A Retrospective Review of Marijuana and Driving Under the Influence in the Service Region of the California Department of Justice.

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Bureau of Forensic Services
Regional Laboratories
Services Provided

• For Agencies in Service Region*
  – DUI Toxicology
  – Violent Crime
  – 11550 Health And Safety And Non-violent Felony Toxicology

* Service provided on a case-to-case basis to other county and agency laboratories in situations that are beyond their capabilities/or request assistance.

http://caag.state.ca.us/bfs/toxlab/evidence.htm
DOJ DUI Case Acceptance and Analysis Policy

• Cases where the Alcohol is 0.08 or less are analyzed for the presence of drugs.
• An initial immunoassay screen is done for amphetamines, benzodiazepines, cocaine, Marijuana, opiates, and phencyclidine.
• A report of the immunoassay results is issued.
• Prior to a court appearance, a GC/MS confirmatory analysis is performed and upon request a quantitative analysis is available.
• A second report is issued and the Toxicologist will provide interpretive testimony if subpoenaed.
DRUGS FOUND IN TOXICOLOGY CASES SUBMITTED IN 1992

MARIJUANA 24%
COCAINE 12%
PHENCYCLIDINE 2%
OPIATES 7%
METHAMPHETAMINE 13%
BENZODIAZEPINES 6%
NEGATIVE 37%
OPIATES 7%
DRUGS FOUND IN SAMPLES SUBMITTED

1993

- MARIJUANA: 29%
- OPIATES: 7%
- METHAMPHETAMINE: 19%
- COCAINE: 9%
- BENZODIAZEPINES: 5%
- PHENCYCLIDINE: 2%
- NEGATIVE: 29%

OPIATES

METHAMPHETAMINE

COCAINE

BENZODIAZEPINES

PHENCYCLIDINE

NEGATIVE

MARIJUANA
COMPOSITE OF 11550 HEALTH AND SAFETY CODE SUBMISSIONS DURING 1994

- MARIJUANA: 33%
- OPIATES: 11%
- METHAMPHETAMINE: 37%
- PHENCYCLIDINE: 2%
- COCAINE: 12%
- NEGATIVE: 5%
COMPOSITE OF DRUGS FOUND IN 1998 TOXICOLOGY SUBMISSIONS

PHENCYCLIDINE: 1%
COCAINE: 11%
BENZODIAZEPINES: 4%
NEGA TIVE: 18%
METHAPHERETAMINE: 28%
MARIJUANA: 24%
OPIATES: 14%
DRUGS AND DRIVING IN CALIFORNIA

1992

ALCOHOL LEVEL

SUBMISSIONS

NEG
OPIATES
METHAMPHETAMINE
BENZODIAZEPINES
COCAINE
PHENCYCLIDINE
MARIJUANA

0.08 0.07 0.06 0.05 0.04 0.03 0.02 0.01 0

NO BA
DRUGS AND DRIVING IN CALIFORNIA
1993

ALCOHOL LEVEL

SUBMISSIONS

NEGATIVE

OPIATES

METHAMPHETAMINE

BENZODIAZEPINES

COCAINE

PHENCYCLIDINE

MARIJUANA
DRUGS AND DRIVING IN CALIFORNIA
1994

SUBMISSIONS

ALCOHOL LEVEL

NEG
OPIATES
METHAMPHETAMINE
BENZODIAZEPINES
COCAINE
PHENCYCLIDINE
MARIJUANA

0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
NO BA
ALCOHOL TESTS COMPLETED IN DOJ SERVICE AREA

Breath:
- 1992: 27103
- 1993: 23759
- 1994: 20300

Blood/Urine:
- 1992: 60283
- 1993: 53169
- 1994: 44221
Alcohol Tests Completed in DOJ Service Area

Blood/Urine

1999: 16074
2000: 20788
2001: 21134
2002: 19794

Breath

1999: 36469
2000: 37207
2001: 35381
2002: 34813
COMPOSITE OF RESULTS
1992-1994

- POS ONE DRUG
- POS TWO DRUGS
- POS THREE DRUGS
- POS FOUR DRUGS
- POS >4 DRUGS

<table>
<thead>
<tr>
<th>Year</th>
<th>POS ONE DRUG</th>
<th>POS TWO DRUGS</th>
<th>POS THREE DRUGS</th>
<th>POS FOUR DRUGS</th>
<th>POS &gt;4 DRUGS</th>
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<tr>
<td>CY '93</td>
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<tr>
<td>CY '94</td>
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### Total Submissions by Driving Violation

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<th>1997</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
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<tr>
<td>DWI, Misd</td>
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<td>4684</td>
<td>4722</td>
<td>5153</td>
<td>5500</td>
<td>5772</td>
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<td>265</td>
<td>294</td>
<td>323</td>
<td>377</td>
<td>399</td>
<td>273</td>
<td>1961</td>
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<tr>
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<td>6</td>
<td>34</td>
<td>23</td>
<td>36</td>
<td>62</td>
<td>68</td>
<td>14</td>
<td>243</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>613</strong></td>
<td><strong>4983</strong></td>
<td><strong>5039</strong></td>
<td><strong>5512</strong></td>
<td><strong>5939</strong></td>
<td><strong>6239</strong></td>
<td><strong>4528</strong></td>
<td><strong>32853</strong></td>
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</table>

1997 incomplete data and 2003 is as of 9/24/03
# Total THC Positive by IA

<table>
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<td>1348</td>
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<td>2115</td>
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<td>69</td>
<td>83</td>
<td>111</td>
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<td><strong>TOTAL</strong></td>
<td>126</td>
<td>1411</td>
<td>1588</td>
<td>1871</td>
<td>2220</td>
<td>2240</td>
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1997 incomplete data and 2003 is as of 9/24/03
## Submissions Positive for Δ⁹ – THC

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<tbody>
<tr>
<td>DWI, Misd</td>
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<td>121</td>
<td>114</td>
<td>199</td>
<td>314</td>
<td>412</td>
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<td>15</td>
<td>14</td>
<td>20</td>
<td>31</td>
<td>37</td>
<td>19</td>
<td>136</td>
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<td>8</td>
<td>8</td>
<td>9</td>
<td>4</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td>2</td>
<td>139</td>
<td>129</td>
<td>227</td>
<td>353</td>
<td>458</td>
<td>300</td>
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1997 incomplete data and 2003 is as of 9/24/03
<table>
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<th>COOH THC</th>
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<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
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<th>2003</th>
<th>TOTAL</th>
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</thead>
<tbody>
<tr>
<td>DWI, Misd</td>
<td>2</td>
<td>270</td>
<td>274</td>
<td>367</td>
<td>460</td>
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<td>22</td>
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<td>13</td>
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<td>TOTAL</td>
<td>3</td>
<td>296</td>
<td>307</td>
<td>409</td>
<td>516</td>
<td>649</td>
<td>399</td>
<td>2579</td>
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1997 incomplete data and 2003 is as of 9/24/03
Submissions Positive for Hydroxy-THC

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<tbody>
<tr>
<td>DWI, Misd</td>
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<td></td>
<td></td>
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<td></td>
<td>323</td>
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<td>590</td>
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<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>35</td>
</tr>
<tr>
<td>Manslaughter, Veh</td>
<td>6</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11</td>
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<tr>
<td><strong>TOTAL</strong></td>
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<td>287</td>
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<td></td>
<td></td>
<td></td>
<td>636</td>
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</table>

Began analyzing for Hydroxy-THC 2/21/2002
• DELTA-9-TETRAHYDROCANNABINOL (THC) is the principal psychoactive constituent of marijuana. When smoked it is rapidly distributed to various tissues and disappears quickly from the blood. If found, it indicates either recent use or chronic daily use of marijuana.
COOH- THC

• **11-NOR-9-CARBOXY-DELTA-9-THC** is the primary metabolite of delta-9-tetrahydrocannabinol which is the principal psychoactive constituent of marijuana. It is an inactive metabolite, and may be detected in blood and urine for several days or weeks depending upon the subject's frequency of use.
11-OH-THC

- **11-HYDROXY-DELTA-9-TETRAHYDROCANNABINOL** is an active metabolite of delta-9-tetrahydrocannabinol which is the principal psychoactive constituent of marijuana. Its presence in a blood and urine sample may be an indicator of recent marijuana usage.
Marijuana

• Marijuana (cannabis sativa) is known to cause many psychomotor effects that are detrimental to safe driving. These include impaired tracking, coordination, and perceptual skills as well as deterioration of driving ability on the test track. Ethyl alcohol has been shown to have an additive effect in this impairment.
Casework Statistics 1999

Immunoassay

- Cannabinoids 36%
- Methamphetamine 33%
- Opiates 21%
- Cocaine 15%
- Benzodiazepines 8%
Casework Statistics 1999
11550 Health and Safety

Number of Confirmations

- Methamphetamine
- Amphetamine
- Morphine
- Codeine
- 6MAM
- Cocaine
- BE
- PCP
Casework Statistics 1999
Driving Under the Influence

Number of Cases

DUI Misdemeanor  DUI Felony

THCA  Methamphetamine  THC  Amphetamine  Morphine  BE  Nordiazepam  Meprobamate  Codeine  Diazepam  Carisoprodol
Casework Statistics 1999
All GC/MS Data

Number of Confirmations

0 200 400 600 800 1000 1200 1400 1600

Methamphetamine Amphetamine Morphine Codeine Benzylecgonine Cocaine 6-MAM THC HA THC Hydrocodone Nordiazepam Diazepam Ephedrine Meprobamate Carisoprodol
87% of all confirmed positives are Amphetamines, Opiates, Cocaine or Marijuana
13% for all other drugs
GC/MS Confirmation

- Gas Chromatography/Mass Spectrometry
- Identification of illicit and therapeutic agents (over 200)
- Qualitative urine analysis
- Qualitative or quantitative blood analysis
Marijuana and Alcohol Impair Driving

- National Highway Traffic Safety Administration. Marijuana and Alcohol Severely Impede Driving Performance. Annals of Emergency Medicine 2000:35;398-399. (Determined that the combination of alcohol BAC of 0.07 and marijuana 100ug/kg gave effects similar to BAC of 0.09. BAC of 0.07 and marijuana 200ug/kg effects similar to BAC 0.14- Measured reaction time, on-road performance, vehicle following. Concluded ‘Under marijuana’s influence, drivers have reduced capacity to avoid collisions if confronted with the sudden need for evasive action. Second study found that BAC of .05 combined with moderate marijuana had significant drop in the visual search frequency. ) NHTSA study-- National Highway Traffic Safety Administration. Marijuana Alcohol and Actual Driving Performance. DOT HS 808.939
<table>
<thead>
<tr>
<th>Year</th>
<th>Mean</th>
<th>High</th>
<th>N</th>
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<td>5.4</td>
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<tr>
<td>1998</td>
<td>3.1</td>
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<td>89</td>
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<tr>
<td>1999</td>
<td>3.2</td>
<td>18</td>
<td>68</td>
</tr>
<tr>
<td>2000</td>
<td>2.5</td>
<td>10</td>
<td>70</td>
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<td>2001</td>
<td>3.8</td>
<td>18</td>
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<tr>
<td>2002</td>
<td>3.2</td>
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<td>166</td>
</tr>
<tr>
<td>2003</td>
<td>4.4</td>
<td>20</td>
<td>83</td>
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</table>
Average Concentration Seen in Driving Cases in DOJ service Region

Delta-9-THC

<table>
<thead>
<tr>
<th>Year</th>
<th>Concentration</th>
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<tbody>
<tr>
<td>1997</td>
<td>5.4</td>
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<tr>
<td>1998</td>
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<td>2000</td>
<td>2.5</td>
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<td>2002</td>
<td>3.2</td>
</tr>
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<td>2003</td>
<td>4.4</td>
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Carboxy11-nor-delta(9)-tetrahydrocannabinol-carboxylic acid

<table>
<thead>
<tr>
<th>Year</th>
<th>Mean</th>
<th>High</th>
<th>n</th>
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<td>1997</td>
<td>66</td>
<td>166</td>
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<tr>
<td>1998</td>
<td>46</td>
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<td>187</td>
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<td>41</td>
<td>266</td>
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<tr>
<td>2002</td>
<td>47</td>
<td>174</td>
<td>214</td>
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<tr>
<td>2003</td>
<td>37</td>
<td>243</td>
<td>80</td>
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</table>
COOH-THC Concentrations seen in Drivers in DOJ Service Region

![Graph showing COOH-THC Concentrations](chart.png)
DOT Sponsored Studies with California DOJ Participation

- Reeve, V.C., Grant, J.D., Robertson, W., Gillespie, H.K., and Hollister, L.E.: Plasma concentrations of delta-9-tetrahydrocannabinol and impaired motor function. Drug Alcohol Depend. 11: 167-175, 1883.

Marijuana Monograph

Bibliographies on line

- http://www.drugpolicy.org/library/bibliography/driving/
- http://www.erowid.org/plants/cannabis/cannabis_driving.shtml
Marijuana Literature


4. PDR section on Marinol®


Marijuana Literature Continued


10. Flaxmayer, Chester. “A Comparison of Drug Induced Signs and Symptoms between D.R.E (Drug Recognition Expert – Examination) and the Medical Literature. Forensic Alcohol Science and Technology (FAST)

11. Wilson, John PhD. Abused Drugs II: A Laboratory Pocket Guide. Section on Tetrahydrocannabinol/Marijuana. Page 54.


Marijuana Literature Continued


Marijuana Literature Continued


