Effective Date: 03/22/2023

# Ventura County Sheriff's Office
# Forensic Services Bureau

# Forensic Services Handbook

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# Forensic Services Handbook
## Introduction

The Forensic Services Bureau consists of the following sections/units:

Forensic Alcohol Unit: Is responsible for the analysis of blood and other bodily fluids for ethyl alcohol and the calibration and maintenance of breath alcohol testing equipment managed by the unit.

Comparative Analysis Section: Is responsible for shoe print analysis.

Chemistry (Controlled Substances) Unit: Is responsible for the analysis and identification of suspected controlled substances, pharmaceuticals and related items in non-biological samples.

Crime Scene Investigation (CSI) Unit: Is responsible for providing crime scene response at the request of Sheriff's Office personnel. The CSI Unit may also provide crime scene response to other local law enforcement agencies.

Fingerprint Unit: Is responsible for processing items of evidence for latent prints; searching latent prints in local, state, and federal fingerprint databases (AFIS); performing examination and comparison of latent fingerprints; and limited ten-print functions.

Firearms Section: Is primarily responsible for all aspects of firearm examinations, including firearms, ammunition and ammunition components,

Forensic Biology Section: Is responsible for the examination of evidence to identify biological materials of value and develop DNA profiles for samples of interest.

Toxicology Section: Is responsible for chemical analysis of blood and urine samples for a wide range of drugs and pharmaceuticals.

Photo Imaging Section: Is responsible for supporting patrol and investigative staff with photographic technology.

Property Room Section: Is responsible for the intake, storage, safekeeping, release, and disposal of property and evidence.

Additional information for each area can be found later in this document under the specific section or unit heading. Additional information on the Propery Room can be found in the VCSO Property and Evidence Manual.

The Bureau reserves the right to reject work that is beyond its scope of abilities, or which it is not prepared to complete in a timely manner. The Bureau will notify the submitting party when work is rejected by notifying the investigating officer.

It is the role of the Forensic Services Bureau to evaluate the type of evidence and the charges listed to determine and select methods that are generally accepted in the scientific community and appropriate for the analysis being performed, pursuant to the Bureau's accredited scope of accreditation. Submitting a service request, whether electronic or hard copy, is considered an agreement for service and an acceptance of the role of the Bureau in choosing the appropriate method(s) of analysis.

All evidence items submitted to the Bureau will be returned to the Sheriff's Property Room or submitting agency after the analysis is complete, unless otherwise indicated in the report or notification.

The Bureau is required to provide discovery (release of records) for criminal and civil cases as required by law. The customer will not be notified when records are release through appropriate discovery channels.

In cases where more than one agency has submitted evidence items on related crime(s), the cases will be cross referenced in LIMS and the reports generated will include information on the involved agencies indicating that all agencies associated with the case will have access to the cross referenced reports.

Updates to this handbook will be made available electronically on the Ventura County Sheriff's Office website at https://www.venturasheriff.org.

For additional information not provided in this handbook please contact the Forensic Services Bureau at 805-654-2370 or crime.lab@ventura.org.

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# Ventura County Sheriff's Forensic Services Bureau

# Alcohol
# Forensic Services Handbook

## I. SERVICES PROVIDED

A. The Forensic Alcohol Section analyzes blood and urine samples for the presence and concentration of ethyl alcohol in cases of driving under the influence and other criminal cases. The section may also analyze beverage samples when requested.

B. The section is responsible for the evidentiary breath testing program in Ventura County, including:

1. Performing calibration and maintenance procedures on AlcoSensor V-XL@ Point of Arrest instruments.

2. Training officers on the use of the AlcoSensor V-XL @ Point of Arrest instruments and Title 17 requirements for performing subject breath testing in California.

C. The section provides expert testimony on analyses and interpretations of results generated by testing in the section or on instruments maintained by the Bureau.

D. The Bureau complies with Forensic Alcohol Analysis pursuant to Title 17 of the California Code of Regulations governed by the California Department of Public Health (CDPH).

1. Compliance with state regulations require that only those models of breath instruments approved by the United States Department of Transportation may be used by law enforcement to test the breath of drivers for alcohol. The Forensic Services Bureau uses the AlcoSensor V-XL @ Point of Arrest breath testing instruments in its breath alcohol testing program. The AlcoSensor V-XL@ Point of Arrest instruments are portable roadside breath testing instruments that can be used in both evidential and screening modes. These instruments are deployed to all of the local law enforcement agencies in the county.

## II. EVIDENCE SUBMISSION (bodily fluids and beverage samples)

A. An electronic service request must be completed and submitted via the BEAST Prelog system. All required fields for blood or urine collection on the service request must be filled out, including the requested service type for each item being submitted. Samples will be assigned for alcohol analysis based on the service requested.

B. The Forensic Services Bureau supplies blood and urine collection kits to all law enforcement agencies in the county. The kits include instructions

for the collection and submission of blood and urine samples. The labels supplied with the kits must be filled out completely.

C. The Bureau provides the following sample submission guidelines:

1. When both “Alcohol Content” and “Toxicological Analysis” (drugs other than alcohol in bodily fluids) are requested on a case, the item will be analyzed for alcohol first.

2. When both alcohol and toxicological analysis are requested, on a DUI case, Forensic Toxicology testing will be performed only if the alcohol result for the sample is below 0.080 % (W/V).

3. The blood vial or urine container should be sealed with the supplied evidence tape. The officer sealing the container must place their initials on the seal and ensure the information is correct on the label. Only kits supplied by the Bureau should be used.

4. When submitting beverage or pruno samples for analysis, a portion of the sample should be transferred to a urine container supplied by the Bureau that contains the preservative. Unpreserved samples will only be tested on the approval of the Forensic Alcohol Section Supervising Forensic Scientist or designee.

5. Samples that cannot be submitted promptly should be refrigerated to prevent the loss of any alcohol present. Blood and urine samples should never be exposed to unnecessary heat (e.g., in the hot trunk of a vehicle).

## III. METHODS OF ANALYSIS (bodily fluids and beverage samples)

A. Submitted bodily fluid (blood and urine) and beverage samples are analyzed utilizing a headspace gas chromatograph with a flame ionization detector (GC/FID).

1. The samples are analyzed in a batch along with multiple standards; therefore, it is difficult to perform analysis on short notice or to give immediate results.

2. Requests for “expedited” analysis should be made to the Forensic Alcohol Section Supervising Forensic Scientist or designee at (805) 654-2370 or e-mail at BA-CS.Lab@ventura.org.

## IV. SCOPE OF ANALYSIS (bodily fluids and beverage samples)

A. The following compounds are routinely tested:

1. Ethyl alcohol (confirmed and quantitated).

B. The following compounds may be identified but not quantitated:

1. Methyl alcohol (methanol);
2. Acetaldehyde;
3. Isopropyl alcohol (isopropanol);
4. Acetone.

C. Ethyl alcohol quantitation in alcoholic beverages and pruno samples may be performed upon request.

D. When alcohol analysis is requested on sexual assault kits, only the blood sample will be analyzed for alcohol content; the urine sample will only be analyzed by special request and upon approval of the Forensic Alcohol Section Supervising Forensic Scientist or designee.

E. If the Bureau is unable to perform an analysis, the case may be sent to an outside laboratory for analysis. The cost incurred for the analysis will be discussed with the submitting agency or District Attorney's (DA's) Office before the sample is sent out for any analysis.

F. If the Bureau knows prior to the service request being accepted that the Bureau cannot perform certain analyses, the request will be declined. It is the responsibility of the submitting or requesting agency to send the sample to the laboratory of their choice. If there are questions on whether the Bureau can perform a particular analysis, please contact the Forensic Alcohol Section Supervising Forensic Scientist or designee at (805) 654-2370 or e-mail at BA-CS.Lab@ventura.org.

## V. RESULTS OF ANALYSIS AND REPORTING (bodily fluids and beverage samples)

A. Results of alcohol analysis are considered a conclusion of the analyst performing the test. The analyst who authored the report is qualified to testify regarding the conclusions or results of the analyses.

## VI. MEASUREMENT UNCERTAINTY

A. Measurement Uncertainty is the variability associated with a quantitative measurement result based on the information known about the measurement method.

B. Reporting a quantitative amount of ethyl alcohol is considered to be a measurement that requires a corresponding uncertainty of measurement.

C. The uncertainty will be reported for blood and urine sample results that are between 0.020 g/100mL and 0.500 g/100mL.

D. The uncertainty for breath alcohol is applied to the reports generated from calibration procedures. A summary of the uncertainty may also be provided when requested.

E. No uncertainty of measurement will be provided for beverage sample analysis.

## VII. TESTIMONY

A. Forensic Alcohol section provides testimony in the following areas, when the case relates to work performed by the Bureau or instrumentation maintained by the Bureau:

1. The methodology and procedures employed for the analysis of casework in the section.

2. The breath testing instrumentation maintained by the Bureau, including calibration checks, calibration adjustments, maintenance, subject test results, and procedures.

3. The requirements of Title 17 of the California Code of Regulations in relation to alcohol testing.

4. The interpretation of alcohol results and concentrations as well as alcohol impairment.

B. Forensic Alcohol scientists will not testify to the analysis of alcohol performed by an outside laboratory or on breath instrumentation not maintained by the Bureau.

C. Please contact the Forensic Alcohol Section Supervising Forensic Scientist or designee at (805) 654-2370 or e-mail at BA-CS.Lab@ventura.org for information about the personnel qualified to testify to the interpretation of the result or alcohol impairment testimony.

# Ventura County Sheriff's Forensic Services Bureau


# Comparative Analysis
# Forensic Services Handbook

## I. SERVICES PROVIDED

A. The Comparative Analysis Section compares the design, wear, size, and pattern of shoe prints left behind at a crime scene.

B. The Bureau also provides expert testimony in comparative analysis for court purposes.

## II. EVIDENCE SUBMISSION

A. An electronic LIMS service request must be completed and submitted to the Forensic Services Bureau. All required fields on the service request must be filled out, including the section for each item being submitted and the type of service requested.

B. It is important that the source of each item be described, including the name of the suspect when more than one is involved. This information assists the analyst in determining whether or not an item meets the Bureau's criteria for examination. It also permits the Bureau to associate the examination results with a specific item and source in the laboratory report.

C. The Bureau provides the following evidence packaging guidelines. **If evidence does not meet the submission guidelines, the Bureau will return the evidence <u>unexamined</u> for appropriate repackaging**.

1. Do not submit items that the agency does not want examined. In order to minimize the number of items handled by Bureau staff and reduce the amount of time spent cataloging and marking evidence, only those items which need to be examined should be submitted to the Bureau.

2. All items should be packaged in such a way to prevent loss, deleterious changes, contamination, or transfer.

3. Envelopes, paper bags or boxes must be sealed with evidence tape. The seal shall be initialed by the officer or property personnel placing the evidence in the packaging.

    a. All cardboard boxes must have the top and bottom flaps sealed with tape and initialed. The seals must prevent the escape of the contents and ensure that future entrance into the package is obvious.

4. When results need to be expedited, a request should be made to the Comparative Analysis Supervising Forensic Scientist or designee at (805) 654-2370.

    a. Typically, cases will be examined in order by date of receipt in the Bureau and in order of seriousness of the crime.

    b. It is important in expedited cases that the evidence be forwarded rapidly to the Bureau to provide Bureau staff sufficient time to complete the analyses.

5. Cases requiring fingerprint analysis or DNA analysis should be submitted to the Fingerprint or DNA Section prior to submission for comparative analysis.

## III. METHODS OF ANALYSIS

A. The Bureau utilizes methods of analysis that are generally accepted in the scientific community and appropriate for the analysis being performed. These include:

- Side-by-side comparison
- Comparison using software such as Photoshop
- Macroscopic and microscopic examination

## IV. SCOPE OF ANALYSIS

A. The following is a list of evidence that is typically examined by the Comparative Analysis Section. The Bureau is not limited in scope to this list and has the capacity to analyze other items. The turnaround time for analysis varies depending upon the complexity of the case.

- Photographs
- Casts
- Gel lifts
- Electrostatic dust lifts
- Shoes

## V. RESULTS OF ANALYSIS AND REPORTING

A. Results of comparative analysis cases are considered a conclusion of the analyst performing the test. The analyst who authored the report is qualified to testify regarding the conclusions or results of analyses.

B. The Bureau may provide interpretation or opinions of the results of analyses for consultation or testimony purposes. Please contact the person who signed the report at (805) 654-2370 for information about the report.

# Ventura County Sheriff's Forensic Services Bureau

# Controlled Substances
# Forensic Services Handbook

## I. SERVICES PROVIDED

A. The Bureau analyzes powders, liquids, tablets, capsules, plant material samples, as well as other materials suspected of being or containing controlled substances.

B. The Bureau does not routinely confirm non-controlled substances.

C. The Bureau also provides expert testimony on controlled substance analysis for court purposes.

## II. EVIDENCE SUBMISSION

A. An electronic LIMS service request must be completed and submitted to the Forensic Services Bureau. All required fields on the service request must be filled out, including the section for each item being submitted and the type of service requested.

B. It is important that the source of each item be described, including the name of the suspect associated to that item. This information assists the analyst in determining whether or not an item meets the Bureau's criteria for examination. It also assists the Bureau in associating the examination results with a specific item and source in the laboratory report.

C. The following guidelines are provided for evidence submission, handling, and packaging. **If evidence does not meet the submission guidelines, the Bureau will return the evidence unexamined for appropriate repackaging**.

2. Always use caution when handling any type of drug evidence. Some drugs, like LSD, can be absorbed through the skin.

3. **Do not submit items that the agency does not want examined**. In order to minimize the number of items handled by Bureau staff and reduce the amount of time spent cataloging and marking evidence, only those items which need to be examined should be submitted to the Bureau.

    a. Agency instructions to the Bureau to examine or not examine certain items may be taken into account.

4. **Do not submit paraphernalia that is not to be analyzed**. Items such as cigarette paper, money, roach clips, coin purses, coke spoons, cigarette packages, empty packaging materials, etc.,

should be separated from the items to be analyzed and retained by the agency.

5. **Do not place loose items in the envelope**. All items should be packaged in such a way to prevent loss, deleterious changes, contamination, or transfer. Pills, cigarettes, bindles, etc., should be placed in another layer of packaging or container before placing into the outer evidence packaging.

6. **Do not submit syringes**. The contents of syringes must be transferred to glass vials for submission. The Bureau will ONLY accept syringes for drug analysis when the syringe contains a drug sold prepackaged in a syringe (e.g., steroids).

7. **Do not submit wet plant material**. Plant material must be dried by the submitting agency prior to submission to the Bureau. Wet plant material will be returned to the submitting agency for drying (and repackaging, if appropriate) before analysis. Submitted plant material that has mold, mildew, or has decayed will not be weighed or analyzed.

8. Suspected LSD and psilocybin mushrooms should be packaged in a way that minimizes exposure to light (e.g., evidence envelope, paper bag). The psychoactive components are light sensitive and exposure to light may cause decay of these components and diminish the scientist's ability to confirm the presence of the drug.

9. **Envelopes, paper bags, or boxes must be sealed with evidence tape. Plastic pouches should be heat sealed**. The seal must be initialed by the officer or property personnel placing the evidence in the packaging.

    a. All cardboard boxes must have the top and bottom flaps sealed with tape and initialed. The seals must prevent the escape of the contents and ensure that future entrance into the package is obvious.

10. When results are needed for an in-custody case or for an urgent investigative purpose, a request should be made to the Controlled Substances Supervising Forensic Scientist or designee to expedite the analysis. There is a turn-around time of approximately five business days on expedited analysis of simple possession cases and 48 hours for in-custody cases, after receipt.

a. Typically, cases will be examined in order by date of receipt in the Bureau. The normal turn-around time for simple possession cases is approximately fifteen business days.

b. It is important in expedited cases that the evidence be forwarded rapidly to the Bureau in order to provide Bureau staff sufficient time to complete the analysis.

11. Cases requiring fingerprint analysis should be submitted to the Fingerprint Section prior to submission for drug analysis.

## III. METHODS OF ANALYSIS

A. The Bureau utilizes methods of analysis that are generally accepted in the scientific community and appropriate for the analysis being performed. These include:

1. Presumptive color/chemical tests;
2. Microscopic examination;
3. Gas chromatography-mass spectrometry (GC/MS);
4. Fourier transform infrared spectroscopy (FTIR);
5. Raman spectroscopy (Raman);
6. Macroscopic examination (for color, texture, appearance, and markings on evidence).

B. Typically, the samples are initially screened by chemical testing and then confirmed by a gas chromatography-mass spectrometry (GC/MS) or Fourier transform infrared spectroscopy (FTIR). Additional instrumentation may be used as necessary.

C. The following analysis guidelines have been adopted by the Bureau:

1. The type and extent of services performed by the Bureau will be determined based on the type of crime and the circumstances of the case.

2. The analyst receiving the evidence will screen the request for compliance with this policy. The analyst assigned to the case will determine the particular analyses to be performed.

3. Limited Bureau staffing and resources prevent the examination of all confiscated items in each case. Consequently, guidelines have been developed to ensure the efficient and successful analysis of cases for the criminal justice system while

minimizing unnecessary examinations by Bureau staff members.

4. In general, when a submission contains items from different drug schedules, the items chosen for analysis are selected based on the following:

    a. The item that supports the charge with the highest penalty.
    b. The schedule of the drugs
    c. The item with the most weight
    d. The item found on the suspect

D. The following is a general description of the guidelines employed by the analyst in determining the analyses to be performed on a case:

1. **Possession**: In cases where the suspect is charged with possession of a controlled substance, the Bureau may examine only one item or unit within an item (e.g., one bindle out of ten) to meet the listed offense. For example, if several powders that are the same in appearance are submitted from a single individual, only one of them will be analyzed. If multiple items of the same drug are submitted in the same case from two different suspects, one item from each suspect will be analyzed.

    a. Only the weight of the items examined may be reported. Items which are already in a dosage unit form (e.g., tablets, capsules) may not be weighed; however, the total number or approximate number will be reported.

    b. Because of these restrictions in the number of items that will be examined by the Bureau, it is important for the submitting agency to select those items for submission that are most important to the case and to clearly specify on the service request the location from which each item was obtained.

    c. If multiple offenses are charged for the same suspect, additional items may be requested at a later time to meet the additional offenses.

2. **Sales**: When the charge is sales or possession for sale of a controlled substance (H&S 11351, 11352, 11353, 11359, 11378, and 11379), and multiple items of the same suspected controlled substance in a similar form are submitted, a minimum of one item shall be sampled for analysis.

a. When more than one type of a Schedule I or II drug is submitted, one unit of each type, up to a maximum of three, will be analyzed. It is not necessary to analyze every item, particularly for charging the suspect or for a preliminary hearing. A statement may be included in the laboratory report that the material in the unexamined units was the same in appearance as the examined one. A total gross weight with packaging of all of the material (when similar in appearance) within the item examined will be given. An estimated total net weight may be reported when the material and the packaging are similar to the extent of being virtually identical and is considered appropriate by the analyst.

3. **Enhancement:** Additional analysis for penalty enhancements will only be performed upon special request and upon approval of the section supervisor or designee. The section supervisor should be contacted when these requests are submitted.

4. **Cultivation:** When submitting plant material from a “grow,” not all of the material needs to be submitted to the Bureau. A representative sampling should be submitted; it should be noted by the submitting agency that the item(s) submitted are only a portion of the larger item. Items that have been packaged in plastic before drying thoroughly can mold and decay very rapidly. This may alter the Bureau’s ability to identify the plant and may pose a health hazard. Therefore, plants must be submitted dry. Samples that are submitted wet or in improper packaging will be returned to the submitting agency for drying or repackaging before examination.

5. **Pharmaceutical Drugs:** When pharmaceutical drugs are submitted to the Bureau for analysis, only reference identification will be performed; instrumental analysis will be performed as needed. When instrumental analysis of pharmaceutical drugs is performed and the sample contains a mixture of controlled and non-controlled substances, only the controlled substance in the mixture is typically confirmed. When multiple types of tablets with different markings are submitted, the higher scheduled tablets will be identified, if possible.

## IV. SCOPE OF ANALYSIS

A. The following is a list of drugs that can be identified by the Bureau. The Bureau is not limited in scope to this list and has the capacity to analyze other drugs provided suitable standard reference materials are available.

The turnaround time for analysis can be delayed depending on the availability of reference material. Some drugs on the list are not controlled substances and may be reported out as “No Controlled Drugs Detected.”

1. **AMPHETAMINES / PHENETHYLAMINES**

   a. Amphetamine
   b. Benzphetamine
   c. β-Phenethylamine
   d. Dimethylamphetamine
   e. Ephedrine and/or Pseudoephedrine
   f. Ethylamphetamine
   g. Fluoroamphetamine
   h. Fluoromethamphetamine
   i. Mephentermine
   j. Methamphetamine
   k. Methoxymethyl phenethylamine
   l. Methylphenidate
   m. N,N-Dimethylamphetamine
   n. Phendimetrazine
   o. Phenmetrazine
   p. Phentermine
   q. 4-Methoxyamphetamine
   r. Other amphetamine or phenethylamine compounds

2. **OPIOIDS**

   a. 6-Acetlycodeine
   b. 6-Monoacetylmorphine
   c. Buphrenorphine
   d. Codeine
   e. Dihydrocodeine
   f. Ethylmorphine
   g. Fentanyl
   h. Heroin
   i. Hydrocodone (Dihydrocodeinone)
   j. Hydromorphone
   k. Meperidine
   l. Methadone
   m. Morphine
   n. Nalorphine
   o. Norcodeine
   p. Normorphine
   q. Noscapine
   r. Oxycodone
   s. Oxymorphone
   t. Papaverine
   u. Propoxyphene
   v. Thebaine
   w. Other opioids

3. **CAINES**

   a. Benzocaine
   b. Cocaine base
   c. Cocaine hydrochloride
   d. Ecgonine
   e. Lidocaine
   f. Mepivacaine
   g. Procaine
   h. Tetracaine
   i. Other caines

4. **CANNABINOIDS**

   a. Cannabidiol
   b. Cannabinol
   c. Tetrahydrocannabinol (THC)

   Note: Cannabis samples (e.g. plant material, hash, oil) are analyzed for the presence of tetrahydrocannabinol.

5. **DISSOCIATIVE ANESTHETICS**

   a. Ketamine
   b. Phencyclidine (PCP) phenylcyclohexylpiperidine
   c. Piperidinocyclohexanecarbonitrile (PCC)

6. **HALLUCINOGENS**

a. 2,5-Dimethoxy-4-bromoamphetamine (2C-B, Nexus)
b. 3,4-Methylenedioxyamphetamine (MDA)
c. 3,4-Methylenedioxyethylamphetamine (MDE)
d. 3,4-Methylenedioxymethamphetamine (MDMA)
e. Bufotenin
f. Diethyltryptamine (DET)
g. Dimethylamphetamine
h. Dimethyltryptamine (DMT)
i. Lysergic acid methylpropylamide (LAMPA)
j. Lysergic acid diethylamide (LSD)
k. Mescaline
l. Methoxyamphetamine
m. Methyltryptamine
n. N,N-Diethyltryptamine
o. N,N-Diisopropyl-5-methoxytryptamine (FOXY)
p. ρ-Methoxyamphetamine (PMA)
q. Psilocin and / or Psilocybin
r. Other hallucinogens

7. **BARBITURATES**

a. Amobarbital
b. Aprobarbital
c. Barbital
d. Butabarbital
e. Butalbital
f. Hexobarbital
g. Mephobarbital
h. Pentobarbital
i. Phenobarbital
j. Secobarbital
k. Thiopental
l. Other barbiturates

8. **BENZODIAZEPINES**

a. Alprazolam
b. Chlorazepate
c. Chlordiazepoxide
d. Clobazam
e. Clonazepam
f. Diazepam
g. Estazolam
h. Flunitrazepam
i. Flurazepam
j. Lorazepam
k. Midazolam
l. Nordiazepam
m. Oxazepam
n. Prazepam
o. Temazepam
p. Other benzodiazepines

9. **STEROIDS**

a. 17ά-Methandrostan-17β-ol-3-one (Mestaline)
b. 17ά-Methyltestosterone
c. 17β-Dihydroandrosterone
d. 19-Nortestosterone
e. 19-Nortestosterone 17-decanoate
f. Androlone
g. Androstenediol
h. Androstenediol dipropionate
i. Androstenedione
j. Androsterone
k. Boldenone
l. Boldenone undecylenate
m. Dihydrotestosterone benzoate
n. Mesterolone
o. Methandriol
p. Methandrostenolone
q. Methenolone
r. Nandrolone
s. Nandrolone decanoate
t. Nandrolone phenpropionate
u. Nandrolone propionate
v. Norethandrolone
w. Normethandrolone
x. Oxandrolone
y. Oxymetholone
z. Stanozolol
aa. Testosterone

bb. Testosterone 17β-cypionate
cc. Testosterone 17-phenylpropionate
dd. Testosterone decanoate
ee. Testosterone enanthate
ff. Testosterone isocaproate
gg. Testosterone propionate
hh. Trenbolone
ii. Trenbolone acetate
jj. Trenbolone enanthate
kk. Other steroids

10. **CATHINONES**

a. Methylethcathinone (MEC)
b. Buphedrone
c. Butylone
d. Cathine
e. Cathinone
f. Ethylone
g. Mephedrone
h. Methcathinone
i. Methylone
j. Pentedrone
k. Pentylone
l. Other cathinones

11. **TRYPTAMINES**

a. 5-Methoxy-ά-methyltryptamine (5-MeO-AMT)
b. N,N-Diisopropyl-5-methoxytryptamine (5-MeO-DIPT)
c. 5-Methoxy-N,N-dimethyltryptamine (5-MeO-DMT)
d. 5-Methoxy-N-methyl-N-isopropyltryptamine (5-MeO-MIPT)
e. α-Methyltryptamine (AMT)
f. N,N-Diisopropyltryptamine (DIPT)
g. N,N,-Dimethyltryptamine (DMT)
h. Other tryptamines

12. **PIPERAZINES**

a. 1-Benzylpiperazine (BZP)
b. 1-(α,α,α-Trifluoro-m-tolyl)-piperazine (TFMPP)
c. Other piperazines

13. **SYNTHETIC CANNABINODS**

a. Most JWH compounds
b. Other synthetic cannabinoids

14. **MISCELLANEOUS**

a. Acetaminophen
b. Amitriptyline
c. Caffeine
d. Carisoprodol
e. Cyclobenzaprine
f. Dextromethorphan
g. Doxepin
h. Fenfluramine
i. Fluoxetine
j. Levorphanol
k. Meprobamate
l. Methaqualone
m. Methocarbamol
n. Methylphenidate
o. Naloxone
p. Pentazocine
q. Phentermine
r. Phenytoin
s. Promethazine
t. Quetiapine
u. Scopolamine
v. Sildenafil
w. Tamoxifen
x. Trazodone
y. Tramadol
z. Zolpidem
aa. Zaleplon

B. If the Bureau cannot perform certain analyses (e.g., quantitative analysis, nitrous oxide testing, lead testing, dust off, etc.), the Bureau will decline

the request for analysis. It is the responsibility of the agency to send the sample to the laboratory of their choice that performs the analysis being sought. If there are questions on whether the Bureau can perform a particular analysis, please contact the Controlled Substances Section Supervising Forensic Scientist or designee at (805) 654-2370 or e-mail at BA-CS.Lab@ventura.org.

## V. RESULTS OF ANALYSIS AND REPORTING

A. Results of drug analysis are considered a conclusion of the analyst performing the test. The analyst who authored the report is qualified to testify regarding the conclusions or results of analyses.

B. The Bureau may provide interpretation or opinions of the results of analyses conducted by the Bureau for consultation or testimony purposes. Please contact the Controlled Substances Section Supervising Forensic Scientist or designee at (805) 654-2370 or e-mail at BA-CS.Lab@ventura.org for information.

## VI. MEASUREMENT UNCERTAINTY

A. Measurement Uncertainty is the variability associated with a quantitative measurement result based on the information known about the measurement method.

B. Drugs weights are considered to be a measurement that matters as legal enhancements may be charged if certain weight limits are exceeded.

C. The measurement uncertainty will be reported on all material net weights that are not approximate or estimated.

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# Ventura County Sheriff's Forensic Services Bureau

# Crime Scene Investigation Unit
# Forensic Services Handbook

## I. SERVICES PROVIDED

A. The Field Evidence Technicians (FETs) assigned to the Crime Scene Investigation (CSI) Unit provide crime scene documentation, crime scene processing, and evidence collection. Crime scene documentation routinely includes digital photography and notes, but may also include measurements and sketches. Crime scene processing techniques may include fingerprint processing, touch DNA collection, and impression evidence collection (shoe, tire, etc.). Evidence collected will be sealed and subsequently booked appropriately.

B. The Forensic Scientists assigned in the Crime Scene Investigation Unit perform bloodstain pattern analysis (BPA), enhancement of bloody impressions, body fluid stain detection, and bullet trajectory analysis in the field. Items may also be submitted to the FSB for BPA.

C. Complicated crime scenes, such as homicides and officer-involved shootings, can involve unit personnel. It is essential that the evidence processing aspects of the scene are coordinated so that personnel can act as a team in the field. These cases will rely on the law enforcement investigators and Bureau personnel to communicate effectively in the field.

## II. EVIDENCE SUBMISSION

A. All requests for an FET and/or for a Forensic Scientist must be made through the Patrol Watch Commander (805) 662-6755) or the on-scene supervisor, who will evaluate the request and determine the level of need for the response.

B. The Watch Commander will then make the request to the CSI Unit.

C. Request for advice or consult on whether a response is warranted may be made using the contact info bellow:

1. CSI Unit (805) 654-2397

2. CSI Unit Supervisor (805) 650-4081 or (805) 765-5859

3. Forensic Services Bureau Manager (805) 662-6803 or (805) 797-6427

D. For items or vehicles booked into the West County Property Room, a service request must be completed and submitted in BEAST. Refer to the Sheriff's Property Manual regarding the booking of evidence.

## III. METHODS OF ANALYSIS

A. The CSI Unit utilizes methods of that are generally accepted in the scientific community and appropriate for the task(s) being performed. Standard Operating Procedures (SOPs) exist for these methods.

B. Appropriate field techniques will be used. If a technique cannot be applied in the field that may be available in a controlled laboratory environment, the item will be collected and preserved for later analysis.

## IV. SCOPE OF ANALYSIS

A. The CSI Unit should not be dispatched on the following types of calls, unless special circumstances justify their response:

1. Vehicle burglaries when the stolen articles are of minor value;
2. Petty theft from vehicles (tires, batteries, etc.);
3. Out of county stolen vehicles;
4. Attempted entry or attempted burglary;
5. Malicious mischief;
6. Illegal dumping.

B. The CSI Unit should not be dispatched for the sole purpose of recovering or transporting property or items (including the service of search warrants).

1. The CSI Unit will not transport items listed as “Found Property,” “Safekeeping,” or “Destruction,” unless special circumstances arise.

2. The CSI Unit should not be called out to deliver alcohol kits, DNA kits, rape kits, or packaging supplies, unless emergency circumstances justify their response.

3. Narcotics will not be transported by the CSI Unit. This is due to the requirement for weighing and performing a presumptive test (reference the Property Manual).

C. For submitted items, it may help for the investigator to discuss the request with a member of the CSI Unit prior to the evidence being analyzed.

1. For vehicles, an investigator will need to be present during some portion or all of the documentation.

2. For bloodstain pattern analysis (BPA) cases, the circumstances of the case will need to be relayed to the analyst prior during to the interpretation. Many conclusions in BPA are directly related to proving or disproving a statement by a witness or a hypothetical situation.

## V. RESULTS OF ANALYSIS AND REPORTING

A. Results of field tests are considered a conclusion of the analyst performing the test.

1. These results are sometimes crucial to the investigation and may be shared as a preliminary finding in the field. If a result is shared, it will be noted in the scene documentation.

2. The completed documentation of the field tests will be in the final report for that case.

3. The analyst who authored the report is qualified to testify regarding the conclusions or results of analyses.

B. For every crime scene response by Bureau personnel, a report will be issued covering the activities at the crime scene and the results of any testing done. The primary responder will be the author of the report and may cover the activities performed by any the assisting responder(s) at the same crime scene. The photographs taken during the response will be maintained on the Sheriff's Imaging Storage Sever (SISS) and can be made available to investigators upon request.

C. The primary responder that wrote the report will be responsible for testifying to the content of the report. The CSI Unit personnel that performed each task will be responsible for testifying to the techniques used in the case. Each CSI Unit member is responsible for their conclusions made, the photographs taken during analysis, the contents of their notes, and the contents of their report.

Effective Date: 03/22/2023

# Ventura County Sheriff's Forensic Services Bureau

# Fingerprint Unit
# Forensic Services Handbook

## I. SERVICES PROVIDED

A. The Fingerprint Unit provides latent print processing for items collected at crime scenes and submitted to the FSB.

B. The Fingerprint Unit provides evaluation of latent prints collected at crime scenes and/or developed from proessed items of evidence.

C. The Fingerprint Unit enters latent prints into local, state, and/or federal fingerprint databases.

D. The Fingerprint Unit provides comparison of latent prints to possible candidates (from fingerprint database searches) and/or to the known print exemplars from individuals associated with the case (suspect, victim, etc.).

E. The Fingerprint Unit can access the fingerprint database archives to provide fingerprint data and comparisons for outside agencies, including the Medical Examiner's Office and the District Attorney's Office.

F. The Fingerprint Unit provides limited ten-print functions, such as quality control (QC) checks of all new incoming LiveScan booking records.

## II. REQUESTS FOR SERVICE AND EVIDENCE SUBMISSION

A. After items are booked into the West County Property Room, a service request must be completed and submitted in BEAST. Refer to the Sheriff's Property Manual regarding the booking of evidence.

B. Any request for fingerprint comparison to a suspect requires the individual's Criminal Information and Identification (CII) Number on the request.

C. Please contact the Fingerprint Unit Supervisor at (805) 650-4081 for any request that is time sensitive.Fingerprint work can be prioritized, and is routinely prioritized, if there is an urgent need for investigation or for court purposes.

## III. METHODS OF ANALYSIS

A. The Fingerprint Unit utilizes methods of analysis that are generally accepted in the scientific community and appropriate for the analysis being performed. Standard Operating Procedures (SOPs) exist in the for these methods.

B. Many techniques are available for the processing of evidence in search of friction ridge detail. Below is a partial list of the most common types of processing techniques:

1. Physical processing techniques

   a. Powders;
   b. Superglue (cyanoacrylate) fuming;
   c. Small particle reagent.

2. Chemical processing techniques

   a. Ninhydrin;
   b. Dye or fluorescent stains;
   c. Blood enhancement reagents.

3. Various additional techniques can be used for specific surface types.

## IV. SCOPE OF ANALYSIS

A. Many surface types are suitable for fingerprint processing.

1. Smooth surfaces are the best for developing friction ridge detail.

2. Porous items, such as paper, are a relatively good material to successfully develop latent prints.

3. Textured or very small surfaces are likely not amenable to latent print processing.

B. All latent print cards collected in the field will be evaluated and, if latent prints of value are located, these will be entered into the applicable fingerprint databases.

C. For submitted items of evidence that have service requests from multiple disciplines in the FSB, it will be necessary for the investigator to discuss the requests with a unit supervisor prior to the evidence being analyzed. For example:

1. Certain items with DNA and fingerprint requests may need to be processed using only one fingerprint processing technique.

2. A decision may need to be made where only fingerprint processing OR only the collection of DNA is performed because both techniques cannot be done on that surface without compromising the other type of evidence.

3. Sequencing the processing of bloody items may require a Forensic Scientist in DNA to assist in the collection of the stains, prior to fingerprint processing.

4. Firearms requiring fingerprint processing, DNA collection, and firearms requests will need to be properly sequenced.

   a. All firearms submitted for latent print processing will be swabbed for touch DNA.

   b. Fired ammunition components (bullets and cartridge cases) and unfired ammunition will not be processed for latent prints. An exception to this rule will be made for homicide cases.

D. The fingerprint examiner may contact the investigator on older cases to check on the investigative status of a case prior to starting a fingerprint comparison.

E. Comparison requests for the identification of in-custody individuals from the District Attorney's Office will require information on the arrest dates for the records that will be used in the comparison.

F. Comparison requests of deceased individuals will likely require communication with Medical Examiner staff to clarify the records needed.

## V. RESULTS OF ANALYSIS AND REPORTING

A. For all fingerprint work done, a report will be issued covering the activities taken, results obtained, and/or conclusions made.

B. Results of fingerprint processing, fingerprint database entry, and comparison are considered a conclusion of the analyst performing the test.

C. Fingerprint database entry is used as a screening tool for latent prints. A list of possible candidates rendered from the database search may be provided to the requesting agency without a completed comparison, as an investigative lead, as long as the possible candidate is listed as not being confirmed. An additional report will be issued for cases where a comparison was done.

D. The Fingerprint Unit personnel that performed the task(s) will be responsible for testifying to the techniques used in the case, the conclusions made, the photographs taken during analysis, the contents of their notes, and the contents of their report.

# Ventura County Sheriff's Forensic Services Bureau

# Firearms
# Forensic Services Handbook

## I. SERVICES PROVIDED

A. Firearm Section of the Forensic Services Bureau analyzes firearms, ammunition, ammunition components, clothing and other items believed to have been involved in shooting incidents and other criminal cases.

B. The Firearms Section also provides expert testimony on firearm analysis, firearms operability, distance determinations, and bullet path analysis.

C. The Firearms Section is also responsible for the National Integrated Ballistic Information Network (NIBIN) program in Ventura County.

## II. EVIDENCE SUBMISSION

A. An electronic LIMS service request must be completed and submitted to the Forensic Services Bureau. All required fields on the service request must be filled out, including the "Exam Requests" section for each item being submitted and the type of exam requested

Please note that the “Date Evidence Recovered” is a critical field when being used to search for possibly related cases using NIBIN.

B. The Bureau provides the following sample submission guidelines:

1. The evidence container should be tape sealed and the officer sealing the container should place their initials on the seal.

2. Firearms submitted to the Property Room need to have either a green sticker or a red sticker. The green sticker indicates that the firearm is unloaded, and the red sticker means that the firearm is loaded. The person submitting the evidence needs to initial the green or red sticker.

C. The Bureau utilizes methods of analysis that are generally accepted in the scientific community and appropriate for the analysis being performed.

D. Requests for “rush” or “expedited” analysis should be brought to the attention of the Firearms Section Supervising Forensic Scientist at (805) 654-2370.

## III. SCOPE OF ANALYSIS

A. The following types of evidence are routinely examined:

- Bullets;

- Cartridge cases;
- Shotshells;
- Live ammunition;
- Guns;
- Vehicles;
- Clothing.

B. The following chemical elements and compounds may also be identified:

- Copper;
- Lead;
- Nitrites.

C. The following types of examinations can be carried out by the Firearms Section:

- Firearms malfunction examination;
- Trigger pull determination;
- Rendering firearms safe (including the removal of rust from firearms);
- Caliber, shot and wadding determination;
- Microscopic examination of debris on projectiles and cartridge cases;
- General rifling characteristics (GRC) determination on fired bullets;
- Bore and chamber casting for caliber determination of firearms;
- Barrel length and overall length measurements of firearms;
- Casting of toolmarks;
- Serial number restoration;
- Bullet hole and range determination;
- Physical matching;
- Trace metal detection;
- Trajectory and bullet path analyses;
- Velocity determination;
- Cartridge case ejection pattern examination;
- X-ray of firearms;
- Full-auto (machinegun) examination;
- IBIS BrassTrax-3D.

D. The following types of examinations are not carried out by the Firearms Section:

- Gunshot residue testing (GSR);
- High explosives;

- If the Bureau cannot perform an analysis, the case may be sent to an outside laboratory for analysis. The cost of the analysis will be paid for by the submitting agency or DA's Office.

E. If there are questions on whether the Bureau can perform a particular analysis, please contact the Firearms Section Supervising Forensic Scientist or designee at (805) 654-2370.

## IV. RESULTS OF ANALYSIS AND REPORTING

A. Results are considered a conclusion of the analyst performing the test. The analyst who authored the report is qualified to testify regarding the conclusions or results of analyses.

B. The Bureau may provide interpretation or opinions of the results of analyses for consultation or testimony purposes. Please contact the person who signed the report at (805) 654-2308 for information about the report.

# Ventura County Sheriff's Forensic Services Bureau

# Fire Debris
# Forensic Services Handbook

## I. SERVICES PROVIDED

A. The Fire Debris unit is not performing casework at this time. All Fire Debris cases are being sent to an accredited outside laboratory. The evidence submission requirements below still apply for submitting evidence. At this time Fire Debris is not part of the Bureau's scope of accreditation.

B. The Fire Debris Unit analyzes clothing, liquids, and other material samples suspected of being involved in a crime. One of the major questions to be answered by the analyst is what investigative lead can be determined and given to the investigating officers.

C. The Bureau also provides expert testimony in comparative analysis for court purposes.

## II. EVIDENCE SUBMISSION

A. A service request must be completed and submitted to the Forensic Services Bureau. All required fields on the service request must be filled out, including the section for each item being submitted and the type of service requested.

B. The Bureau provides the following evidence packaging guidelines. **If evidence does not meet the submission guidelines, the Bureau will return the evidence <u>unexamined</u> for appropriate repackaging**. Some airtight packaging may be remediated at the Bureau if necessary.

1. Do not submit items that the agency does not want examined. In order to minimize the number of items handled by Bureau staff and reduce the amount of time spent cataloging and marking evidence, only those items which need to be examined should be submitted to the Bureau.

2. All items should be packaged in such a way to prevent loss, deleterious changes, contamination, or transfer.

3. Envelopes, paper bags, paint cans, or boxes must be sealed with evidence tape. Nylon arson bags should be heat-sealed. The seal shall be initialed by the officer or property personnel placing the evidence in the packaging.

    a. All cardboard boxes must have the top and bottom flaps sealed with tape and initialed. The seals must prevent the escape of the contents and ensure that future entrance into the package is obvious.

4. When results need to be expedited, a request should be made to the Chemistry Section Supervising Forensic Scientist or designee at (805) 654-3724.

    a. Typically, cases will be examined in order by date of receipt in the Bureau and in order of seriousness of the crime.

    b. It is important in expedited cases that the evidence be forwarded rapidly to the Bureau to provide Bureau staff sufficient time to complete the analyses.

## III. METHODS OF ANALYSIS

A. The Bureau utilizes methods of analysis that are generally accepted in the scientific community and appropriate for the analysis being performed. These include:

- Gas Chromatography-Mass Spectrometry (GC/MS) for ignitable liquids;

B. The following analysis guidelines have been adopted by the Bureau:

1. The type and extent of services performed by the Bureau will be determined based on the type of crime and the circumstances of the case.

2. The analyst receiving the evidence will screen the request for compliance with this policy. The analyst assigned to the case will determine the particular analyses to be performed.

3. Limited Bureau staffing and resources prevent the examination of all confiscated items in each case. Consequently, guidelines have been developed to ensure the efficient and successful analysis of cases for the criminal justice system while minimizing unnecessary examinations by Bureau staff members.

## IV. SCOPE OF ANALYSIS

A. The following is a list of evidence that is typically examined by the Comparative Analysis Section. The Bureau is not limited in scope to this list and has the capacity to analyze other items. The turnaround time for analysis varies depending upon the complexity of the case.

- Clothing;
- Burned material;

## V. RESULTS OF ANALYSIS AND REPORTING

A. Results of fire debris cases are considered a conclusion of the analyst performing the test. The analyst who authored the report is qualified to testify regarding the conclusions or results of analyses.

B. The Bureau may provide interpretation or opinions of the results of analyses for consultation or testimony purposes. Please contact the person who signed the report at (805) 654-2370 for information about the report.

# Ventura County Sheriff's Forensic Services Bureau

# Forensic Biology
# Forensic Services Handbook

## I. SERVICES PROVIDED

A. The Forensic Biology Section:

- Inventories and preserves sexual assault evidence collection kits;
- Screens items of evidence for the presence of blood, semen, and saliva;
- Collects samples from areas of evidence that may contain “touch” DNA (cellular material suitable for DNA analysis that is present on items simply by coming into contact with an individual);
- Examines hairs for suitability for DNA analysis;
- Performs DNA analysis on suitable evidence items for comparison with reference samples from known individuals;
- Enters qualifying evidence and suspect profiles into CODIS (Combined DNA Index System);
- Recommends alternative forms of DNA testing and probabilistic genotyping, when appropriate.
- Facilitates sending evidence to outside laboratories upon request of the submitting agency

## II. REQUEST FOR ANALYSIS SUBMISSION

A. An electronic LIMS service request must be completed and submitted to the Forensic Services Bureau. If the following sections are not adequately filled out, the service request will be sent back with a request for more information:

- The “Details of Investigation” section must contain all of the pertinent information about the submitted evidence and how it relates to the crime.
- The “Exam Requests” section must contain a description of the evidence items submitted. For example, “swabs” is not descriptive enough; “swabs taken from the point of entry” is descriptive enough.

## III. CASE SUBMISSION GUIDELINES

A. AUTHORIZATION TO CONSUME THE DNA EVIDENCE

If the evidence sample submitted for analysis is a “touch” sample, then the Bureau requires that authorization to consume the DNA evidence be given to us. This should be from the investigator in the case, or the District Attorney’s (DA’s) Office in cases that already have involvement from the DA’s Office. *Analysis will not proceed until this information is provided*.

The best place to provide this information is in the “Details of Investigation” portion of the service request.

B. REFERENCE SAMPLES

Reference samples are either blood samples or buccal swabs (a swab of the inside cheek area of a person’s mouth) taken from an individual. These samples are used to obtain a known DNA profile from an individual in the case for comparison to evidence profiles. Reference samples from victims and suspects must be submitted with the evidence.

C. CASES THAT WILL NOT BE ACCEPTED

At this time, the Bureau is not accepting the following type of cases for DNA analysis:

- Misdemeanors;
- Drug possession cases.

Exceptions can be made on a case-by-case basis. Please contact the Forensic Biology Supervisor at (805) 477-7261 to discuss the possibility of an exception on a particular case.

The Bureau may decide, depending on case particulars, not to process an item on a certain case or a case in general.

D. PATERNITY CASES

The Bureau will accept paternity cases, including products of conception (living or deceased) and miscarriage. The laboratory report will simply state that a particular person could be or could not be a parent. For a statistical analysis, the Bureau can send the results to a paternity lab at the user agency’s expense.

E. UNKNOWN OR NO SUSPECT CASES

DNA profiles from possible perpetrators obtained from evidence in crimes with unknown or no suspects are entered into CODIS (Combined DNA Index System) for searching against DNA profiles in the local, state, and national databases. If a match that adds information to an investigation is made between the evidence profile and the local or national databases, the agency will be notified via a written report. If a match that adds information to an investigation is made between the evidence profile and the state database, a notification will be made via CHOP (CODIS Hit Outcome Project). CHOP was developed by the California Department of Justice (DOJ), Bureau of Forensic Services (BFS) in partnership with the

Western States Information Network (WSIN). The CHOP database is located within WSIN's Regional Information Sharing System Network (RISSNET). Information about the match, including the matching person's name and CII number, is entered into CHOP by DOJ BFS. Then, CHOP sends an alert e-mail to the CODIS Administrator (CA) and the Alternate CODIS Administrator (ACA) notifying them that a match entry is available in CHOP. The CA or ACA logs into CHOP and enters the law enforcement agency, agency case number, offense, and offense date into for the match entry. CHOP sends an alert e-mail to the CHOP contacts at the law enforcement agency and the District Attorney's Office. The law enforcement agency CHOP contact logs into CHOP and accesses the information about the match.

Questions regarding CHOP should be directed to the Local CODIS Administrator, Christina Tokatlian, at (805) 654-2370.

Prior to analyzing evidence from crimes with no or unknown suspects, the following two requirements must be met:

- If an item is submitted for analysis with the intent of identifying perpetrator DNA and that item is likely to have DNA from people other than the perpetrator, then reference samples must be submitted from the other people. For instance, the perpetrator enters a home and uses a kitchen knife from the counter to stab the victim. The victim reference sample must be submitted, but also any other people that could have used that knife, for instance, a spouse. The Bureau must eliminate the possibility of entering a victim or uninvolved person's DNA profile into CODIS. Analysis will not proceed until the necessary samples are provided.
- The Bureau must have documentation from the submitting agency explaining why the submitted item of evidence is thought to be involved in the crime. For instance, a cigarette butt is submitted for analysis with the simple explanation that it was found in a business after a burglary. The Bureau needs to document that there is a reason the cigarette butt is thought to be associated with the crime. For instance, a surveillance camera recorded the perpetrator smoking, or the cigarette butt was not in the business prior to the burglary**.** The best place to provide this information is in the "Details of Investigation" portion of the service request.

## IV. METHODS OF ANALYSIS

A. The Bureau uses the following tests to locate and identify possible blood stains, possible saliva, and semen stains:

- Phenolpthalein, Hemastix, luminol, Takayama, Acid phosphatase spot test and mapping, methylumbelliferyl phosphate mapping, ABAcard, microscopy, amylase radial diffusion and Phadebas mapping.

B. The Bureau uses the following tests during DNA analysis:

- DNA is extracted from the samples using a QIAgen EZ1XL robot or phenol/chloroform extraction.
- The recovered DNA extracts are evaluated for the quantity of DNA present using the Quantifiler® Trio DNA Quantification Kit. DNA extracts are amplified using the polymerase chain reaction (PCR) of twenty-one short tandem repeat (STR) loci (D3S1358, vWA, D16S539, CSF1PO, TPOX, D8S1179, D21S11, D18S51, D2S441, D19S433, TH01, FGA, D22S1045, D5S818, D13S317, D7S820, SE33, D10S1248, D1S1656, D12S391, and D2S1338), the gender marker Amelogenin, and two Y chromosome specific markers (Y indel and DYS391) using the GlobalFiler™ PCR Amplification Kit.
- The amplified DNA is instrumentally analyzed using an Applied Biosystems® 3500 Genetic Analyzer.
- The data obtained from the Genetic Analyzer is analyzed using GeneMapper ID-X software.
- DNA mixture interpretation is conducted using STRmix™, a probabilistic genotyping software program.
- The Bureau uses the NIST allele frequency data.

# Ventura County Sheriff's Forensic Services Bureau

# Toxicology
# Forensic Services Handbook

## I. SERVICES PROVIDED

A. The Forensic Toxicology Section of the Forensic Services Bureau (FSB) analyzes blood and urine samples qualitatively and quantitatively for the presence of prescription drugs and drugs of abuse in criminal cases.

## II. EVIDENCE SUBMISSION (bodily fluids)

A. An electronic LIMS service request must be completed and submitted via the Bar Coded Evidence Tracking and Statistics (BEAST) Prelog system to Forensic Services Bureau. All required fields for blood or urine collection on the service request must be filled out, including the requested service type for each item being submitted. Samples will be assigned for Toxicology analysis based on the service requested.

   1. The blood and urine collection kits must be delivered to the Bureau within 30 days of the submission of the service request to BEAST. After thirty days, the service request will be cancelled and a new one must be submitted for the evidence to be accepted by the Bureau.

B. The Forensic Services Bureau supplies blood and urine collection kits to all law enforcement agencies in the county. The kits include instructions for the collection and submission of blood and urine samples. The labels supplied with the kits must be filled out completely.

C. A designated person from the laboratory will enter the necessary clerical information into the Laboratory Information Management System (Barcoded Evidence Analysis Statistical Tracking, BEAST) for specimens to be analyzed in the Toxicology Section.

   1. Any minor discrepancies found on the packaging or specimen container written label will be recorded in the <u>observations</u> field in BEAST, which will be captured in the analytical notes.

      a. Misspelling of the subject name (e.g., Jon vs John), the order of the subject name (e.g., Joe Smith Doe vs Joe Doe Smith) or any other minor discrepancies.

   2. Any important information pertaining to the entire case will be recorded in the *report notes* field and it will appear on the Toxicology report.

   3. The evidence will be rejected if it is not properly sealed (envelope seal is not intact and/or initialed) or if there is a major discrepancy regarding the subject name or agency #.

D. Bureau submission guidelines:

1. Two blood vials are typically necessary to complete confirmatory testing for all possible drugs present in the case. Blood specimens collected a few minutes apart are considered the same blood draw.
2. The Toxicology Section does not test any other bodily fluids besides blood and urine.
3. The toxicological presumptive testing will be assigned to DUI blood cases as follows:
    a. If the requested exam type on the service request is alcohol only, it will be tested for alcohol. Toxicological analysis will not be automatically performed on the case when the blood alcohol result is below 0.080 %. A law enforcement agency may submit an additional request for toxicological analysis based on the information on the police report.
    b. If the requested exam type on the service request is toxicological analysis only, the case will come directly to the Forensic Toxicology Section. Alcohol analysis will not be performed on the case. A law enforcement agency may submit an additional request for alcohol analysis.
    c. If the requested exam type on the service request is alcohol and toxicological analysis, the case will be assigned to the Forensic Toxicology Section only if the blood alcohol result is at or below 0.080 %. The section supervisor may assign Toxicological analysis for DUI cases with alcohol between 0.08 – 0.1 % and information on the service request that indicates drug use.

## III. TESTING PANELS BY OFFENSE TYPE

### A. HS 11550, JUVENILE, PRE-EMPLOYMENT, AND VOP CASES:

#### 1. PRESUMPTIVE TESTING

**BLOOD**

By Immunoassay (ELISA):

Methamphetamine
Cocaine/metabolites
Opioids

**URINE**

By Immunoassay (ELISA or EIA):

Methamphetamine (ELISA) or Amphetamines (EIA)
Cocaine
Opiates

*Notes:*

1. *Upon request by a law enforcement agency and approval by the section supervisor, the Bureau can also screen for other drugs covered under California Health & Safety code 11550.*
2. *Confirmatory tests for HS 11550, VOP, and juvenile cases are performed upon request of a law enforcement agency only.* A report note *will be* added to the report indicating that. *Confirmatory tests for pre-employment cases are performed automatically.*
3. *Pre-employment cases are also screened for cannabinoids.*
4. *VOP cases are also screened for cannabinoids if the test is positive in the field or requested by the submitting agency and the initial screening results by ELISA for amphetamines, cocaine and opiates are not detected.*
5. *Fentanyl screen will be added to any 11550, violation of probation/parole or juvenile cases with Not Detected results for methamphetamine, cocaine, and opioids, and the service request states fentanyl is suspected or there is a positive field test noted in the service request.*
6. *Other additional tests may be ordered for 11550/ juvenile/violation of probation (parole cases) upon request of a law enforcement agency and approval of the section supervisor or designee.*

2. **CONFIRMATORY ANALYSES** of positive or inconclusive screening results are performed by Gas Chromatography-Mass Spectrometry (GC/MS) using Selected Ion Monitoring (SIM) or Scan mode methods or by Liquid Chromatography-Tandem Mass Spectrometry (LC/MS/MS) using Multiple Reaction Monitoring (MRM) acquisition methods or by Gas Chromatography-Nitrogen-Phosphorus Detector-Mass Spectrometry (GC/NPD/MS).

## B. DUID AND SEXUAL ASSAULT:

a. **PRESUMPTIVE TESTING**

**BLOOD**

By Immunoassay (ELISA):

Methamphetamine
Amphetamine
Cocaine/Metabolites
Opioids
Oxycodone
Benzodiazepines
Cannabinoids
Methadone
Zolpidem
Fentanyl

**URINE**

By Immunoassay (ELISA or EIA):

Methamphetamine (ELISA) or Amphetamines (EIA)
Amphetamine (ELISA)
Cocaine
Opiates
Benzodiazepines
Cannabinoids
Oxycodone
Methadone
Zolpidem
Fentanyl

b. **Other Offenses** - For other offenses, the drug screen panel will depend on the charge and the section supervisor or designee retains final discretion about the panel.

*Notes:*

1. *Sexual assault and DUID case sample results that are reported as positive or inconclusive will automatically be scheduled for confirmation by GC/MS or LC/MS/MS.*
2. *Upon request by a law enforcement agency and approval by the section supervisor, the Bureau can also screen for barbiturates, tramadol, carisoprodol, PCP, and buprenorphine in blood and urine.*

3. *Carisoprodol, zolpidem, and fentanyl may not be included in the presumptive testing of other felony charges not related to driving or sexual assault cases.*
4. *Confirmatory testing for buprenorphine in urine is performed by an outside laboratory (NMS Labs).*
5. *A comprehensive analysis by GC/NP/MS and or GC/MS (DRUG ID) will be ordered for any DUID case involving traffic collision with injury and/or fatality that generates all not detected results by ELISA.*
6. *A comprehensive analysis by GC/NPD/MS and or GC/MS (DRUG ID) may be ordered for SA cases. The test will normally be ordered for the urine sample unless this specimen is not available.*
7. *The section supervisor or designee may order additional testing upon review of the service request and results of the presumptive testing listed above.*

c. **CONFIRMATORY ANALYSIS** of positive or inconclusive screening results is performed by GC/MS using SIM or Scan mode methods or by LC/MS/MS using MRM acquisition methods or by GC/NPD/MS.

*Note: A sample whose value is greater than the limit of linearity of the assay and whose ion ratios are conserved may be reported qualitatively as "POSITIVE (> highest calibrator)". Those samples will not be automatically diluted and rerun to bring the result within the calibration curve. If a written request for quantitation is received, the supervisor or designee will assess the request and will contact the requestor if further clarification is necessary prior to making the final decision.*

d. **ADDITIONAL ANALYSIS**:

ii. Identification of acidic/basic/neutral drugs in blood and urine by GC/MS or GC/NPD/MS. This comprehensive screening detects common prescription drugs and drugs of abuse. Refer to a detailed list of all analytes included in this analysis in the section that describes the identification of acidic/basic/neutral drugs in body fluids in this Handbook.

iii. Quantitation of basic drugs in blood. Drugs identified by the comprehensive screening can be sent out to a reference laboratory

for quantitative analysis (refer to the send out section of this handout).

*Note: When a toxicology case has been completed within the scope of the Toxicology Program, any request for additional analysis will ONLY be performed if the request by a law enforcement agency is supported by observations on the police report. The CRE or DAARF sent by the requesting agency for additional work MUST include the police report or sufficient information about the subject's evaluation. This information will be required to assess logically and scientifically the signs, symptoms, and behavior displayed by the subject to support the additional testing.*

## IV. PRESUMPTIVE TESTING IN BLOOD

**Qualitative Analysis of Drugs of Abuse by ELISA (Enzyme-Linked Immunosorbent Assay) using the TECAN instrument:** The micro-plate ELISA is a competitive immunoassay for the qualitative determination of drugs of abuse in bodily fluid samples. The sample, calibrator, or control is added to each well along with enzyme-labeled hapten derivative. There is a competition to bind to the antibody fixed onto the well. The wells are washed, substrate is added, and a color is produced. The absorbance produced (450 nm) is inversely proportional to the amount of drug present in the sample and calibrator/control. The TECAN is an automated system that provides robotic pipetting of the samples and reagents, plate washing, plate reading, and data analysis. The required sample volume is 200 µL.

| CLASS | TARGET ANALYTE[1] | CUTOFF |
|---|---|---|
| METHAMPHETAMINE | Methamphetamine | 40 ng/mL |
| AMPHETAMINE | Amphetamine | 40 ng/mL |
| COCAINE | Benzoylecgonine | 50 ng/mL |
| OPIATES | Morphine | 20 ng/mL |
| OXYCODONE | Oxycodone | 20 ng/mL |
| BENZODIAZEPINES | Clonazepam | 50 ng/mL |
| BARBITURTES | Secobarbital | 100 ng/mL |
| CANNABINOIDS | COOH-THC | 10 ng/mL |
| CARISOPRODOL | Carisoprodol | 500 ng/mL |
| ZOLPIDEM | Zolpidem | 20 ng/mL |
| TRAMADOL | Tramadol | 20 ng/mL |
| FENTANYL | Fentanyl | 2 ng/mL |
| METHADONE | Methadone | 50 ng/mL |
| BUPRENORPHINE | Buprenorphine | 1 ng/mL |

Notes:

1. Screening kits have different cross reactivity with many structurally related compounds in each class. See manufacturer for cross reactivity data.

2. **CONFIRMATORY ANALYSES** of positive or inconclusive screening results are performed by Gas Chromatography-Mass Spectrometry (GC/MS) using Selected Ion Monitoring (SIM) methods or by Liquid Chromatography-Tandem Mass Spectrometry (LC/MS/MS) using Multiple Reaction Monitoring (MRM) acquisition methods or by Gas Chromatography-Nitrogen-Phosphorus Detector-Mass Spectrometry (GC/NPD/MS).

*** An "inconclusive" result either means that a weak response, below the Bureau's reporting cutoff for this assay, was observed for the compound or compounds in the indicated class or was due to the low selectivity of the antibody in the indicated class. Confirmatory testing for this class may, or may not, yield a positive finding.*

## V. CONFIRMATORY TESTS IN BLOOD

A. **Amphetamines by GC/MS**: This method is used to quantitatively and/or qualitatively confirm the presence of amphetamine and methamphetamine in blood samples that previously tested positive by ELISA or LC/MS TOF. This method uses a liquid-liquid extraction followed by GC/MS analysis. MDA and MDMA can also be detected with this method. Phentermine, ephedrine, pseudoephedrine, and phenylpropanolamine do not interfere with this method. The required sample volume is 2 mL.

| ANALYTES | LOD |
|---|---|
| Amphetamine | 25 ng/mL |
| Methamphetamine | 25 ng/mL |
| MDA | 25 ng/mL |
| MDMA | 25 ng/mL |

B. **Pain Management Drugs/Fentanyl Analogues Confirmation using LC-QQQ**: This method is used to quantitatively and/or qualitatively confirm the presence of Codeine, Morphine, Hydrocodone, Hydromorphone, Oxycodone, Oxymorphone, Meperidine, Normeperidine, Methadone, EDDP (Methadone metabolite), Tramadol, O-Desmethyltramadol, Tapentadol, Fentanyl, and Norfentanyl in biological matrices extracted by solid phase extraction followed by LC-QQQ analysis. This method is also used to *qualitatively* confirm the presence of 6-Monoacetylmorphine (6-MAM), Buprenorphine, and Norbuprenorphine. An additional procedure is outlined to qualitatively confirm the following Fentanyl Analogues: 4-ANPP, Acetyl Fentanyl, Carfentanyl, Furanylfentanyl, and. The required sample volume is 1 mL.

| ANALYTES | LOD/LOQ |
|---|---|
| Codeine: | 10 ng/mL |
| Morphine: | 10 ng/mL |
| 6-MAM: | 1 ng/mL (Qualitative) |
| Hydrocodone: | 10 ng/mL |
| Hydromorphone: | 10 ng/mL |
| Oxycodone: | 10 ng/mL |
| Oxymorphone: | 10 ng/mL |
| Meperidine | 10 ng/mL |
| Normeperidone | 10 ng/mL |
| Tramadol | 10 ng/mL |
| O-desmethyltramadol | 10 ng/mL |
| Methadone | 10ng/mL |
| EDDP | 10 ng/mL (Qualitative) |
| Tapentadol | 10 ng/mL |
| Fentanyl | 1 ng/mL |
| Norfentanyl | 1 ng/mL |
| Buprenorphine | 1 ng/mL |
| Norbuprenorphine | 1 ng/mL |

C. **Cocaine and metabolites by GC/MS**: This method is used to quantitatively and/or qualitatively confirm the presence of cocaine, cocaethylene, and benzoylecgonine in blood samples that previously tested positive by ELISA or LC/MS TOF. This method uses solid-phase extraction, derivatization with BSTFA followed by SIM GC/MS analysis. The required sample volume is 2 mL.

| ANALYTES | LOD |
|---|---|
| Cocaine | 20 ng/mL |
| Cocaethylene (CE) | 20 ng/mL (qualitative) |
| Benzoylecgonine (BE) | 20 ng/mL |

D. **BENZODIAZEPINES AND ZOLPIDEM CONFIRMATION IN BLOOD USING LC/MS/MS**: This method is used to quantitatively and/or qualitatively confirm the presence of alprazolam, alpha-hydroxyalprazolam, clonazepam, 7-aminoclonazepam, lorazepam, flunitrazepam, 7-aminoflunitrazepam, flurazepam, desalkylflurazepam, midazolam, alpha-hydroxymidazolam, chlordiazepoxide, diazepam, nordiazepam, oxazepam, temazepam and zolpidem in blood samples that previously tested positive for benzodiazepines and / or zolpidem by enzyme immunoassay. The method uses solid-phase extraction followed by LC/MS/MS analysis. The required sample volume is 1 mL.

| ANALYTES | LOD/LOQ |
|---|---|
| Clonazepam | 10 ng/mL |
| 7-Amino clonazepam | 10 ng/mL |

| | | |
|---|---|---|
| Lorazepam | | 10 ng/mL |
| Alpha-hydroxyalprazolam | | 10 ng/mL |
| Alprazolam | | 10 ng/mL |
| 7-aminoflunitrazepam | | 10 ng/mL |
| Zolpidem | | 10 ng/mL |
| Alpha-hydroxymidazolam | | 10 ng/mL |
| Midazolam | | 10 ng/mL |
| Flurazepam | | 10 ng/mL |
| Alpha-hydroxyalprazolam | | 10 ng/mL |
| Oxazepam | | 10 ng/mL |
| Nordiazepam | | 10 ng/mL |
| Clonazepam | | 10 ng/mL |
| Lorazepam | | 10 ng/mL |
| Alprazolam | | 10 ng/mL |
| Desalkylflurazepam | | 10 ng/mL |
| Flunitrazepam | | 10 ng/mL |
| Temazepam | | 10 ng/mL |
| Diazepam | | 10 ng/mL |
| Chlordiazepoxide | LOD | 10 ng/mL, LOQ 50 ng/mL |

E. **Barbiturates by GC/MS (scan mode)**: This method is used to qualitatively confirm the presence of barbiturates in blood samples that previously tested positive by ELISA (if requested). The method uses solid-phase extraction followed by GC/MS analysis. The required sample volume is 1 mL.

F. **Cannabinoids by LC/MS/MS:** This method is used to quantitatively and/or qualitatively confirm the presence of tetrahydrocannabinol (THC), 11-nor-9-carboxy-tetrahydrocannabinol (COOH-THC), and 11-hydroxy-tetrahydrocannabinol (OH-THC) in blood samples that previously tested positive by ELISA. The method uses liquid-liquid extraction followed by LC/MS/MS analysis. The required sample volume is 1 mL.

*Note: The current analytical method cannot differentiate the following compounds: Delta 9-THC and Delta 8-THC, Delta 9-Hydroxy THC and Delta 8-Hydroxy THC, as well as Delta 9-Carboxy THC and Delta 8-Carboxy THC. Delta-8-THC is found naturally in Cannabis among other cannabinoids compounds, though at substantially lower concentrations than delta-9-THC (major psychoactive component). However, delta-8 THC can be synthesized from cannabidiol (CBD) extracted from hemp. Even though delta-8 THC appears to be less potent than delta-9 THC, it binds to cannabinoids receptors and generates some response. To avoid issues regarding identifying these compounds and respective metabolites correctly, this method will be revalidated to exclude the interference of delta-8 THC among other cannabinoids compounds. In the meantime, the*

*cannabinoids reported by this method will be identified on the report as THC, Hydroxy-THC (OH-THC), and Carboxy THC (COOH-THC) only.*

| ANALYTES | LOD | LOQ |
|---|---|---|
| THC | 0.75 ng/mL | 1 ng/mL |
| OH-THC | 3.0 ng/mL | 5 ng/mL |
| COOH-THC | 2.5 ng/mL | 5 ng/mL |

G. **PCP by GC/MS**: This method is used to quantitatively and/or qualitatively confirm the presence of phencyclidine (PCP) in blood samples that previously tested positive by ELISA or GC/MS on scan mode. The method uses solid-phase extraction followed by GC/MS SIM analysis. The required sample volume is 2 mL.

| ANALYTE | LOD |
|---|---|
| Phencyclidine | 3 ng/mL |

H. **Carisoprodol by LC/MS/MS:** This method is used to quantitatively and/or qualitatively confirm the presence of carisoprodol and meprobamate in blood samples that previously screened positive by ELISA. The method uses “crash and shoot” sample preparation followed by LC/MS/MS analysis. The required sample volume is 100 µL.

| ANALYTES | LOD |
|---|---|
| Carisoprodol | 250 ng/mL |
| Meprobamate | 250 ng/mL |

## VI. PRESUMPTIVE TESTS IN URINE

**Qualitative Analysis of Drugs of Abuse by ELISA (Enzyme-Linked Immunosorbent Assay) using the TECAN instrument:** The micro-plate ELISA is a competitive immunoassay for the qualitative determination of drugs of abuse in bodily fluid samples. The sample, calibrator, or control is added to each well along with enzyme-labeled hapten derivative. There is a competition to bind to the antibody fixed onto the well. The wells are washed, substrate is added, and a color is produced. The absorbance produced (450 nm) is inversely proportional to the amount of drug present in the sample and calibrator/control. The TECAN is an automated system that provides robotic pipetting of the samples and reagents, plate washing, plate reading, and data analysis. The required sample volume is 20 µL.

| CLASS | TARGET ANALYTE[1] | CUTOFF |
|---|---|---|
| AMPHETAMINE | d-Amphetamine | 1000 ng/mL |
| METHAMPHETAMINE | d-Methamphetamine | 1000 ng/mL |
| COCAINE/BE | Benzoylecgonine | 300 ng/mL |

| | | |
|---|---|---|
| OPIOIDS | Morphine | 300 ng/mL |
| BENZODIAZEPINES | Oxazepam | 200 ng/mL |
| BARBITURATES | Secobarbital | 200 ng/mL |
| CANNABINOIDS | COOH-THC | 50 ng/ml |
| CARISOPRODOL | Meprobamate | 500 ng/mL |
| METHADONE | Methadone | 300 ng/mL |
| OXYCODONE | Oxycodone | 100 ng/mL |
| BUPRENORPHINE | Buprenorphine | 5 ng/mL |
| FENTANYL | Fentanyl | 2 ng/mL |
| TRAMADOL | Tramadol | 200 ng/mL |
| ZOLPIDEM | Zolpidem | 20 ng/mL |

**Qualitative Analysis of Drugs of Abuse by EIA (Enzyme Immunoassay) using the INDIKO Plus instrument**: EIA is based on the competition of drug labeled enzyme and free drug in a sample for a fixed amount of specific antibody binding sites. In the absence of free drug in the sample, the antibody binds the drug enzyme conjugate, and the enzyme activity is inhibited. This inhibition creates a direct relationship between drug concentration in the sample and enzyme activity. The enzyme activity is measured spectrophotometrically by its ability to reduce a fixed amount of substrate. The required sample volume is 20 µL.

| **CLASS** | **TARGET ANALYTE**[1] | **CUTOFF** |
|---|---|---|
| AMPHETAMINES | d-Methamphetamine | 1000 ng/mL |
| COCAINE/BE | Benzoylecgonine | 300 ng/mL |
| OPIOIDS | Morphine | 300 ng/mL |
| BENZODIAZEPINES | Oxazepam | 200 ng/mL |
| BARBITURATES | Secobarbital | 200 ng/mL |
| CANNABINOIDS | COOH-THC | 50 ng/ml |
| CARISOPRODOL | Meprobamate | 100 ng/mL |
| METHADONE | Methadone | 300 ng/mL |
| OXYCODONE | Oxycodone | 100 ng/mL |
| BUPRENORPHINE | Buprenorphine | 5 ng/mL |
| FENTANYL | Fentanyl | 1 ng/mL |
| TRAMADOL | Tramadol | 100 ng/mL |
| ZOLPIDEM | Zolpidem | 20 ng/mL |
| AB-PINACA | AB-Pinaca | 10 ng/mL |
| UR-144/XLR-11 | UR-144/XLR-11 | 5 ng/mL |

Notes:

a. Screening kits/reagents have different cross reactivity with many structurally related compounds in each class. See manufacturer for cross reactivity data.

b. **CONFIRMATORY ANALYSES** of positive or inconclusive** screening results are performed by Gas Chromatography-Mass Spectrometry (GC/MS) using Selected Ion Monitoring (SIM) methods or by Liquid Chromatography-Tandem Mass Spectrometry (LC/MS/MS) using Multiple Reaction Monitoring (MRM) acquisition methods or by Gas Chromatography-Nitrogen-Phosphorus Detector-Mass Spectrometry (GC/NPD/MS).

*** An "inconclusive" result either means that a weak response, below the Bureau's reporting cutoff for this assay, was observed for the compound or compounds in the indicated class or was due to the low selectivity of the antibody in the indicated class. Confirmatory testing for this class may, or may not, yield a positive finding.*

## VII. CONFIRMATORY TESTS IN URINE

1. **Amphetamines confirmation by GC/MS:** This method is used to qualitatively confirm the presence of amphetamine and methamphetamine in urine samples that previously tested positive by ELISA. The method uses a solid-phase extraction followed by GC/MS analysis. Ephedrine, pseudoephedrine, phentermine, and phenylpropanolamine do not interfere with this method. The required sample volume is 1 mL.

| ANALYTE | LOD |
|---|---|
| Amphetamine | 50 ng/mL |
| Methamphetamine | 50 ng/mL |

2. **Cocaine and benzoylecgonine by GC/MS:** This method is used to qualitatively confirm the presence of cocaine and benzoylecgonine in urine samples that previously tested positive by ELISA. The method employs a solid-phase extraction technique and subsequent silyl derivatization of benzoylecgonine for improved stability, chromatography, and detectability. Analysis is done by GC/MS in the SIM mode. The required sample volume is 2 mL.

| ANALYTE | LOD |
|---|---|
| Cocaine | 20 ng/mL |
| Benzoylecgonine | 20 ng/mL |

3. **Confirmation of codeine, morphine, 6-monoacetylmorphine, hydrocodone, hydromorphone, oxycodone and oxymorphone by GC/MS:** This method is used to qualitatively confirm the presence of codeine, morphine, 6-monoacetylmorphine (6-MAM), hydrocodone, hydromorphone, oxycodone, and oxymorphone in urine samples that have

previously tested positive for opiates and/or oxycodone by enzyme immunoassay. This method utilizes a solid-phase extraction technique, oxime derivatization of the keto-opiates (hydrocodone, hydromorphone, oxycodone, oxymorphone) and subsequent silyl derivatization of all seven compounds. Analysis is performed by GC/MS in the SIM mode. The method can be used to identify total morphine if the samples are hydrolyzed prior to extraction. The required sample volume is 2 mL.

| **ANALYTE** | **LOD** |
|---|---|
| Codeine: | 40 ng/mL |
| Morphine: | 20 ng/mL |
| 6-MAM: | 6 ng/mL |
| Hydrocodone: | 20 ng/mL |
| Hydromorphone: | 20 ng/mL |
| Oxycodone: | 20 ng/mL |
| Oxymorphone: | 40 ng/mL |

4. **Pain Management Drugs Confirmation using LC-QQQ** : This method will be used to qualitatively confirm the presence of Codeine, Morphine, Hydrocodone, Hydromorphone, Oxycodone, Oxymorphone, Methadone, EDDP (Methadone metabolite), Fentanyl and Norfentanyl in urine samples extracted by solid phase extraction followed by LC-QQQ analysis. The required sample volume is 1 mL.

| ANALYTES | LOD/LOQ |
|---|---|
| Codeine: | 25 ng/mL |
| Morphine: | 25 ng/mL |
| 6-MAM: | 2.5 ng/mL |
| Hydrocodone: | 25 ng/mL |
| Hydromorphone: | 5 ng/mL |
| Oxycodone: | 25 ng/mL |
| Oxymorphone: | 5 ng/mL |
| Methadone | 200ng/mL |
| EDDP | 200 ng/mL |
| Fentanyl | 1 ng/mL |
| Norfentanyl | 1 ng/mL |

5. **Barbiturates confirmation by GC/MS (scan mode)**: This method is used to qualitatively confirm the presence of barbiturates in urine samples that previously tested positive by ELISA (if requested). The method uses a solid-phase extraction followed by GC/MS or GC/NPD/MS analysis. The required sample volume is 2 mL.

6. **BENZODIAZEPINES AND ZOLPIDEM CONFIRMATION IN URINE USING LC/MS/MS**: This method is used to quantitatively and/or

qualitatively confirm the presence of alprazolam, alpha-hydroxyalprazolam, clonazepam, 7-aminoclonazepam, lorazepam, flunitrazepam, 7-aminoflunitrazepam, flurazepam, desalkylflurazepam, midazolam, alpha-hydroxymidazolam, chlordiazepoxide, diazepam, nordiazepam, oxazepam, Temazepam, etizolam and zolpidem in blood samples that previously tested positive for benzodiazepines and / or zolpidem by ELISA. The method uses solid-phase extraction followed by LC/MS/MS analysis. The required sample volume is 1 mL.

| **ANALYTES** | **LOD** |
|---|---|
| Clonazepam | 10 ng/mL |
| 7-Amino clonazepam | 10 ng/mL |
| Lorazepam | 10 ng/mL |
| Alpha-hydroxyalprazolam | 10 ng/mL |
| Alprazolam | 10 ng/mL |
| 7-aminoflunitrazepam | 10 ng/mL |
| Zolpidem | 10 ng/mL |
| Alpha-hydroxymidazolam | 10 ng/mL |
| Midazolam | 10 ng/mL |
| Flurazepam | 10 ng/mL |
| Alpha-hydroxyalprazolam | 10 ng/mL |
| Oxazepam | 10 ng/mL |
| Nordiazepam | 10 ng/mL |
| Clonazepam | 10 ng/mL |
| Lorazepam | 10 ng/mL |
| Alprazolam | 10 ng/mL |
| Desalkylflurazepam | 10 ng/mL |
| Flunitrazepam | 10 ng/mL |
| Temazepam | 10 ng/mL |
| Diazepam | 10 ng/mL |
| Chlordiazepoxide | 10 ng/mL |

7. **THC-COOH confirmation by GC/MS:** This method is used to qualitatively confirm the presence of THC-COOH in urine samples that previously tested positive by ELISA. The method uses a liquid/liquid extraction followed by GC/MS analysis. The required sample volume is 2 mL.

| **ANALYTE** | **LOD** |
|---|---|
| COOH-THC | 10 ng/mL |

8. **PCP confirmation by GC/MS**: This method is used to qualitatively confirm the presence of phencyclidine (PCP) in urine samples that previously tested positive by ELISA or GC/MS on scan mode. The method uses solid-phase extraction followed by GC/MS analysis. The required sample volume is 2 mL.

| ANALYTE | LOD |
|---|---|
| Phencyclidine | 10 ng/mL |

VIII. **Identification of acidic/basic/neutral drugs in body fluids:** This method is used to identify acidic/basic/neutral drugs in body fluids and tissues. The method uses a solid-phase extraction followed by injection on to the Gas chromatograph with nitrogen-phosphorus detector and mass spectrometer (GC/NPD/MS) and/or a gas chromatograph-mass spectrometer (GC/MS) instrument. This analysis can be used as screening and/or confirmatory methods. The required sample volume is 1 mL of blood and 2 mL of urine.

a. The analysis by GC/NPD/MS is used as a screening method for drugs not detected by ELISA or EIA. Confirmatory testing requires an extraction of a second sample aliquot followed by injection on to a GC/MS instrument.

b. The analysis by GC/NPD/MS or GC/MS may be used as a confirmatory method for drugs detected by ELISA or EIA.

*Note: For DUID cases, confirmatory testing for compounds detected by GC/NPD/MS will be performed only for drugs with the potential for central nervous system impairment.*

**Drugs Commonly Identified in Casework by the Comprehensive Screening**:

2-Ethyl-5-methyl-3,3-diphenylpyrroline (EMDP)
2-Ethylidene-1,5-dimethyl-3,3-diphenylpyrrolidine (EDDP)
7-aminoclonazepam
Acetaminophen
Alprazolam
Amitriptyline
Amoxapine
Amphetamine
Atropine
Benzphetamine
Benztropine
Brompheniramine
Bupivicaine
Bupropion
Caffeine
Carbamazepine
Carbinoxamine
Carisoprodol
Chlorcyclizine
Chlordiazepoxide
Chloroquine
Chlorpheniramine
Chlorpromazine
Chlorpyramine
Citalopram
Clomipramine
Clonidine
Clozapine
Cocaethylene
Cocaine
Codeine
Cotinine
CPP (Trazodone metabolite)
Cyclizine
Cyclobenzaprine
Delta-9 Tetrahydrocannabinol (THC)
Desalkylflurazepam
Desipramine
Desmethylclomipramine
Desmethylclozapine

Desmethyldiazepam (Nordiazepam)
Desmethyldoxepin
Dextromethorphan
Diazepam
Dicyclomine
Diltiazem
Diphenhydramine
Doxepin
Doxylamine
Ecgonine Methyl Ester (EME)
Ephedrine/Pseudoephedrine
Fentanyl
Fluoxetine
Fluphenazine
Flupromazine
Haloperidol
Hydrocodone
Hydroxybupropion
Hydroxyzine
Imipramine
Ketamine
Lamotrigine
Laudanosine
Levetiracetam
Levorphanol
Librium Breakdown#1
Lidocaine
Lidocaine metabolite
Maprotiline
Meclizine
Meperidine
Mepivacaine
Meprobamate
Methadone
Methamphetamine
Methapyriline
Methaqualone
Methylphenidate
Metoclopramide
Metoprolol
Mirtazapine
NAPA (N-acetyl procainamide)
Nicotine
Nifedipine
Nomephesine
Norchlorcyclizine
Norcodeine
Norcyclobenzaprine
Norfluoxetine
Normeperidine
Nortriptyline
Olanzepine
Orphenadrine
Oxycodone
Papaverine
Paroxetine
Pentazocine
Phencyclidine (PCP)
Phendimetrazine
Pheniramine
Phenylpropanolamine
Phenyltoloxamine
Phenytoin
Procainamide
Procaine
Prochlorperazine
Promethazine
Propanolol
Propofol
Propoxyphene
Quetiapine
Quinidine
Quinine
Selegiline
Sertraline
Tramadol
Trazodone
Trimethoprim
Trimipramine
Trimipramine metabolite
α-Phenethylamine
Valproic Acid
Venlafaxine
Zolpidem

## IX. TOXICOLOGY MEASUREMENT UNCERTAINTY BUDGET

1. Measurement Uncertainty (MU)

    a. Measurement Uncertainty (Uncertainty of Measurement): Is the variability associated with a quantitative measurement result based on the information known about the measurement method. In practical terms, estimated uncertainty of a measured value is an interval around that value such that any repetition of the measurement will produce a new result that lies within this interval with a stated level of confidence.

    b. Reporting a quantitative amount of drug in blood is considered to be a measurement that requires a corresponding uncertainty of measurement. Uncertainty will NOT be determined or reported for analytes that are reported qualitatively (this includes all urine analysis).

    c. Due to lack of drug per se legal limits in the state of California, measurement uncertainty for quantitative toxicology testing is not included on the test report but is available to the customer upon request.

## X. SEND OUT

A. The Bureau sends samples out to a qualified reference laboratory (NMS Labs) to perform analysis of compounds that cannot be detected and/or quantified in-house (e.g., gabapentin, duloxetine, topiramate, and volatiles). The costs of the testing, the discovery packet, and the testimony from NMS staff are borne by the requesting agency. The sample sent out must be approved by the requesting agency prior to the work being undertaken.

## XI. TESTIMONY

1. The Forensic Toxicology Section scientists are qualified to testify about the methodology and procedures employed on the analysis of casework in the section.

2. The Forensic Toxicology Section scientists may testify to the effects of drugs and/or driving impairment when they have completed the required training and are competent on the subject matter. The testimony to the effects of drugs may include drugs of abuse and/or prescription drugs.

3. The Forensic Toxicology Section scientists will testify to the effects of drugs on human performance and behavior that have been chemically tested by the Toxicology Section. The staff may testify for the pharmacology of a drug not tested but will not form an opinion regarding impairment that includes that drug. Any opinion regarding impairment shall include drugs detected by a chemical testing only.

4. The Forensic Toxicology Section scientists will not testify to the analysis of drugs performed by an outside laboratory. However, the scientists can testify for the pharmacology of the detected drug(s) and the effects in human performance and behavior.