

IDAHO STATE POLICE



Toxicology Program Trends 2011

Toxicology Program Trends

Overview and Background

This report discusses trends in the toxicology program, as well as the number of toxicology cases submitted to the Idaho State Police Forensics laboratories in District 1, Coeur d' Alene, and District 5, Pocatello for the fiscal year of 2011. The phrase "toxicology cases" is defined as those cases which have urine, blood or vitreous humor that are submitted to the laboratory for analysis, qualitatively and/or quantitatively for the presence of drugs and/or alcohol. This analysis falls under three major disciplines: blood alcohol (the level of alcohol in blood), blood toxicology (drugs in blood) and urine toxicology (drugs in urine).

These statistics were compiled from the Idaho Evidence Tracking System (IETS) which is used to log in and track all evidence submitted to the forensic laboratory system. The information in IETS regarding a case is taken directly from the Evidence Submission Form filled out by the agency officer and submitted simultaneously with the evidence to the laboratory.

Toxicology Tracking Information

	Blood Toxicology	Blood Alcohol	Urine Toxicology	Total	2011 Percent	2010 Percent
DRE						
Adult	23	3	111	137	4.1%	5.1%
Juvenile	5	1	6	12	0.35%	0.5%
NJDT	0	0	2	2	0.05%	0.2%
DUI						
Adult	502	1653	316	2471	74%	69%
Juvenile	41	93	39	173	5.2%	8.1%
Probation & Parole						
Adult	0	1	20	21	0.6%	0.8%
Juvenile	1	1	24	26	0.8%	0.6%
Other Criminal	69	77	94	240	7.2%	6.5%
Auto Accident Fatalities	55	89	18	162	4.8%	3.9%
Accident Victim Kits	0	14	0	14	0.4%	0.4%
Death (non-homicide)	35	42	08	85	2.5%	4.8%
Total:	731	1974	638	3343	100%	100%

Table 1: Statistics were compiled from the Idaho Evidence Tracking System (IETS) which is used to log in and track all evidence submitted to the forensic laboratory system.

Terms and Drug Categories

Central Nervous System Depressants (CNS-D's), Central Nervous System Stimulants (CNS- S's), and Carboxy-THC account for most of the positive toxicology results obtained after analysis.

Carboxy-THC is an inactive metabolite of marijuana (MJ). Which means, after ingestion, the MJ is broken down in the body to a form that the body can eliminate as waste. There are many MJ metabolites and Carboxy-THC is one of them. Idaho State Police Forensic Service's (ISPFS) current methods for extracting MJ from the blood and urine will extract this metabolite. We have added an appendix to the report this year to help define terms and describe the drug categories and the drugs included in those categories.

Many prescription drugs are impairing and highly abused, which is why we see so many in DUI cases. Some of the most impairing drugs fall under the CNS-Depressants category drugs. CNS-Depressant drugs have many categories, such as anti-depressants, anti-anxiety, anti-histamines, barbiturates, narcotic analgesics and others. *Merriam-Webster Dictionary* defines a "narcotic as a drug that in moderate doses dulls the senses, relieves pain, and induces profound sleep but in excessive doses causes stupor, coma, or convulsions." An analgesic relives pain. Some of the most common found in our DUI cases are hydrocodone, methadone and oxycodone. The benzodiazepine class drugs are anti-anxiety or tranquilizers, the most commonly found benzodiazepines in DUI cases are alprazolam, temazepam and lorazepam.

We have just implemented a method for tracking the cases that have been positive for inhalants. We have a few every year and they usually are products of paint or air duster inhalation.

CNS-Stimulant drugs that are highly impairing, not usually in prescription form, are amphetamine, methamphetamine and cocaine. Amphetamine can be a prescription, but is most commonly seen as an active metabolite of methamphetamine. Methamphetamine will be reduced to amphetamine after ingestion and is excreted partly as amphetamine. Once broken down into amphetamine, the amphetamine acts as its own drug and produces stimulant effects as well as the methamphetamine, therefore it is an *active* metabolite. We have few cocaine positives, which do not necessarily mean it isn't being used. Cocaine is eliminated from the body very rapidly and if very much time has passed from ingestion to sample collection, it may not be detected.

One reason that drug combinations are listed in each of the drug toxicology categories is because drug combinations can cause *additive* or *synergistic* effects. Additive, for example, means $1+1=2$. For example, the additive effects of hydrocodone used in conjunction with meprobamate means the impairing effects can be added to create two times the effects. An anti-depressant taken alone in therapeutic amounts (prescribed quantities) may not have any impairing effects, but taken in

conjunction with other CNS-D's such as alcohol or other anti-depressants may then have additive effects. Synergistic effects is 1+1 may = more than 2.

Please note that a negative result in one discipline only reflects the testing in that discipline; the case may have had a positive result in another discipline. For example, a case may have had a negative result in blood alcohol, but a positive result for drugs in blood. If both blood alcohol and blood toxicology were requested for a case, a blood alcohol cutoff of 0.10g/100cc of blood or above is a flag to scientists that toxicology testing is not required. In special circumstances, such as felony possession, suicide or possible overdose cases, the toxicology may still be analyzed even if the blood alcohol is above 0.10g/100cc of blood.

Toxicology results for FY2011

The laboratory system received 3,343 toxicology cases for FY 2011, 45 cases less than last year 1,189 and more cases than in 2007 (a 35% increase in toxicology cases from 5 years ago). Please see **Figure 1** for the comparison between years of submitted toxicology cases, while keeping in mind that some of these samples may be counted twice (a blood alcohol sample maybe sent in for blood toxicology).

Results in each of the three disciplines will be reported out in three categories and will be explained in greater detail in subsequent paragraphs.

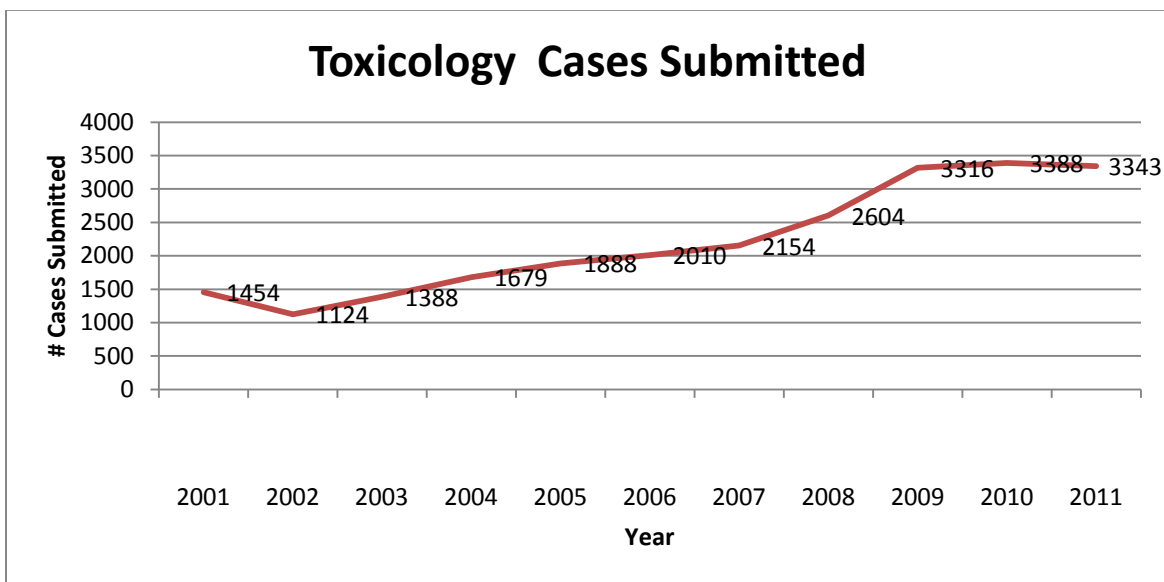


FIGURE 1

Blood Alcohol Concentration (BAC)

The blood alcohol results for adults will be discussed in this report in three levels for adults: negative, less than 0.08 g/100cc of blood and 0.08 g/100cc of blood and above. The three alcohol levels discussed for juveniles are Negative, less than 0.02 g/100cc of blood, 0.02 g/100cc of blood and above, and inhalants. A visual representation of the results of blood alcohol levels in adults can be found in **Figure 2**. Negative samples were at about 14% (with 256 samples processed). The second group – those less than 0.08 – is about 5%, (with 88 samples processed). The last level is samples at 0.08 g/100cc of blood and above and is the largest percentage – 81% (1,501 samples processed). There were 37 more cases submitted this year for BAC testing than last year.

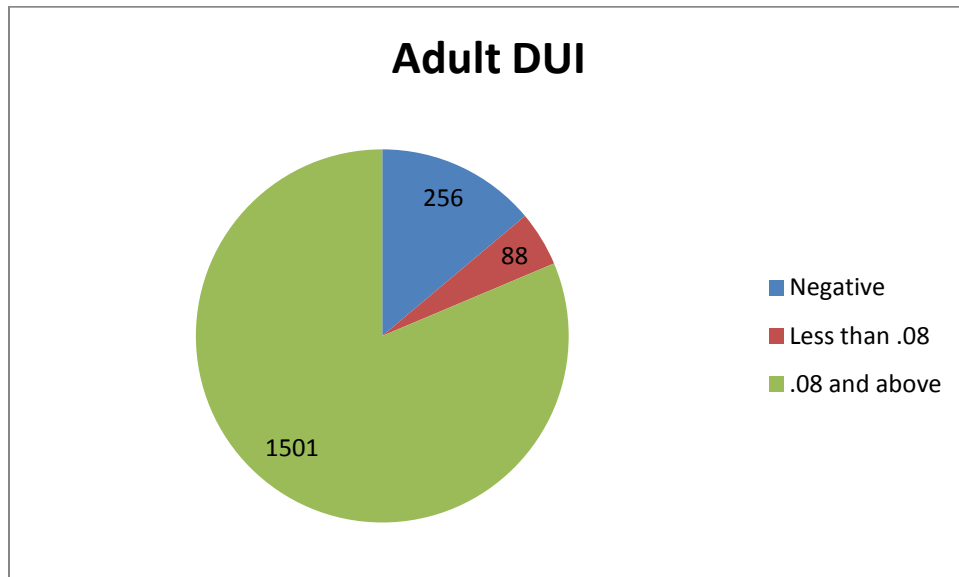


FIGURE 2

Cases submitted this year for BAC analysis in adult DUI's increased by 114 cases this year over last. Conversely, juvenile cases submitted for BAC in DUI cases decreased by almost 50 cases.

We have seen an increase in BAC and Blood toxicology cases over the past couple of years since The State vs. Diaz and State vs. DeWitt Court of Appeals rulings that have upheld "forcible blood draws". We did see a larger increase in cases submitted this year than last but the ruling may not be the only factor influencing the increase. One cause may be that more blood samples are being drawn because both toxicology and BAC can be analyzed, rather than sending blood and urine or just urine. Blood samples also seem to carry more weight in court than urine samples as well.

A breakdown of the adult blood alcohol category to look only at auto accident fatalities shows an increase of cases submitted; up to 74 cases submitted this year as opposed to 64 from last year. Although the cases submitted increased, the percent of the fatalities with blood alcohol levels above 0.08 g/100cc of blood, the increase was only 3 percent. **Figure 3** is a representation of the breakdown of results in the auto accident fatalities.

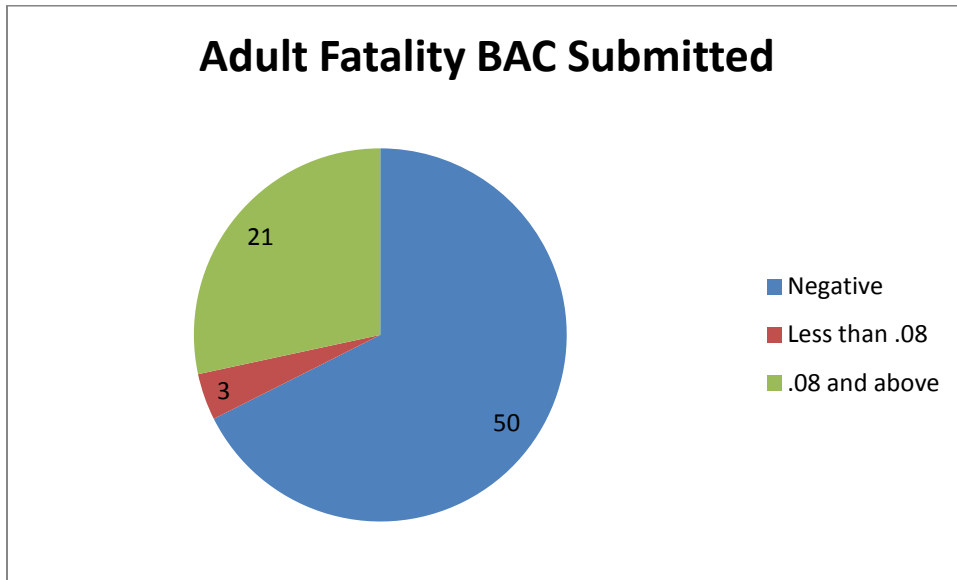


FIGURE 3

The DUI portion of the juvenile blood alcohol results show a total of 129 cases submitted for BAC and/or inhalants analysis; as mentioned earlier this is a decrease from last year. The decrease was about 43 cases less submitted for analysis. Accordingly the cases testing 0.02 g/100cc of blood or above decreased, but by an astounding 60 cases. **Figure 4**.

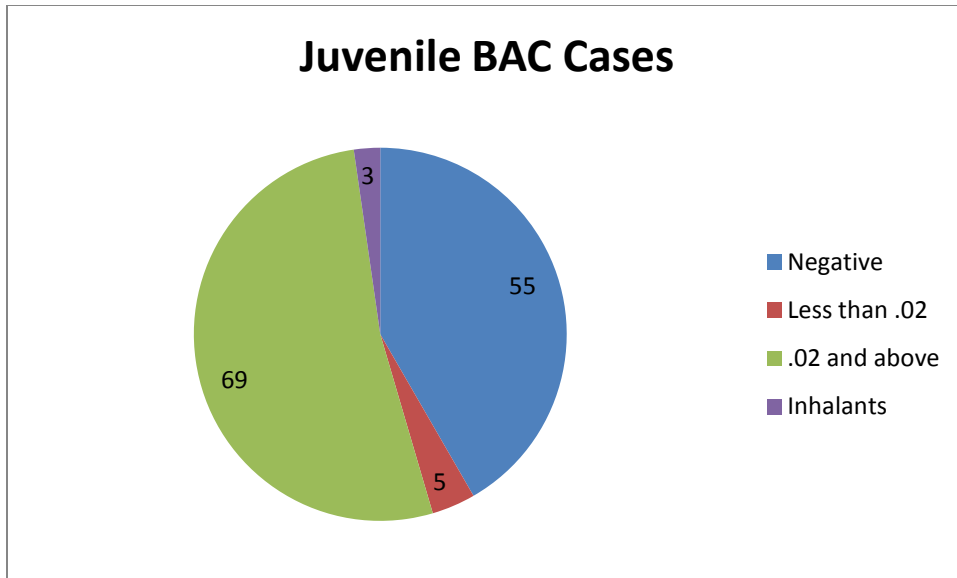


FIGURE 4

Of the 129 cases submitted for testing in the juvenile blood category three tested positive for an inhalant. Inhalants cover many volatiles such as toluene (seen in paint), isopropyl alcohol, methanol, difluoroethane (seen in “Air Dusters”) and other similar volatiles. The three positive samples were all positive for difluoroethane, (**Figure 4**). Currently that is the same number of cases as last year, but with fewer cases submitted it represents a 1% increase in inhalant positive results for juveniles.

Juvenile BAC cases submitted in fatality cases dropped from 10 last year to only 2 in FY2011. One was positive for 0.02 g/100cc of blood or above and one was negative for blood alcohol. Clearly, dropping down to only two cases was good news in this category.

Toxicology (Drugs in Blood and Urine)

As in past years, the Idaho State Police Forensic Services Toxicology Discipline policy states that samples with a result over a set amount of blood alcohol, currently 0.10g/100cc of blood, will not be retained to be tested for drugs in blood unless there is /are extenuating circumstances.

NJDT’s, Non-Random Juvenile Drug Testing, samples are of a growing concern, we get fewer and fewer cases submitted each year. Only 2 total were submitted this year and only 3 cases were submitted in FY2010. Why this has happened is unclear. Questions that should be addressed include: Is the program not working? Do schools need to be re-educated about NJDT’s? Is the economy and lack of full time school resource officers an issue? Are turn-around times a reason for so few?

As far as NJDT test results, all three of the cases submitted were positive, 1 for Carboxy –THC and one for a central nervous system depressant.

Once again DRE's (Drug Recognition Evaluations) are also a concern, but only as far as this report is concerned. This program is very successful and hugely helpful regarding toxicology information for analysts. The concern is that we cannot track them in a meaningful manner, because cases submitted are not properly marked as DRE's. DRE cases are counted as DUI cases in our evidence tracking system, so for purposes of this report they will not be differentiated from the other toxicology DUID (DUI-Drugs) cases.

Adult

The total results for drugs in blood and urine in the adult category are shown in **Figures 5**. For urine samples, drug combinations were more prevalent than single drug use. Blood results showed the opposite. The numbers are important for knowing what drugs are used and are the most common or impairing. The results cannot be compared against each other however, because testing methods are different and allow for testing in some areas but not others.

In the past it has been shown year after year that carboxy-THC has been the predominate drug in the single drug present category in both blood and urine. For FY 2011 both blood and urine results demonstrated a change to CNS-D's as the prominent drug category for single drug use. This category can be many different drugs. For instance, barbiturates, benzodiazepines, muscle relaxers and many others all fall into the CNS-D category. Some of the most prevalent drugs seen in this category for single drug use appear to be: diphenhydramine (over the counter cold medicine and sea sick medication), alprazolam (prescription benzodiazepine class compound) and zolpidem (prescription sleep aid).

Then carboxy-THC ranks next highest in urine samples and stimulants in blood samples. This may be due in part to carboxy-THC having a much longer half life in urine.

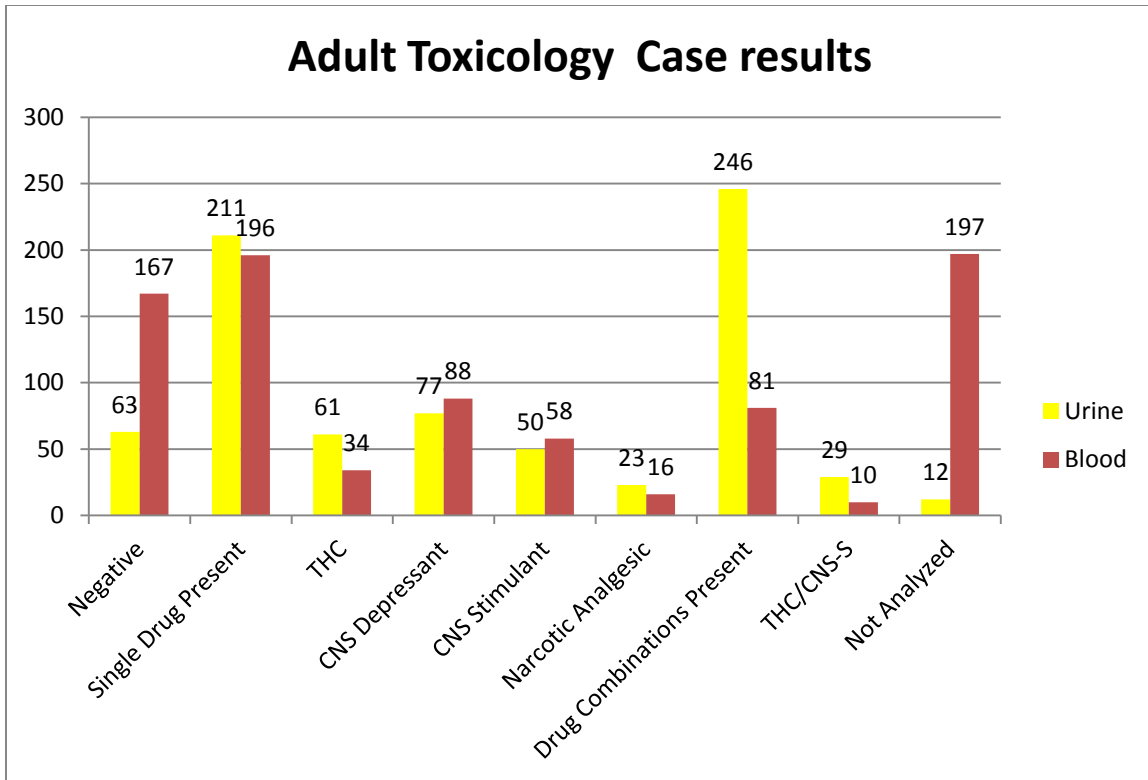


FIGURE 5

The most popular drug combination by class in adults is CNS-D with a narcotic analgesic, in both the blood and urine categories, followed by THC/CNS-S in urine and CNS-S/CNS-D in blood. The drugs in the anti-depressant class are common and add to the large number of depressants found; some of the depressants include citalopram, sertraline (Zoloft®), and venlafaxine. The most common narcotic analgesics found are hydrocodone, oxycodone and tramadol. Narcotic analgesics and benzodiazepine class compounds like alprazolam are widely abused and addicting.

In every instance throughout this report, whenever CNS-Stimulants (CNS-S) are mentioned, amphetamine and methamphetamine dominate this category. Some of the other stimulants seen are phentermine and cocaine. Amphetamine can be found as a prescription drug like Adderall® and as a metabolite of methamphetamine. The final breakdown of the adult drug results include 63 negative results and 12 not analyzed for urine samples. Negative samples for blood toxicology were 167 with 197 not analyzed. The large number of samples not analyzed in blood samples is due to the blood alcohol results being 0.10 g/100cc of blood or higher; under those conditions, unless extenuating circumstances exist, the samples will not be tested for drugs.

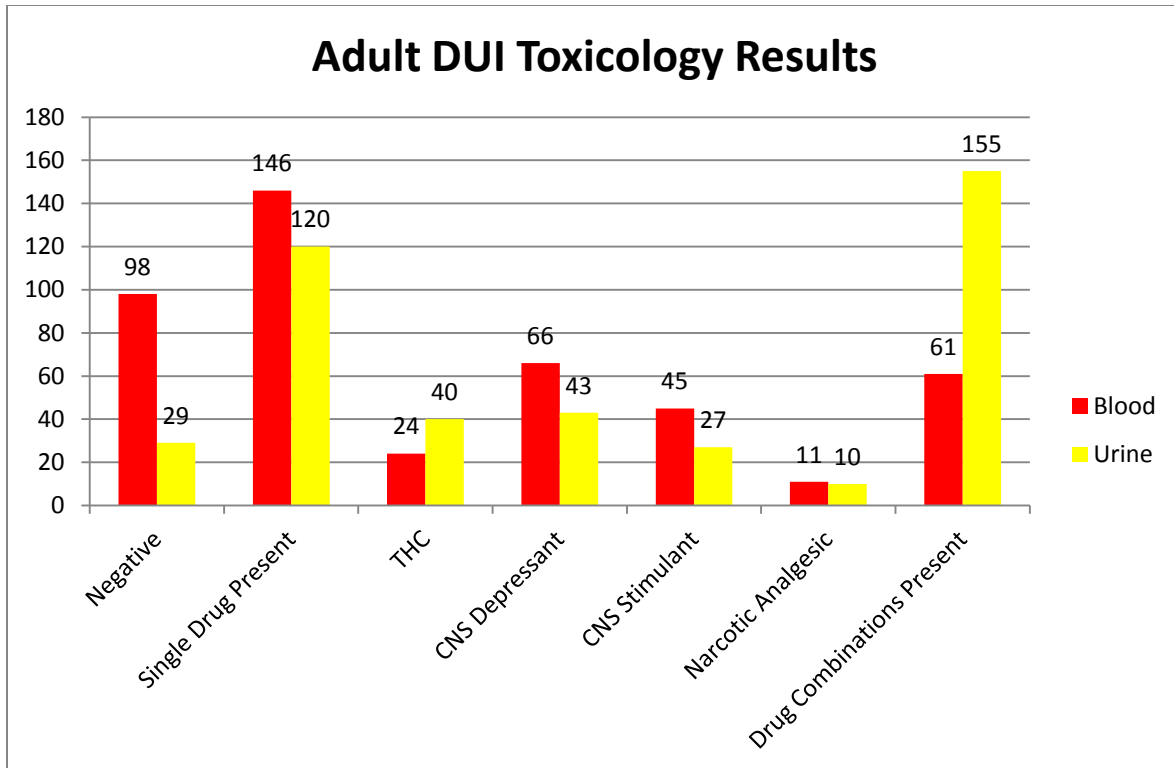


Figure 6

As seen in **Figure 6** adult drug results for both blood and urine associated with DUI's followed the same pattern as all adult toxicology as illustrated in **Figure 5**: single drugs present in the most abundance was the CNS-D and for drug combinations CNS-D/NA lead the way.

The laboratories received 186 less urine samples in FY2011, than last year.

Overall the adult DUI's (positive results for drugs and/or alcohol over 0.08g/100cc of blood) were up by about 4%. Juveniles positive results decreased by almost 43 % over the past year

Juvenile

The decrease in juvenile positive samples for drugs and alcohol has been encouraging. In the juvenile categories carboxy –THC dominates.

Overwhelmingly in the Juvenile category, carboxy-THC is the drug of choice, both in the single drug and drug combination classes. Two of the most commonly seen drug combinations are carboxy-THC with a CNS-D and carboxy-THC with CNS-S. As mentioned earlier most prescription drugs are CNS-D, many of the positive results in this class were carboxy-THC in combination with one or more of the benzodiazepine class compounds such as alprazolam, temazepam and diazepam. Also diphenhydramine and dextromethorphan weighed heavily on the positive results in both classes. These are over the counter medications used most often in cold remedies. Many people using these medications to relieve cold symptoms do not realize that they may be impaired by them. These two drugs are commonly taken intentionally for the side effects, in other words they are taken in higher than recommended doses (abuse), and this seems to be more common in juveniles than adults.

Methamphetamine is the stimulant drug seen in the THC/ CNS-S class. It has almost the same weight as the THC/CNS-D in the Juvenile DUI drug category. If one considers this is the only drug that was found in the stimulants category versus numerous different prescription and over the counter drugs that comprised the CNS-D category, it is obvious methamphetamine and Carboxy-THC continue to lead the way in drug abuse for both adults and juveniles.

Juvenile accident fatalities numbered 18 in FY 2011; 12 were negative for drugs or alcohol. Two of the positive results were for carboxy-THC, 1 was positive for BAC over a 0.02g\100cc of blood, 1 was positive for CNS-D/NA and one for CNS-D/CNS-S.

Overall, the juvenile samples submitted to the lab for testing decreased this year by over 30%. For both blood and urine drug toxicology, in all categories such as DRE's, fatalities and so forth as outlined in Table 1, Carboxy-THC accounted for a majority of the positive results.

Summary

The laboratory system received 3,343 toxicology cases for FY 2011, 45 less than last year and 1189 more toxicology cases than FY2007; over the past 5 years we have had a 35% increase in toxicology cases submitted to the system. The trend has been large increases in cases submitted for blood alcohol analysis and urine samples submitted are fewer than last year, as expected.

Greater testing capabilities in blood toxicology will decrease the need for analyzing urine samples, and the toxicology section of ISP Forensics will be moving toward testing only blood and whenever possible.

Samples submitted for blood alcohol analysis has increased over the years. This year we also saw a slight increase in adult BAC cases, whereas, juvenile DUI cases decreased.

Last year we posed a couple of questions: Have juveniles moved to smoking marijuana as opposed to drinking alcohol? Will this be a trend? Is the juvenile population under the impression that they are not impaired by marijuana usage? Or are they under the impression they are less likely to be caught? Although Carboxy-THC was the prominent drug in the DUI arrests there were an equal number in

alcohol. Overall this total was still very small. Because the data set is small in this category it leaves us unable to answer the questions above, except that it does not appear to be a trend.

Adult toxicology results across the board; (DUI'S, Fatalities, other offenses and so forth), remained consistent from last year. Highest percentage of urine positive results in the single drug category was Central Nervous System Depressants (CNS-D), followed by Carboxy-THC (marijuana metabolite). This result was exactly opposite of last year. For drug combinations in both adult blood and urine was the combination of CNS-D with a Narcotic Analgesic (NA), was most prominent; this result was consistent with FY 2010. The CNS- Depressant category covers a wide range of drugs and drug classes so the result is expected. The significant drugs in this category that were found were alprazolam, zolpidem and over the counter medications like diphenhydramine. The most popular narcotic analgesics were the drugs hydrocodone, oxycodone and tramadol .Methamphetamine was the most prominent CNS-S found.

The trend for juveniles samples submitted for blood and urine toxicology decreased in FY 2011. The most common drug found in the samples was Carboxy –THC, and CNS-Depressants. CNS-S followed. As mentioned earlier CNS- Depressant covers a wide range of drugs and drug categories so the result is expected, but in the CNS-S category methamphetamine is almost the only substance accounting for the numbers. Methamphetamine remains a big problem in Idaho for both juveniles and adults. Many of the depressants found included anti-depressants; sertraline, citalopram and venlafaxine. Also found were the benzodiazepine class compounds, diphenhydramine and few barbiturates.

Carboxy-THC continues to be, year after year, the most commonly found drug of abuse. It is used alone or in combination with other drugs from every category. It is by far the most commonly used drug within the juvenile and adult populations; it is most prevalent in the juvenile population however.

Methamphetamine is the biggest contributor to the CNS-S category in both adults and urine as well.

We had projected that blood alcohol and toxicology cases would increase in 2010, and so it did, but not in a dramatic fashion, because we only received 81 cases more than in 2009. According to *the Crime in Idaho Report for 2010*, <http://www.isp.idaho.gov/BCI/CrimeInIdaho2010/>, there was a decrease in DUI arrests statewide, the previous year that increase was at 1.5%. Statewide rates are calculated on an adjusted population base of 1,554,255.

For FY2012 we are going to see the latest and greatest new drug enter into ISP Forensics database and that is Spice. We are currently testing for it in controlled substances and have not yet begun testing in toxicology samples.

DRE DUI cases give rise to a significant amount of the cases and are useful to toxicologists. They will no longer be counted as part of this report, because we cannot get the proper documentation for counting purposes. They remain contributors to our overall cases and they will remain very important to both forensics and the law enforcement community.

NJDT'S are nearly nonexistent. In our Idaho society of juveniles using illegal substances such as marijuana and methamphetamine in such abundance, it seems NJDT's may be more useful than they

have ever been. It is important that this program be revisited and the importance of it stressed to our schools.

Overall we received less toxicology and more blood alcohol cases than last year. We did see an increase in blood cases submitted and a decrease in urine toxicology cases which was expected. We predict a continuation in this pattern as we begin testing for more and more drugs in blood and one day start quantifying some of the drugs present in blood samples.

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 anti-anxiety column in the chart and Methamphetamine has been added to list of stimulants.

Central Nervous System Depressants

Central Nervous System (CNS) Depressants 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	Chlordiazepoxide 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	Meprobamate	Phenelzine Sulfate		
	Paraldehyde	Oxazepam	Sertaline		
	Zolpidem	Temazepam	Venlafaxine		
		Triazolam			

Central Nervous System Stimulants

Central Nervous System (CNS) Stimulants speed up the operation of the brain and spinal cord. It is important to emphasize that “speed up” does *not* mean “improve” or “enhance”. The CNS Stimulants 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 etc...

Hallucinogens

Hallucinogens 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 (In the annual toxicology report Narcotic Analgesics are counted as Central Nervous Systems Depressants)

There are two subcategories of Narcotic Analgesics. The first subcategory consists of the Opiates. The second subcategory is the Synthetics.

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
- Fentanyls
- MPPP
- Darvon