Toxicology Program Trends

FY 2020

FY2020 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 2020 (FY2020): District 1, Coeur d' Alene; District 5, Pocatello; and District 3, Meridian (blood alcohol only). A "toxicology case" is 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. 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 is 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 is 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 FY2020. All case information is 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 is 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.

Both the Pocatello and Coeur d'Alene labs started using new toxicology methods in FY 2018, which greatly decreased the time it takes to process case samples and blood toxicology turnaround times have continued to decline from those seen in previous years.

In addition to decreasing the amount of time it takes to process blood toxicology cases, the new methods implemented also included the ability to report out quantitative values for numerous compounds. The toxicology section is currently able to report 103 compounds (36 of those are able to be reported quantitatively). The labs will continue to collect data for additional compounds and start reporting out quantitative values for those additional compounds as appropriate uncertainties are established.

Best practice in toxicology testing is to use two different technologies to screen and confirm compounds. Sometimes this is not possible so workarounds such as using the same instrument but different mobile phases, columns, and methods for the screening and confirmatory testing can be employed. This was how the toxicology section was and has been functioning for some time.

Toward the end of FY2019, the toxicology section received two new instruments (LC-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 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 LC-QQQ instruments that are currently being used for preliminary testing (screening), the new LC-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 is not something that is 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.

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 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). Drugs that slow the processes of the central nervous system are termed Central Nervous System Depressants (CNS-D). Central Nervous System Stimulants, Central Nervous System Depressants, and cannabinoids (marijuana) account for the vast majority of the positive toxicology results obtained from analysis. The report appendix includes term definitions, drug category descriptions, and examples of drugs included in each category.

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 as 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 is 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 is not detected in the sample.

Driving under the influence of impairing prescription drugs is an increasing problem in Idaho. 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-depressant, anti-anxiety, anti-histamine, barbiturate, narcotic analgesic (NA), and others.

The active component of marijuana is tetrahydrocannabinol (THC). There are numerous THC metabolites, including hydroxy-THC and carboxy-THC. Before the implementation of the new methods, ISPFS was only able to detect the inactive metabolite (produces no pharmacological effects), carboxy-THC in blood samples. The current method for blood not only allows for the detection of THC, hydroxy-THC and carboxy-THC, but allows THC and hydroxy-THC quantities to be reported. The current method used for urine analysis allows for the detection of the carboxy-THC 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 also 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 hydrocodone, oxycodone, and methadone. Since fentanyl has become so popular nationwide, it and one of its metabolites (norfentanyl) were added to the new methods to allow for the reporting of those compounds in blood. Acetyl fentanyl (a designer drug that is similar to fentanyl) and its metabolite, acetyl norfentanyl, were also added.

Benzodiazepine class drugs are typically prescribed for anti-anxiety, and as tranquilizers. The most well-known benzodiazepines include Xanax (alprazolam), Valium (diazepam), Klonopin (clonazepam), and Ativan (lorazepam). There are many different drugs under this class; however, we typically only see a few different ones. The most commonly found benzodiazepines in casework were alprazolam, clonazepam/7-aminoclonazepam, and lorazepam. Due to an increase in the number of designer benzodiazepines or Novel Psychoactive Substances (NPS), the toxicology section has been monitoring what the controlled substance section has been seeing as well as what agencies are requesting or suspecting. During FY2019, an increase in the number of etizolam submissions was noted and this drug was added to our testing panel. During FY2020, an increase in the number of flualprazolam submissions was noted and this drug was added to our testing panel. In addition, clonazolam, cocaethylene, levetiracetam, norketamine, and alpha-PHP were 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 not to 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 is below 0.20 g% of blood.

A negative toxicology result does also 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 is no drug detected because there is 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.

General Toxicology Discipline Breakdown for FY2020

Statistics included in this report were obtained from the Idaho Laboratory Information Management System (ILIMS). This is the system that is used to log in and track all evidence submitted to the forensic laboratory system during FY2020. 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	FY2020 Percent
DUI					
Adult	1012	783	103	1898	66.78%
Juvenile	45	26	3	74	
Probation Violations*					
Adult	2	0	3	5	0.17%
Juvenile	0	0	0	0	
Drug/Narcotic Violations**					
Adult	23	134	23	180	6.33%
Juvenile	2	2	3	7	
Other***	38	45	10	93	3.15%
Auto Accident Fatalities	85	78	2	165	5.59%
Accident Victim Kits	7	5	0	12	0.41%
Death (non-homicide)	8	5	1	14	0.47%
Murder	0	1	1	2	0.07%
Rape****	66	26	76	168	5.69%
Cases Closed Before Analysis*****	37	294	4	335	11.34%
Total:	1325	1399	229	**2953**	100%

Table 1- Statistical Representation of the Number and Distribution of Toxicology Cases for FY2020.

*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, 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 is no longer necessary per the agency or if other evidence proves to be probative and testing of another type is no longer warranted (i.e. blood alcohol and blood toxicology are both requested but the alcohol result is greater than 0.10 g%, so the blood toxicology request is closed without analysis).

The ISPFS laboratory system received 2,953 toxicology cases for FY2020, which was a decrease of 166 cases from FY2019. The number of cases corresponds to a decrease of approximately 5.32% from FY2019 but a 7.03% increase from FY2018.

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 is 2884 cases.

There appears to be a trend in which there were a much higher number of cases submitted between FY2011 and FY2013 than there were between FY2014 and FY2020. In fact, the 3 year average for FY2011-FY2013 is 20% higher than the average for FY2015-FY2020. One possible explanation for the large change in cases submitted could be due to the Supreme Court ruling on Missouri vs. McNeely in which it was decided that if an evidentiary blood draw is desired, a warrant must be obtained prior to collecting the blood. **Figure 1b** further supports this hypothesis as the rapid decline in the number of alcohol/volatiles is seen. The number of cases submitted for alcohol/volatiles analysis seemed to be fairly consistent from FY2009 to FY2013, then in FY2014, a drastic decline occurred. The Supreme Court ruling on Missouri vs. McNeely was issued just before FY2014. If this hypothesis is 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. It is suspected that the slight decrease for FY2020 is likely due to COVID-19 since fewer people were out in public and driving. It is anticipated that the population will continue to increase, and as such, it is likely that the number of cases submitted for the next three years will be similar or greater than that of the number of cases submitted for FY2019 and FY2020. If this is the case, the section of the graph (**Figure 1a**) for FY2020-FY2023 will look very similar to FY2011-FY2013, before the large decrease in FY2014.

The number of urine toxicology cases has been slowly declining for the last ten years. It is unknown why this is happening but one possible explanation is that it is due to a decrease in the turnaround time and an increase in the scope of testing (including quantitation) for blood toxicology analysis. Some officers are choosing to collect blood where at all possible versus collecting urine.

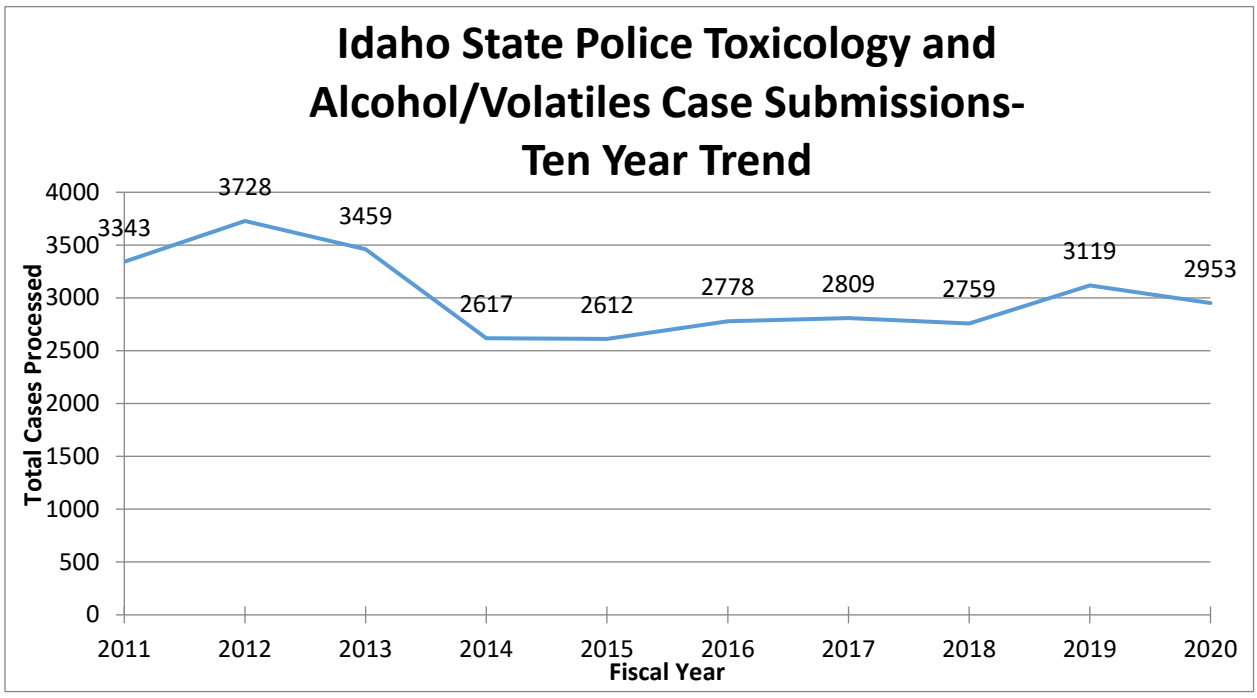

FIGURE 1a- Ten Year Trend for Toxicology Case Submissions

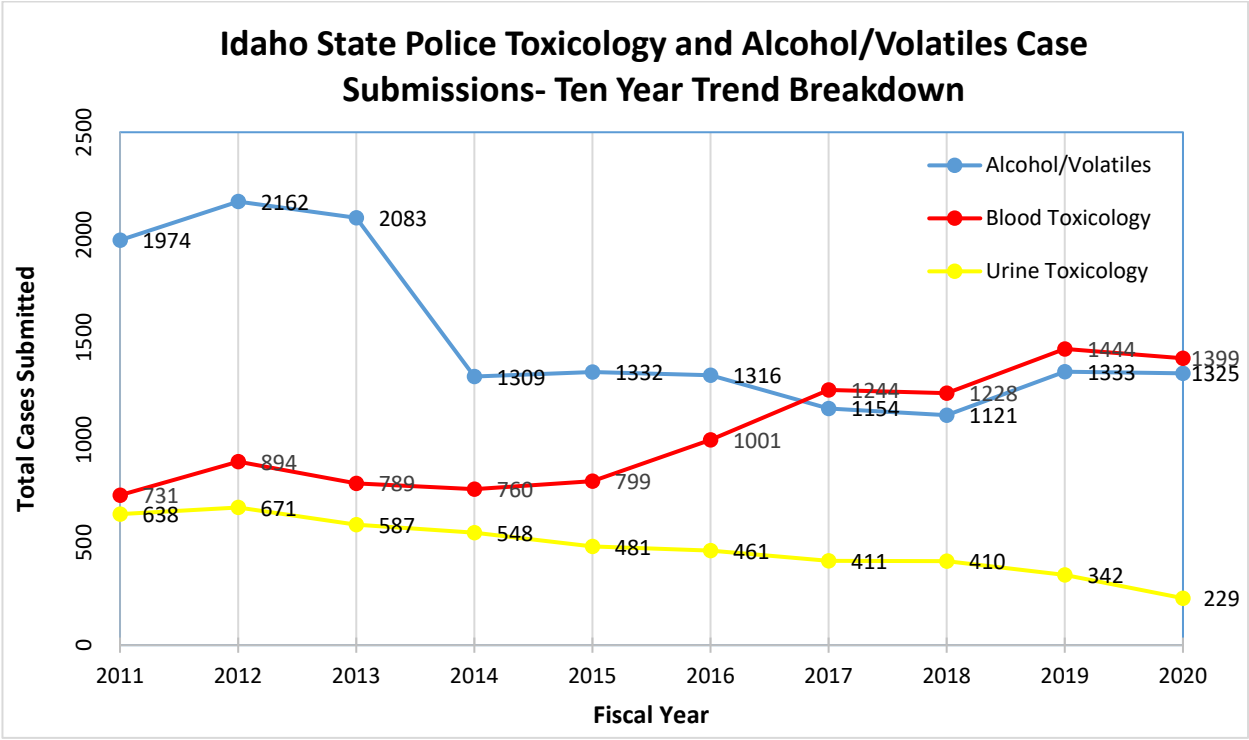

FIGURE 1b- Breakdown of the Ten Year Trend for Toxicology Case Submissions

Alcohol and Other Volatiles

The number of alcohol/volatiles case submissions to ISPFS decreased by only 8 cases from 1,333 in FY2019 to 1,325 in FY2020. This change corresponds to about a 0.6% decrease. 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 fairy consistent or has slightly increased or decreased but there have been no other dramatic changes. A significant increase (beyond the increase that is expected due to population increases) in the number of cases is not expected since ISPFS provides support for breath testing in Idaho; the scientists working in this discipline have reported a significant increase in breath testing workload. Idaho also implemented a new fuel cell/IR breath testing instrument in recent years that officers may be eager 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 is not the only compound that is 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 1221 adult samples for alcohol and inhalants during FY2020. The analysis results are tabulated below. Each sample for which alcohol analysis is requested is simultaneously tested for the presence of inhalants, however, the total 1206 samples reported in the table below does not include beverage samples, or inhalant results.

Number of Adult Samples	Result Category
37 (not included in total)	Not analyzed
266	<0.02 g%
57	≥0.02 g% and <0.08 g%
883	≥0.08 g%
1206	Total (Reflects ethanol results only)

For the purposes of this report, any alcohol result that was reported as "none detected" or "below reportable limit" is categorized as <0.02 g%. If alcohol and toxicology testing are both requested, then a

negative alcohol sample is also processed for drugs. Therefore, samples listed as none detected (or <0.1 g%) may be positive for drugs other than alcohol.

Figure 2 is a depiction of the overall adult alcohol results for FY2020; this chart includes DUIs, death investigations, auto accident fatalities, and a wide variety of other case types.

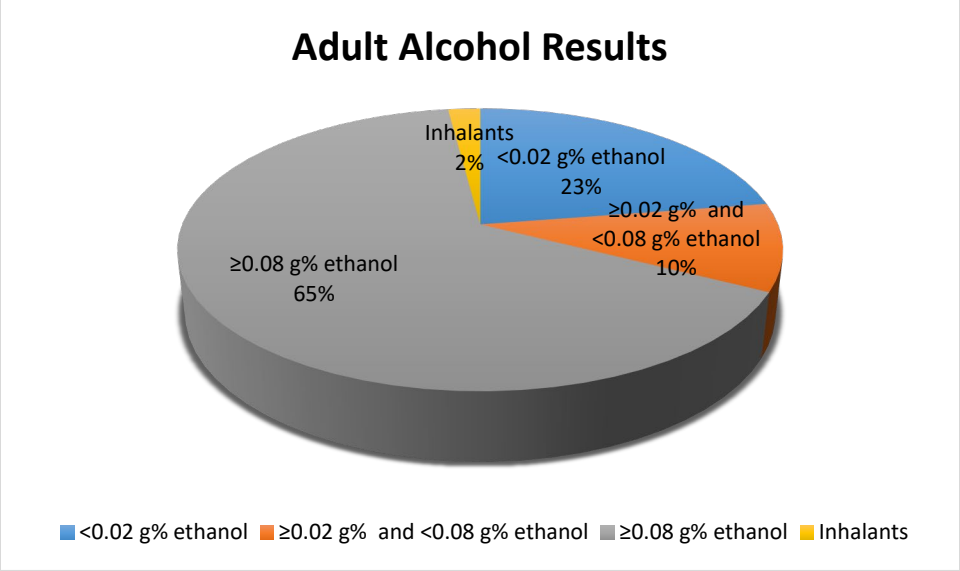

FIGURE 2- Adult Alcohol/Volatiles Levels for FY2020

Fifteen adult samples tested positive for inhalants. In terms of significance, considering the 1258 adult alcohol samples submitted, fifteen inhalant samples is not a significant percentage. However, it is interesting to note that for FY2019, the number of inhalants reported was thirty-five. This difference corresponds to a 133% decrease. The inhalants confirmed in the 15 positive samples included: eight samples that were positive for fluorinated hydrocarbons (air duster), five samples that were positive for acetone (nail polish remover, it is also formed in the body during ketoacidosis), two were positive for toluene (an additive in gasoline, paint thinner, and nail products), and one sample was positive for isopropanol (rubbing alcohol).

Adult samples submitted for pending DUI charges constituted 1000 of the total 1258 alcohol/volatiles cases (79%). Of these 1000 samples, 883 were over the per se limit of 0.08 g% (88.3%). 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 is ≥0.10 g% if there are extenuating circumstances which may include sexual assault or death investigations, injury to a child, or aggravated offenses.

When urine samples are submitted for inhalant testing, they also undergo simultaneous alcohol testing as it is the same test. Urine alcohol results are of questionable value, and thus are reported by ISPFS with a disclaimer statement. The questionable value of these results 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 is 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 of particular interest is adult auto accident fatalities. **Figure 3** shows the BAC results for the adult auto accident fatalities. A total of 75 adult auto accident fatality case samples were submitted to ISPFS in FY2020; this is 21 fewer cases than in FY2019. Of the 75 cases, 59 (79%) contained <0.02 g% alcohol, two (3%) were between 0.02 and 0.08 g%, and 14 (19%) were at or above the legal limit of 0.08 g%. This distribution is very similar to previous years.

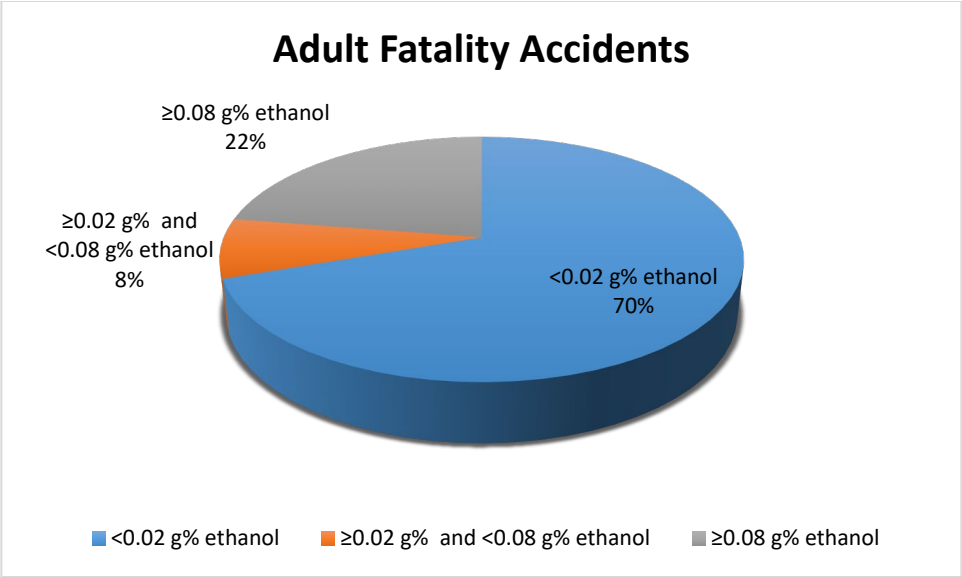

Figure 3- Results for Adult Alcohol Fatality Accidents

The ten year trend of adult auto accident fatality cases submitted to ISPFS is depicted in **Figure 4**. Interestingly, the number of cases submitted seemed to fluctuate with about every other year being higher than the previous year (FY2015-FY2016 did not follow this trend). There was no apparent explanation for why this occurs. The number of fatality accident cases submitted for alcohol/volatiles testing in FY2020 (75 cases) continues this trend. The average number of adult fatality cases submitted for the last 10 years (including FY2020) was 74 cases.

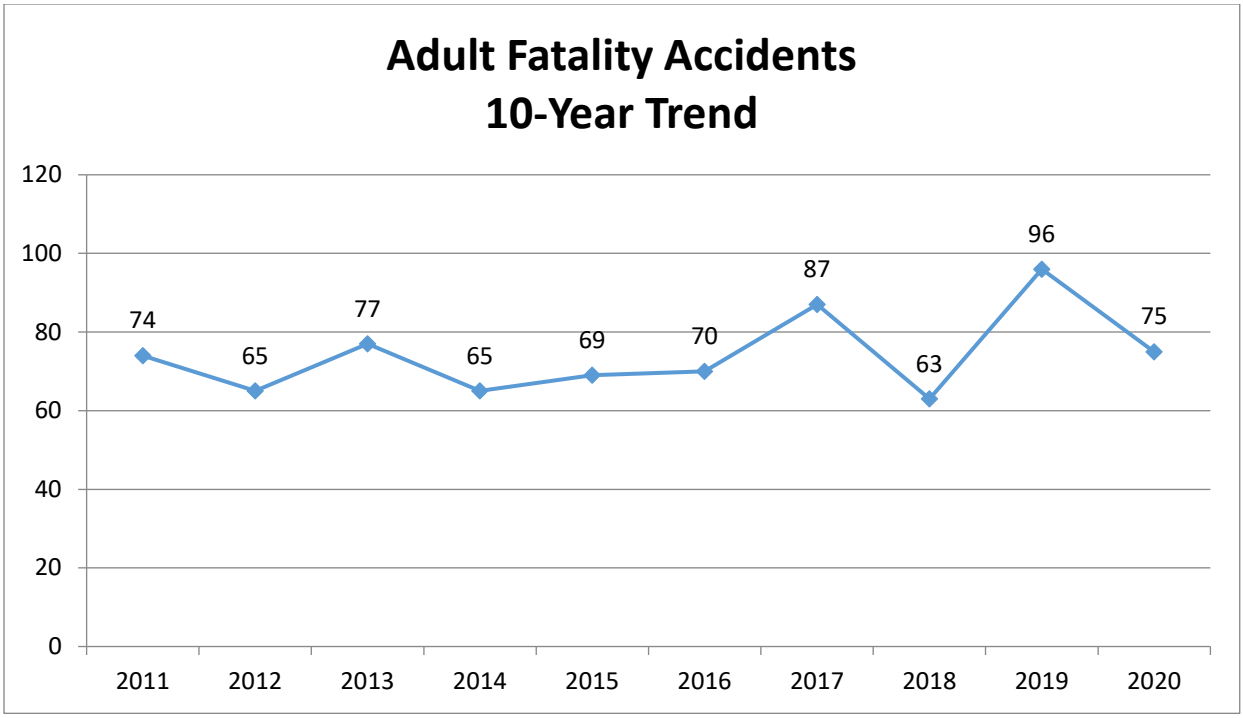

Figure 4- Ten Year Adult Fatality Accident Trend

Juvenile Alcohol Concentrations

ISPFS processed 106 juvenile alcohol cases in FY2020. This is the same number of juvenile alcohol/volatile cases that was processed in FY2019. Of these samples, 51% were over the legal limit for persons under age 21 (0.02 g%). Of the 106 juvenile alcohol samples submitted to ISPFS, 57 were juvenile DUI cases; 43 of these 57 cases (75%) were over the juvenile (under age 21) legal limit of 0.02 g%. This percentage is roughly 6 percent lower than it was in FY2019, where 81% of the juvenile DUI cases had a result of over 0.02%.

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

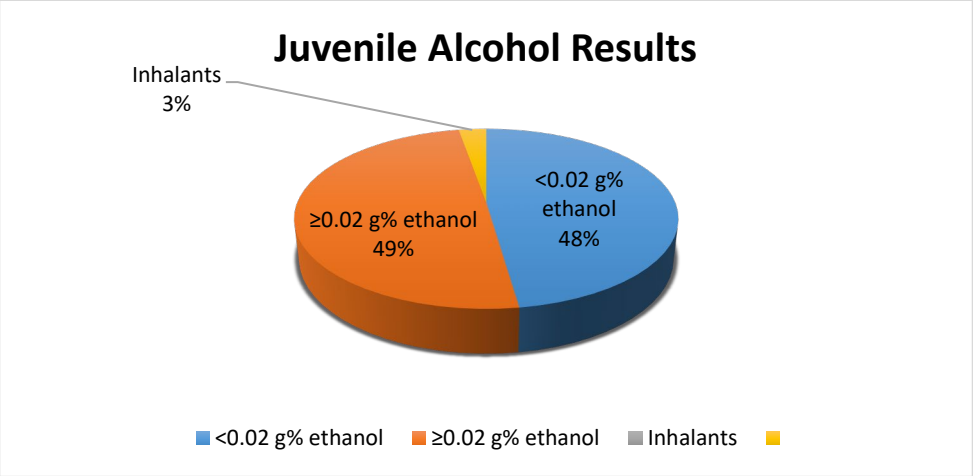

Figure 5- Juvenile Alcohol Levels for FY2020

Three percent of the juvenile samples tested positive for inhalants. This number is up from one percent of the juvenile samples that tested positive for inhalants in FY2019 and two percent that tested positive for inhalants for juveniles in FY2018. Since inhalants are volatiles and evaporate easily they do not stay in the blood or urine in detectable amounts for long periods of time, so the laboratory results may not necessarily be indicative of the prevalence of use.

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 is a 550% increase! 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 in FY2019 and FY2011.

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

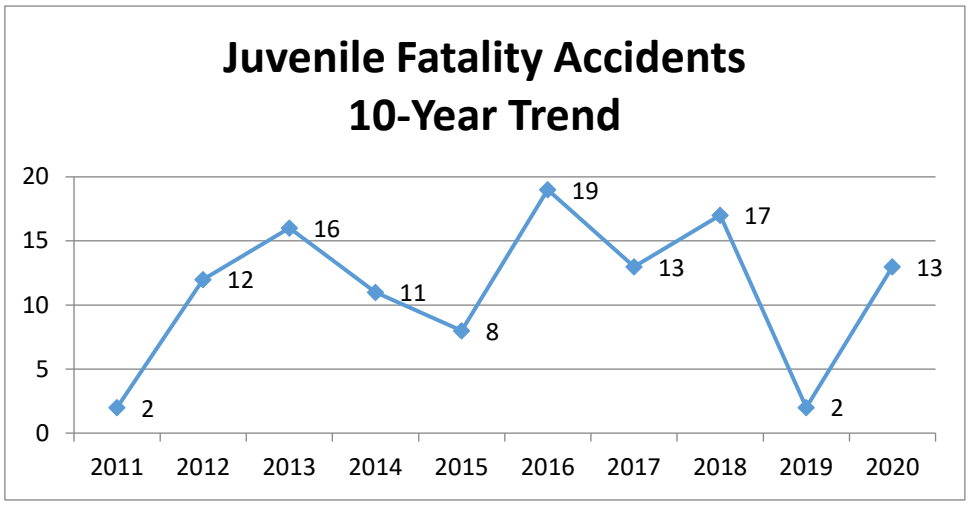

Figure 6- Ten Year Juvenile Fatality Accident Trend

Other Offense Alcohol Concentrations

Cases submitted for alcohol analysis in FY2020 also included several other offenses. **Figures 7** is 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 is 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.

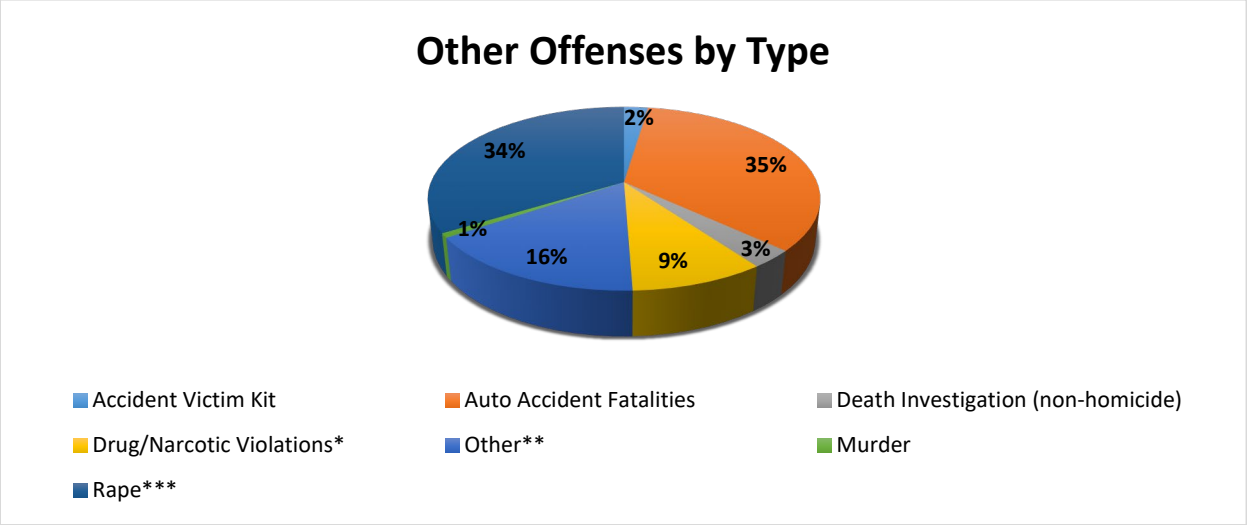

Figure 7 – Alcohol Analysis Requests by Other Offense Types

*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.

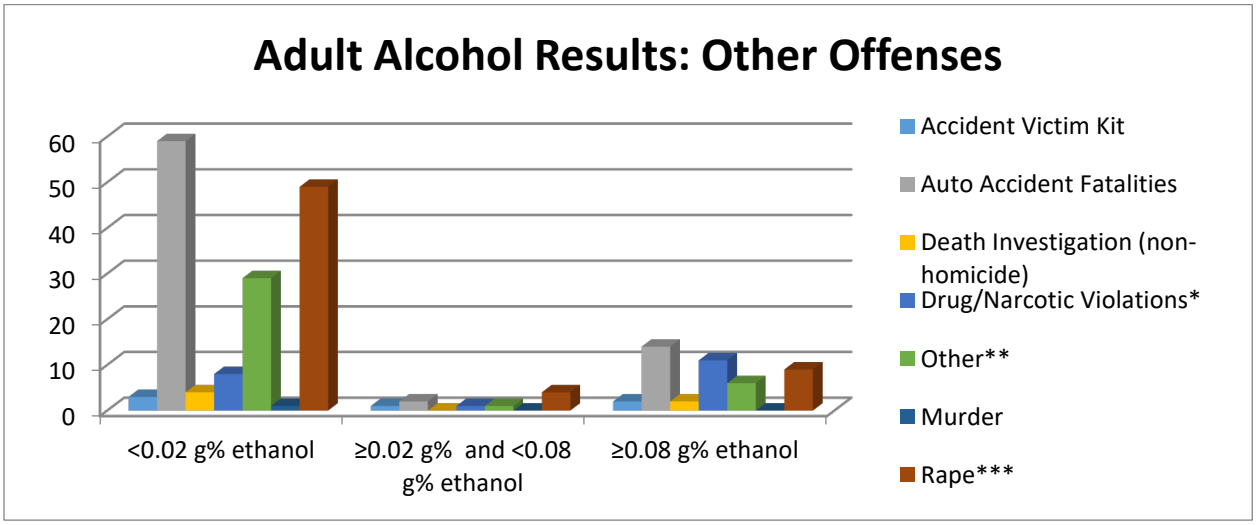

Figure 8- Adult Alcohol Results for Other Offenses

*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.

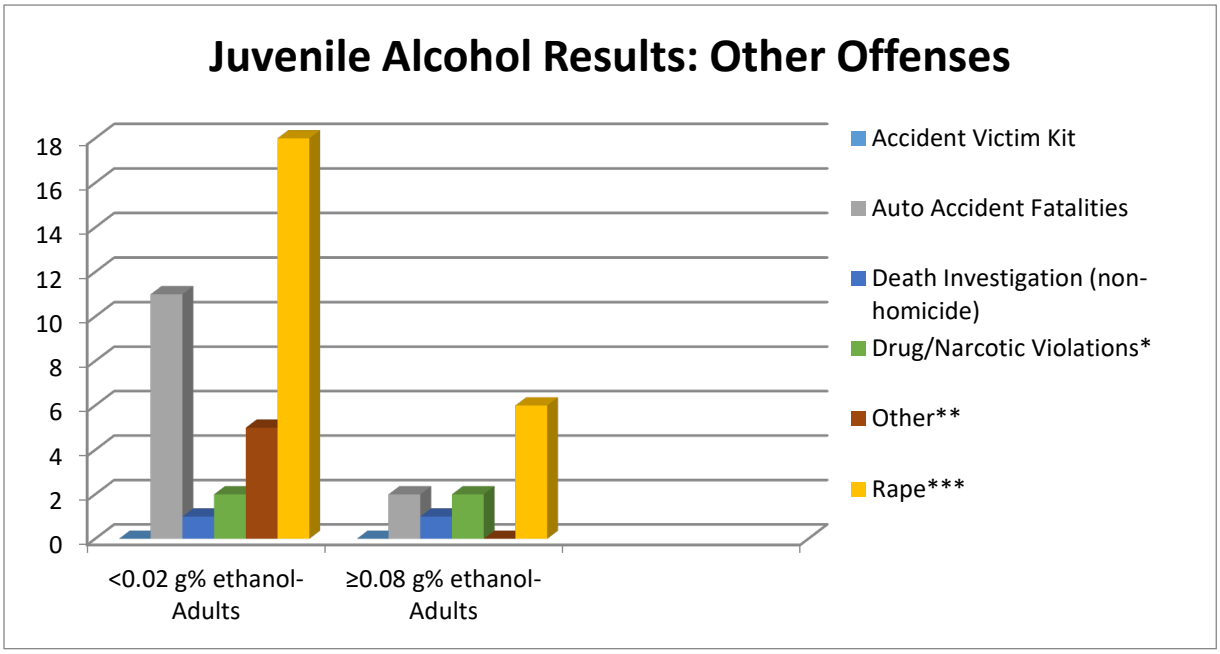

Figure 9- Juvenile Alcohol Results for Other Offenses

*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 is certified. The successful completion of this annual test is required for analysts to be permitted to continue to perform analyses on casework. Furthermore, analysts are also provided a competency test prior to becoming certified 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 after use, but not in blood. If carboxy-THC is found in the blood, it may be indicative of more recent use. THC and hydroxy-THC can be found in the blood, but 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 often 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 1399 blood samples and 229 urine samples for toxicology testing in FY2020. This correlates to an increase of about 5% in the number of blood cases and a decrease of about 33% in urine cases. When considering the number of blood and urine toxicology submissions for the last 10 years, it appears that there is an upward trend associated with the blood toxicology samples and a 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, 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. For multiple drugs, only those combinations that had 20 or more cases associated with it are displayed in the graphs.

Adult

Figure 10 shows the adult blood and urine toxicology results for FY2020 by drug category. For example, hallucinogens (Hall) includes ecstasy (MDMA), phencyclidine (PCP), and others; narcotic analgesics (NA) includes drugs such as morphine or hydrocodone.

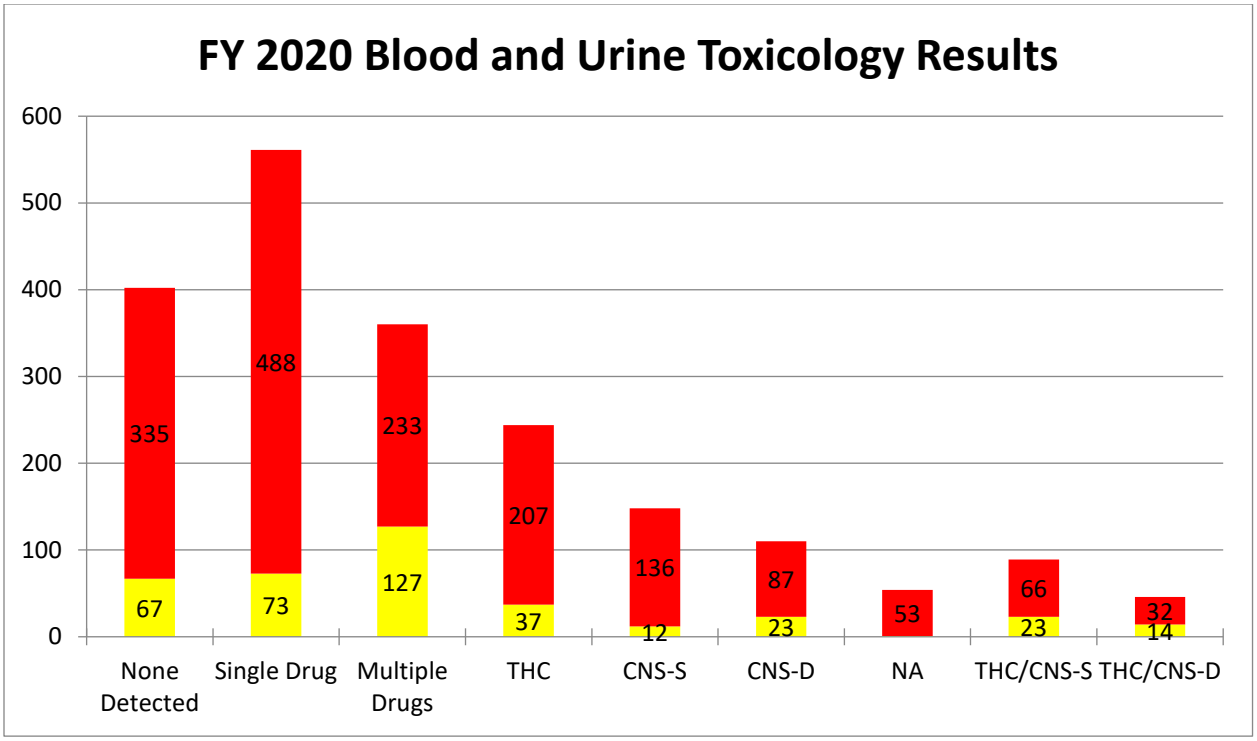

FIGURE 10 – Adult Blood and Urine Toxicology Results by Category

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 returned without toxicology testing in most cases. Therefore, there may have been many more cases that would 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 show some interesting differences. For instance, blood analysis data indicates single-category drug use is more prevalent than multiple drug category combinations. Of those single category cases, it appears that cases with cannabinoids (can be either THC, hydroxy-THC or carboxy-THC) are most prevalent, followed by CNS stimulants. CNS-Ss include drugs like Ritalin (methylphenidate), Adderall (amphetamine), and methamphetamine. Urine analysis shows the opposite. The number of cases with multiple drug categories present is higher than the number of cases with a single drug class present. In fact, it is more than double. This is 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. Of the single drug urine cases, cannabinoids are detected most often, then CNS-S and CNS-D. CNS-Ds can be many different drugs; examples include Valium (diazepam), Xanax (alprazolam), and Ambien (Zolpidem).

There is a large number of possible combinations that can arise with the different drug classes. However, there were only six different combinations that encompassed the majority of the samples. As such, only those combinations are displayed in **Figure** 10. Of those six combinations, CNS-S drugs are

present in four out of the six combinations. CNS-D drugs are also present in four out of the six combinations.

In urine, CNS-S combined with carboxy-THC and CNS-S combined with CNS-D drugs are the most common combinations. In blood, the most prevalent drug combinations are CNS-S and cannabinoids, and CNS-D and narcotic analgesics (NAs). In previous years, NAs were not very prevalent in blood. This is likely due to limitations of the blood toxicology methods and not the fact that there were not NAs present in the samples. Narcotic analgesics are likely more prevalent in blood for FY2020 because of the updated methods. The new blood toxicology methods that were validated in the last few years are much less limited in the types and concentrations of narcotic analgesic compounds that can be detected.

Around 66 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. Interestingly enough, this percentage is about the same as it was in FY2019. One thing to remember when reading this report and looking at the figures is that often times cases will come in to 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 are associated with for the case.

Figure 11 illustrates adult drug results for both blood and urine associated with DUI. Of the adult DUI toxicology cases tested in FY2020, 70% of them were positive for one or more drugs. This number is lower than what was reported in FY2019. The percentage of adult DUI cases that were positive for one or more drugs in FY2019 was 84%.

The blood and urine toxicology adult DUI results were very similar in terms of the percentage of cases that had no drugs detected. The percentage of blood toxicology DUI samples that were reported as none detected was about 31% and the percentage for urine was around 28%.

The trend of multiple drug categories being most prevalent for urine toxicology cases also remains true when looking at DUI cases. For the blood toxicology DUI cases, about 47% of the cases contained drugs from a single drug category while only 22% contained drugs from multiple categories. This ratio of single category to multiple categories is almost the complete opposite when looking at the adult urine toxicology DUI cases. For the urine cases, 27.6% of the samples contained drugs from a single category while over 50% of them contained drugs from multiple categories.

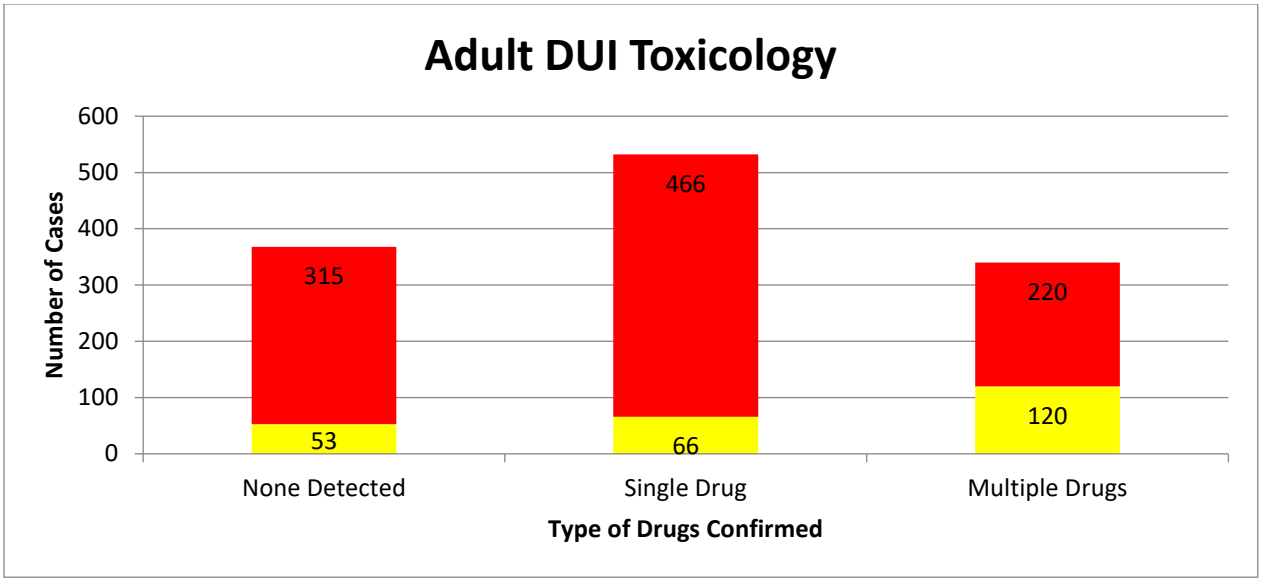

Figure 11 – Adult DUI Toxicology Results

In FY2020, there were 80 cases that were classified as auto accident fatalities. **Figure 12** shows the result categories for these cases. When compared to the number of auto accident fatality cases submitted for toxicology for FY2019, there was a decrease of 22 cases (or about 22%). It should be noted that only two of the 80 samples submitted for auto accident fatalities in FY2020 were urine.

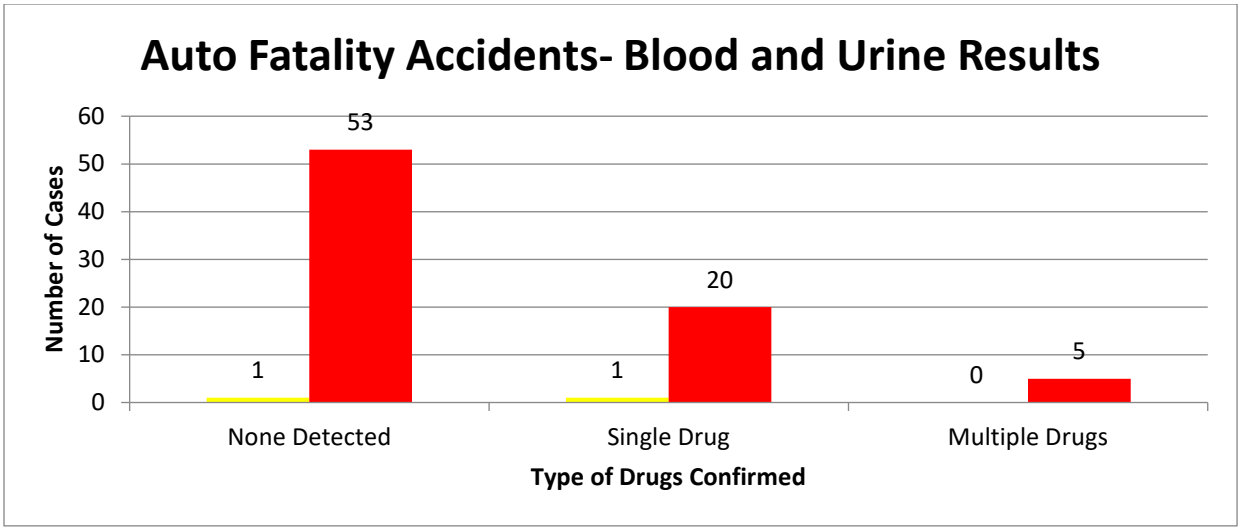

Figure 12 –Toxicology Summary for Fatality Accidents, by Category

For the auto accident fatality cases, the trend in blood of having a higher percentage of cases that had drugs belonging to a single category continues. For the blood auto accident fatality cases, roughly 26% of the cases contained drugs from a single category while only 6.4% of the cases had drugs from multiple categories. Unlike the adult DUI cases, the majority (about 68%) of the adult auto accident fatality

cases were found to have no drugs detected. With the single drug fatality cases, approximately 40% had cannabinoids (marijuana), 35% had CNS-D drugs, 15% had narcotic analgesics and only 10% had CNS-S drugs. This last percentage is very surprising as CNS-S drugs are usually the most common or second most common type of drug seen in toxicology cases.

Juvenile

Sixty juvenile toxicology cases were submitted for FY2019. The number of juvenile cases submitted in FY2020 was 83. This corresponds to an increase of 38%. Year after year, ISPFS reports cannabinoids are the most commonly detected drug in those juvenile samples containing drugs, and FY2020 is no exception as 43% 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, 73% contained cannabinoids either alone or in combination with another type of drug.

Sixty-four percent of blood and 50% of urine samples contained at least one drug. Forty percent of blood cases and 25% of urine cases were positive for a single drug category. Surprisingly, the percentage for the juvenile urine samples contained drugs from multiple drug categories and from a single category was the same. In FY2020, there were three different drug combinations seen for the urine samples and four different drug combinations seen with the blood. Eleven percent of the juvenile urine toxicology cases that contained one or more drugs were positive for a CNS-D, while only 3.6% were positive for a CNS-S. Of the juvenile blood toxicology cases, 16% of the cases that contained one or more drugs included a CNS-D, and 11% included a CNS-S drug. So while CNS-S is not the most prevalent in juvenile cases, as it is in the adult cases, it is still a problem. Interestingly, none of the juvenile cases tested positive for narcotic analgesics, either alone or in combination with another drug. Of the 83 juvenile toxicology cases submitted for FY2020, 50% of the urine and 36% of the blood samples were negative. The percentage of negative results may be partially due to limitations in ISPFS drug detection methods since ISPFS has limited capabilities to analyze toxicology samples for many designer drugs and/or their metabolites (i.e. spice and bath salts).

Figure 13 shows the distribution of results in the juvenile blood and urine toxicology categories.

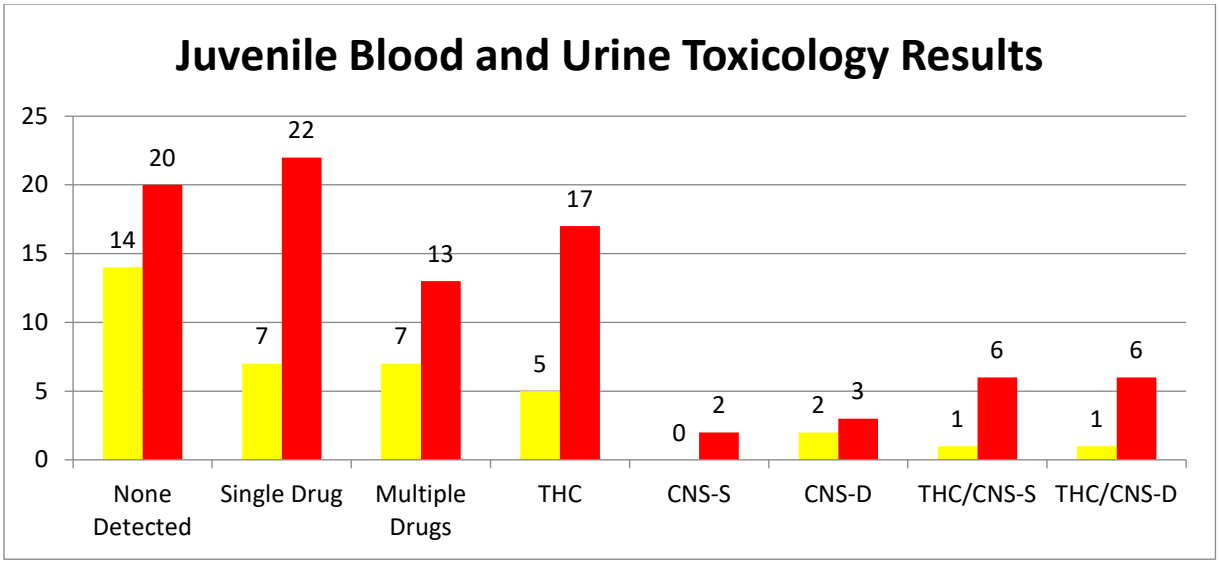

Figure 13 – Juvenile Blood and Urine Toxicology Results by Category

There was a huge increase (400%) in juvenile accident fatalities submitted for toxicology from FY2015 to FY2016 (there were 2 cases in FY2015 and 10 in FY2016). The 4 juvenile auto accident fatality cases submitted for toxicology in FY2017 was much more consistent with what was seen in years prior to FY2016. In FY2018, 5 juvenile auto accident fatality cases were submitted for toxicology analysis and for FY 2019, this number dropped down to 3 cases. For FY2020, there were 5 juvenile auto accident fatality cases submitted for toxicology. This is more consistent with the average number of cases submitted over the years.

For FY2017, sixty-five percent of the juvenile cases submitted for toxicology were DUI cases. In FY2018, this number dropped drastically to only 38%. By FY2019, that number was back up again to 68%. For FY2020, it had decreased again (although not as drastically as in FY2018) as 52% of the juvenile cases submitted were for DUI cases. The trend of the urine cases testing positive for multiple drug categories more often than a single drug category did not hold true when only looking at the DUI toxicology cases. The number of juvenile urine DUI cases that had drugs from only one drug category was the same as that of the multiple drug category (at 50% each), and there were none that were reported as no drugs detected. This may seem significant, however, there were only 4 juvenile urine toxicology DUI cases total, so it is very difficult to use such a small sample size to determine any sort of pattern or conclusion. The same pattern of having a higher percentage of cases containing drugs from a single category rather than multiple categories that was seen with the adult blood toxicology DUI cases was also observed with the juvenile blood toxicology DUI cases. For the juvenile blood toxicology DUI cases, 46% of the cases contained drugs belonging to a single drug category while 26% had drugs belonging to multiple categories.

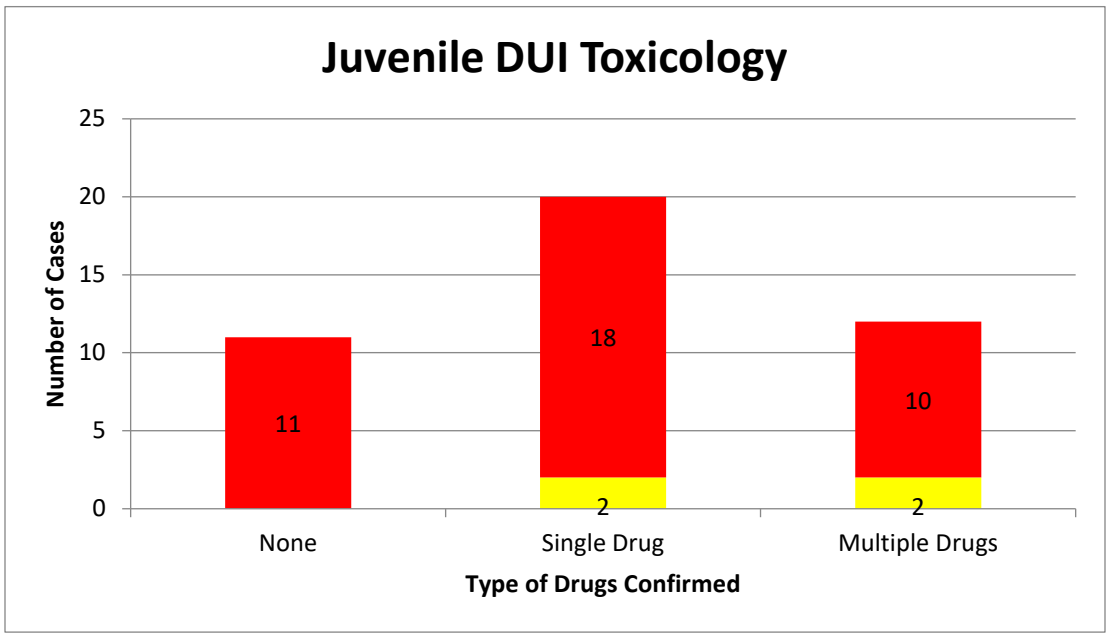

Figure 14- Juvenile DUI Toxicology Results

Other Offense Toxicology Results

While DUI cases accounted for roughly 67% of the cases submitted for toxicology, the remaining 33% was broken down into several other offenses (shown below). Of those cases with a drug violation associated with them, roughly 80% tested positive for one or more drugs. For those cases classified as "other offenses" 46% of the adult cases in this category were positive for one or more drugs. The category of "other offenses" includes charges such as assault and battery, burglary, injury accidents, and under the influence in public.

In FY2018, there were 126 rape cases submitted for toxicology analysis. That is almost double what it was in FY2017 (71 cases)! For FY2019, this number was back in line with previous years, at 78 cases, but it increased again for FY2020 to 115 cases. When considering the toxicology results associated with rape charges (rape, sexual abuse of a minor, etc.), there is a slightly lower percentage of positive cases. In FY2020, only forty-eight percent of the cases with a rape charge associated with it were positive for one or more drugs. The percentage of positive cases in FY2019 was 59%. With rape cases, the toxicology testing is still done even if the alcohol result is over 0.1 g%. So, in some of these cases that had negative results, it is possible that there was a high alcohol result reported. Another possible reason for the higher percentage of negative cases could be that sometimes the rape is not reported for hours (or sometimes days) after the assault, and by the time the sample is collected, the drug can be out of the system or at a level that cannot be detected with our methods. Also, many agencies will submit blood or urine samples for assault cases even if no drugs or alcohol are suspected.

Adults:

Count	Offense	Toxicology Results
88	Rape*	• 42 Negative • 46 Positive –CNS-D and THC, or some combination containing one or both of those were the most common results by far
126	Drug Violations**	• 25 Negative • 101 Positive –CNS-S and THC, or some combination containing one or both of those accounted for most of the positive cases
52	Other Offenses**	• 28 Negative • 24 Positive —CNS-D and THC, or some combination containing one or both of those were the most common results by far
5	Death Investigations	• 4 Negative • 1 Positive —containing drugs from CNS-S, CNS-D, and NA drug categories

Juveniles:

Count	Offense	Toxicology Results
27	Rape*	• 18 Negative • 9 Positive —CNS-D and THC, or some combination containing one or both of those were the most common results by far
6	Drug Violations**	• 0 Negative • 6 Positive —containing drugs from CNS-S, CNS-D, and THC drug categories

*Includes Rape, Male Rape, Sexual Abuse/Battery of Child/Minor, and Penetration with a Foreign Object.
**Includes Possession of Controlled Substances or Paraphernalia, Trafficking, Manufacturing, Delivering, Possession/Distribution

Top ten ISPFS reported drugs for FY2020:

1. Amphetamine (CNS-S)*
2. Methamphetamine (CNS-S)
3. Carboxy- THC (inactive marijuana metabolite)
4. THC (active component of marijuana)
5. Alprazolam (CNS-D)
6. Diphenhydramine (CNS-D)
7. Morphine (NA)
8. 7-aminoclonazepam (CNS-D) (active metabolite of clonazepam)
9. Lorazepam (CNS-D)
10. Citalopram (CNS-D)

*Amphetamine may be present as a metabolite of methamphetamine.

In evaluating the top ten drugs for FY2020 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. In four out of the five years, THC and alprazolam were ranked either 4th or 5th. Diphenhydramine was in the top six drugs in four out of the five years. For FY2016 and FY2017, 7-aminoclonazepam was ranked at number ten. It jumped up to number 8 in FY2018, and even higher, to number 6, in FY2019. It then dropped down to number eight for FY2020. Hydrocodone was present in FY2016, FY2017, and FY2018, then it disappeared from the top ten in FY2019 and FY2020. The top 10 drugs for FY2016 – FY2020 are displayed in **Figure 15**.

Rank	FY2016	FY2017	FY2018	FY2019	FY2020
1	Methamphetamine	Methamphetamine	Methamphetamine	Methamphetamine	Amphetamine
2	Carboxy-THC	Carboxy-THC	Amphetamine	Amphetamine	Methamphetamine
3	Amphetamine	Amphetamine	Carboxy-THC	Carboxy-THC	Carboxy-THC
4	Alprazolam	Alprazolam	Alprazolam	THC	THC
5	THC	Diphenhydramine	THC	Alprazolam	Alprazolam
6	Diphenhydramine	Hydrocodone	Diphenhydramine	7-aminoclonazepam	Diphenhydramine
7	Hydrocodone	Citalopram	Morphine	Diphenhydramine	Morphine
8	Nordiazepam	Morphine	7-aminoclonazepam	Hydroxy-THC	7-aminoclonazepam
9	Zolpidem	THC	Hydrocodone	Morphine	Lorazepam
10	7-aminoclonazepam	7-aminoclonazepam	Lorazepam	Clonazepam	Citalopram

Figure 15- Ranking of Top 10 Drugs for FY2016 - FY2020

In FY2017, there were a total of 2590 times that a drug was reported. This is 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 3578 for FY2018, then dropped slightly to 3383 in FY2019. In FY2020, the number increased to 3675. As ISPFS continues to add more drugs to the scope of our methods, it is suspected that this number will continue to increase.

Summary

The ISPFS laboratory system received 2,953 toxicology cases for FY2020, which was a decrease of 166 cases from FY2019. The number of cases corresponds to a decrease of approximately 5.32% from FY2019 but a 7.03% increase from FY2018. Of those cases, 1325 were submitted for alcohol/volatiles analysis, 1399 were submitted for blood toxicology analysis, and 229 cases were submitted for urine toxicology analysis. This correlates to an increase of about 5% in the number of blood cases and a decrease of about 33% in urine cases.

As the population climbs as more and more people choose to move to Idaho, it is likely that the number of cases submitted to the laboratory for volatiles and/or toxicological analysis will also continue to climb. In addition, as the turnaround times decrease, the number of cases submitted is also expected to increase. When evaluating the last ten years, there appears to be a downward trend in the number of urine toxicology cases that have been submitted. It is unknown why this is happening but one possible explanation is that it is due to a decrease in the turnaround time and an increase in the scope of testing (including quantitation) for blood toxicology analysis. So more officers are choosing to collect blood where at all possible versus collecting urine. This decrease would also make sense if the process for obtaining blood draw warrants has become easier.

Adult samples submitted for pending DUI charges constituted 1000 of the total 1258 alcohol/volatiles cases (79%). Of these 1000 samples, 883 were over the per se limit of 0.08 g% (88.3%). Of the adult DUI toxicology cases tested in FY2020, 70% of them were positive for one or more drugs. This number is lower than what was reported in FY2019. The percentage of adult DUI cases that were positive for one or more drugs in FY2019 was 84%. Since we have been unable to test for many of the designer drugs (especially flualprazolam, which has become very common in other states) until very recently, it is likely that this is why the percentage of DUI positive cases has decreased. As we continue to expand our scope of drugs included in our testing, it is likely that the percentage of positive cases will increase.

For the blood toxicology DUI cases, about 47% of the cases contained drugs from a single drug category while only 22% contained drugs from multiple categories. This ratio of single category to multiple categories is almost the complete opposite when looking at the adult urine toxicology DUI cases. For the urine cases, 27.6% of the samples contained drugs from a single category while over 50% of them contained drugs from multiple categories.

In FY2020, there were 80 cases that were classified as auto accident fatalities. When compared to the number of auto accident fatality cases submitted for toxicology for FY2019, there was a decrease of 22 cases (or about 22%). This decrease was not all the surprising as it seems that FY2019 was a bit of an outlier and had significantly more auto accident fatality cases than in the previous 10 years. For the auto accident fatality cases, the trend in blood of having a higher percentage of cases that had drugs belonging to a single category continues. For the blood toxicology auto accident fatality cases, roughly 26% of the cases contained drugs from a single category while only 6.4% of the cases had drugs from multiple categories. Unlike the adult DUI cases, the majority (about 68%) of the adult auto accident fatality cases were found to have no drugs detected. With the single drug fatality cases, approximately 40% had cannabinoids (marijuana), 35% had CNS-D drugs, 15% had narcotic analgesics and only 10% had CNS-S drugs. This last percentage is very surprising as CNS-S drugs are usually the most common or

second most common type of drug seen in toxicology cases. In terms of alcohol results, 79% of the samples contained <0.02 g% alcohol, 3% were between 0.02 and 0.08 g%, and 19% were at or above the legal limit of 0.08 g%. This distribution is very similar to previous years.

ISPFS processed 106 juvenile alcohol/volatiles cases in FY2020. This is the same number of juvenile alcohol/volatiles cases that was processed in FY2019. Of these samples, 51% were over the legal limit for persons under age 21 (0.02 g%). Of the 106 juvenile alcohol/volatiles samples submitted to ISPFS, 57 were juvenile DUI cases; 43 of these 57 cases (75%) were over the juvenile (under age 21) legal limit of 0.02 g%. This percentage is roughly 6 percent lower than it was in FY2019, where 81% of the juvenile DUI cases had a result of over 0.02%.

Three percent of the juvenile samples submitted for alcohol/volatiles tested positive for inhalants. This number is up from one percent of the juvenile samples that tested positive for inhalants in FY2019 and two percent that tested positive for inhalants for juveniles in FY2018. Since inhalants are volatiles and evaporate easily they do not stay in the blood or urine in detectable amounts for long periods of time, so the laboratory results may not necessarily be indicative of the prevalence of use.

A significant increase in the number of juvenile alcohol/volatiles samples submitted in fatality cases was seen in FY2020 as it increased from 2 cases in FY2019 to 13 cases in FY2020. That is a 550% increase! However, when looking at the numbers for the last ten years, 13 cases isn't that crazy as of the average number of juvenile auto accident fatality cases submitted in the last ten years was 11.

Sixty juvenile toxicology cases were submitted for FY2019. The number of juvenile cases submitted in FY2020 was 83. This corresponds to an increase of 38%. Year after year, ISPFS reports cannabinoids are the most commonly detected drug in those juvenile samples containing drugs, and FY2020 is no exception as 43% 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, 73% contained cannabinoids either alone or in combination with another type of drug.

The data for adult blood and urine samples show some interesting differences. For instance, blood analysis data indicates single-category drug use is more prevalent than multiple drug category combinations. Of those single category cases, it appears that cases with CNS-S are most prevalent, followed by cannabinoids. Urine analysis shows the opposite indication. This is 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. Of the single drug urine cases, cannabinoids, CNS-S, and CNS-D are all very close in terms of number of cases. However, there are more urine cannabinoid cases than any other drug category.

In terms of drug combinations, the combination of CNS-S combined with carboxy-THC is the most prevalent combination detected in urine, followed closely by the combination of CNS-S and CNS-D drugs. In blood, the most prevalent drug combination is CNS-S and cannabinoids.

In FY2018, there were 126 rape cases submitted for toxicology analysis. That is almost double what it was in FY2017 (71 cases)! For FY2019, this number was back in line with previous years, at 78 cases, but it increased again for FY2020 to 115 cases.

Toward the end of FY2019, the toxicology section received two new instruments (LC-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 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 LC-QQQ instruments that are currently being used for preliminary testing (screening), the new LC-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 is not something that is 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 FY2020, 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 is 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. 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 is near impossible. Having additional personnel that can take over casework and allow the more senior scientists to focus on method development is essential for adding those types of compounds to our resting 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.

APPENDIX

Non Random Juvenile Drug Testing (NJDT) Please see Idaho Statutes *Title 33. Education, Chapter 2.*

Drug Evaluation and Classification (Information below was provided by the NHTSA *Drug Evaluation and Classification Training Manual,* January 2006 edition.) Changes have been made to help the understanding of the reader, such as Benzodiazepines have been added to antianxiety column in the chart and Methamphetamine has been added to list of stimulants.

Central Nervous System Depressants

Central Nervous System Depressants (CNS-D) slow down the operation of the brain. They first affect those areas of the brain that control a person's conscious, voluntary actions. As dosage increases, depressants begin to affect the parts of the brain controlling the body's automatic, unconscious processes, such as heartbeat and respiration.

Possible Effects of CNS Depressants:

- ✓ Reduced social inhibitions
- ✓ Divided attention impairment
- ✓ Slowed reflexes
- ✓ Impaired judgment and concentration
- ✓ Impaired vision and coordination
- ✓ Slurred, mumbled or incoherent speech
- ✓ A wide variety of emotional effects, such as euphoria, depression, suicidal tendencies, laughing or crying for no apparent reason, etc.

Alcohol is the model for the CNS Depressant category of drugs.

Some major subcategories of CNS Depressants other than alcohol include:

- ➢ Barbiturates
- ➢ Non-Barbiturates (synthetic compounds with a variety of chemical structures)
- ➢ Anti-Anxiety Tranquilizers
- ➢ Anti-Depressants (to combat psychological depression)
- ➢ Anti-Psychotic Tranquilizers
- ➢ Combinations of the above five subcategories

Examples of CNS Depressants

Barbiturates	Other	Anti-Anxiety Tranquilizers Benzodiazepines	Anti-Depressants	Anti-Psychotic Tranquilizers
Amobarbital	Carisoprodol Meprobamate-M	Alprazolam	Amitriptyline	Chlorpromazine
Butalbital	Zolpidem	Chlordiazepoxide	Bupropion	Droperidol
Phenobarbital	Diphenhydramine Hydrochloride	Clonazepam	Citalopram	Lithium Carbonate
			Desipramine	Lithium Citrate
Secobarbital	Zolpiclone	Diazepam	Doxepin Hydrochloride	Haloperidol
			Escitalopram	
Barbital	Metoprolol	Estazolam		
	Gamma-Hydroxybutyrate (GHB)	Flunitrazepam	Fluoxetine	
		Flurazepam	Impramine	
		Lorazepam	Paroxetine	
		Oxazepam	Trazodone	
		Temazepam	Sertaline	
		Triazolam	Venlafaxine	

Central Nervous System Stimulants

Central Nervous System Stimulants (CNS-S) speed up the operation of the brain and spinal cord. It is important to emphasize that "speed up" does *not* mean "improve" or "enhance". Some CNS Stimulants can improve cognitive functions in very low doses; however, most definitely do not make the brain work better. Rather, they cause the brain and the rest of the nervous system to work *harder*, and often to make more mistakes.

The "speeding up" caused by CNS Stimulants results in significantly increased heartbeat, respiration and blood pressure, all of which can lead to physical harm to the abuser. In addition, the stimulant user experiences nervousness, irritability and an inability to concentrate or think clearly.

Possible Effects of CNS Stimulants

- ✓ Euphoria
- ✓ Anesthetic effect
- ✓ Hyperactive
- ✓ Impaired ability to perceive time and distance
- ✓ Confusion and loss of the ability to concentrate or to think clearly for any length of time

Some major subcategories of CNS Stimulants

- ➢ Cocaine
- ➢ Amphetamines
- ➢ Methamphetamines
- ➢ Others such as phentermine, methylphenidate, ephedrine/pseudoephedrine

Hallucinogens

Hallucinogens (Hall) are drugs or substances that affect a person's perception, sensation thinking, self-awareness and emotions. They may also cause hallucinations. A hallucination is a sensory experience of something that does not exist outside the mind. It may involve hearing, seeing, smelling, tasting or feeling something that isn't really there. Or, it may involve distorted sensory perceptions so that things look, sound, smell, taste or feel differently from the way they actually are.

Possible Effects of Hallucinogens

- ✓ Hallucination
- ✓ Perception of reality severely distorted
- ✓ Delusions
- ✓ Illusions

Examples of Hallucinogens

Naturally occurring Hallucinogens

- ➢ Peyote
- ➢ Psilocybin

Synthetically manufactured Hallucinogens

- ➢ LSD
- ➢ MDA, MDMA, MMDA, TMA, STP, DET, DMT

Narcotic Analgesics

There are two subcategories of Narcotic Analgesics (NA). The first subcategory consists of the Opiates. The second subcategory is the Synthetic Opioids.

Possible Effects of Narcotic Analgesics

- ✓ "On the nod" (a semiconscious state of deep relaxation, eyelids will be droopy and the head will slump.)
- ✓ Slowed reflexes
- ✓ Slow and raspy speech
- ✓ Slow, deliberate movement
- ✓ Inability to concentrate
- ✓ Slow breathing
- ✓ Skin cool to touch
- ✓ Possible vomiting
- ✓ Itching of the face, arms, or body

Commonly-Abused Opiates and Their Derivation from Opium

- Morphine
- Codeine
- Heroin
- Hydromorphone
- Hydrocodone
- Oxycodone

Common Synthetic Opiates

- Meperidine
- Methadone
- Fentanyl
- Buprenorphine