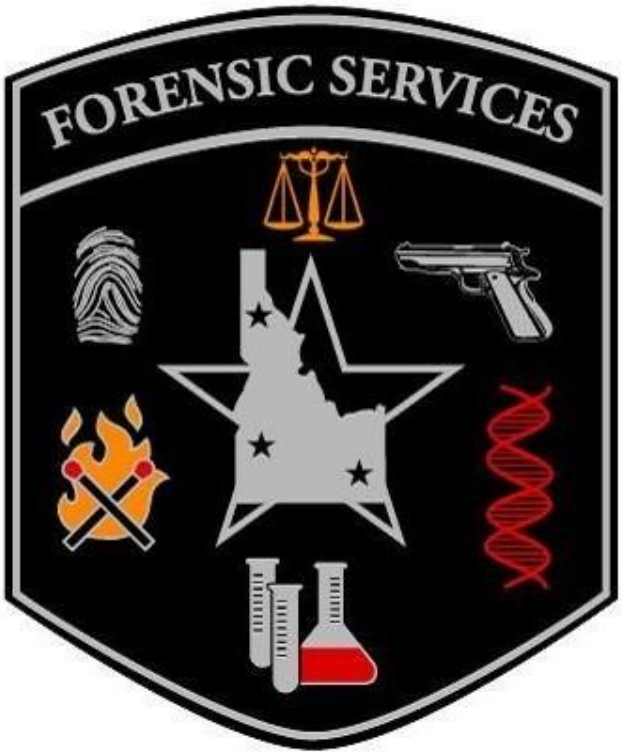
IDAHO STATE POLICE



Toxicology Program Trends

FY 2017

FY2017 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 2017 (FY2017): 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 qualitative 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 FY2017. 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.

Two analyst in the Pocatello laboratory were in the process of being trained in blood toxicology in FY2017 and were signed off to do some select methods for casework in August 2017. In addition, validations for four new blood toxicology methods were completed in FY 2017. The two toxicology analysts in the Coeur d'Alene laboratory participated in those validations and were signed off to do blood toxicology casework using those methods, starting in December 2016. The new methods implemented greatly decreased the time necessary to process case samples. As such, a large number of the blood toxicology cases were sent to the Coeur d'Alene laboratory for analysis, in an effort to reduce the backlog of blood toxicology cases.

The Pocatello laboratory toxicology analysts also worked on validations and were signed off to start using those methods for casework in December 2017. Since the new methods were not implemented until about halfway through the fiscal year in the Coeur d'Alene laboratory and after FY2017 in the

Pocatello laboratory, the turnaround times were still greater than our goal of 30 days. With the implementation of the new methods in both labs, as well as four additional analysts being signed off for blood toxicology casework in FY 2017, it is anticipated that the turnaround times for FY2018 should be greatly improved from those in previous years, and hopefully the majority of blood toxicology cases will be completed with 30 days.

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 THC and hydroxy-THC. 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.

Terms and Drug Categories

Central Nervous System Stimulants (CNS-S), Central Nervous System Depressants (CNS- D), and carboxy-THC (THC) account for most 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.

Carboxy-THC is an inactive metabolite of marijuana (MJ). After ingestion, MJ is broken down in the body to a form that the body can eliminate as waste. There are numerous MJ metabolites, including hydroxyl-THC and carboxy-THC. ISPFS current methods for extracting MJ from blood and urine will extract this metabolite. ISPFS has recently approved a method which will allow the lab to identify several cannabinoids, including the active component of MJ (THC) and its metabolites, in blood and urine.

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.

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.

The benzodiazepine class drugs are prescribed for anti-anxiety, and as tranquilizers. The most well-known benzodiazepines include Xanax (alprazolam), Valium (diazepam), 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 diazepam.

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. Methamphetamine is metabolized (or broken down into) amphetamine after ingestion, and is excreted partly as amphetamine. Once broken down into amphetamine, the amphetamine acts as its own drug (i.e. it is an active metabolite), and produces

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. However, the inactive cocaine metabolite, benzoylecgonine, has a longer detection window. This means that toxicology results can support allegations of cocaine use, even if cocaine itself is not detected in the sample.

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 or 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 something in there but that we are not able to detect it 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 FY2017

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 FY2017. 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**.

	Blood Toxicology	Alcohol/Volatiles	Urine Toxicology	Total	FY2016 Percent
DUI					
Adult	632	895	255	1781	66.39%
Juvenile	23	56	4	83	
Probation Violations*					
Adult	1	0	5	6	0.21%
Juvenile	0	0	0	0	
Drug/Narcotic Violations**					
Adult	63	19	36	118	4.31%
Juvenile	1	2	0	3	
Other***	45	70	37	152	5.41%
Auto Accident Fatalities	96	100	6	202	7.19%
Accident Victim Kits	0	4	0	4	0.11%
Death (non-homicide)	22	20	0	42	1.50%
Murder	3	2	0	5	0.21%
Rape****	15	50	56	121	4.31%
Cases Closed Before Analysis*****	253	26	12	291	10.36%
Total:	1154	1244	411	**2809**	100%

Table 1- Statistical Representation of the Number and Distribution of Toxicology Cases for FY2017.

*Includes Juvenile, Misdemeanor, and Felony; **Includes Possession of Controlled Substances or Paraphernalia, Trafficking, Manufacturing, Delivering, Possession/Distribution/Use by a Minor; ***Includes Abuse/Exploitation of a Vulnerable Adult, Assault/Battery (Aggravated or not), Burglary, Domestic Violence, Evidence Destruction/Alteration/Concealment, Officer Involved Shooting/Accident, Possession of liquor not subject to regulation by division, Injury Accidents, Injury to Child, Under the Influence in Public, Unlawful exercise of functions of peace officers, Trespassing, Manslaughter, Vehicular Manslaughter, Lewd Conduct, and Competency/Proficiency Tests; ****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 2,612 toxicology cases for FY2017, an increase of 197 cases from FY2016. This number corresponds to an increase of just over 7%. The relative stability of the caseload observed (as opposed to a double digit increase) may be due to ISPFS toxicology analysis limitations, particularly in the area of drug quantitation. Many prosecutors believe that quantitation of the drugs in toxicology samples is necessary for prosecuting cases; and since ISPFS is only able to provide quantitative values for a very limited number of compounds (and only recently), it is suspected that a number have been sent to private labs for testing. As ISPFS increases the scope of compounds that can be reported quantitatively, it is expected that the number of cases will increase slightly. In addition, as the turnaround times decrease, the number of cases submitted is also expected to increase.

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

Figure 1 (below) contains a line graph of the total yearly toxicology submissions for the last ten years. 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 2855 cases.

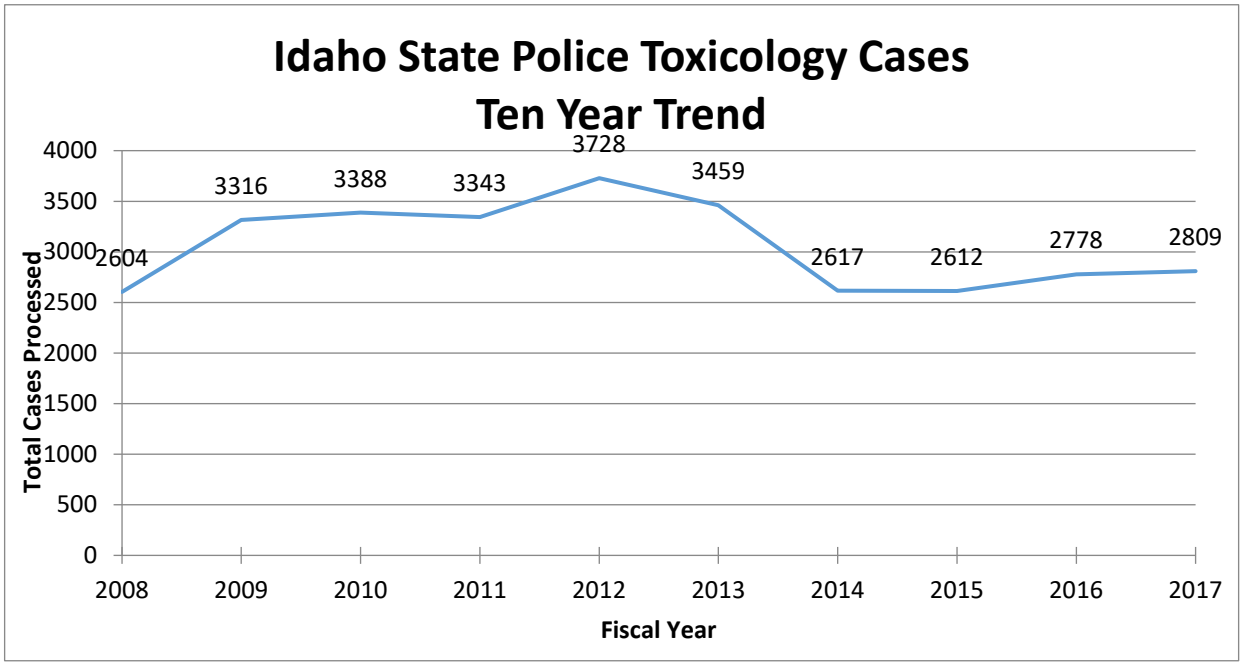


FIGURE 1- Ten Year Trend for Toxicology Case Submissions

Alcohol and Other Volatiles

The number of alcohol case submissions to ISPFS decreased by 72 cases from FY2016 to FY2017. This is not surprising as it is typical for the numbers to fluctuate slightly from year to year. Another reason that a significant increase in number of cases is not expected is that 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 recently that officers may be eager to use. It is likely that officers are opting to perform breath tests rather than obtain warrants, except in cases where drugs other than alcohol (i.e. inhalants) are also suspected.

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. ISPFS processed 1110 adult samples for alcohol and inhalants during FY2016. 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 1110 samples reported in the table below does not include beverage samples, or inhalant results.

Number of Adult Samples	Result Category
26 (not included in total)	Not analyzed
243	<0.02 g%
48	≥0.02 g% and <0.08 g%
819	≥0.08 g%
1110	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%. The 243 samples with a result of <0.02 g% is virtually unchanged from FY2016. 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 FY2017; this chart includes DUIs, death investigations, auto accident fatalities, and a wide variety of other case types.

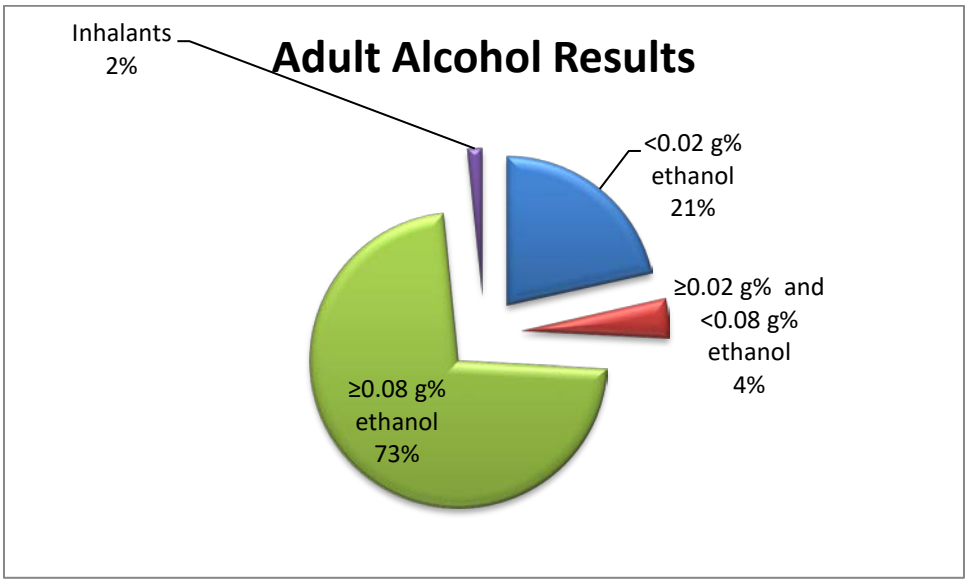


FIGURE 2- Adult Alcohol Levels for FY2017

Eighteen adult samples tested positive for inhalants. In terms of significance, considering the 1128 adult alcohol samples submitted, 18 inhalant samples is not a significant percentage. The inhalants confirmed in the 18 positive samples included: 11 samples that were positive for fluorinated hydrocarbons (air duster) and 7 samples that were positive for acetone (nail polish remover, it is also formed in the body during ketoacidosis).

Adult samples submitted for pending DUI charges constituted 828 of the total 1128 (73.4%). Of these 828 samples, 702 were over the per se limit of 0.08 g% (84.8%). 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. A total of 87 adult auto accident fatality case samples were submitted to ISPFS in FY2017; this is twenty more for this case type than was submitted to the lab in FY2016. Of the 87 cases, 59 (68%) contained <0.02 g% alcohol, 7 (8%) were between 0.02 and 0.08 g%, and 21 (24%) were at or above the legal limit of 0.08 g%. This distribution is very similar to FY2016. **Figure 3** shows the BAC results for the adult auto accident fatalities.

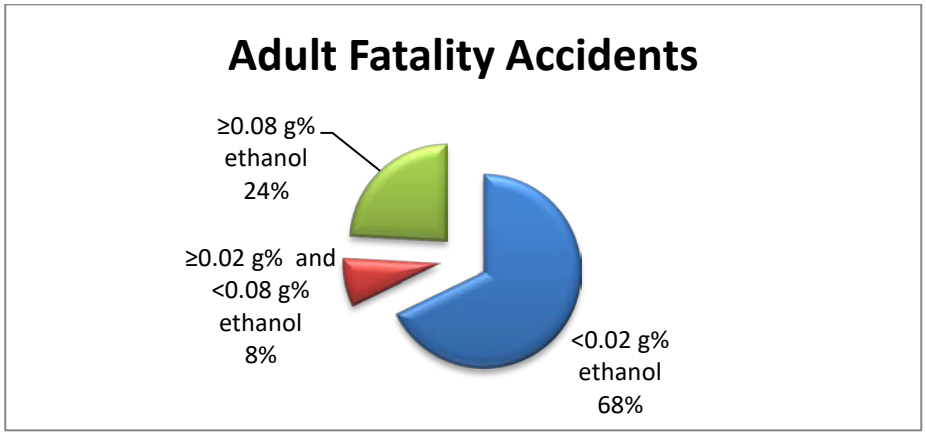


Figure 3- Results for Adult Fatality Accidents

The ten year trend of adult auto accident fatality cases submitted to ISPFS is depicted in **Figure 4**. There was a large increase in the number of auto accident fatality cases in FY2017 when comparing it to previous years. The average number of cases submitted for the previous 10 years was 70 cases. The number of adult auto accident fatality cases submitted this year was 87. That is an increase of approximately 25%!

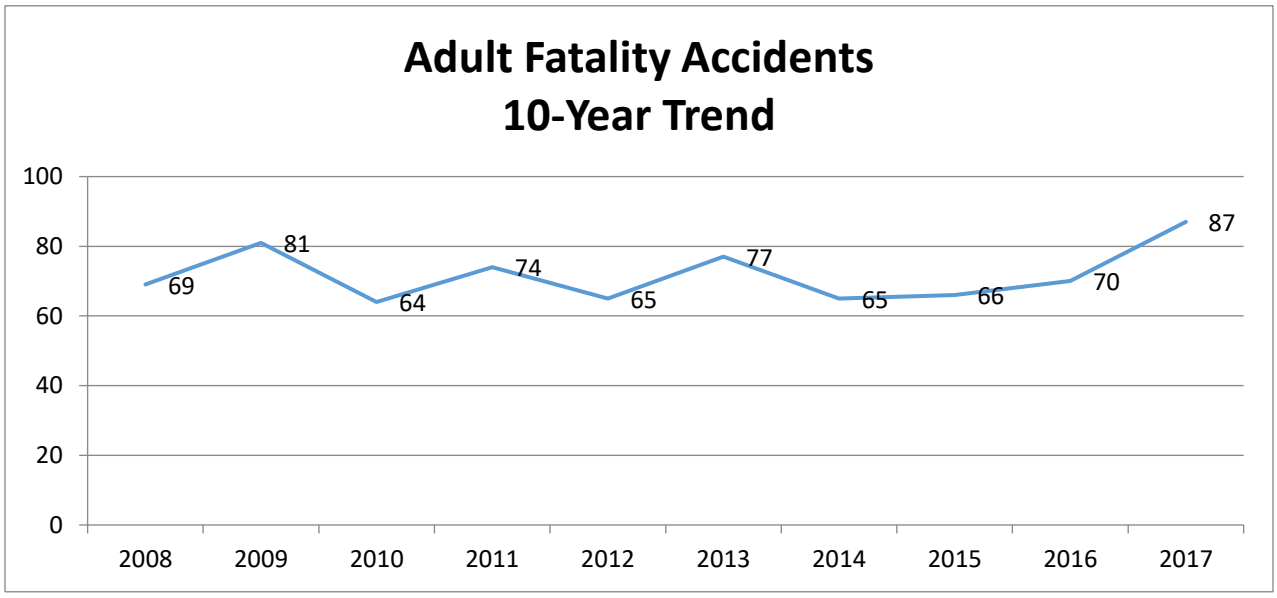


Figure 4- Ten Year Adult Fatality Accident Trend

Juvenile Alcohol Concentrations

ISPFS processed 126 juvenile BAC cases in FY2017. This is identical to what was received in FY2016 and only 2 cases more than what was received in FY2015. Of these samples, an equal number of cases were over the legal limit for persons under age 21 (0.02 g%) versus under the legal limit. Of the 126 juvenile alcohol samples submitted to ISPFS, 67 were juvenile DUI cases; 46 of these 67 cases (69%) were over the juvenile (under age 21) legal limit of 0.02 g%.

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

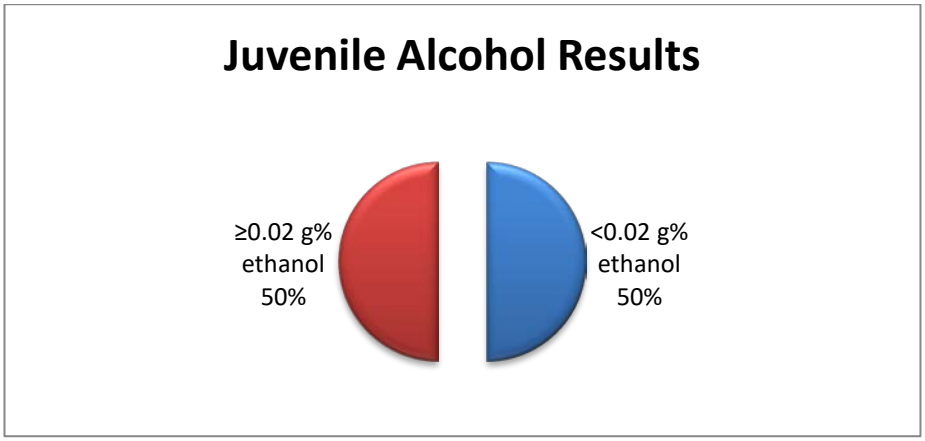


Figure 5- Juvenile Alcohol Levels for FY2017

In FY2016, four percent of the juvenile samples tested positive for inhalants. There were no positive results for inhalants for juveniles in FY2017. 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 be indicative of the prevalence of use.

A significant decrease of Juvenile alcohol samples submitted in fatality cases was seen as it decreased from 19 cases in FY2016 to 13 cases in FY2017. When looking at the results for those juvenile fatality cases, it seems that while the number of cases submitted was higher in FY2016 than it was in FY2017, the percentage of cases that had an alcohol result above the per se of 0.02 g%, remained the same (about 17%). The 19 juvenile auto accident fatality cases for FY2016 was higher than that seen in the previous 10 years. The 13 cases in FY2017 seems to be much more in line with what was seen in the previous 10 years.

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

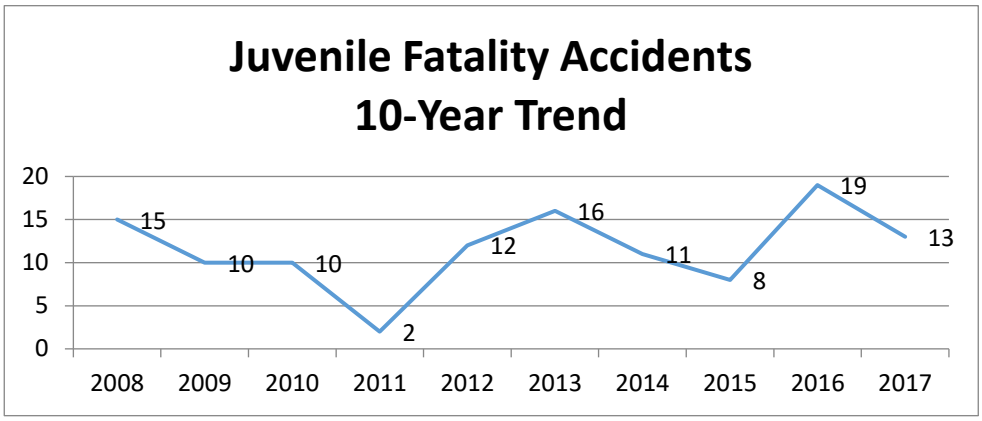


Figure 6- Ten Year Juvenile Fatality Accident Trend

Other Offense Alcohol Concentrations

Cases submitted for alcohol analysis in FY2017 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.

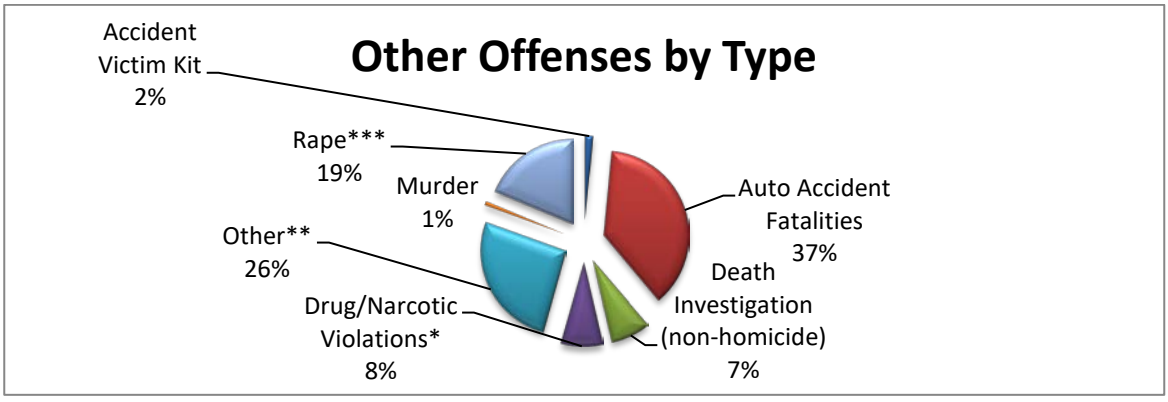


Figure 7 – Alcohol Analysis Requests by Other Offense Types

* Includes Possession of Controlled Substances or Paraphernalia, Trafficking, Manufacturing, Delivering, Possession/Distribution/Use by a Minor; **Includes Abuse/Exploitation of a Vulnerable Adult, Assault/Battery (Aggravated or not), Burglary, Domestic Violence, Evidence Destruction/Alteration/Concealment, Officer Involved Shooting/Accident, Possession of liquor not subject to regulation by division, Injury Accidents, Injury to Child, Under the Influence in Public, Unlawful exercise of functions of peace officers, Vehicular Manslaughter; ***Includes Rape, Male Rape, Sexual Abuse/Battery of Child/Minor.

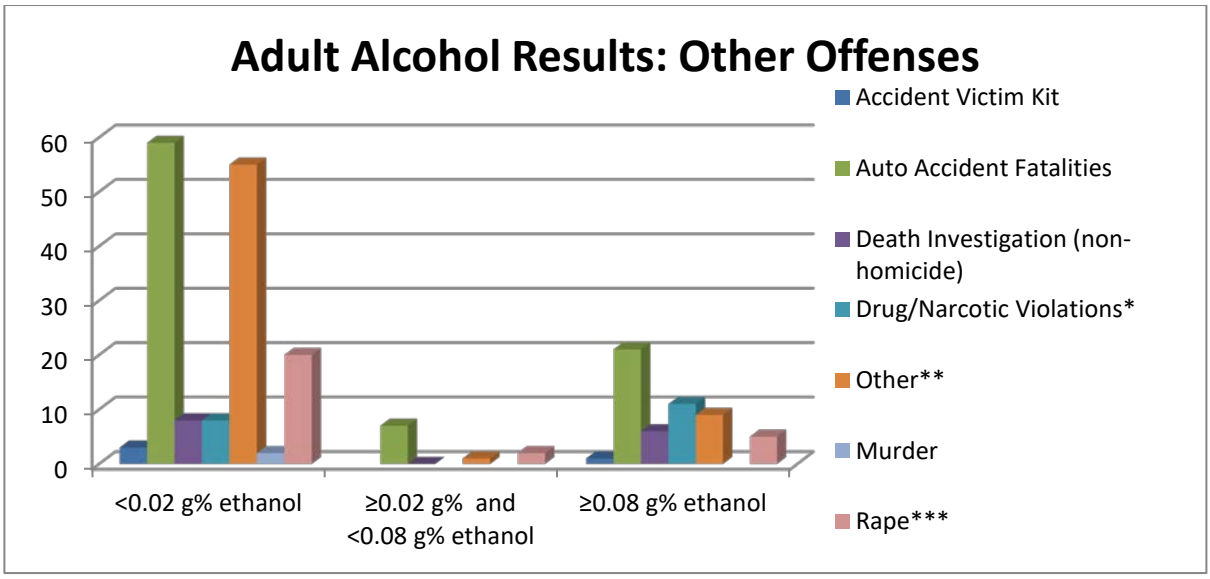


Figure 8- Adult Alcohol Results for Other Offenses

* Includes Possession of Controlled Substances or Paraphernalia, Trafficking, Manufacturing, Delivering, Possession/Distribution/Use by a Minor; **Includes Abuse/Exploitation of a Vulnerable Adult, Assault/Battery (Aggravated or not), Burglary, Domestic Violence, Evidence Destruction/Alteration/Concealment, Officer Involved Shooting/Accident, Possession of liquor not subject to regulation by division, Injury Accidents, Injury to Child, Under the Influence in Public, Unlawful exercise of functions of peace officers, Vehicular Manslaughter; ***Includes Rape, Male Rape, Sexual Abuse/Battery of Child/Minor.

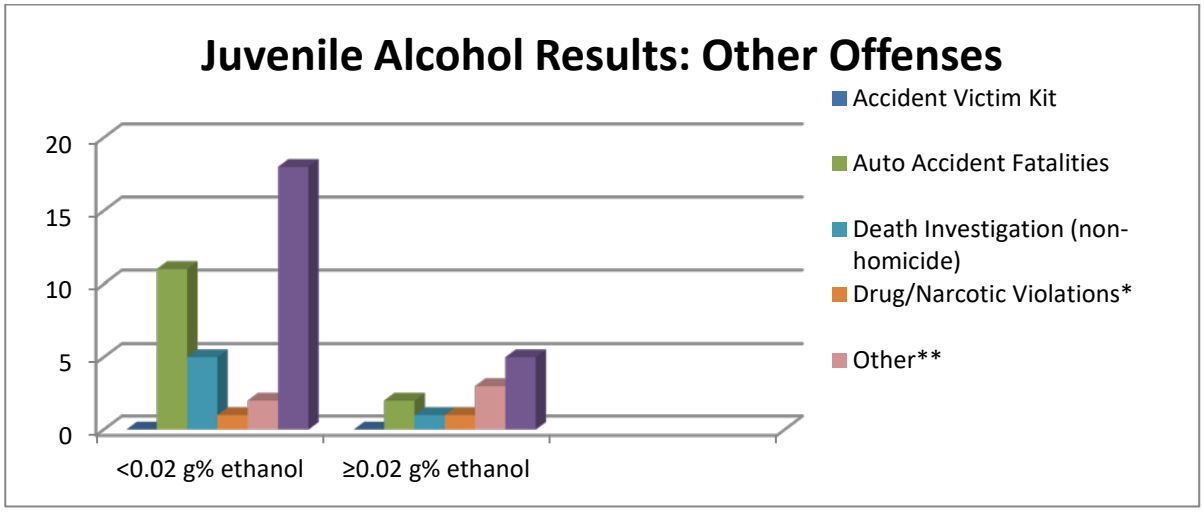


Figure 9- Juvenile Alcohol Results for Other Offenses

* Includes Possession of Controlled Substances or Paraphernalia, Trafficking, Manufacturing, Delivering, Possession/Distribution/Use by a Minor; **Includes Abuse/Exploitation of a Vulnerable Adult, Assault/Battery (Aggravated or not), Burglary, Domestic Violence, Evidence Destruction/Alteration/Concealment, Officer Involved Shooting/Accident, Possession of liquor not subject to regulation by division, Injury Accidents, Injury to Child, Under the Influence in Public, Unlawful exercise of functions of peace officers, Vehicular Manslaughter; ***Includes Rape, Male Rape, Sexual Abuse/Battery of Child/Minor.

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. 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. Blood is often the preferred sample for toxicology because it gives the best indicator for possible impairment, and blood is usually obtained for legal purposes. Urine is filtered by the kidneys and is a much cleaner matrix; thereby allowing faster extractions for drugs. Further, urine pools in the bladder and often provides a greater concentration of drug than in blood. Obtaining a urine sample is not an invasive procedure, whereas a blood sample collection is invasive; also, it is usually possible to obtain a much larger volume of urine than blood. For these reasons, and because samples are not usually taken for several hours (or even days) after an assault, urine is the preferred matrix for sexual assault cases. Blood is the preferred sample for purposes where current impairment is in question, so urine is often not collected. The blood and urine results cannot be directly compared against each other, but using both blood and urine methods allows for more diverse and comprehensive analysis. It also allows for more accurate interpretation of results.

ISPFS accepted 1154 blood samples and 411 urine samples for toxicology testing in FY2017. This corresponds to an increase of 153 blood toxicology samples (or 13%) submitted to the laboratory system between FY2016 and FY2017, and an increase of 355 (31%) in samples submitted in FY2015. Interestingly, while there was a 13% increase in the number of blood toxicology samples submitted from FY2016 to FY2017, there was a decrease of 50 urine toxicology samples (or approximately 12%) submitted between FY2016 and FY2017.

Please note that all toxicology graphs use red 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

Figure 10 shows the adult blood and urine toxicology results for FY2017 by drug category. For example, hallucinogens (Hall) include ecstasy (MDMA), phencyclidine (PCP), and others; narcotic analgesics (NA) include drugs such as morphine or hydrocodone.

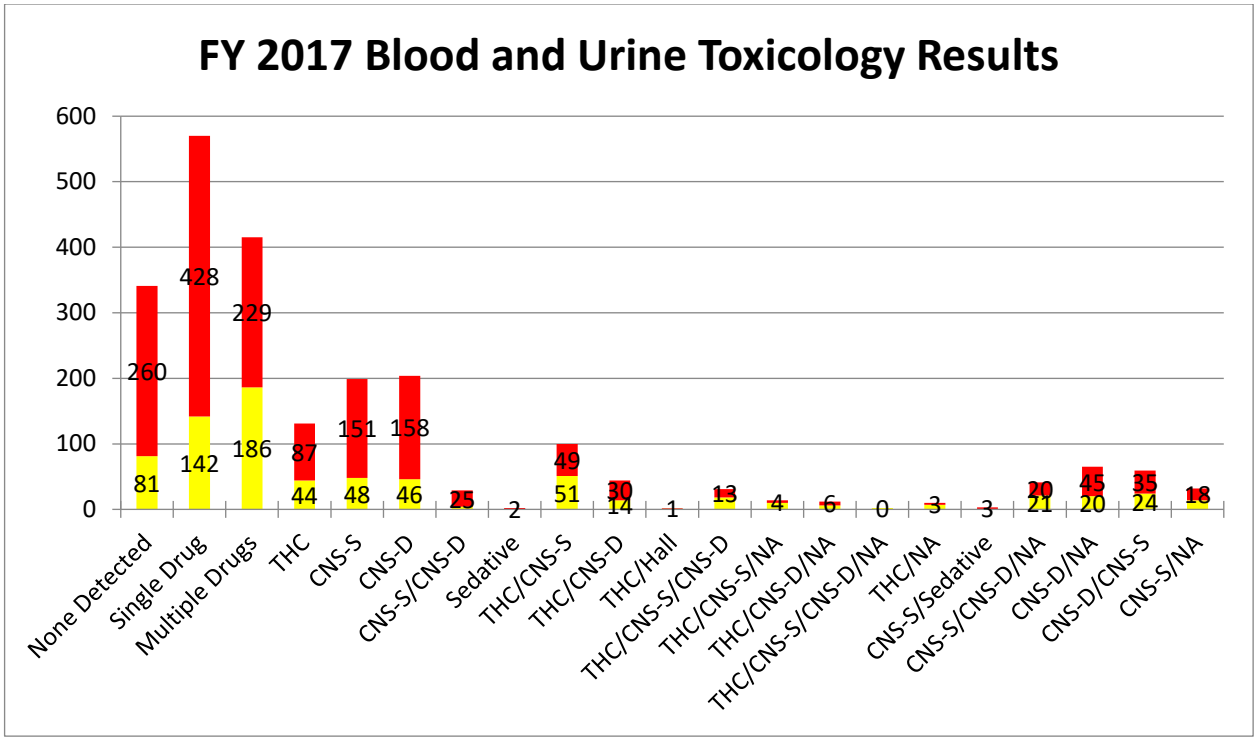


FIGURE 10 – Adult Blood and Urine Toxicology Results by Category

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.

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. 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.

In past years, it has been common in Idaho for the most common single drugs present in both adult urine and blood matrices to be a central nervous system stimulant (CNS-S), followed by carboxy-THC, and then a central nervous system depressant (CNS-D). However, this year that prevalence in urine has changed. The prevalence of THC, CNS-S, and CNS-D in urine is now almost identical. The prevalence of THC or carboxy-THC in blood has shifted from a close second, to a distant third. The prevalence of CNS-S and CNS-D drugs confirmed in blood is almost identical for FY2017. CNS-Ss include drugs like Ritalin (methylphenidate), Adderall (amphetamine), and methamphetamine. CNS-Ds can be many different drugs; examples include Valium (diazepam), Xanax (alprazolam), and Ambien (Zolpidem). Carboxy-THC is commonly the metabolite of either MJ or the prescription drug Dronabinol. The amount of THC excreted in the urine is very low and as such, it is typically not tested for. Instead, analysis for carboxy-

THC is done; which is likely on of the reasons that carboxy-THC is ranked at #2 in overall prevalence and THC is at #9.

In terms of drug combinations, the combination of CNS-S combined with carboxy-THC is by far the most prevalent combination detected in urine. Methamphetamine accounts for a great majority of the CNS-S results, so the most prevalent combination in urine is actually methamphetamine and carboxy-THC. In blood, the most prevalent drug combination is CNS-S and carboxy-THC, with the CNS-D and NA combination in a close second. 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 FY2017 because of the change in methods. The new blood toxicology methods that were validated are much less limited in the types and concentrations of NA compounds that can be detected.

Over 50 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. 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 associate with for the case.

Figure 11 illustrates adult drug results for both blood and urine associated with DUI. Of the 881 adult DUI toxicology cases tested in FY2017, 81% of them were positive for one or more drugs. The pattern is the same as demonstrated with overall adult toxicology (see **Figure 10**) with a single drug group being most common for blood toxicology and multiple drug groups being the most common in urine toxicology cases.

The urine toxicology adult DUI results are astonishing as only 6.8% of the cases had no drugs reported. The percentage of blood toxicology DUI samples that were reported as none detected was 23%. One possible explanation for this difference is the rate at which drugs are metabolized (broken down within the body). Often times, it takes several hours for blood to be collected. During this time period, any drugs that may be in the blood are being broken down by the body. This can result in the concentration of the drug in the blood being below the limits of detection.

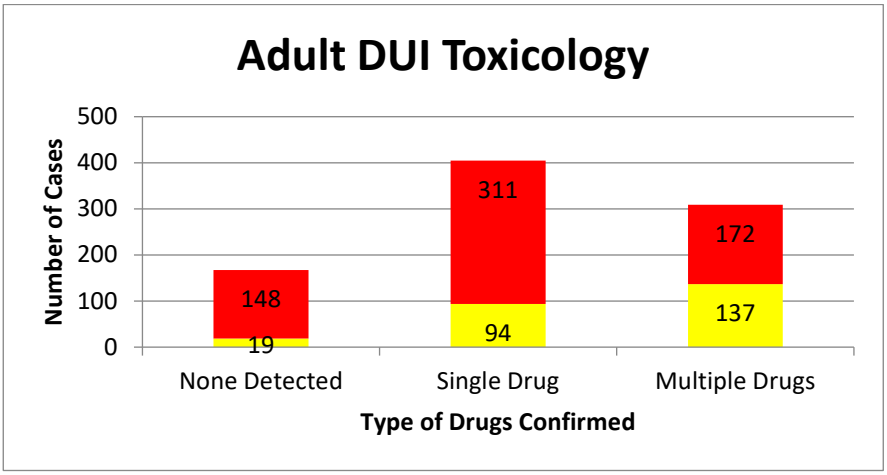


Figure 11 – Adult DUI Toxicology Results

In FY2017, there were 102 cases that were classified as auto fatality accidents. **Figure 12** shows the result categories for these cases. When compared to the number of auto accident fatality cases submitted for toxicology for FY2017 to FY2016, there was an increase of 36% (27 cases).

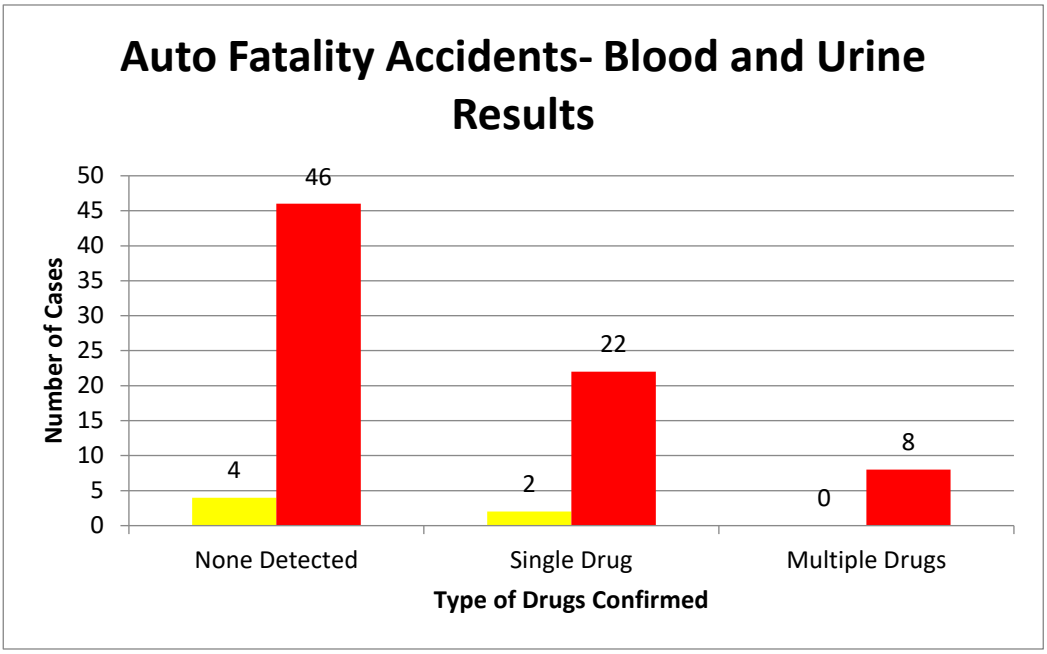


Figure 12 –Toxicology Summary for Fatality Accidents, by Category

Of the 102 cases submitted for toxicology that involved fatality accidents, 49% had no drugs confirmed. Twenty-four percent had drugs in a single category and 7.8% had drugs confirmed from multiple drug categories. The most common drug category present in drug-positive cases was CNS-S, followed closely by CNS-D, and then THC/carboxy-THC.

Juvenile

Juvenile toxicology case submissions typically remain fairly stable, and this year was no exception. The total number of juvenile toxicology cases submitted for FY2017 was 89. This is slightly up (about 9.9%) from FY2016 but not significantly. Year after year, ISPFS reports carboxy–THC is the most commonly detected drug in those juvenile samples containing drugs, and FY2017 is no exception.

Sixty percent of blood and 58% of urine samples contained at least one drug. Sixty percent of blood cases and 32% of urine cases were positive for a single drug category. While only 12% of juvenile blood samples contained drugs from multiple drug categories, 26% of the urine samples did. This is consistent with what was seen in adult samples. All of the drug combination blood samples contained THC/carboxy-THC, and 7 of the 8 drug combination urine samples contained c-THC. Overall, 72% of juvenile urine and 60% of the juvenile blood samples that contained drugs contained THC/carboxy-THC, either alone or in combination with other drugs. Thirty-five percent of the juvenile toxicology cases that contained drugs were positive for one or more CNS-D, either on its own or in combination with another drug from a different drug category. Twenty-eight percent of the juvenile toxicology cases that contained one or more drugs were positive for a CNS-S. So while CNS-S is not the most prevalent in juvenile cases, it is still a problem. Of the 89 juvenile toxicology cases submitted for FY2017, forty-two

percent of the urine and 28% 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.

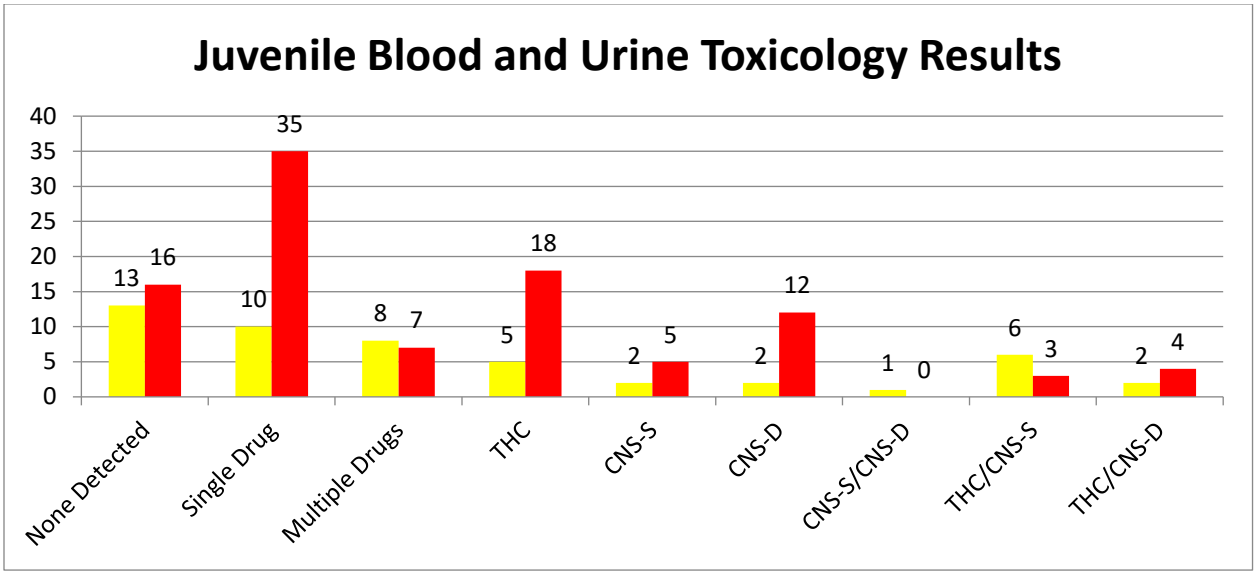


Figure 13 – Juvenile Blood and Urine Toxicology Results by Category

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 number of juvenile auto accident fatalities submitted for toxicology in FY2017 (4 cases) was much more consistent with what was seen in years prior to FY2016.

Sixty-five percent of the juvenile cases submitted for toxicology were DUI cases. Of those cases, 72% tested positive for one or more drugs. (**Figure 14**). The trend of the urine cases testing positive for multiple drug categories more often than a single drug category remains true for the juvenile DUI urine cases, as well. Of the 11 juvenile urine toxicology DUI cases submitted, 6 of them (55%) were positive for multiple drug categories while only 18% were positive for a single drug category and 27% were reported as none detected. For the juvenile blood toxicology DUI cases, 57% were positive for a single category of drugs, 15% were positive for drugs in multiple drug categories, and 28% did not test positive for any drugs.

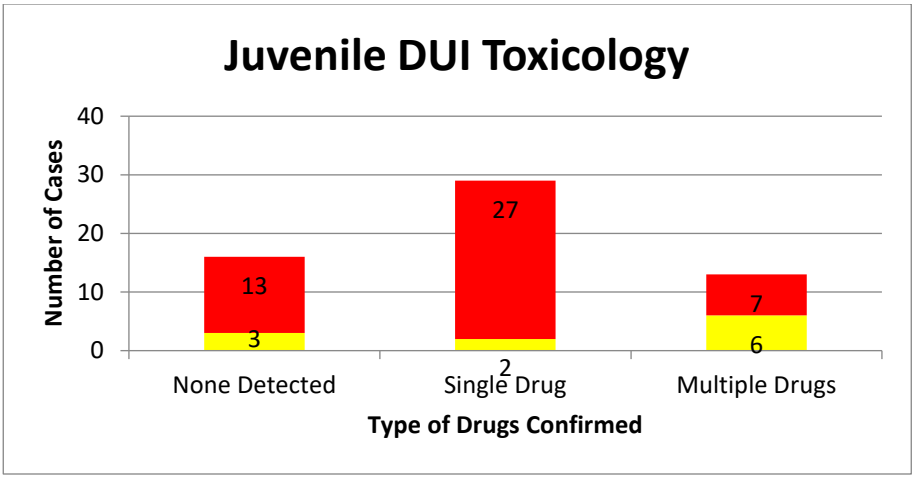


Figure 14- Juvenile DUI Toxicology Results

Other Offense Toxicology Results

While DUI cases accounted for over 58% of the cases submitted for toxicology, the remaining 42% was broken down into several other offenses (shown below). There were 3 toxicology cases submitted that were associated with a murder charge. Of those three cases, all tested positive for drugs. The drug violations cases were the next most skewed in terms of positive versus negative cases. Of those cases with a drug violation associated with them, roughly 85% tested positive for one or more drugs. For probation violation cases, 83% were positive. Sixty-three percent of the death investigation cases submitted for toxicology were positive for one or more drugs (50% for the juveniles).

There is an interesting situation when comparing the results of the cases classified as "other offenses" for the adults versus the juveniles. For the adults, 61% of the cases in this category were positive for one or more drugs, while 83% of the cases in this category were positive in the juvenile cases. The category of "other offenses" includes charges such as assault and battery, burglary, injury accidents, and under the influence in public.

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. Fifty-eight percent of the cases with a rape charge associate with it were positive for one or more drugs). 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 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.

Adults:

Count	Offense	Toxicology Results
3	Murder	• 0 Negative • 3 Positive—CNS-S, CNS-S/THC, CNS-D/NA
51	Rape****	• 22 Negative • 29 Positive –CNS-S, CNS-D, or some combination containing those were the most common results by far
99	Drug Violations*	• 15 Negative • 84 Positive – the most common categories detected were CNS-S or THC, either alone or in combination with other drugs
6	Probation Violations**	• 1 Negative • 5 Positive— four were CNS-S, and one was CNS-S/CNS-D/NA
76	Other Offenses***	• 22 Negative • 34 Positive—mostly CNS-S, CNS-D, THC, or some combination of those were the most common
20	Death Investigations*****	• 7 Negative • 13 Positive— CNS-D, CNS-S, NA, or a combination containing those were the most common

Juveniles:

Count	Offense	Toxicology Results
6	Other Offenses***	• 1 Negative • 5 Positive – CNS-S, CNS-D, THC or some combination of those comprised all of the results
20	Rape****	• 8 Negative • 12 Positive— CNS-D, CNS-S, THC, or some combination of those
2	Death Investigations*****	• 1 Negative • 1 Positive— CNS-D/THC

* Includes Possession of Controlled Substances or Paraphernalia, Trafficking, Manufacturing, Delivering, Possession/Distribution/Use by a Minor; **Includes Juvenile, Misdemeanor, and Felony; ***Includes Abuse/Exploitation of a Vulnerable Adult, Assault/Battery (Aggravated or not), Burglary, Domestic Violence, Evidence Destruction/Alteration/Concealment, Officer Involved Shooting/Accident, Possession of liquor not subject to regulation by division, Injury Accidents, Injury to Child, Under the Influence in Public, Unlawful exercise of functions of peace officers, Vehicular Manslaughter; ****Includes Rape, Male Rape, Sexual Abuse/Battery of Child/Minor; *****Death investigations can be suicides, unattended deaths or any other death that is deemed non-criminal.

Top ten ISPFS reported drugs:

1. Methamphetamine (CNS-S)
2. Carboxy- THC
3. Amphetamine (CNS-S)*
4. Alprazolam (CNS-D)
5. Diphenhydramine (CNS-D)
6. Hydrocodone (NA)
7. Citalopram (CNS-D)
8. Morphine (NA)
9. THC
10. 7-aminoclonazepam (CNS-D)**

*Amphetamine may be a metabolite of methamphetamine.

**7-Aminoclonazepam is an active metabolite of clonazepam.

Summary

The laboratory system received 2,809 toxicology cases in FY2017, which is 31 more cases than in FY2016 and 197 more than in FY2015. ISPFS accepted 1154 blood samples and 411 urine samples for toxicology testing in FY2017. This corresponds to an increase of 153 blood toxicology samples (or 13%) submitted to the laboratory system between FY2016 and FY2017, and an increase of 355 (31%) in blood toxicology samples submitted in FY2015. Interestingly, while there was a 13% increase in the number of blood toxicology samples submitted from FY2016 to FY2017, there was a decrease of 50 urine toxicology samples (or approximately 12%) submitted between FY2016 and FY2017. This trend has been predicted over the last few years. We expect further decline in urine toxicology submission in FY2018, particularly as ISPFS continues to expand the blood analytical capabilities to include more quantitative methods. ISPFS is moving toward testing only blood for DUI cases whenever possible.

Over 66% of the blood and urine toxicology cases submitted for FY2017 were DUI cases. Of the 881 adult DUI toxicology cases tested in FY2017, 81% of them were positive for one or more drugs. The urine toxicology adult DUI results are astonishing as only 6.8% of the cases had no drugs reported. The percentage of blood toxicology DUI samples that were reported as none detected was 23%. One possible explanation for this difference is the rate at which drugs are metabolized (broken down within the body). Often times, it takes several hours for blood to be collected. During this time period, any drugs that may be in the blood are being broken down by the body. This can result in the concentration of the drug in the blood being below the limits of detection. It is suspected that being able to have the blood collected sooner would result in even more cases being reported as positive for drugs.

There was a large increase in the number of auto accident fatality cases in FY2017 when comparing it to previous years. The average number of cases submitted for the previous 10 years was 70 cases. The number of adult auto accident fatality cases submitted this year was 87. That is an increase of approximately 25%!

A significant decrease of Juvenile alcohol samples submitted in fatality cases was seen as it decreased from 19 cases in FY2016 to 13 cases in FY2017. When looking at the results for those juvenile fatality cases, it seems that while the number of cases submitted was higher in FY2016 than it was in FY2017, the percentage of cases that had an alcohol result above the per se of 0.02 g%, remained the same (about 17%). The 19 juvenile auto accident fatality cases for FY2016 was higher than that seen in the previous 10 years. The 13 cases in FY2017 seems to be much more in line with what was seen in the previous 10 years.

In past years, it has been common in Idaho for the most common single drugs present in both adult urine and blood matrices to be a central nervous system stimulant (CNS-S), followed by carboxy-THC, and then a central nervous system depressant (CNS-D). However, this year that prevalence in urine has changed. The prevalence of THC, CNS-S, and CNS-D in urine is now almost identical. The prevalence of THC or carboxy-THC in blood has shifted from a close second, to a distant third. The prevalence of CNS-S and CNS-D drugs confirmed in blood is almost identical for FY2017.

In terms of drug combinations, the combination of CNS-S combined with carboxy-THC is by far the most prevalent combination detected in urine. In blood, the most prevalent drug combination is CNS-S and carboxy-THC, with the CNS-D and NA combination in a close second. 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 FY2017 because of the change in methods. The new blood toxicology methods that were validated are much less limited in the types and concentrations of NA compounds that can be detected.

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Juvenile toxicology case submissions typically remain fairly stable, and this year was no exception. The total number of juvenile toxicology cases submitted for FY2017 was 89. This is slightly up (about 9.9%) from FY2016 but not significantly. Year after year, ISPFS reports carboxy–THC is the most commonly detected drug in those juvenile samples containing drugs, and FY2017 is no exception.

Overall, 72% of juvenile urine and 60% of the juvenile blood samples that contained drugs contained THC/carboxy-THC, either alone or in combination with other drugs.

Huge strides were made in the blood toxicology section in FY2017 as new methods were validated and four analysts were approved to do blood toxicology casework analysis (two that were previously doing urine toxicology in the Coeur d'Alene laboratory, and two that were hired in 2016). Blood toxicology turnaround time decreased and it is expected to decrease in FY2018, assuming the instruments needed are obtained. The methods that were validated are all set up for one instrument, so with having numerous analysts trained in those methods, there is a queue for the instrument. In addition, some of the analysis runs tie up the instrument for over 24 hours! For FY2018, it continues to be essential that ISPFS personnel get the funding, training, and instruments 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. ISPFS scientists are working hard to reduce backlogs, but continued training, and new instruments are needed to keep up with the demands of Idaho population growth and law enforcement activities.

APPENDIX

Non Random Juvenile Drug Testing (NJDT) Please see Idaho Statues *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	Combinations
Amobarbital	Carisoprodol Meprobamate-M	Alprazolam	Amitriptyline Hydrochloride	Chlorpromazine	Chlordiazeproxide and Amitriptyline
Pentobarbital	Chloral Hydrate	Chlordiazepoxide	Bupropion	Droperidol	Chlordiazepoxide Hydrochloride and Clidinium Bromide
Phenobarbital	Diphenhydramine Hydrochloride	Clonazepam	Citalopram	Lithium Carbonate	Perphenazine And Amitriptyline
			Desipramine Hydrochloride	Lithium Citrate	
Secobarbital	Diphenylhydantoin Sodium	Diazepam	Doxepin Hydrochloride	Haloperidol	
			Escitalopram		
Barbital	Ethchlorvynol	Estazolam			
	Gamma-Hydroxybutyrate (GHB)	Flunitrazepam	Fluoxetine		
		Flurazepam	Impramine		
	Glutethimide	Lorazepam	Paroxetine		
	Methaqualone	Oxazepam	Phenelzine Sulfate		
	Paraldehyde	Temazepam	Sertaline		
	Zolpidem	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
- Dilaudid
- Hydrocodone
- Numorphan
- Oxycodone

Common Synthetic Opiates

- Demerol
- Methadone
- Fentanyl
- MPPP
- Darvon