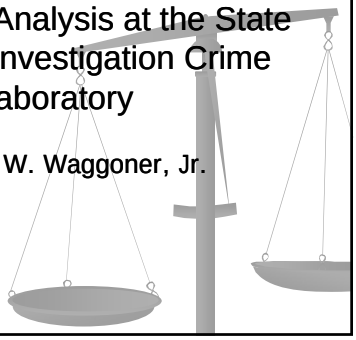
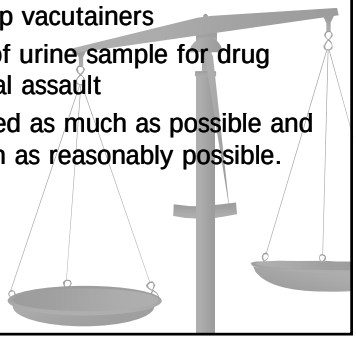
Blood Drug Analysis at the State Bureau of Investigation Crime Laboratory

Richard W. Waggoner, Jr.

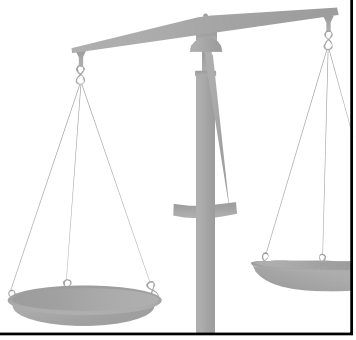


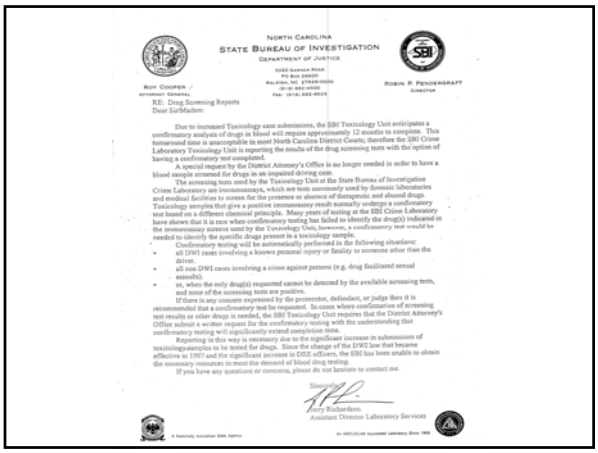
Sample Requirements

- 2-10 ml gray top vacutainers
- At least 10 ml of urine sample for drug facilitated sexual assault
- Keep refrigerated as much as possible and transfer as soon as reasonably possible.



Administrative Requirements for Blood Drug Analysis





NORTH CAROLINA
STATE BUREAU OF INVESTIGATION
DEPARTMENT OF JUSTICE

ROY COOPER
ATTORNEY GENERAL

ROBIN P. PENDERGRAFT
DIRECTOR

RE: Drug Screening Reports
Dear Sir/Madam:

Due to increased Toxicology case submissions, the SBI Toxicology Unit anticipates a confirmatory analysis of drugs in blood will require approximately 12 months to complete. This turnaround time is unacceptable in most North Carolina District Courts; therefore the SBI Crime Laboratory Toxicology Unit is reporting the results of the drug screening tests with the option of having a confirmatory test completed.

A special request by the District Attorney's Office is no longer needed in order to have a blood sample screened for drugs in an impaired driving case.

The screening tests used by the Toxicology Unit at the State Bureau of Investigation Crime Laboratory are immunoassays, which are tests commonly used by forensic laboratories and medical facilities to screen for the presence or absence of therapeutic and abused drugs. Toxicology samples that give a positive immunoassay result normally undergo a confirmatory test based on a different chemical principle. Many years of testing at the SBI Crime Laboratory have shown that it is rare when confirmatory testing has failed to identify the drug(s) indicated in the immunoassay screens used by the Toxicology Unit; however, a confirmatory test would be needed to identify the specific drugs present in a toxicology sample.

Confirmatory testing will be automatically performed in the following situations:

- all DWI cases involving a known personal injury or fatality to someone other than the driver,
- all non DWI cases involving a crime against persons (e.g. drug facilitated sexual assaults),
- or, when the only drug(s) requested cannot be detected by the available screening tests, and none of the screening tests are positive.

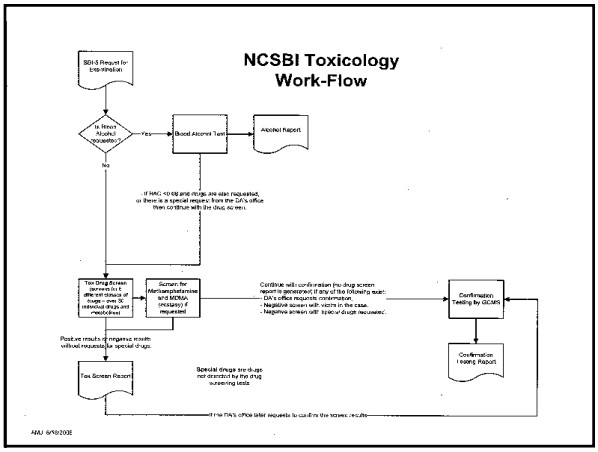
If there is any concern expressed by the prosecutor, defendant, or judge then it is recommended that a confirmatory test be requested. In cases where confirmation of screening test results or other drugs is needed, the SBI Toxicology Unit requires that the District Attorney's Office submit a written request for the confirmatory testing with the understanding that confirmatory testing will significantly extend completion time.

Reporting in this way is necessary due to the significant increase in submissions of toxicology samples to be tested for drugs. Since the change of the DWI law that became effective in 1997 and the significant increase in DRE officers, the SBI has been unable to obtain the necessary resources to meet the demand of blood drug testing.

If you have any questions or concerns, please do not hesitate to contact me.

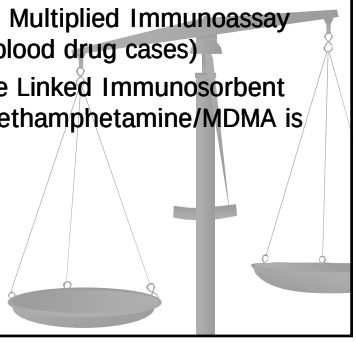
Sincerely,

Terry Richardson
Assistant Director Laboratory Services



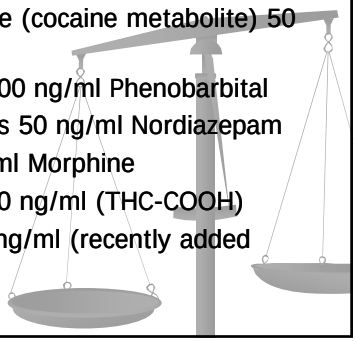
Screening
Not Confirmatory

- EMIT – Enzyme Multiplied Immunoassay Technique (all blood drug cases)
- ELISA – Enzyme Linked Immunosorbent Assay (when methamphetamine/MDMA is requested)



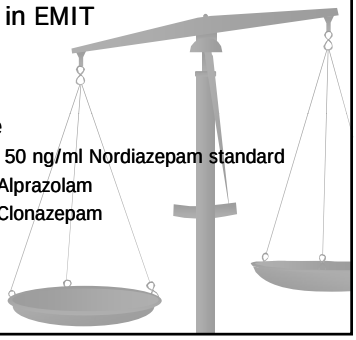
Drug Classes Screened by EMIT

- Benzoylecgonine (cocaine metabolite) 50 ng/ml
- Barbiturates 1000 ng/ml Phenobarbital
- Benzodiazepines 50 ng/ml Nordiazepam
- Opiates 50 ng/ml Morphine
- Cannabinoids 20 ng/ml (THC-COOH)
- Methadone 50 ng/ml (recently added screen)



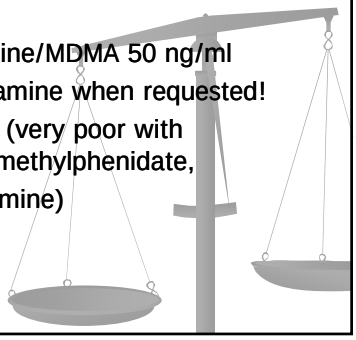
Cross-reactivity

- Cross-reactivity in EMIT
- Example
  - Benzodiazepine
    - Cutoff set with 50 ng/ml Nordiazepam standard
    - Case contains Alprazolam
    - Case contains Clonazepam



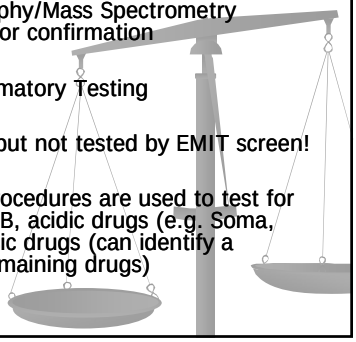
ELISA

- ELISA Screen
- Methamphetamine/MDMA 50 ng/ml
  d-methamphetamine when requested!
- Cross-reactivity (very poor with amphetamine, methylphenidate, l-methamphetamine)



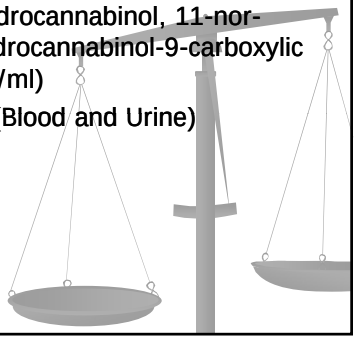
Confirmatory Testing

- Gas Chromatography/Mass Spectrometry (GC/MS) utilized for confirmation
- Criteria for Confirmatory Testing
- Positive EMITs
- Drugs requested but not tested by EMIT screen!
- Specific GC/MS procedures are used to test for Cannabinoids, GHB, acidic drugs (e.g. Soma, Barbiturates), basic drugs (can identify a majority of the remaining drugs)



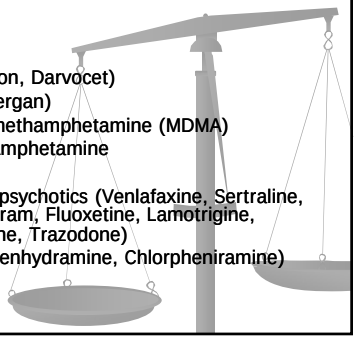
Confirmatory Cutoffs

- Delta-9-tetrahydrocannabinol, 11-nor-delta-9-tetrahydrocannabinol-9-carboxylic acid (both 8 ng/ml)
- GHB 10 μg/ml (Blood and Urine)



Drugs not Detected by EMIT Screen

- Zolpidem (Ambien)
- Carisoprodol (Soma)
- Meprobamate
- Propoxyphene (Darvon, Darvocet)
- Promethazine (Phenergan)
- 3,4-Methylenedioxymethamphetamine (MDMA)
- Methamphetamine/Amphetamine
- Tramadol
- Antidepressants/Antipsychotics (Venlafaxine, Sertraline, Amitriptyline, Citalopram, Fluoxetine, Lamotrigine, Paroxetine, Quetiapine, Trazodone)
- Antihistamines (Diphenhydramine, Chlorpheniramine)



Drugs Not Tested in Blood Samples

- Heroin
- LSD/Psilocin/Psilocybin
- Fentanyl/Lorazepam/Clonazepam ??
- Clorazepate
- Analogs
- Lithium
- Hormones/proteins/natural products/steroids
- NSAIDs
- Heart/Blood Pressure medications

Cannabinoids

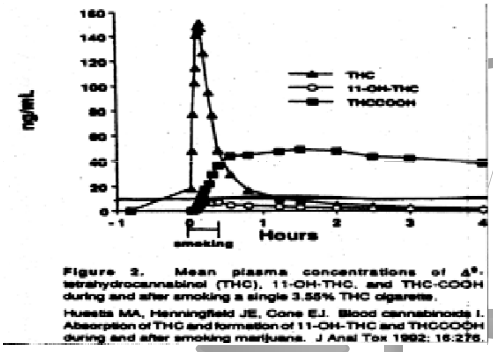


Figure 2. Mean plasma concentrations of Δ^9-tetrahydrocannabinol (THC), 11-OH-THC, and THC-COOH during and after smoking a single 3.55% THC cigarette.

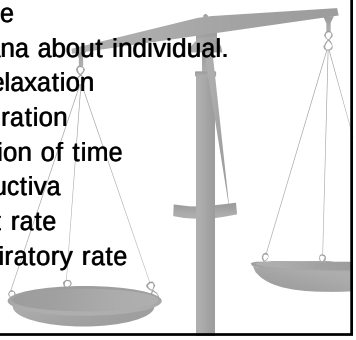
Huestis MA, Henningfield JE, Cone EJ. Blood cannabinoids I. Absorption of THC and formation of 11-OH-THC and THCCOOH during and after smoking marijuana. J Anal Tox 1992; 16:276.

Cannabinoids (cont.)

- Cannabinoids undergo a redistribution from blood to fatty body tissue.
- Cannabinoid blood presence or levels do not correlate well with demonstrated impairment.

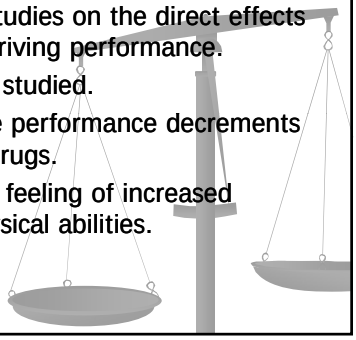
Cannabinoids (cont.)

- Indicators of use
- Odor of Marijuana about individual.
- Euphoria and relaxation
- Lack of concentration
- Altered perception of time
- Reddened conjuctiva
- Increased heart rate
- Decreased respiratory rate



Cocaine

- Few scientific studies on the direct effects of cocaine on driving performance.
- Only low doses studied.
- Can reverse the performance decrements of depressant drugs.
- May give driver feeling of increased mental and physical abilities.

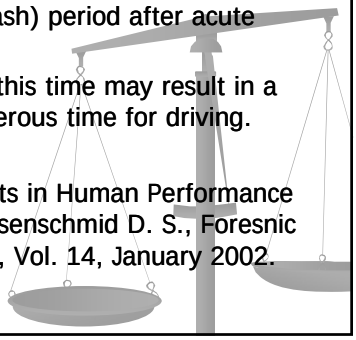


Cocaine (cont.)

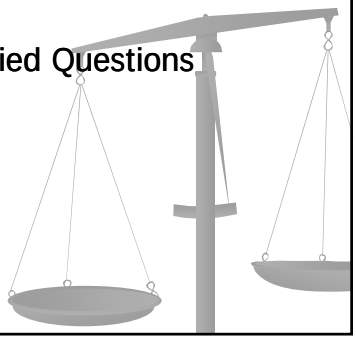
- May result in increased risk taking behavior.
- High speed chases with police.
- Road rage.
- Effects are brief (30 minutes)

Cocaine (cont.)

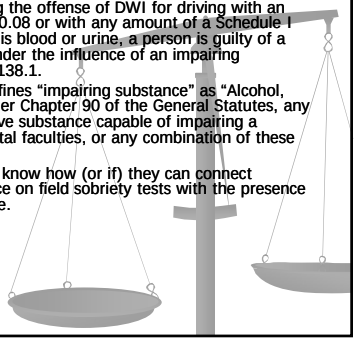
- Withdrawal (crash) period after acute cocaine use.
- Fatigue during this time may result in a particular dangerous time for driving.
- Cocaine – Effects in Human Performance and Behavior, Isenschmid D. S., Foresnic Science Review, Vol. 14, January 2002.



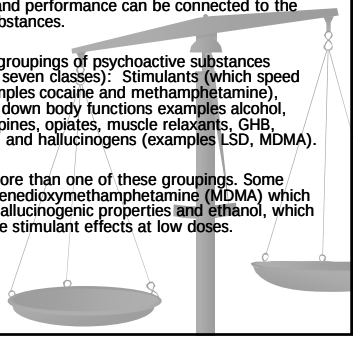
- Supplied Questions



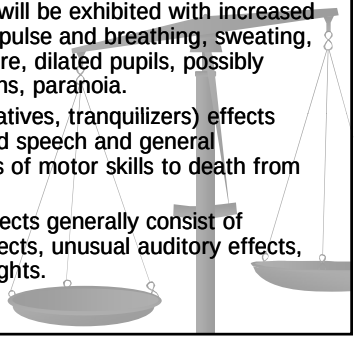
- In addition to committing the offense of DWI for driving with an alcohol concentration of 0.08 or with any amount of a Schedule I controlled substance in his blood or urine, a person is guilty of a DWI if he drives while under the influence of an impairing substance. N.C.G.S. 20-138.1.
- N.C.G.S.20-4.01(14a) defines "impairing substance" as "Alcohol, controlled substance under Chapter 90 of the General Statutes, any other drug or psychoactive substance capable of impairing a person's physical or mental faculties, or any combination of these substances."
- The judges would like to know how (or if) they can connect behavior and performance on field sobriety tests with the presence of an impairing substance.



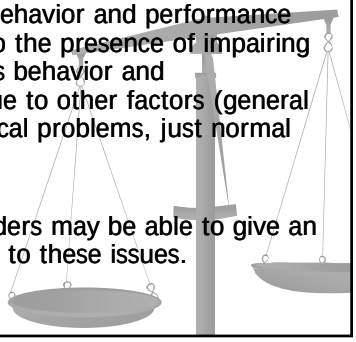
- Yes, generally behavior and performance can be connected to the presence of impairing substances.
- There are three general groupings of psychoactive substances (DREs expand this list to seven classes): Stimulants (which speed up bodily functions, examples cocaine and methamphetamine), depressants (which slow down body functions examples alcohol, barbiturates, benzodiazepines, opiates, muscle relaxants, GHB, sedating antihistamines), and hallucinogens (examples LSD, MDMA).
- Some drugs may have more than one of these groupings. Some examples are 3,4-methylenedioxymethamphetamine (MDMA) which has both stimulant and hallucinogenic properties and ethanol, which is a depressant, has some stimulant effects at low doses.



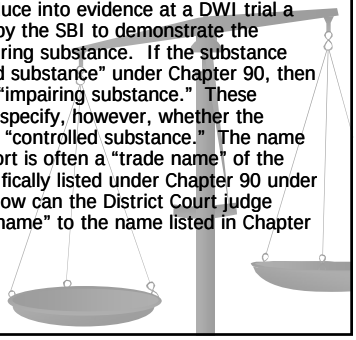
- Stimulant effects will be exhibited with increased excitability, rapid pulse and breathing, sweating, high blood pressure, dilated pupils, possibly some hallucinations, paranoia.
- Depressants (sedatives, tranquilizers) effects range from slurred speech and general drowsiness to loss of motor skills to death from respiratory arrest.
- Hallucinogenic effects generally consist of unusual visual effects, unusual auditory effects, and unusual thoughts.



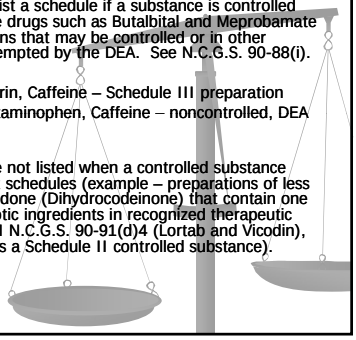
- Can observed behavior and performance be connected to the presence of impairing substances or is behavior and performance due to other factors (general tiredness, medical problems, just normal behavior)?
- Medical responders may be able to give an opinion relating to these issues.



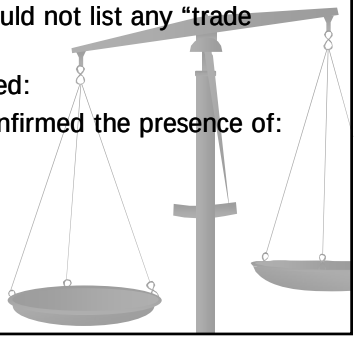
- The state may introduce into evidence at a DWI trial a lab report prepared by the SBI to demonstrate the presence of an impairing substance. If the substance found is a "controlled substance" under Chapter 90, then by definition it is an "impairing substance." These reports often do not specify, however, whether the substance found is a "controlled substance." The name listed on the lab report is often a "trade name" of the drug and is not specifically listed under Chapter 90 under the "trade name." How can the District Court judge translate the "trade name" to the name listed in Chapter 90?



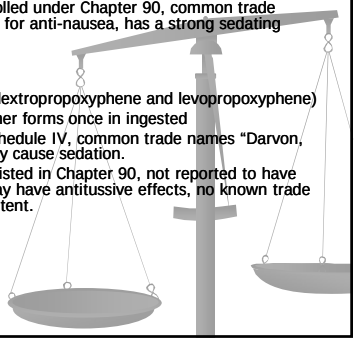
- Lab reports should now list a schedule if a substance is controlled under Chapter 90. Some drugs such as Butalbital and Meprobamate are present in preparations that may be controlled or in other preparations that are exempted by the DEA. See N.C.G.S. 90-88(i).
- Fiorinal – Butalbital, Aspirin, Caffeine – Schedule III preparation
- Fioricet – Butalbital, Acetaminophen, Caffeine – noncontrolled, DEA exempt preparation.
- In addition schedules are not listed when a controlled substance may be listed in different schedules (example – preparations of less 15 milligrams of Hydrocodone (Dihydrocodeinone) that contain one or more active, nonnarcotic ingredients in recognized therapeutic amounts are Schedule III N.C.G.S. 90-91(d)4 (Lortab and Vicodin), otherwise Hydrocodone is a Schedule II controlled substance).



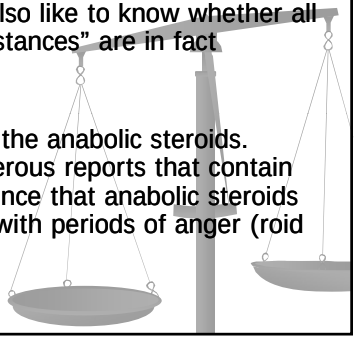
- Lab reports should not list any "trade names".
- Example received:
- Examination confirmed the presence of:
- promethazine
- propoxyphene.



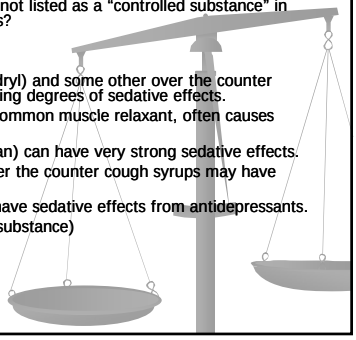
- Promethazine, not controlled under Chapter 90, common trade name "Phenergan", used for anti-nausea, has a strong sedating effect.
- Propoxyphene
- 2 optical isomer forms (dextropropoxyphene and levopropoxyphene)
- Cannot differentiate isomer forms once in ingested
- Dextropropoxyphene, Schedule IV, common trade names "Darvon, Darvocet", analgesic, may cause sedation.
- Levopropoxyphene, not listed in Chapter 90, not reported to have any analgesic effects, may have antitussive effects, no known trade names, virtually non-existent.



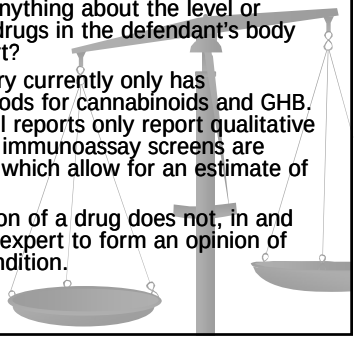
- Judges would also like to know whether all "controlled substances" are in fact impairing.
- Yes, except for the anabolic steroids. There are numerous reports that contain anecdotal evidence that anabolic steroids are associated with periods of anger (roid rage).



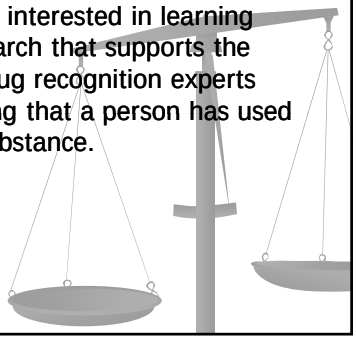
- Are other drugs that are not listed as a "controlled substance" in fact impairing substances?
- Yes.
- Diphenhydramine (Benadryl) and some other over the counter antihistamines have varying degrees of sedative effects.
- Carisoprodol (Soma), a common muscle relaxant, often causes drowsiness.
- Promethazine (Phernergan) can have very strong sedative effects.
- Dextromethorphan in over the counter cough syrups may have sedative effects.
- Certain individuals may have sedative effects from antidepressants.
- Inhalants (Psychoactive substance)



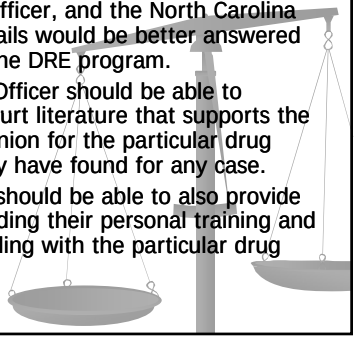
- Can a judge tell anything about the level or concentration of drugs in the defendant's body from such a report?
- The SBI Laboratory currently only has quantitative methods for cannabinoids and GHB. For consistency all reports only report qualitative information. The immunoassay screens are semi-quantitative which allow for an estimate of concentration.
- Often concentration of a drug does not, in and of itself, allow an expert to form an opinion of an individual's condition.



- Judges also are interested in learning about any research that supports the testimony of drug recognition experts (DRE) identifying that a person has used an impairing substance.



- I am not a DRE Officer, and the North Carolina DRE program details would be better answered by a member of the DRE program.
- However, a DRE Officer should be able to provide for the court literature that supports the basis for their opinion for the particular drug class(es) that they have found for any case.
- and, DRE Officer should be able to also provide information regarding their personal training and experience in dealing with the particular drug class(es).



Questions?