Memorandum

TO: **Drug Policy Task Force**

FROM: Marijuana DUID Working Group

DATE: September 6, 2011

The working group met seven times from June through August 2011 to carefully discuss existing research and to hear testimony from 8 experts (see attached summaries). At the working group meeting on August 31, 2011, the members decided to inform the Drug Policy Task Force of the complex issues associated with setting a *per se* limit for THC-blood levels. While there are many areas of agreement which will result in recommendations to the Task Force, the group was unable to come to consensus regarding a *per se* limit. The reasons for the lack of consensus are both scientific and pragmatic, and are summarized below.

- High levels of THC can remain in the blood long after use, perhaps up to 24 hours, whereas behavioral impairment that would negatively affect driving occurs closer to the time the THC was consumed.
- Whereas BAC (Blood Alcohol Content) can be accurately measured and correlated with behavioral impairment, this may not be the case with cannabis.
    - Alcohol is water soluble; cannabis is stored in the fat and is metabolized differently, making a direct correlation with behavior difficult to measure.
    - One expert equated 2 ng/ml to .05 BAC and 5 ng/ml to .08 BAC.
    - Blood tests are not readily available to law enforcement officers at traffic stops; as time passes the THC levels will decline.
- Research is currently underway in California and The Netherlands that will likely improve our understanding of nanogram levels of THC and behavioral impairment.
- The experts agree that chronic use, such as that by medical marijuana patients, can lead to drug tolerance.
- While the science is clear that use of cannabis leads to immediate behavioral impairment which can negatively affect driving, there is disagreement among the experts about the duration of impairment (approximately 2-4 hours for smoking, 8 hours for edibles).
- Discussions by the experts of the *per se* limit related to driving impairment ranged from 1-2 ng/ml to 15 ng/ml.
    - A low threshold would likely include individuals whose driving ability was not impaired because consumption occurred many hours prior to the blood test.
    - A low threshold would not necessarily imply impairment, especially for chronic users.
    - A high threshold would make prosecution for nanogram levels below the designated number very difficult and likely result in dismissed cases.
    - The proportion of drivers, especially chronic users, whose behavior may not be impaired while testing positive at, for example, 5 ng/ml is unknown.
- Administrative sanctions (such as revocation of a driver's license) for impaired driving due to THC in the blood is a critical ingredient to a successful *per se* law but will require that a fiscal note be attached to the legislation.
- Additional non-scientific concerns were identified by members of the working group:
    - Prosecutors want a *per se* limit to use in court and with juries, however, this "system efficiency" requires scientific consensus across many studies and experts, and such consensus remains

debatable; the state toxicologist lab director told the Working Group that 15 out of 16 cannabis cases where she testified were successfully prosecuted.

- Some members question if the current system is broken and if a *per se* limit might result in both unintended and intended consequences:
  - Establishing *per se* levels may communicate to the public that it is permissible to drive after the consumption of small amounts of cannabis.
  - Does establishing a *per se* law encourage what is illegal behavior by Federal law?
  - Not having a *per se* level might undermine the public education campaign ("the jury didn't convict me").
  - Having a *per se* law sends a message that driving while impaired will not be tolerated.
  - Since the scientific community lacks complete consensus, establishing a *per se* limit that affects individuals who are competent to drive while testing positive for THC might undermine confidence in the justice system and lead to contempt for the law.
- The Federal government may link highway funding to establishing a *per se* limit for the consumption of cannabis.

RECAP

Drug Policy Task Force – Marijuana *Per Se* (DUID) Working Group/Meetings

Working Group Members

- Grayson Robinson, Arapahoe County Sheriff
- Sean McAllister, Private Defense Attorney
- Christine Flavia, Division of Behavioral Health
- Heather Garwood, Colo. Judicial Department
- Rod Walker, Colo. Springs Police Department
- Laura Spicer, Drug Addictions Counselor
- Mike Elliott, Medical Marijuana Industry Group
- Mark Hurlbert, DA, 5th Judicial District

EXPERT TESTIMONY	SUMMARY POSITION
Paul Armentano, NORML Dep Director	**Measurement problem** Need better development of cannabis DUI tests
Cindy Burbach, State Toxicology Lab Director	No measurement problem tolerance/1-2 nanogram limit
Dr. Carl Hart, Columbia University	**Measurement problem** Nanogram information is not sufficient to determine cognitive functioning
Glenn Davis/CDOT, Manager of Impaired Driving Programs, DRE (Drug Recognition Evaluator) Coordinator	(Measurement problem not applicable) By the end of 2011 there will be 200 DREs in the state; need 250-300 for rural/frontier parts of the state
Dr. Jan Ramaekers, Behavioral Toxicology of Medicinal Drugs and Drugs of Abuse, Maastricht University, The Netherlands	**No measurement problem** --Cannabis in the blood can be measured and is correlated with driving impairment --THC at 2ng/ml is equivalent to .05 BAC; 5ng/ml=.08 BAC --Two thresholds of impairment would not distinguish between the amount of THC actually consumed
Alan Shackelford, Amarimed of Colorado (written letter)	**Measurement problem** --Little correlation between any given blood level of THC or THC metabolites and impaired driving --An arbitrarily determined limit would therefore adversely affect patients without improving public safety
Dr. Franjo Grotenhermen, International Association for Cannabis as Medicine (written letter)	**Measurement problem** No good correlation between THC concentrations in blood and impairment blood tests; cannot accurately show impairment
Dr. Marilyn Huestis, Chief, Chemistry and Drug Metabolism, U.S. Dept. of Health and Human Services	**No Measurement problem** Many advocate for zero tolerance limit; a limit of 5 ng/ml in whole blood is most likely too high although a step in the right direction

Discussion Points from Expert Testimony

Paul Armentano/NORML Deputy Director

- Acute marijuana intoxication impairs psycho-motor performance
- Peak problems occur in the first 20 to 60 minutes
- Impaired performance is subtle unless used with alcohol
- Marijuana use alone shows increase in weaving, issues in tracking hand/eye coordination, decision making impact, impact in braking, slower speeds, over-estimation of time and users are aware of their impairments
- The way THC is taken into the body, stored in the body and expelled through the body makes it difficult to have a per se level. Alcohol is water soluble and therefore tests differently in the body. THC is fat soluble and manifests completely differently in the body. This is why it's hard to have a per se level for MJ.
- THC is at its peak level within a few minutes. But peak impairment is 20-40 minutes later, when THC levels are actually lower. THC levels are higher at the beginning, impairment is higher later when THC levels are lower.
- There's a wide variance on different people's tolerance
- Current studies are retrospective, we need more prospective studies
- Proposed per se standards are convenient, are they necessary or efficacious?
- **Better development of cannabis DUI tests**

Cindy Burbach/State Toxicology Lab Director

- 15 states have per se levels, all the rest have zero tolerance
- Marijuana metabolizes quickly in the blood
- Cannabinoids- duration effects 2-4 hours (smoking), up to 8 hours for edible. Detectable in the blood (THC) 2-4 hours
- THC peaks in the blood within 30 minutes – different peak times for edibles. Typical high is 2 hours.
- At a nanogram level of 5 we're going to miss a lot of people driving under the influence. This is a problem in other countries around the world.
- MJ positive samples have surpassed alcohol levels in the state labs and the sample load has gone up significantly.
- "Tolerance" does not necessarily equate to not "Impaired". True. There are two different types of tolerance, but there is no such thing as no tolerance to Executive Cognitive Functioning.
- DUI results in a revocation, DWAI does not result in revocation of driver's license.

- Five nanograms is a very high level and you'll miss a lot of people. **Cindy suggests one or two nanogram limit or no tolerance.** With 5 you'll miss many people. Nederlands has ½ nanogram or single nanogram limit.
- We need to refer to either plasma or whole blood data, you can't refer to both. Plasma is cleaner.
- We need to look at NEW studies.

Dr. Carl Hart/Columbia University

- Effects of marijuana are brief. Those who smoke approx. 4 times/week, see minimal differences in performance
- **Nanogram info is not sufficient to determine cognitive functioning.**
- Marijuana and limited cognitive effects: slowing of performance/inhibits control problems. Impairment peaks in 15 minutes for smokers. Impact DAYS later is impossible, despite blood levels.
- THC/Marijuana stays in the system for weeks. But it is not pharmacologically active, meaning that it ishaving no impact.
- What law enforcement does to test sobriety is excellent. Roadside sobriety maneuvers used for alcohol would be appropriate for marijuana. Heel to toe; stand on one foot, hands out eyes closed. Advantage in lab is comparison w/ baseline.
- Slowing of cognitive performance is main effect.
- Driving requires complex memory; a series of steps to remember versus declarative memory (which is remembering one thing, like what state do you live in?)

Glenn Davis/CDOT, Manager of Impaired Driving Programs, Drug Recognition Expert (DRE) Coordinator

- 178 officers trained in DRE in 2011, soon to be 200
- What is the process of taking someone from a roadside test to a blood sample?
  - Person stopped for traffic violation such as weaving
  - Ask driver to get out of car to do roadside (can be any SFT officer)
  - If person shows impairment, regardless of what it is, they get arrested. They can choose breath test, blood test or refuse both. If officer has probable cause, can arrest the driver.

    - If arrestee shows nothing on breath test but clearly impaired then the officer can mandate a blood test. DRE can do the blood test, or blood can be drawn at a hospital, or by a paramedic
    - If person refuses roadside and refuses blood test do you call in DRE.
        - DRE is used only with cooperative person.
- DRE officers get 24 hours of DRE training
- ARIDE trained officers get 16 hours of training
- Why are traffic fatalities going down?
    - Engineering of roadways
    - Vehicles are safer
    - High visibility enforcement (such as The Heat Is On campaign)
    - A lot of dedicated law enforcement
    - Many DUI filings 26,600 in2010
    - Arrests have gone down. Patterns in arrest based on economy. A lot of variables influence impaired driving arrests, people don't have as much money to go a bar and drink so there is less drinking and driving.
    - One of the reasons fatality counts are down is because guardrails are now cable and not steal. Cable bounces car back into its lane.
- **There will soon be 200 DRE's in the state but we need 250 to 300 DRE's to serve the underserved (rural/frontier) parts of the state. We don't have enough funds state or locally to support this**

- Currently DREs are peace officers. Is this necessary?

Dr. Jan Ramaekers/ Behavioral Toxicology of Medicinal Drugs and Drugs of Abuse, Maastricht University, The Netherlands

- Driving tests are being standardized by measuring driving function with road task tracking. A subject drives for an hour at 65 miles per hour on a highway, needs to drive as straight as possible in the right driving lane. Eventually what is calculated is the weaving motion of the vehicle over a one hour drive. The weaving index is a very sensitive measure of fatigue (fatigue can be induced by several reasons). Even people who have taken a placebo will often weave as the task is so monotonous. The task itself induces tiredness in subjects, and weaving motions increase over time.
- The test model described above is the most important model because it is a sensitive measure of fatigue and it is calibrated with blood/alcohol up to .13 BAC.
- Another important point is that this test is standardized, and researchers can correlate outcomes with blood alcohol outcomes.

- Given these two tests (weaving plus BAC),it can be shown that there is an exponential rise in weaving based on BAC
- Testing is done on people between 18-35 years, cannabis by itself increased weaving motion and these effects were comparable with blood alcohol levels of .05. Tests are comparable to or more significant than that of a blood alcohol levels of .05 to .08. Cannabis alone increased weave motion in a dose-dependent manner.
- Combined cannabis plus alcohol in ANY dose is bigger than either alone.
- There is a relationship between recent use of cannabis and crashes.
- These point correlations were confirmed through epidemiological data, crash info, real life parameters.
- There are not many epidemiological studies available.
- Drivers under the influence of a drug would have higher culpability rates/risk than those not under the influence, and this increases with dose and concentration of THC.
- A majority of the research has been conducted in occasional users and occasional users have been used to determine thresholds.
- Another study had people smoke MJ in a lab, different doses, and then test their blood every five minutes or so. Outcomes from this study were published in 2006. From this data, researchers concluded that impairment occurs with blood serum concentrations between 2 and 5 nanograms. This does not mean at this level each and every individual is impaired, it just means the group as a whole is at risk of impairment.
- Frequent users (daily users) do develop behavioral tolerance.
- Frequent users are not unimpaired. A substantial proportion shows impairment even though the group as a whole shows tolerance.
- Regarding per se levels that define impairment, to capture each and every individual including heavy users you would have to increase the nanogram level to a level of 15 or 30 .
- If you define a per se limit, are you defining it for the population at large or each individual? The numbers would vary greatly depending on the population you're defining per se for.
- A per se limit is to protect the general population.
- If you compare driving impairment between occasional and frequent users, the occasional users are much more likely to be impaired.
- People do adapt to the drug, some adapt much better than others. You can't say each and every individual will be affected. But you also can't say that each and every individual user will be impaired.
- **In the Netherlands there is a 'Fitness to Drive' law. Daily cannabis smokers are deemed unfit to drive and their licenses are revoked.** A study by Pope in 2001 looked

at smokers who went into abstinence for 3 weeks. After those three weeks the performance levels of daily users returned to 'normal' levels. Also, soon after stopping using cannabis, the baseline levels for frequent users were lower than infrequent users.

Alan Shackelford/Amarimed of Colorado (written letter)
Dr. Franjo Grotenhermen/International Association for Cannabis as Medicine (written letter)
Dr. Marilyn Huestis/Dept. of Health and Human Services, Chief, Chemistry and Drug Metabolism (written letter)