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Standard for the Analytical Scope and Sensitivity of Forensic Toxicology Urine Testing in Drug-Facilitated Crime Investigations



Draft Document

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Foreword

Drug-facilitated crimes (DFC) are a public health and safety concern and specialized toxicological testing is a critical part of these investigations. Urine is typically the specimen of choice as it may extend the window of drug detection up to 120 hours (5 days) after the alleged incident. This document is intended to promote standardization of the analytical scope and sensitivity of toxicological testing performed in DFC cases. This document is adapted from the Society of Forensic Toxicologists (SOFT) document entitled *Recommended Minimum Performance Limits for Common DFC Drugs and Metabolites in Urine Samples*. These requirements were developed based on the current prevalence and availability of drugs in the United States. For example, despite popular belief of its use in these crimes, flunitrazepam (Rohypnol) was excluded because the current data do not support its use in DFC in the United States.

All hyperlinks and web addresses shown in this document are current as of the publication date of this standard.

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Standard for the Analytical Scope and Sensitivity of Forensic Toxicology Urine Testing in Drug-Facilitated Crime Investigations

1 Scope

This document delineates the minimum requirements for target analytes and analytical sensitivity for the toxicological testing of urine specimens collected from alleged victims of drug-facilitated crimes (DFC). This document does not cover the analysis of blood and other evidence that may be collected in DFC cases.

2 Normative References

Society of Forensic Toxicologists, Recommended Minimum Performance Limits for Common DFC Drugs and Metabolites in Urine Samples. It is available at:
http://www.SOFT-Tox.org/files/MinPerfLimits_DFC2017.pdf

3 Terms and Definitions

For purposes of this document, the following definitions and acronyms apply.

3.1

analytical scope

Selection of drugs and drug metabolites covered in an analytical testing scheme.

3.2

analytical sensitivity

The lowest amount of an analyte that can be reliably measured in a specimen by a laboratory test; may be a decision point, a limit of detection or a limit of quantitation.

3.3

decision point

An administratively defined cutoff or concentration that is at or above the method's limit of detection or limit of quantitation and is used to discriminate between positive and negative results.

3.4

drug facilitated crime(s)

DFC

When an individual is victimized while mentally or physically incapacitated due to the effects of ethanol and/or other drugs.

3.5

lower limit of detection

An estimate of the lowest concentration of an analyte in a sample that can be reliably differentiated from blank matrix and identified by the analytical method.

3.6

lower limit of quantitation

An estimate of the lowest concentration of an analyte in a sample that can be reliably measured with acceptable bias and precision.

4 Requirements for Forensic Toxicological Testing of Urine Specimens in Investigations of Drug-Facilitated Crime

4.1 A urine specimen collected from an alleged victim of DFC within 120 hours (5 days) of the incident shall be tested. Case-specific circumstances may warrant testing of specimens collected past 5 days.

4.2 Toxicological testing of urine specimens collected from alleged victims of DFCs shall include, at a minimum, the compounds listed in Table 1. Analytical sensitivity shall meet or exceed (be lower than) the concentrations listed in Table 1. The table reflects total concentrations, which may be achieved via hydrolysis or direct analysis of conjugated compounds.

4.3 Laboratories shall meet the required analytical scope and sensitivity by testing internally, externally, or a combination of both.

4.4 Laboratories shall have a written strategy for addressing case specific circumstances that may not be addressed by the minimum requirements, including:

- when additional specimens (e.g., blood, hair, or biological stains) are received.
- techniques to improve detection (e.g., increasing sample extraction volume).
- utilization of a reference laboratory for the testing of analytes.

4.5 Laboratories shall consider other potentially impairing substances based on factors such as drug-use demographics, regional drug trends, and case histories.

Table 1: Required Minimum Analytical Scope and Sensitivity for Urine Testing in Investigation of Drug Facilitated Crime

Analyte	Concentration ¹
High-Dose Sedatives	
Ethanol (alcohol) ²	0.01 g/dL
Gamma hydroxybutyrate (GHB) ³	10 µg/mL
Antidepressants	
Amitriptyline	10 ng/mL
Nortriptyline	10 ng/mL
Imipramine	10 ng/mL
Desipramine	10 ng/mL
Trazodone	10 ng/mL
Antihistamines	
Brompheniramine	10 ng/mL
Chlorpheniramine	10 ng/mL
Diphenhydramine	10 ng/mL
Doxylamine	10 ng/mL
Norchlorcyclizine	10 ng/mL
Barbiturates	
Butalbital	100 ng/mL
Phenobarbital	100 ng/mL
Benzodiazepines	
α-hydroxyalprazolam	5 ng/mL
7-aminoclonazepam	5 ng/mL
Lorazepam	5 ng/mL
Nordiazepam	10 ng/mL
Oxazepam	10 ng/mL
Temazepam	10 ng/mL
Cannabinoids	
Carboxy-tetrahydrocannabinol (THC-COOH)	10 ng/mL
CNS Stimulants	
Methylenedioxymphetamine (MDA)	25 ng/mL
Methylenedioxymethamphetamine (MDMA)	25 ng/mL
Amphetamine	50 ng/mL
Methamphetamine	50 ng/mL
Benzoyllecgonine	50 ng/mL
Miscellaneous	
Cyclobenzaprine	10 ng/mL
Dextromethorphan ⁴	10 ng/mL
Norketamine	10 ng/mL
Zolpidem carboxylic acid	10 ng/mL
Zopiclone	10 ng/mL
Carisoprodol	100 ng/mL
Meprobamate	100 ng/mL
Opioids	
Fentanyl	1 ng/mL
Norfentanyl	1 ng/mL
Codeine	10 ng/mL
Morphine	10 ng/mL
Hydromorphone	10 ng/mL
Hydrocodone	10 ng/mL
Oxymorphone	10 ng/mL
Oxycodone	10 ng/mL
Tramadol	10 ng/mL

¹All are total drug concentrations; ng/mL is equivalent to µg/L

²If more than 24 hours has passed between the alleged incident and urine collection testing is not required

³If more than 12 hours has passed between the alleged incident and urine collection testing is not required

⁴Differentiation between d and l isomers is not required

Annex A

(Informative)

Bibliography

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- 2) LeBeau, M.A. "Laboratory Management of Drug-Facilitated Sexual Assault Cases." *Forensic Science Review*, 2010, pp. 114-119.
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- 5) UNODC United Nations Office on Drugs and Crime *Guidelines for the forensic analysis of drugs facilitating sexual assault and other criminal acts* December 2011 https://www.unodc.org/documents/scientific/forensic_analys_of_drugs_facilitating_sexual_assault_and_other_criminal_acts.pdf