This document has been accepted by the **Academy Standards Board (ASB)** for development as an American National Standard (ANS). For information about ASB and their process please refer to asb.aafs.org. This document is being made available at this stage of the process so that the forensic science community and interested stakeholders can be more fully aware of the efforts and work products of the Organization of Scientific Area Committees for Forensic Science (OSAC). The documents were prepared with input from OSAC Legal Resource Committee, Quality Infrastructure Committee, and Human Factors Committees, as well as the relevant Scientific Area Committee. The content of the documents listed below is subject to change during the standards development process within ASB and may not represent the contents of the final published standard. All stakeholder groups or individuals are strongly encouraged to submit technical comments on this draft document during the ASB's open comment period. Technical comments will not be accepted if submitted to the OSAC Scientific Area Committee or Subcommittees.

Standard for the Analytical Scope and Sensitivity of Forensic Toxicology Testing in Impaired Driving Investigations

OSAC
Organization of Scientific Area Committees for Forensic Science

Draft Document

Standard for the Analytical Scope and Sensitivity of Forensic Toxicology Testing in Impaired Driving Investigations

Foreword

Impaired driving is a public health and safety concern, and toxicological testing is a critical part of these investigations. This document is intended to promote standardization of the analytical scope and sensitivity of toxicological testing performed in investigations of alleged impaired driving. This document is adapted from the work of the National Safety Council's Alcohol, Drug, and Impairment Division. The requirements were developed based on laboratory surveys, epidemiological data, drug-use patterns, and analytical capabilities of laboratories conducting analyses of specimens collected from drivers suspected of being impaired. Specific legal requirements may require deviations from this standard practice.

Table of Contents

Standard for the Analytical Scope and Sensitivity of Forensic Toxicology Testing in Impaired Driving Investigations

1 Scope

This document delineates the minimum requirements for target analytes and analytical sensitivity for the toxicological testing of blood and urine specimens collected from drivers suspected of being impaired. This document does not cover the analysis of breath, oral fluid, or other potential specimen types collected in impaired driving investigations.

2 Normative References

Logan, BK; D'Orazio, AL; Mohr, ALA; Limoges, JF; Miles, AK; Scarneo, CE; Kerrigan, S; Liddicoat, LJ; Scott, KS; and Huestis, MA. Recommendations for Toxicological Investigation of Drug-Impaired Driving and Motor Vehicle Fatalities – 2017 Update. Journal of Analytical Toxicology; 42(2), 63-68 (2018)

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
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.

3.5
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 Toxicology Testing in Impaired Driving Investigations

4.1 Toxicological testing of blood and urine specimens in impaired driving investigations 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 laboratory shall determine the appropriate analytical instrumentation to be utilized for both the screening of case samples and the confirmation of presumptively-identified analytes of interest. Table 1 has been adapted from the work of the National Safety Council's Alcohol, Drug, and Impairment Division.

4.2 Based upon request, the scope of testing may be limited to ethanol-only, other drugs-only, or a combination. If the testing request is for both ethanol and other drugs, the scope shall include all compounds in Table 1. Laboratory procedures shall address the specimens to be tested when multiple specimens are submitted.

4.3 Laboratories shall meet the required scope and analytical 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, i.e., utilizing a reference laboratory for confirmation tests that may not be possible in-house.

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

4.6 In Table 1, screening concentrations are based on a target analyte for immunoassay testing. Therefore, all compounds in the table do not have an associated screening concentration listed. Other drugs shall have at least 80% cross reactivity with that assay. For example, if relying on a methamphetamine immunoassay test to detect MDMA, then MDMA must have at least 80% cross reactivity. If an immunoassay test uses a different target analyte than that listed in Table 1, that alternate target analyte concentration must be the same, or lower, and other analytes relying on that test must have at least 80% cross reactivity.

4.7 If a chromatographic screening technique is used, each compound shall meet the analytical sensitivity requirement listed in Table 1 for the immunoassay target analyte.

Table 1: Required Minimum Analytical Scope and Sensitivity1 for Toxicology Testing in Impaired Driving Investigations

Compound[1]	Blood Screen	Blood Confirmation[2]	Urine Screen	Urine Confirmation[2]
Ethanol				
Ethanol	0.01 g/dL	0.01 g/dL	0.01 g/dL	0.01 g/dL
Cannabinoids				
THC	-	1	-	N/A
Carboxy-THC	10 ng/mL	5 ng/mL	20 ng/mL	5 ng/mL
11-OH-THC	-	1	-	N/A
CNS Stimulants				
Amphetamine	20 ng/mL	20 ng/mL	200 ng/mL	50 ng/mL
Methamphetamine	20 ng/mL	20 ng/mL	200 ng/mL	50 ng/mL
MDA	-	20 ng/mL	-	50 ng/mL
MDMA	-	20 ng/mL	-	50 ng/mL
Cocaine	-	10 ng/mL	-	20 ng/mL
Cocaethylene	-	10 ng/mL	-	20 ng/mL
Benzoylecgonine	50 ng/mL	50 ng/mL	150 ng/mL	50 ng/mL
CNS Depressants				
Carisoprodol	500 ng/mL	500 ng/mL	500 ng/mL	500 ng/mL
Meprobamate[3]	-	500 ng/mL	-	500 ng/mL
Zolpidem	10 ng/mL	10 ng/mL	20 ng/mL	20 ng/mL
Low Dose Benzodiazepines[3]	10 ng/mL	-	50 ng/mL	-
Alprazolam	-	10 ng/mL	-	50 ng/mL
αOH-alprazolam	-	N/A	-	50 ng/mL
Clonazepam	-	10 ng/mL	-	50 ng/mL
7-aminoclonazepam	-	10 ng/mL	-	50 ng/mL
Lorazepam	-	10 ng/mL	-	50 ng/mL
High Dose Benzodiazepines	50 ng/mL	-	100 ng/mL	-
Diazepam	-	20 ng/mL	-	50 ng/mL
Nordiazepam	-	20 ng/mL	-	50 ng/mL
Oxazepam	-	20 ng/mL	-	50 ng/mL
Temazepam	-	20 ng/mL	-	50 ng/mL
Narcotic Analgesics				
Morphine	10 ng/mL	10 ng/mL	200 ng/mL	50 ng/mL
Codeine	-	10 ng/mL	-	50 ng/mL
6-acetylmorphine	-	5 ng/mL	-	10 ng/mL
Hydrocodone	-	10 ng/mL	-	50 ng/mL
Hydromorphone	-	5 ng/mL	-	50 ng/mL
Oxycodone	10 ng/mL	10 ng/mL	100 ng/mL	50 ng/mL
Oxymorphone	-	5 ng/mL	-	50 ng/mL
Methadone	50 ng/mL	20 ng/mL	300 ng/mL	50 ng/mL
Fentanyl	1 ng/mL	0.5 ng/mL	1 ng/mL	0.5 ng/mL
Buprenorphine	1 ng/mL	0.5 ng/mL	5 ng/mL	1 ng/mL
Norbuprenorphine	-	0.5 ng/mL	-	1 ng/mL
Tramadol	100 ng/mL	50 ng/mL	100 ng/mL	50 ng/mL
o-desmethyltramadol	-	50 ng/mL	-	50 ng/mL

[1]ng/mL is equivalent to µg/L
[2]Confirmation is based on free drug concentrations

Annex E
(Informative)

Bibliography

1) Logan, Barry K., Lowrie, Kayla J., Turri, Jennifer L., Yeakel, Jillian K., Limoges, Jennifer F., Miles, Amy K., Scarneo, Colleen E., Kerrigan, Sarah, and Farrell, Laurel J. *Recommendations for Toxicological Investigation of Drug-Impaired Driving and Motor Vehicle Fatalities*. Journal of Analytical Toxicology, 37(8):552-8, 2013.

2) Farrell, Laurel J., Kerrigan, Sarah, Logan, Barry K. *Recommendations for Toxicological Investigation of Drug-Impaired Driving*. Journal of Forensic Sciences, 52(5):1214-8, 2007.