

2013 Annual Toxicology Report

Department of Justice
Forensic Science Division
Toxicology Department



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Special thanks to Jim Hutchison who retired in 2013 after 38 years as a forensic toxicologist and Chief Toxicologist for the State of Montana. His dedication to Montana and the field of forensic toxicology is unmatched.

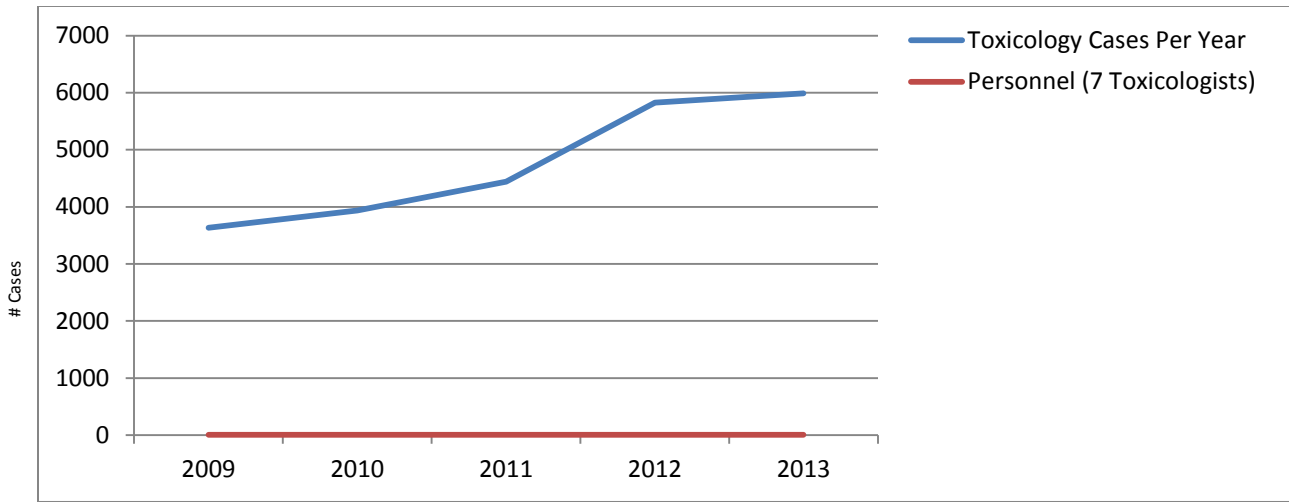
Introduction

The mission of the Forensic Science Division Toxicology laboratory is to provide the state of Montana forensically defensible results in the quickest timeframe possible. We provide drug/alcohol testing and expert testimony in DUI cases. In addition, our testing results assist the medical examiner/coroner system's determination of cause/manner of death. The cases in this report are sorted in groups as they were submitted to us, not necessarily as the final cause/manner of death as concluded by the medical examiner or coroner. We also perform testing for the Department of Corrections probation/parole system, drug facilitated sexual assault, and drug endangered children cases (DEC). The laboratory continues to follow guidelines needed to sustain ASCLD/LAB accreditation, provide expert witness testimony, and develop analytical strategies for testing. The laboratory communicates with medical examiners, coroners, law enforcement officials, attorneys, and the general community in matters pertaining to chain-of-custody, pharmacology, and toxicological related matters.

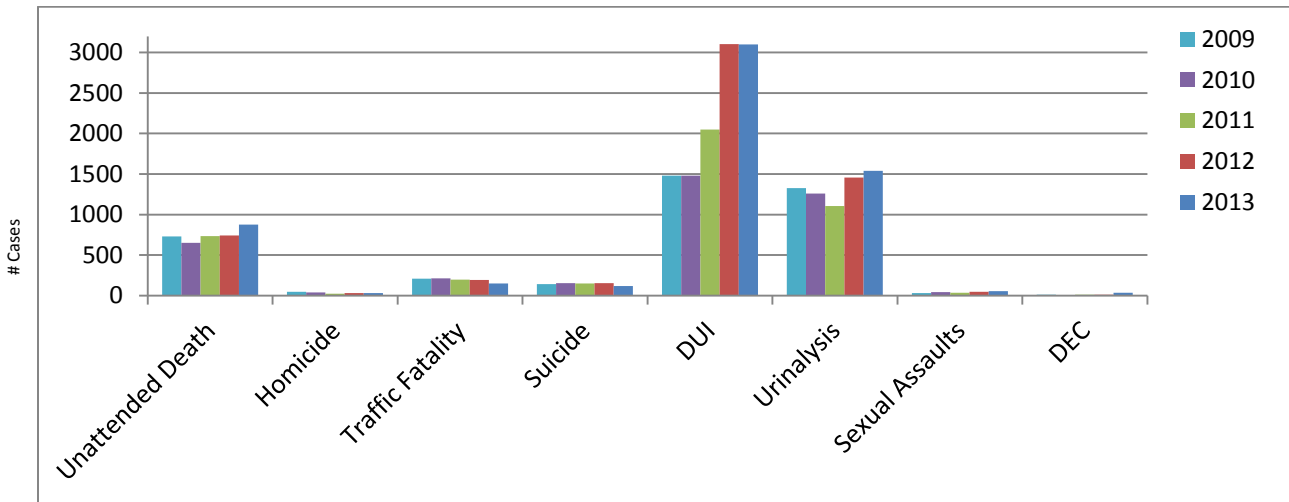
The laboratory provides the state with a large volume of testing with a small staff of seven toxicologists. There has been a 65% increase in the total number of submitted cases from 2009 to 2013. During that timeframe the cases have continued to become more complex with an increasing number of new drugs on the pharmaceutical and illicit drug markets.

This report contains graphs and figures that can be used to track our results by the many agencies we work with throughout the state. In addition, it gives a synopsis on drug and alcohol results throughout the state and can be used as a reference guide. This is not an exhaustive list of drugs detected and confirmed by this laboratory, just the most frequently found drugs.

Total Testing Per Year



2009-2013 Toxicology Results



2009-2013 Toxicology Results

Total Cases	Unattended Death (Postmortem Cases)	Homicide (Postmortem Cases)	Traffic Fatality (Postmortem Cases)	Suicide (Postmortem Cases)	DUI	Urinalysis	Sexual Assaults	DEC
2009	732	49	209	142	1480	1325	33	12
2010	652	39	212	152	1481	1259	45	9
2011	736	22	196	151	2048	1104	37	13
2012	741	30	195	152	3102	1457	49	12
2013	877	33	151	117	3099	1539	57	37

2013 TURN-AROUND TIME SUMMARY

A standard metric within the toxicology field is determining the number of days needed to complete 95% of the cases. The goal at this laboratory is to complete 95% of the postmortem and DUI Drugs cases within 60 days. To complete 95% of the DUI Ethanol cases within 20 days and 95% of the Urinalysis cases within 30 days. The results of every laboratory depend on the efficiency of the program in general and resources available to the laboratory.

2013 Turn-Around Time

<u>Type of Case</u>	<u>Mean</u>	<u>% of cases within desired range</u>
Unattended Death	26 days	96% cases within 60 days
DUI Drugs	45 days	75% cases within 60 days
DUI Ethanol	15 days	83% cases within 20 days
Urinalysis	22 days	82% cases within 30 days

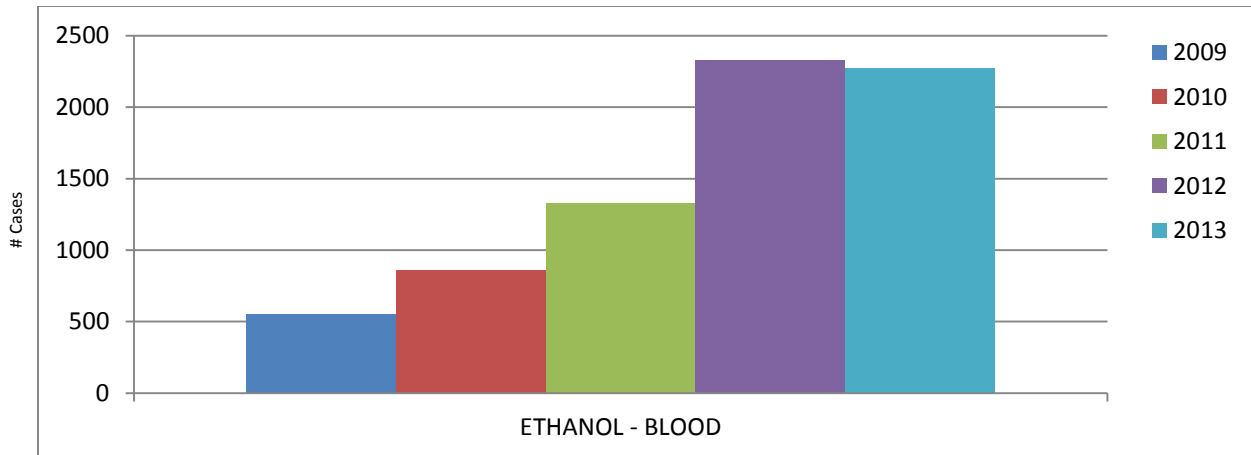
Driving Under the Influence (Ethanol and/or Drugs) Summary

DUI Data

	2007	2008	2009	2010	2011	2012	2013
1. Total DUI's submitted	1051	1311	1480	1481	2048	3102	3099
2. Drug DUI	330	400	491	651	827	949	788
3. Ethanol Only DUI	721	911	989	830	1221	2153	2311

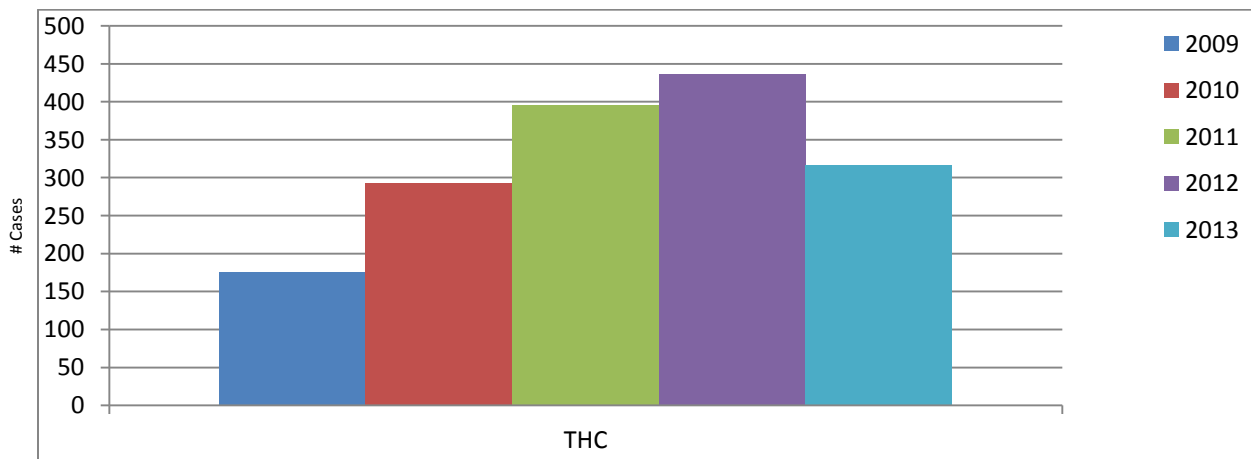
- 1. Total DUI's submitted:** Total number of DUI cases submitted to laboratory.
- 2. Drug DUI:** Cases that had drugs other than alcohol reported out. You will notice that the total dropped from 2012 to 2013. This was not necessarily because of less drug use but a policy that was put in place internally where we only tested suspected drug cases *if* the blood alcohol was less than 0.1 g/100mL. We put drug holds on all cases above that level. This policy was necessary to cope with the increased workloads and to reduce delays in the completion of reports for the majority of DUI cases. DRE cases are exempt from this policy and officers have the option to contact the Toxicology section to request the drug testing. This policy enabled us to have an average turn-around time of 15 days for ethanol cases and 45 days for drug cases.
- 3. Ethanol Only:** Cases that were reported out as ethanol only (drugs may have been tested but were negative).

DUI- Ethanol



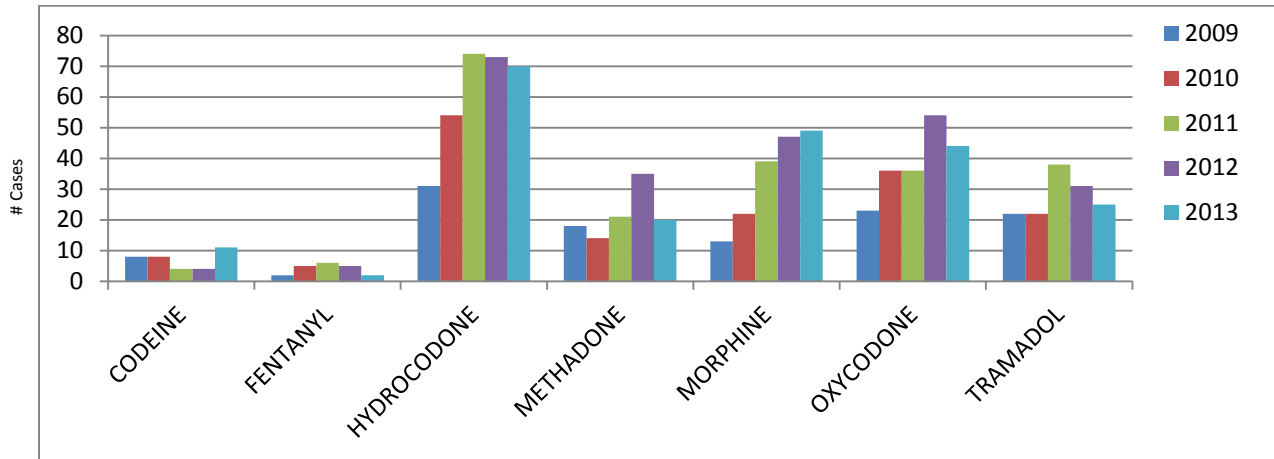
Year	g/100mL	ETHANOL-BLOOD
2009	Mean	0.14
	Range	0.0-0.45
2010	Mean	0.16
	Range	0.0-0.42
2011	Mean	0.17
	Range	0.0-0.46
2012	Mean	0.17
	Range	0.0-0.44
2013	Mean	0.18
	Range	0.0-0.47

DUI- THC



Year	(ng/mL)	THC
2009	Mean	7
	Range	2-42
2010	Mean	8
	Range	1-68
2011	Mean	7
	Range	1-84
2012	Mean	6
	Range	1-49
2013	Mean	8
	Range	1-48

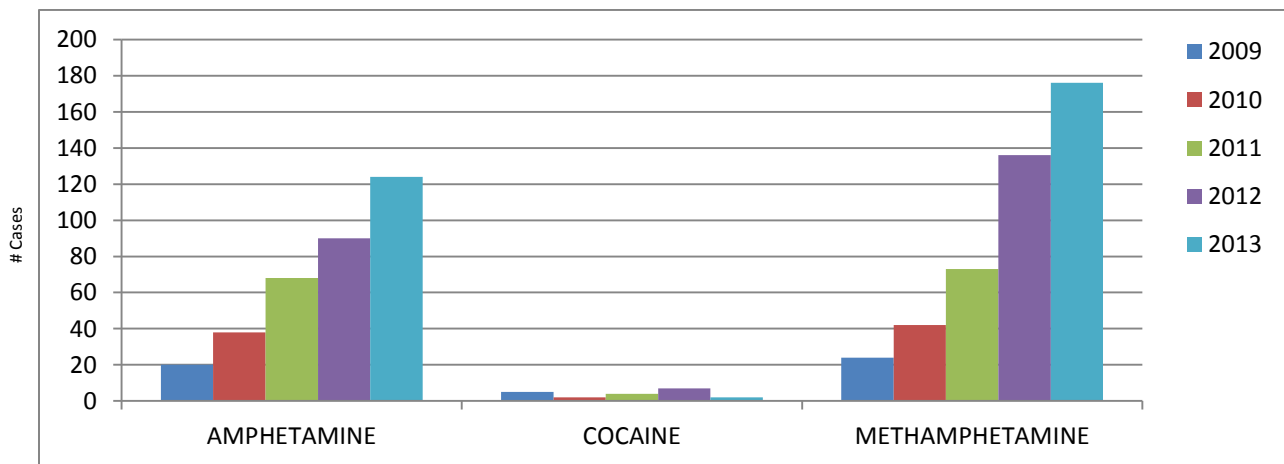
DUI- Narcotic Analgesics



Year	mg/L	CODEINE	FENTANYL*	HYDROCODONE	METHADONE	MORPHINE	OXYCODONE	TRAMADOL
2009	Mean	0.20	61	0.09	0.28	0.11	0.10	0.54
	Range	0.05-0.35	---	0.02-0.33	0.02-0.99	0.02-0.39	0.03-0.25	0.03-2.4
2010	Mean	0.56	3.4	0.06	0.15	0.10	0.10	0.41
	Range	0.02-3.1	2-6	0.02-0.18	0.03-0.39	0.02-0.56	0.02-0.41	0.02-3.1
2011	Mean	0.05	3.4	0.06	0.21	0.05	0.23	0.43
	Range	0.02-0.08	2-5	0.02-0.21	0.02-0.7	0.02-0.13	0.02-1.9	0.02-3.5
2012	Mean	0.12	4.3	0.07	0.23	0.06	0.09	1.1
	Range	0.05-0.21	4-5	0.02-0.6	0.02-0.92	0.02-0.19	0.02-0.41	0.02-10
2013	Mean	0.10	---	0.57	0.19	0.05	0.10	0.67
	Range	0.02-0.27	---	0.02-22	0.04-0.79	0.02-0.14	0.02-0.51	0.03-3.4

*All concentrations are in mg/L except Fentanyl which is in ng/mL

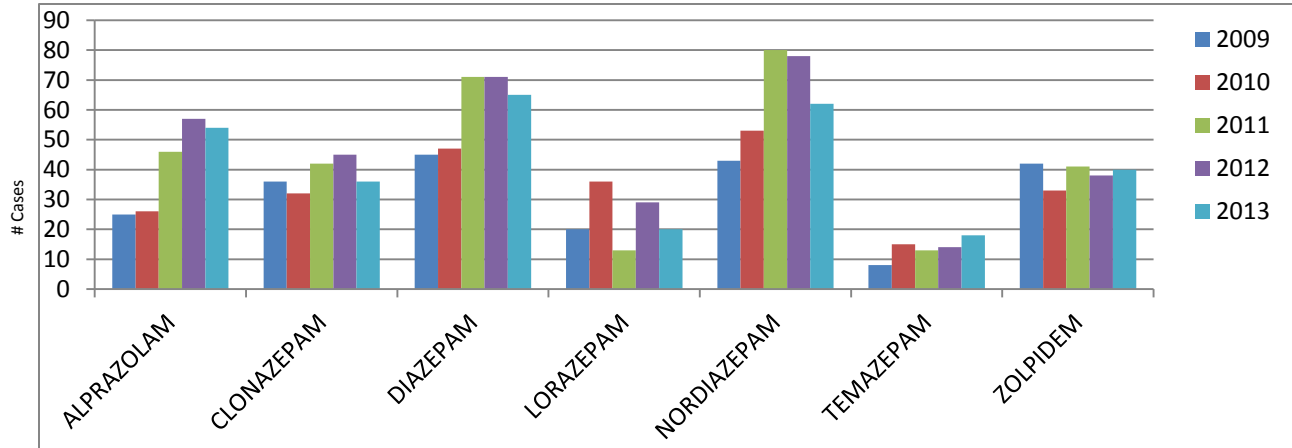
DUI- Central Nervous System Stimulants



Year	mg/L	AMPHETAMINE	COCAINE	METHAMPHETAMINE
2009	Mean	0.09	0.03	0.16
	Range	0.01-0.38	<0.02-0.04	0.05-0.33
2010	Mean	0.06	<0.02	0.32
	Range	0.02-0.14	<0.02	0.03-1.1
2011	Mean	0.06	0.07	0.22
	Range	0.02-0.38	<0.02-0.07	0.02-1.3
2012	Mean	0.09	0.03	0.30

	Range	0.02-1.0	<0.02-0.03	0.02-4.3
2013	Mean	0.07	0.03	0.26
	Range	0.02-0.28	<0.02-0.04	0.02-2

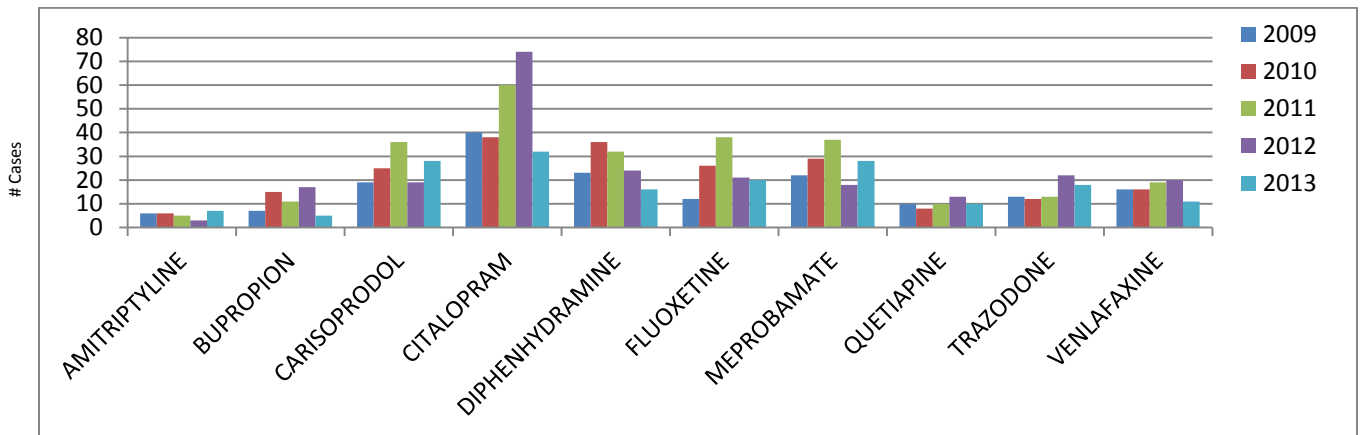
DUI- Central Nervous System Depressants (Benzodiazepines)



Year	mg/L	ALPRAZOLAM	CLONAZEPAM	DIAZEPAM	LORAZEPAM *	NORDIAZEPAM	TEMAZEPAM	ZOLPIDEM
2009	Mean	0.12	0.05	0.37	52	0.44	0.53	0.23
	Range	0.02-0.90	0.02-0.22	0.02-3.3	7-185	0.02-7.1	0.12-1.9	0.02-1.5
2010	Mean	0.06	0.04	0.38	76	0.39	0.13	0.21
	Range	0.02-0.15	0.02-0.13	0.02-1.7	6-435	0.02-2.5	0.05-0.37	0.02-0.86
2011	Mean	0.09	0.06	0.35	82	0.35	0.33	0.37
	Range	0.02-0.44	0.02-0.17	0.02-3.4	7-201	0.02-3.6	0.06-0.15	0.02-2.7
2012	Mean	0.10	0.07	0.29	58	0.30	0.16	0.40
	Range	0.02-0.26	0.02-0.20	0.02-1.6	5-159	0.02-2.3	0.02-1.1	0.02-3.5
2013	Mean	0.13	0.05	0.54	54	0.40	0.36	0.21
	Range	0.02-0.88	0.02-0.14	0.02-4.6	6-194	0.02-1.7	0.03-0.93	0.02-0.69

*All concentrations are in mg/L except Lorazepam which is in ng/mL

DUI- Central Nervous System Depressants

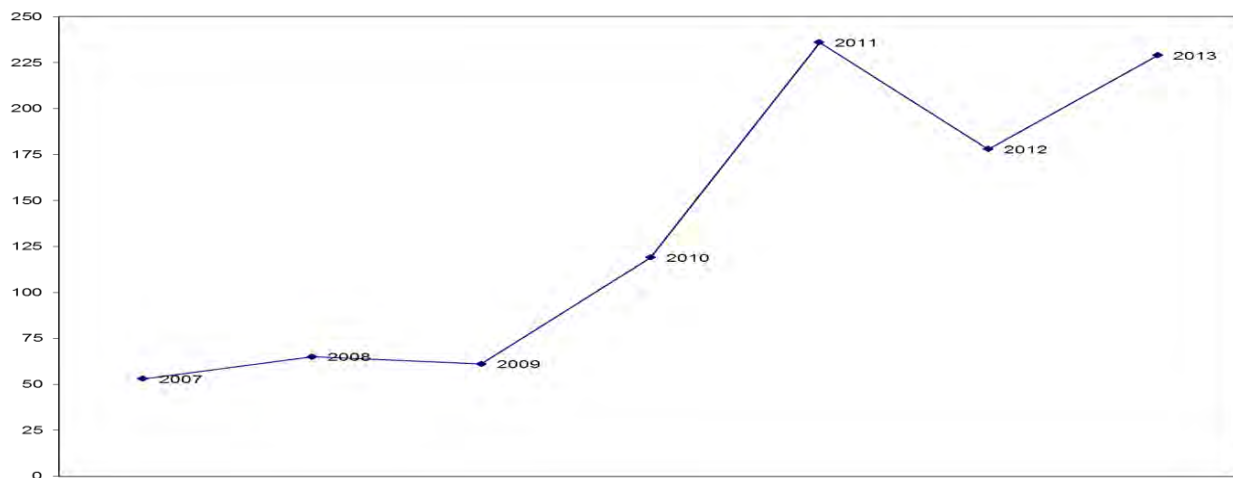


Year	mg/L	AMITRIPTYLENE	BUPROPRION	CARISOPRODOL	CITALOPRAM	DIPHENHYDRAMINE
2009	Mean	0.22	0.09	5.3	0.12	0.08
	Range	0.05-0.46	0.02-0.39	2.0-12	0.02-0.50	0.02-0.48
2010	Mean	0.23	0.05	5.4	0.10	0.13
	Range	0.02-0.82	0.02-0.12	2.0-12	0.02-0.32	0.02-0.99
2011	Mean	0.07	0.04	6.7	0.14	0.24

	Range	0.03-0.13	0.02-0.06	2.0-16	0.02-0.67	0.02-1.4
2012	Mean	0.11	0.04	5.4	0.13	0.23
	Range	0.07-0.14	0.02-0.08	2.0-10	0.02-0.48	0.03-1.1
2013	Mean	0.14	0.03	6.4	0.13	0.54
	Range	0.07-0.21	0.03-0.04	2.5-13	0.04-0.46	0.53-2.2

Year	mg/L	FLUOXETINE	MEPROBAMATE	QUETIAPINE	TRAZODONE	VENLAFAXINE
2009	Mean	0.18	13	0.33	0.48	0.17
	Range	0.05-0.42	2-29	0.04-1.4	0.07-2.1	0.02-0.47
2010	Mean	0.21	14	0.11	0.43	0.25
	Range	0.03-0.52	2-36	0.03-0.27	0.06-0.7	0.05-0.52
2011	Mean	0.23	16	0.21	0.34	0.24
	Range	0.03-0.67	2-40	0.03-0.69	0.06-0.73	0.02-0.75
2012	Mean	0.29	15	0.37	0.51	0.14
	Range	0.03-1.2	3-26	0.02-1.2	0.06-1.2	0.03-0.49
2013	Mean	0.19	11	0.36	0.56	0.38
	Range	0.07-0.43	2-28	0.04-1.1	0.12-1.6	0.05-1.4

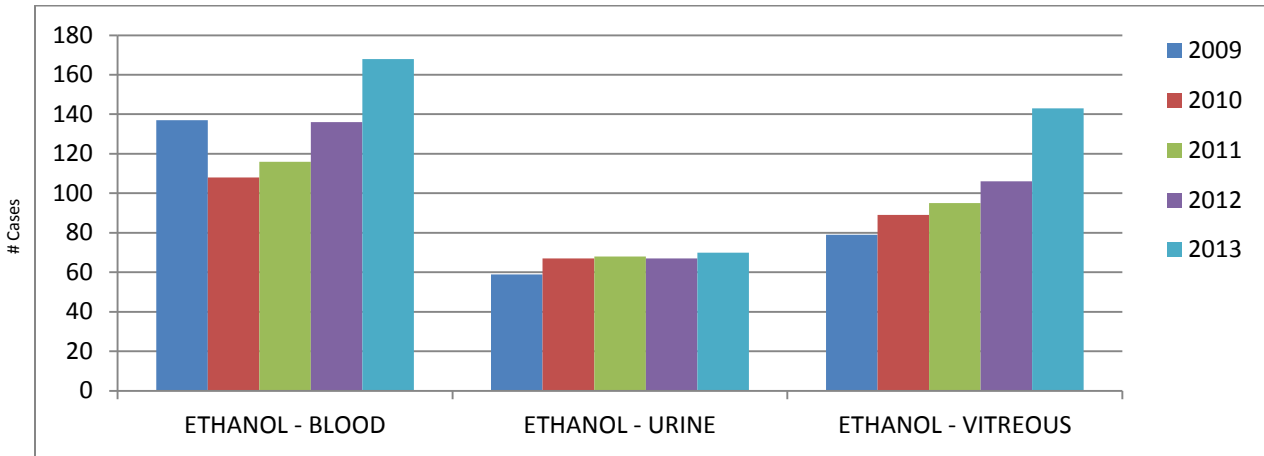
Drug Recognition Expert (DRE) Cases Submitted Annually



UNATTENDED DEATH SUMMARY (POSTMORTEM CASES)

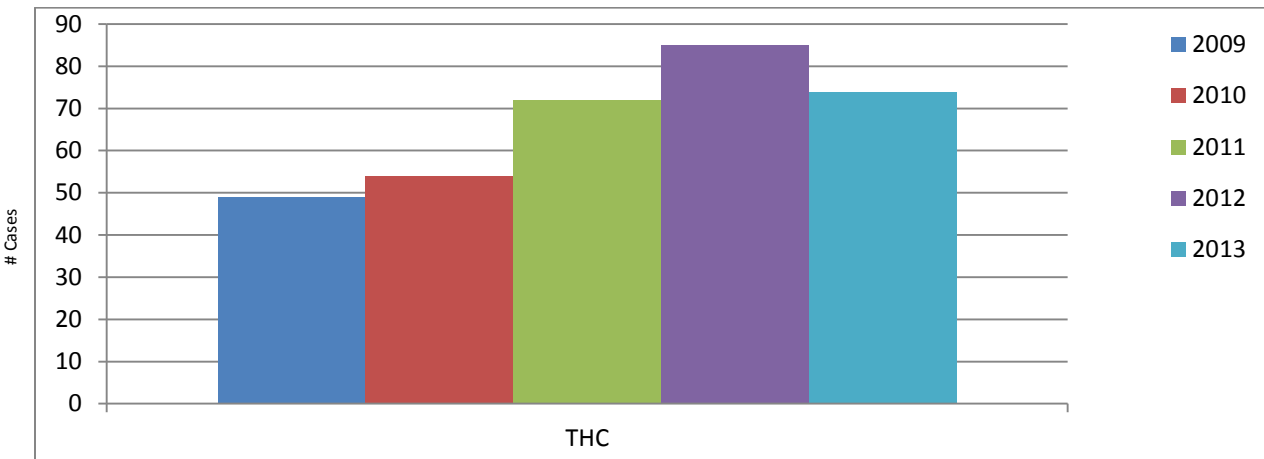
A routine postmortem toxicology testing panel consists of the analysis of major alcohols (ethanol, methanol, acetone, and isopropanol), illicit drugs, and prescription medications. Case history and requests from the submitting agency decides the final testing panel of each case. All positive drug results have been screened and confirmed by different scientific methods. All significant drug results were quantitated unless directed otherwise.

Unattended Death- Ethanol



Year	g/100mL	ETHANOL-BLOOD	ETHANOL-URINE	ETHANOL-VITREOUS
2009	Mean	0.16	0.23	0.18
	Range	0.02-0.59	0.03-0.51	0.02-0.50
2010	Mean	0.17	0.23	0.20
	Range	0.02-0.53	0.03-0.62	0.03-0.88
2011	Mean	0.16	0.24	0.21
	Range	0.02-0.53	0.02-0.50	0.02-0.55
2012	Mean	0.14	0.23	0.19
	Range	0.02-0.41	0.02-0.49	0.02-0.54
2013	Mean	0.17	0.22	0.20
	Range	0.02-0.50	.02-0.55	0.03-0.53

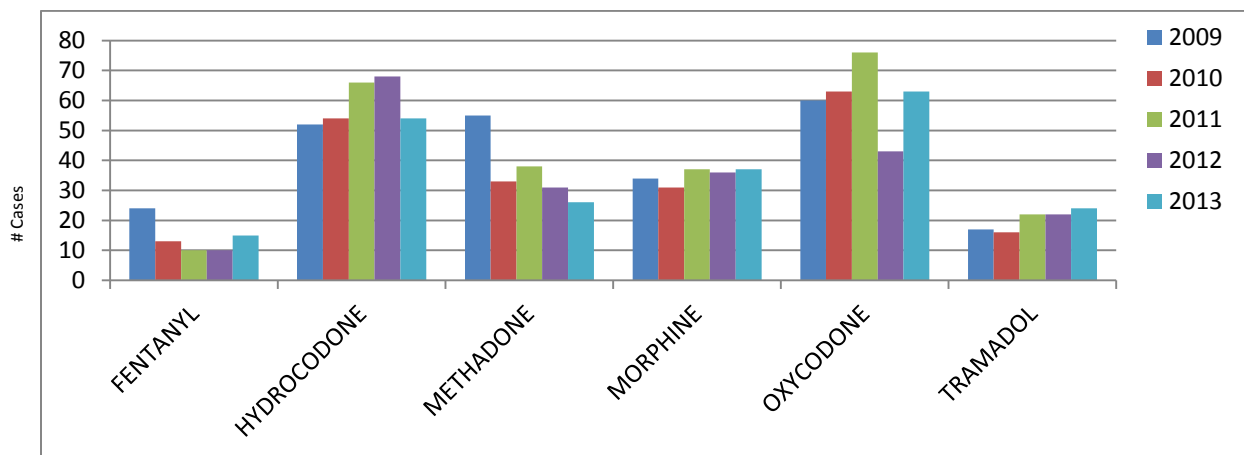
Unattended Death- THC



Year	ng/mL	THC
2009	Mean	7

	Range	2-70
2010	Mean	11
	Range	2-50
2011	Mean	7
	Range	1-44
2012	Mean	7
	Range	1-39
2013	Mean	9
	Range	1-70

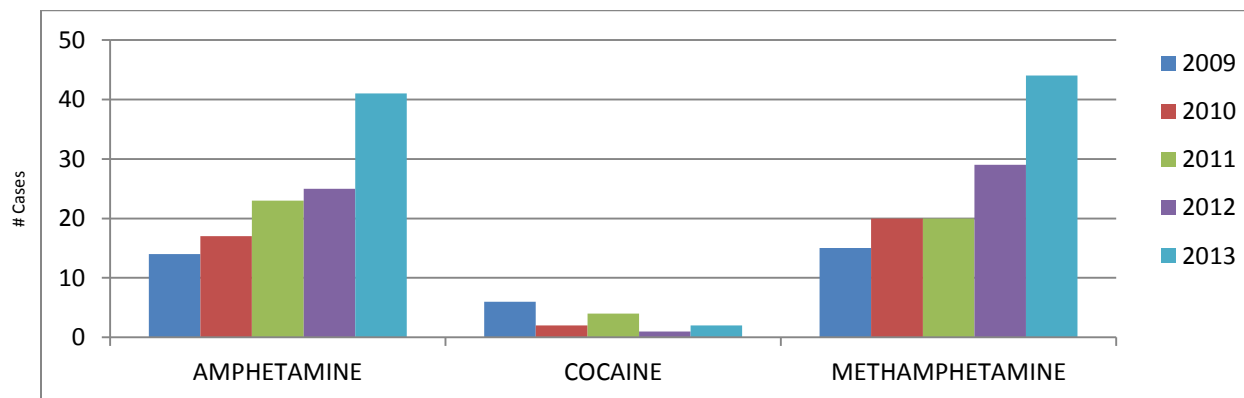
Unattended Death- Narcotic Analgesics



Year	ng/mL	FENTANYL	HYDROCODONE	METHADONE	MORPHINE	OXYCODONE	TRAMADOL
2009	Mean	25	0.20	0.56	0.59	0.25	1.3
	Range	4-135	0.03-1.0	0.05-2.1	0.02-7.5	0.02-0.85	0.02-7.7
2010	Mean	19	0.15	0.49	0.10	0.35	11
	Range	5-42	0.02-0.67	0.03-1.6	0.02-0.39	0.03-1.1	0.04-82
2011	Mean	23	0.10	0.61	0.22	0.45	2.1
	Range	6-80	0.02-0.26	0.07-1.6	0.02-2.3	0.02-2.9	0.03-4.1
2012	Mean	18	0.15	0.56	0.25	0.47	1.1
	Range	3-35	0.02-0.82	0.11-1.9	0.25-2.7	0.02-2.6	0.04-5.4
2013	Mean	15	0.21	0.45	0.25	0.31	2.7
	Range	4-29	0.03-1.0	0.02-1.1	0.02-2.5	0.03-1.9	0.04-24

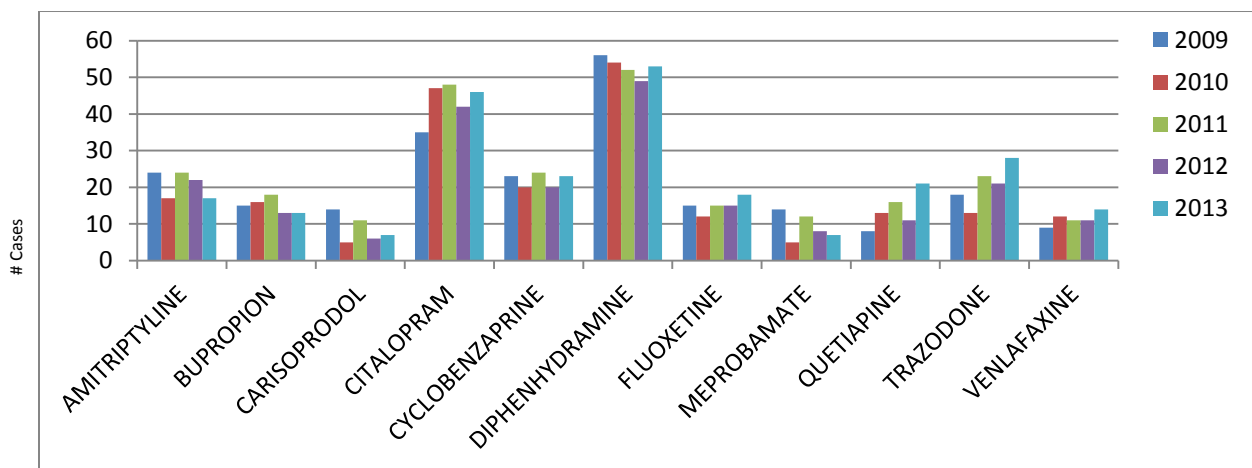
*All concentrations are in mg/L except Fentanyl which is in ng/mL

Unattended Death- Central Nervous System Stimulants



Year	mg/L	AMPHETAMINE	COCAINE	METHAMPHETAMINE
2009	Mean	0.17	0.16	0.95
	Range	0.03-0.42	0.09-0.23	0.005-3.1
2010	Mean	0.14	0.06	1.2
	Range	0.03-0.27	0.03-0.08	0.03-8.5
2011	Mean	0.14	0.07	0.34
	Range	0.04-0.36	0.04-0.1	0.06-0.91
2012	Mean	0.18	NA	0.56
	Range	0.02-1.2	NA	0.12-1.9
2013	Mean	0.16	NA	0.91
	Range	0.02-1.2	NA	0.14-10.7

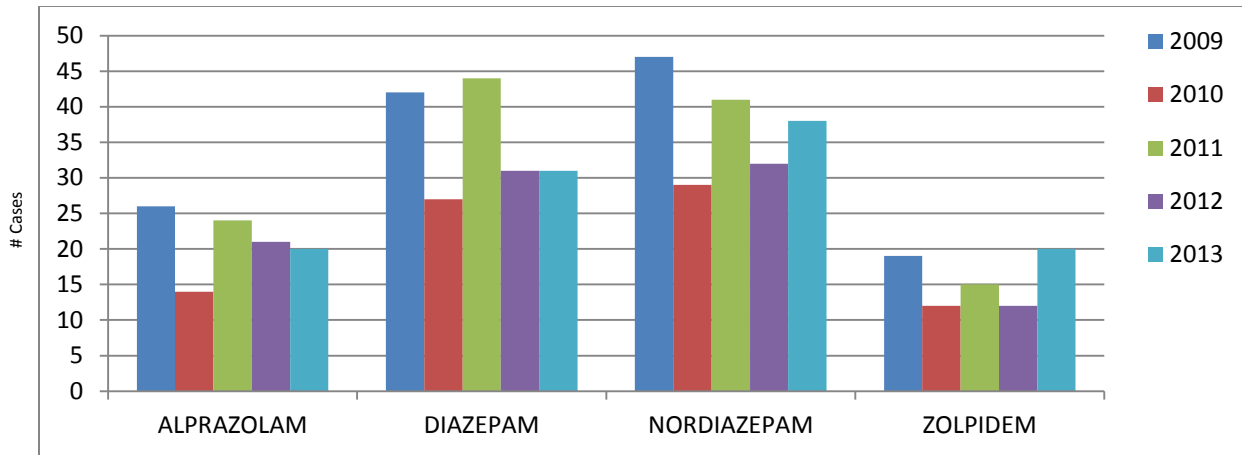
Unattended Deaths- Central Nervous System Depressants



Year	mg/L	AMITRIPTYLENE	BUPROPRION	CARISOPRODOL	CITALOPRAM	CYCLOBENZAPRINE
2009	Mean	0.50	0.37	3.4	0.39	0.36
	Range	0.04-2.1	0.06-1.9	0.6-10	0.1-0.97	0.06-2.6
2010	Mean	2.3	0.43	2.8	1.6	0.13
	Range	0.31-9.3	0.03-2.6	0.4-8.9	0.03-18	0.02-0.5
2011	Mean	0.72	0.37	7.9	0.50	0.14
	Range	0.07-4.0	0.03-1.2	3.7-18	0.04-1.3	0.02-0.46
2012	Mean	0.46	0.21	0.76	0.59	0.11
	Range	0.08-1.9	0.08-0.41	0.3-1.4	0.06-2.9	0.05-0.3
2013	Mean	0.64	1.3	7.9	0.49	0.13
	Range	0.03-2.3	0.03-9.4	0.3-35	0.05-2.1	0.03-0.67

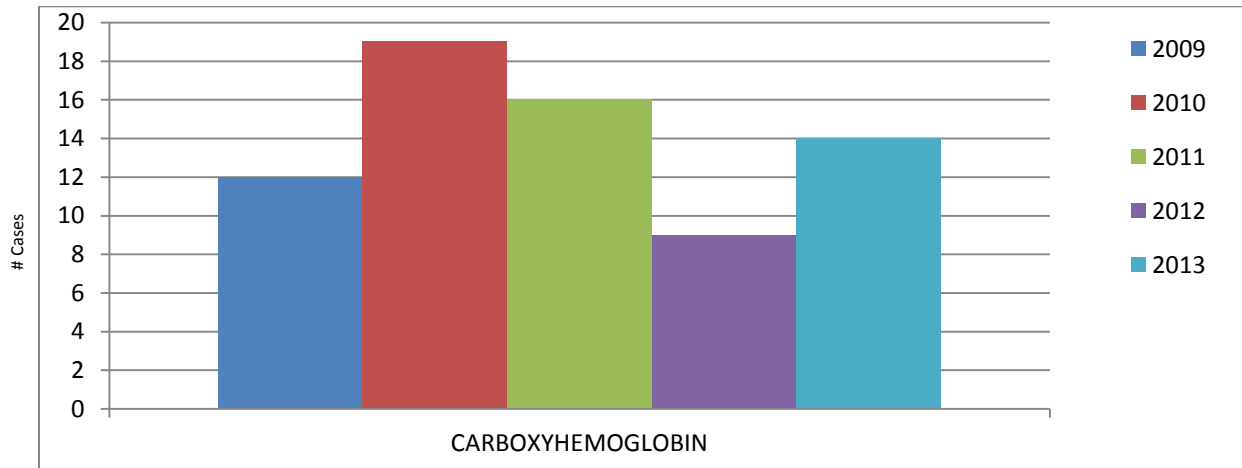
Year	mg/L	DIPHENHYDRAMINE	FLUOXETINE	MEPROBAMATE	QUETIAPINE	TRAZODONE	VENLAFAXINE
2009	Mean	2.1	0.84	9.0	1.7	0.61	0.97
	Range	0.04-18	0.64-1.2	1.4-28	0.08-9.8	0.19-1.7	0.25-2.8
2010	Mean	3.1	3.0	5.0	1.3	1.2	0.80
	Range	0.04-46	0.26-21	1.1-16	0.12-4.5	0.28-5.9	0.04-3.5
2011	Mean	0.80	0.97	14.4	0.71	1.7	1.9
	Range	0.04-6.1	0.2-3.2	1.0-38	0.08-4.1	0.2-20	0.21-12
2012	Mean	1.7	0.87	3.3	0.91	0.94	0.65
	Range	0.07-19	0.23-1.8	1.7-6.7	0.21-2.8	0.06-2.1	0.1-1.3
2013	Mean	1.3	0.95	9.8	2.3	0.96	1.3
	Range	0.04-24	0.3-3.8	2.4-31.0	0.13-11	0.07-9.7	0.1-5.6

Unattended Deaths- Central Nervous System Depressants (Benzodiazepines)



Year	mg/L	ALPRAZOLAM	DIAZEPAM	NORDIAZEPAM	ZOLPIDEM
2009	Mean	0.67	0.13	0.17	0.25
	Range	0.02-9.5	0.02-1.0	0.02-0.63	0.05-0.61
2010	Mean	0.10	0.24	0.31	0.47
	Range	0.02-0.34	0.02-0.98	0.02-1.6	0.05-2.2
2011	Mean	0.07	0.18	0.26	0.39
	Range	0.03-0.17	0.02-0.73	0.02-1.0	0.03-1.9
2012	Mean	0.07	0.18	0.19	0.15
	Range	0.02-0.17	0.02-0.75	0.02-0.84	0.03-0.57
2013	Mean	0.08	0.13	0.19	0.15
	Range	0.02-0.40	0.02-0.34	0.03-0.52	0.04-0.57

Unattended Death- Carboxyhemoglobin

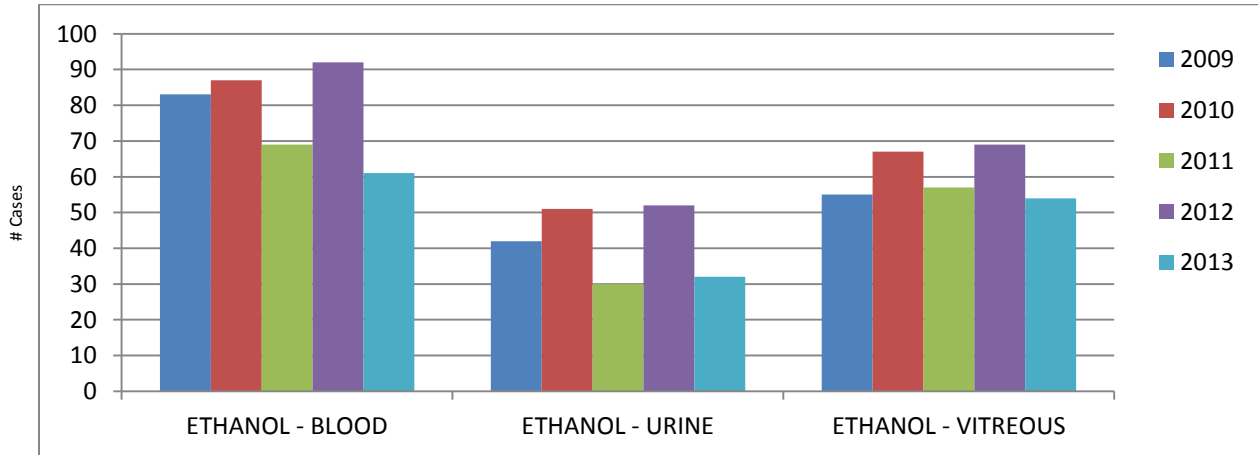


Year	%COHB	CARBOXYHEMOGLOBIN
2009	Mean	56%
	Range	0-85%
2010	Mean	43%
	Range	0.6-77%
2011	Mean	42%
	Range	0.1-92%
2012	Mean	39%
	Range	0.3-79%

2013	Mean	34%
	Range	0.15-70%

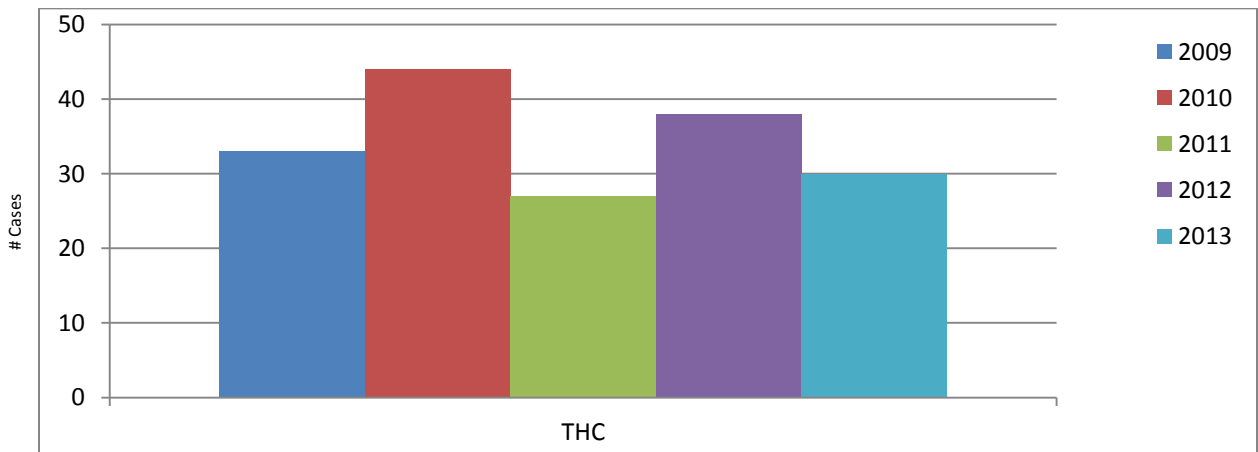
TRAFFIC FATALITIES SUMMARY

Traffic Fatalities- Ethanol



Year		ETHANOL-BLOOD	ETHANOL-URINE	ETHANOL-VITREOUS
2009	Mean	0.16	0.26	0.21
	Range	0.02-0.59	0.1-0.47	0.06-0.41
2010	Mean	0.17	0.21	0.17
	Range	0.02-0.53	0.02-0.43	0.02-0.4
2011	Mean	0.16	0.23	0.18
	Range	0.02-0.53	0.04-0.4	0.04-0.37
2012	Mean	0.14	0.24	0.20
	Range	0.02-0.41	0.02-0.48	0.02-0.48
2013	Mean	0.17	0.23	0.20
	Range	0.02-0.50	0.027-0.55	0.05-0.44

Traffic Fatalities- THC



Year	ng/mL	THC
2009	Mean	8
	Range	2-27
2010	Mean	11

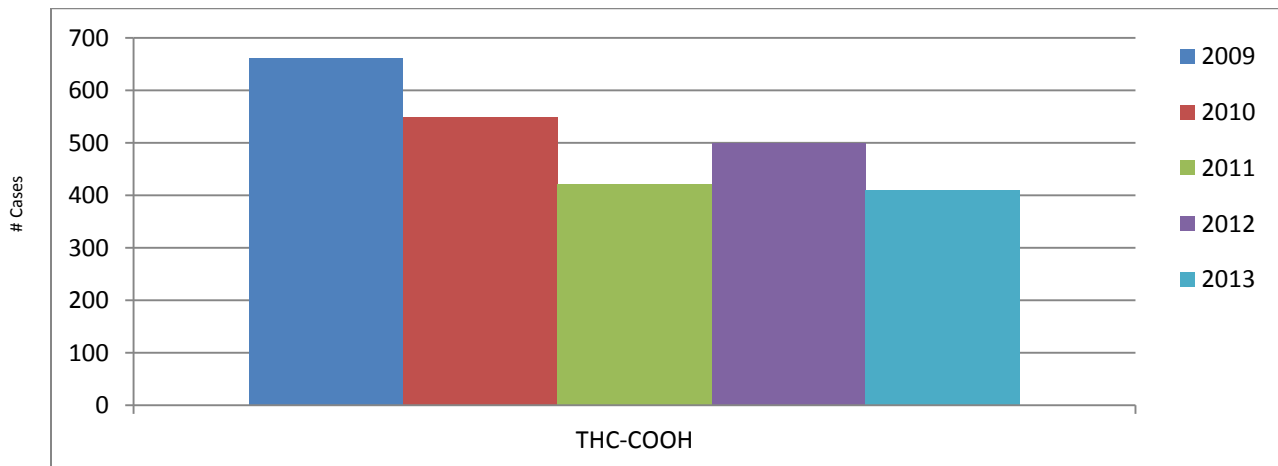
	Range	1-52
2011	Mean	10
	Range	2-36
2012	Mean	9
	Range	1-68
2013	Mean	9
	Range	1-42

URINALYSIS SUMMARY

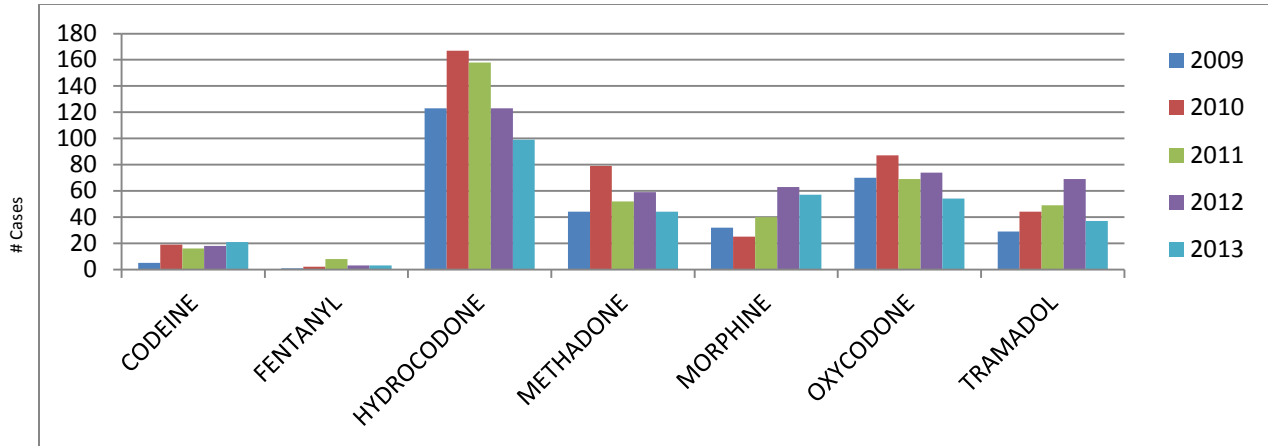
Listed are the drugs regularly tested for in Urinalysis cases. This is not a complete list but gives the majority of drugs probation/parole agencies are interested in. There can be overlap between the Immunoassay and the Basic Drug Screen depending on the drug. This list will only include some of that overlap. Clearly the detection of all drugs is concentration dependent. There is no quantitation on urine specimens.

1. Immunoassay Screen (Further testing needed for confirmation)
 - a. Cocaine/Metabolites
 - b. Benzodiazepines
 - c. Barbiturates
 - d. Opiates (Morphine)
 - e. Oxycodone
 - f. THC/Metabolites
 - g. Amphetamine
 - h. Methamphetamine
2. Basic Drug Screen
 - a. Opiate related drugs: Methadone/ Tramadol/ Hydrocodone/ Fentanyl/ Oxycodone
 - b. Cocaine
 - c. Benzodiazepines
 - d. Amphetamine
 - e. Methamphetamine
 - f. Anti-depressants
3. Ethanol
4. THC-COOH Confirmation (Inactive metabolite of THC)

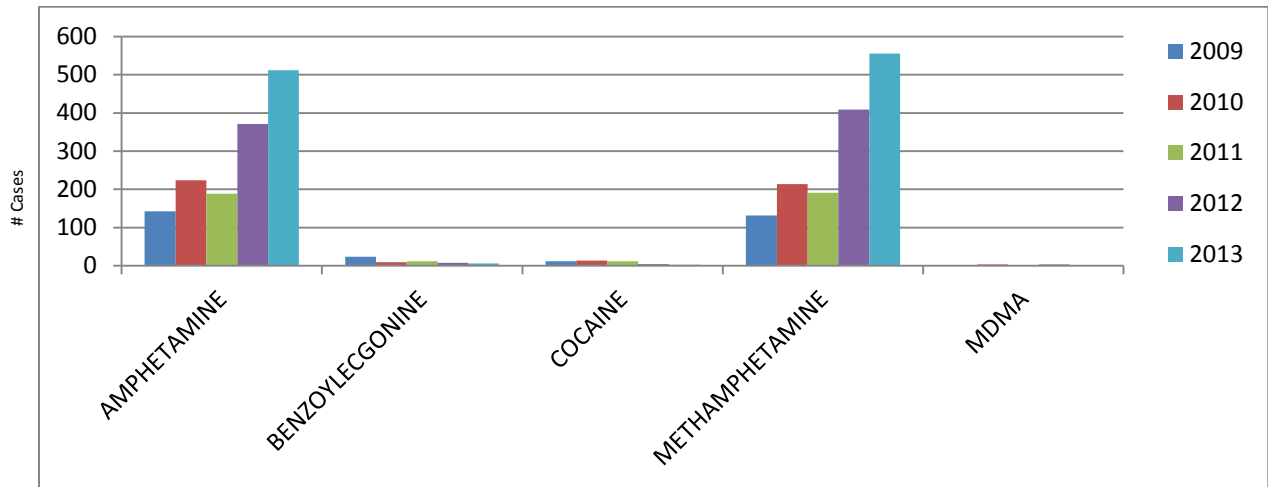
Urinalysis- THC-COOH



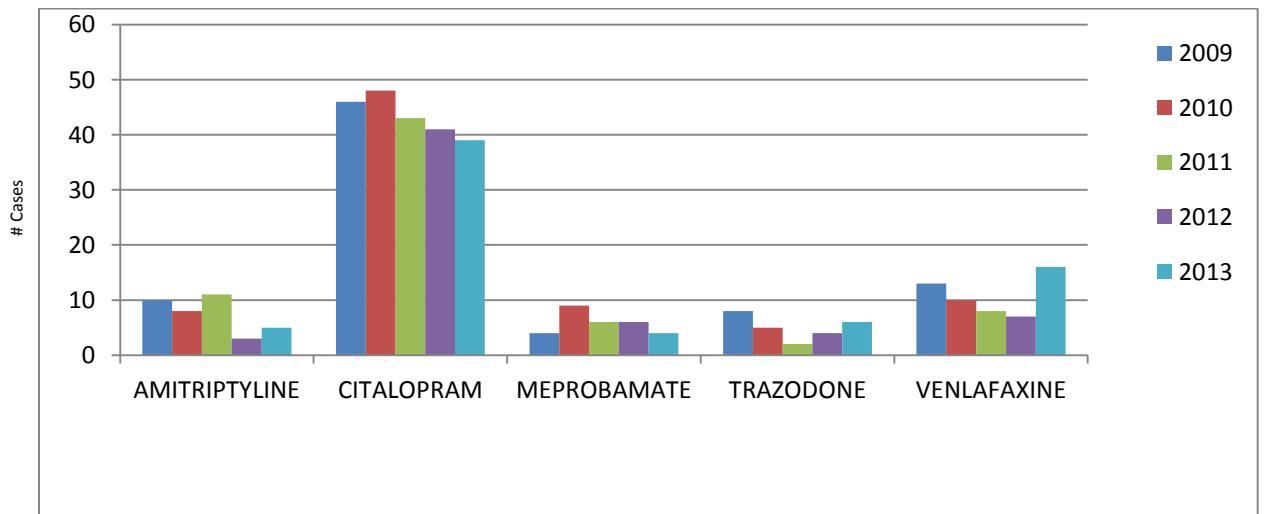
Urinalysis- Narcotic Analgesic



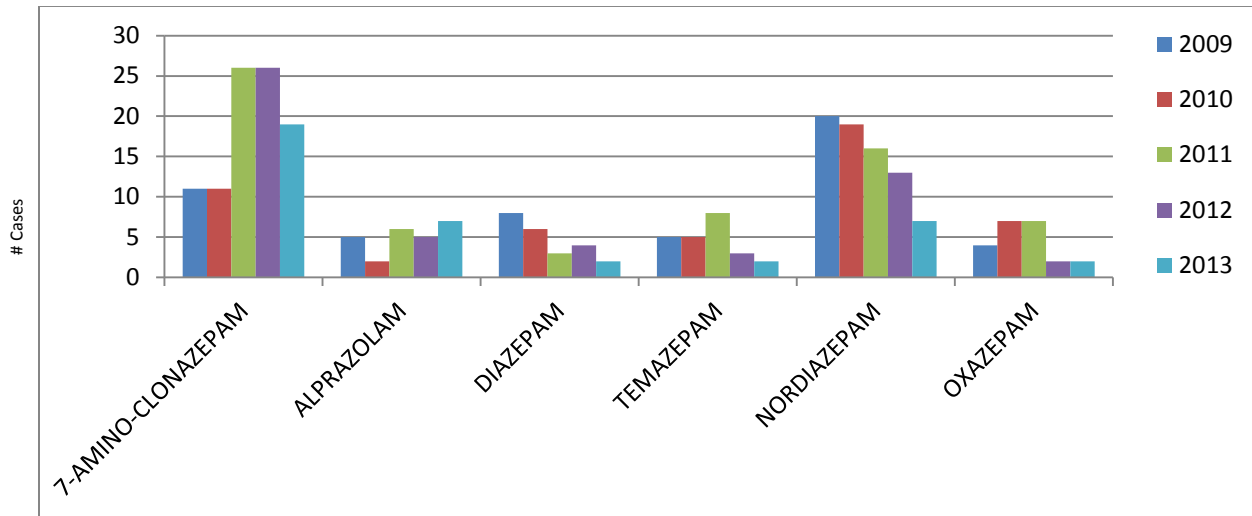
Urinalysis- Central Nervous System Stimulants



Urinalysis- Central Nervous System Depressants



Urinalysis- Central Nervous System (Benzodiazepines)



BREATH ALCOHOL SUMMARY

The Breath Alcohol section was created in the late 1980's by Phil Lively, who implemented the state wide use of the Intoxilyzer infrared breath analysis instrument. The section now oversees nearly 100 instruments in the field and has almost 2000 certified officers throughout the state. In a typical year those officers run approximately 20,000 breath tests. More accurate state and local testing statistics aren't available with the current instrumentation and software, but could be attained with the implementation of the newest instrument and accompanying software.

The section has three main duties that are performed on a regular basis. The first duty includes the maintenance, repair, and calibration of all breath analysis instruments. These instruments are supplied to law enforcement agencies around the state comprising of local, county, state and federal locations. Montana Administrative Rules require all instruments to be returned to the laboratory at least once a year for this process. The annual certification returns the instruments to above factory standards using the most modern forensic techniques available.

The second duty of the Breath Alcohol section involves the training and recertification of all law enforcement officers. As part of the Montana Law Enforcement Academy, all officers are required to pass a comprehensive 40-hour course in DUI detection, arrest and processing. Officers are from all types of law enforcement agencies, including local, county, state and federal. This course includes basic alcohol pharmacodynamics and pharmacokinetics, breath analysis instrument infrared theory and operation; in combination with Standardized Field Sobriety Testing (SFST). All students are exposed to live alcohol dosed individuals for 'real world' hands-on training and must pass a written and practical test. This course typically has nearly 50 students and is run at least 5 times a year. After achieving this level of certification, all officers are also required to perform a recertification each year in order to maintain their DUI certification status.

The final duty involves giving training, advice and testimony to the legal world with regard to the field of Breath Alcohol testing. The toxicology section is involved with training county attorneys, judges and defense attorneys; as requested by those groups. We give roughly 3-5 trainings a year to legal professionals through courses set up by the Traffic Safety Recourse Prosecutor. We usually testify in court, for both prosecution and defense, almost 50 times per year in all jurisdictions across Montana, including local, justice, district and federal courts.