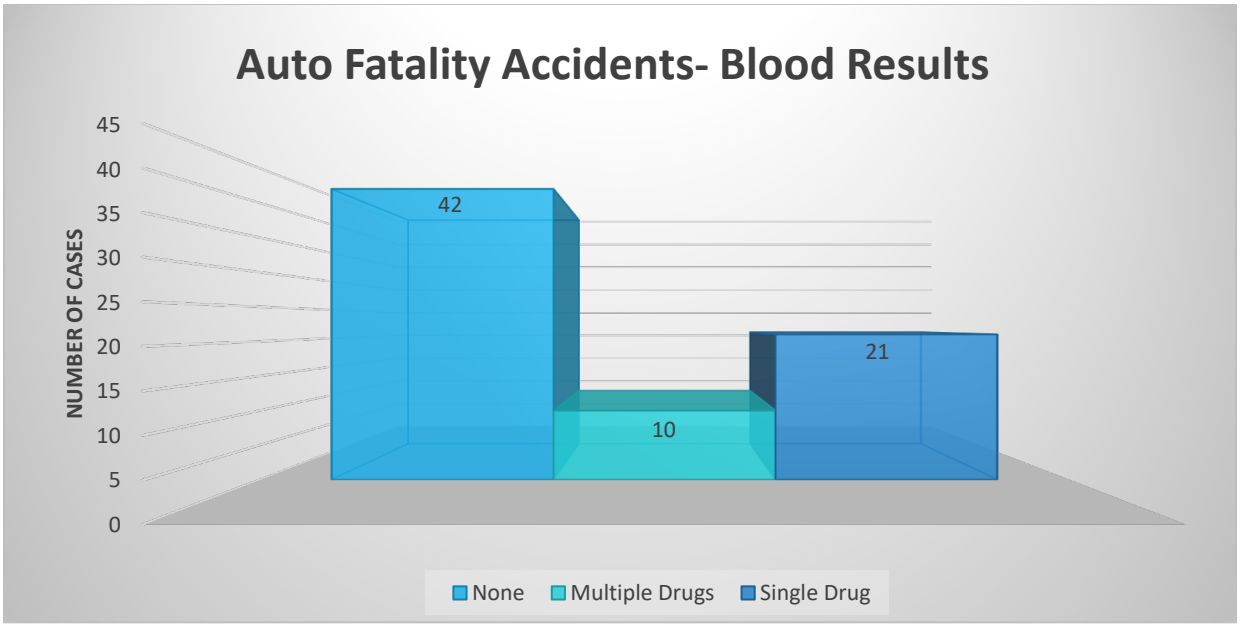


**Figure 13–Toxicology Summary for Fatality Accidents, by Category**

Although the overall trend for FY2022 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 15% of the cases had drugs from multiple categories. Unlike the adult DUI cases, a significant portion (about 54%) of the adult auto accident fatality cases were found to have no drugs detected. With the single drug adult fatality cases, approximately 38% had cannabinoids, 24% had CNS-S drugs, and CNS-D drugs and narcotic analgesics accounted for 19% each.

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

| Number of Cases | Offense | Toxicology Results |
|---|---|---|
| 60 | Rape | • 12 Negative<br>• 48 Positive – of the 48 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) |
| 178 | Drug Violations | • 6 Negative<br>• 172 Positive – of the 172 positive cases, 118 of them contained CNS-S drugs (either alone or in combination with a drug from another category) |
| 65 | Other Offenses | • 31 Negative<br>• 34 Positive — of the 34 positive cases, 13 of them contained CNS-D drugs (either alone or in combination with a drug from another category), 11 of them contained cannabinoids (either alone or in combination with a drug from another category) |
| 14 | Death Investigations | • 5 Negative<br>• 9 Positive —of the 9 positive cases, 6 of them contained CNS-D drugs (either alone or in combination with a drug from another category) |
| 4 | Murder/Attempted Murder | • 1 Negative<br>• 3 Positive — 1 contained cannabinoids, 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.

Of the 59 juvenile cases that were tested for toxicology, 48% of them had a DUI charge associated with it. The other cases were distributed between five other types of offenses. They included auto accident

fatalities, drug/narcotic violations, probation violations, rape, and other. A large majority (67%) 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**.

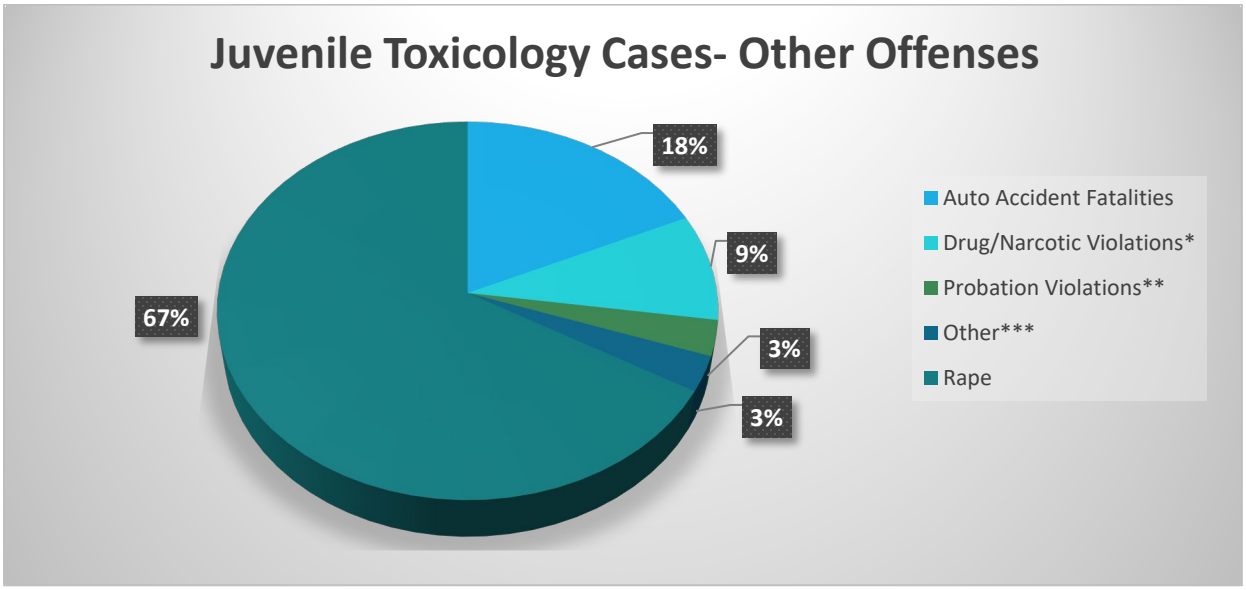


**Figure 14- Breakdown of Juvenile Toxicology Cases Processed for Crimes Other Than DUI**

Year after year, ISPFS reports cannabinoids are the most commonly detected drug in those juvenile samples containing drugs, and FY2022 was no exception as 54% 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), 60% 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 FY2021, this number increased drastically as just under 80% of blood and over 93% of urine cases contained at least one drug. For FY2022, 85% of urine cases and about 70% of blood cases were positive for at least one drug. There were six different drug combinations seen for both the blood and urine samples. Fifty-nine percent of the juvenile urine toxicology cases that contained one or more drugs were positive for cannabinoids, 50% were positive for CNS-D drugs, 36% were positive for CNS-S drugs, and only 4.5% were positive for narcotic analgesics. Of the juvenile blood toxicology cases, 83% contained cannabinoids, 22% contained a CNS-D, 13% contained a narcotic analgesic and 9% contained a CNS-S drug. 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.

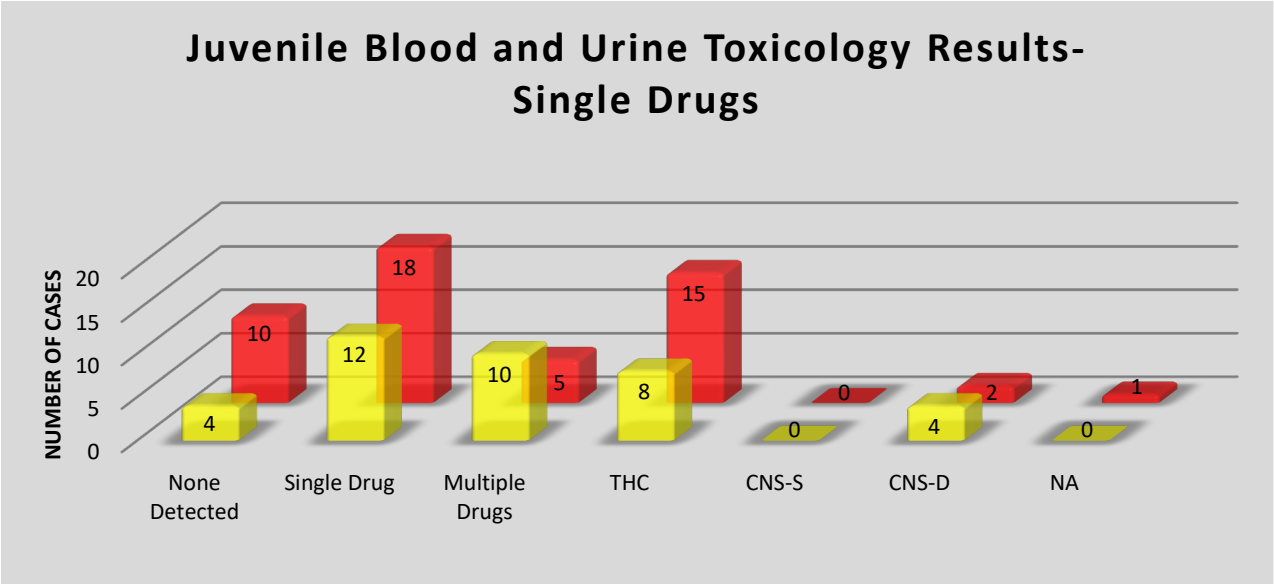


**Figure 15a – Juvenile Blood and Urine Toxicology Results by Category**

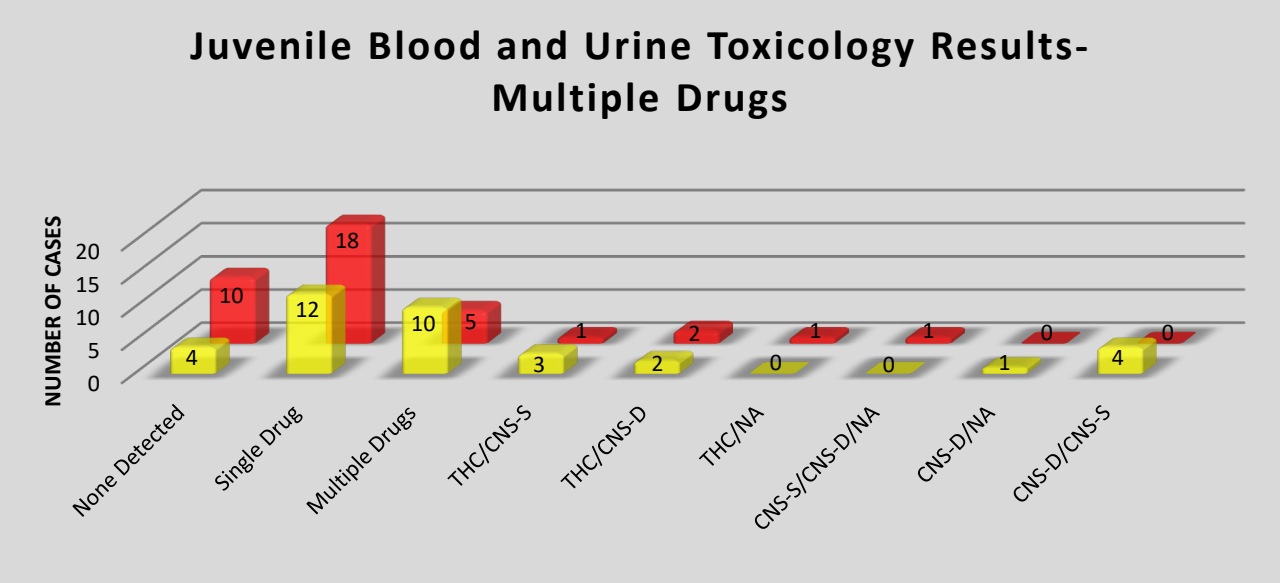


**Figure 15b – Juvenile Blood and Urine Toxicology Results by Category**

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 FY2013 and FY2022 ranged from 2 cases (in FY2015) to 12 cases (in FY2013). There does not seem to be any pattern when looking at the last ten years. The overall trend is displayed in **Figure 16.**

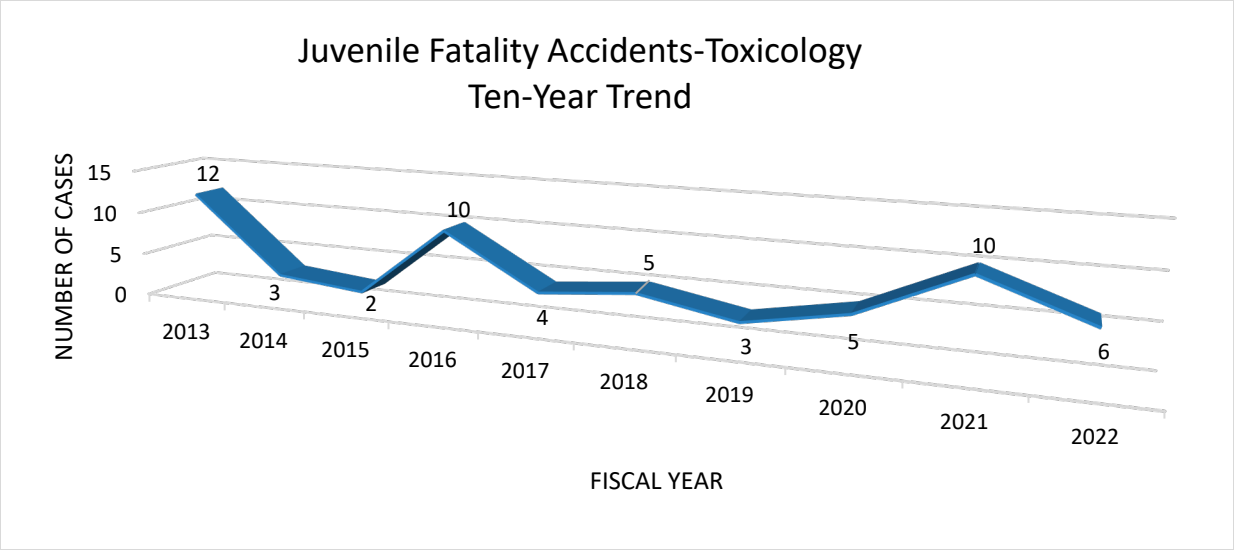


**Figure 16 – Juvenile Fatality Accidents Submitted for Toxicology**

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, and FY2022, the number had decreased to 52%, 50%, and 48%, respectively. For the 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 26 juvenile DUI toxicology samples tested for FY2022, only one of the urine samples and one of the blood samples tested negative for drugs. This means that only 7.7% of the juvenile DUI toxicology samples tested were negative for drugs.

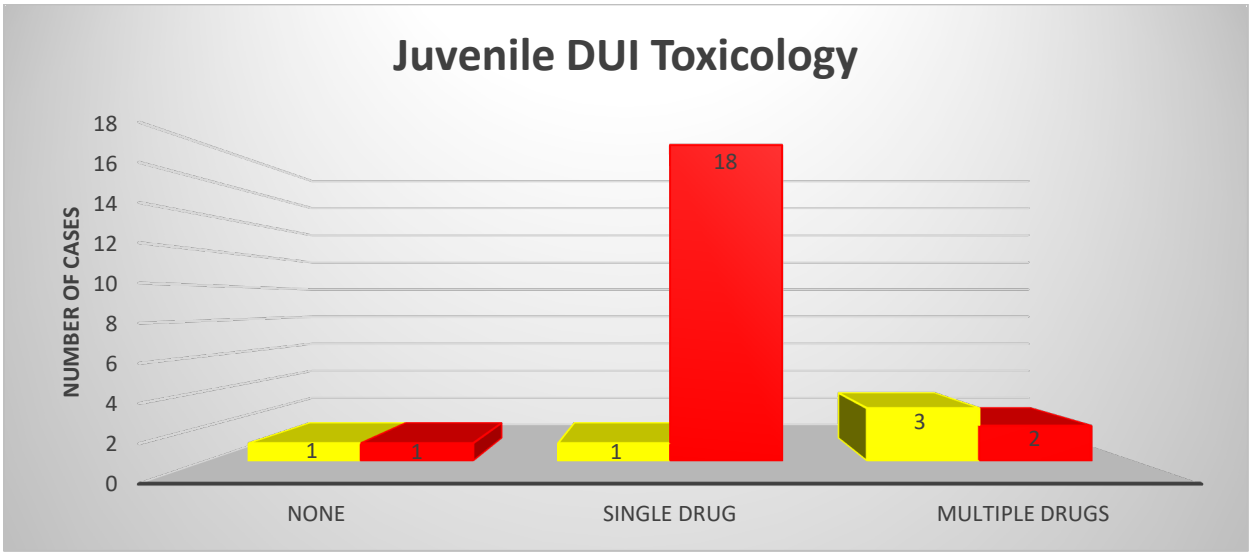


**Figure 17- Juvenile DUI Toxicology Results**

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

| Number of Cases | Offense | Toxicology Results |
|---|---|---|
| 22 | Rape | • 4 Negative<br>• 18 Positive – of the 18 positive cases, 12 of them contained cannabinoids (either alone or in combination with a drug from another category), and 10 contained CNS-D drugs (either alone or in combination with a drug from another category) |
| 3 | Drug/Narcotic Violations | • 1 Negative<br>• 2 Positive – of the 2 positive cases, 1 contained CNS-D drugs combined with cannabinoids and the other contained a combination of CNS-S drugs, CNS-D drugs, and narcotic analgesics |
| 1 | Other Offenses | • Sample was negative |
| 1 | Probation Violations | • Sample was positive for a combination of CNS-D drugs and narcotic analgesics |

# 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. Alprazolam (CNS-D)
8. Diphenhydramine (CNS-D)
9. 7-aminoclonazepam (CNS-D)
10. Citalopram (CNS-D)

*Amphetamine may be present as a metabolite of methamphetamine.

In evaluating the top ten drugs for FY2022 and the previous four fiscal years, the majority of the drugs have not changed. In fact, the top three drugs have not changed. The ranking has changed between the years, but methamphetamine, amphetamine, and carboxy-THC have been in the top three spots each year. Alprazolam has been in the top five spots for four out of the five years. Diphenhydramine has been in the top six drugs in four out of the five years. 7-aminoclonazepam has been ranked in the top ten all five years. 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 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 FY2018 – FY2022 are displayed in **Figure 17**.

| Rank | FY2018 | FY2019 | FY2020 | FY2021 | FY2022 |
|---|---|---|---|---|---|
| 1 | Methamphetamine | Methamphetamine | Amphetamine | Carboxy-THC | Amphetamine |
| 2 | Amphetamine | Amphetamine | Methamphetamine | Amphetamine | Methamphetamine |
| 3 | Carboxy-THC | Carboxy-THC | Carboxy-THC | Methamphetamine | Carboxy-THC |
| 4 | Alprazolam | THC | THC | THC | THC |
| 5 | THC | Alprazolam | Alprazolam | Diphenhydramine | Fentanyl |
| 6 | Diphenhydramine | 7-aminoclonazepam | Diphenhydramine | Alprazolam | Norfentanyl |
| 7 | Morphine | Diphenhydramine | Morphine | Morphine | Alprazolam |
| 8 | 7-aminoclonazepam | Hydroxy-THC | 7-aminoclonazepam | 7-aminoclonazepam | Diphenhydramine |
| 9 | Hydrocodone | Morphine | Lorazepam | Hydroxy-THC | 7-aminoclonazepam |
| 10 | Lorazepam | Clonazepam | Citalopram | Fentanyl | Citalopram |

**Figure 17- Ranking of Top 10 Drugs for FY2018 - FY2022**

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. As ISPFS continues to add more drugs to the scope of our methods, it was suspected that this number will continue to increase. For the top ten drugs confirmed in FY2022, amphetamine was confirmed 641 times, methamphetamine was confirmed 591 times, carboxy-THC was confirmed 512 times, THC was confirmed 367 times, fentanyl was confirmed 164 times, norfentanyl was confirmed 132 times, alprazolam was confirmed 93 times, diphenhydramine was confirmed 82 times, 7-aminoclonazepam was confirmed 71 times, and citalopram was confirmed 65 times. 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 3,137 toxicology cases for FY2022, which was slightly less (3.5%) than that received in FY2021. This was slightly more than the number of cases received in FY2020 (2,953 cases). Interestingly, the number of cases submitted for FY2019 increased substantially from the previous five years, then went back down, slightly in FY2020, back up in FY2021, then slightly back down again for FY2022. The number of cases for blood alcohol/volatiles analysis has been fairly consistent since FY2014 but there were very different trends seen with the blood and urine toxicology case submissions. The number of blood toxicology cases submitted was on an upward trend, while the number of urine toxicology cases submitted was on a downward trend. Starting in FY2014, the number of blood toxicology cases has continued to increase, nearly every year. The number of cases submitted for blood toxicology for FY2022 was nearly double what it was in FY2014. As mentioned previously, the opposite trend was seen with urine toxicology cases drastically decreasing. The number of urine toxicology cases submitted in FY2022 was less than half of what was submitted in FY2013.

The number of alcohol/volatiles case submissions to ISPFS increased by 25 cases from 1,403 in FY2021 to 1,428 in FY2022. This change corresponds to only about a 1.8% increase. There were significantly more alcohol/volatiles cases submitted prior to the McNeely decision in 2013. Then in FY2014, there was a dramatic decline in the number of alcohol/volatiles cases submitted and since then, the number has stayed fairly consistent.

Adult samples submitted for pending DUI charges constituted 1,096 of the total 1,322 alcohol/volatiles cases (83%). Of these 1,092 samples, 913 were over the per se limit of 0.08 g% (83%).

A total of 67 adult auto accident fatality case samples were submitted to ISPFS in FY2022. Of the 67 cases, 52 (70%) contained <0.02 g% alcohol, one (~8%) was between 0.02 and 0.08 g%, and 14 (22%) were at or above the legal limit of 0.08 g%.

ISPFS processed 94 juvenile alcohol cases in FY2022. This was 27 fewer juvenile alcohol/volatile cases than was processed in FY2021. Of these samples, 62% were over the legal limit for persons under age 21 (0.02 g%). Of the 94 juvenile alcohol samples submitted to ISPFS, 57 were juvenile DUI cases; 42 of these 57 cases (74%) were over the juvenile (under age 21) legal limit of 0.02 g%.

ISPFS accepted 1487 blood samples and 222 urine samples for toxicology testing in FY2022. This correlates to a decrease of about 6% in the number of blood cases and a 16.9% decrease in urine cases from FY2021. When considering the number of blood and urine toxicology submissions for the last 10 years, it appears that there was an upward trend associated with the blood toxicology samples and an overall downward trend with the urine toxicology samples.

For FY2022, there were 1,302 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 data for adult blood and urine samples showed an interesting difference from previous years. Data from the previous five years had shown that single-category drug use was more prevalent than multiple drug category combinations for blood toxicology. For FY2021 and FY2022, this changed as there was a much higher number of blood cases in which there were drugs present from multiple drug categories. 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. However, the drug most often seen in the cases where there were multiple drug categories present was THC. So, perhaps an increase in the use of THC in combination with other drug categories was responsible for the increase in multiple drug categories in FY2021 and FY2022.

There were eleven different combinations that encompassed the majority of the samples. In previous years, NAs were not very prevalent in blood and did not typically appear in many of the drug combinations. This seemed to change in FY2021. For FY2022, three out of the top seven drug combinations included some type of narcotic analgesic. 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.

There were fifty-nine juvenile toxicology cases that were submitted for toxicology in FY2022. Of the 59 juvenile cases that were tested for toxicology, 48% of them had a DUI charge associated with it. Of the 26 juvenile DUI toxicology samples tested for FY2022, only one of the urine samples and one of the blood samples tested negative for drugs. This means that only 7.7% of the juvenile DUI toxicology samples tested were negative for drugs.

The non-DUI cases were distributed between five other types of offenses. They included auto accident fatalities, drug/narcotic violations, probation violations, rape, and other. A large majority (67%) of the non-DUI cases were associated with a rape or sexual assault. For FY2022, 85% of urine cases and about 70% of blood cases were positive for at least one drug.

Year after year, ISPFS reports cannabinoids are the most commonly detected drug in those juvenile samples containing drugs, and FY2022 was no exception as 54% of the total juvenile cases were positive for either cannabinoids alone or in combination with drugs from another drug category.

In evaluating the top ten drugs for FY2022 and the previous four fiscal years, the majority of the drugs have not changed. In fact, the top three drugs have not changed. The ranking has changed between the years, but methamphetamine, amphetamine, and carboxy-THC have been in the top three spots each year.

One big change that did happen in terms of the most commonly confirmed drugs was the inclusion of fentanyl in the top ten drugs for FY2021 and its rise to spot number 5 for FY2022 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 for FY2021. For FY2022, this number dropped slightly to 4,287. As ISPFS continues to add more drugs to the scope of our methods, it was suspected that this number will continue to increase.

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 FY2022, 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.