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

DRAFT



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

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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.

This standard was developed by the Toxicology Subcommittee of the Organizational Scientific Area Committee. It was prepared and finalized as a standard by the Toxicology Consensus Body of the ASB.

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

Keywords: *impaired driving; scope of testing; analytical sensitivity; forensic toxicology*

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Table 1 – Required Minimum Analytical Scope and Sensitivity for Toxicology Testing in Impaired Driving Investigations

Annex A (informative) Bibliography

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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

The following reference is indispensable for the application of the standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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), pp. 63-68. 2018.

3 Terms and Definitions

For purposes of this document, the following definitions apply.

3.1

analytical scope

A selection of drugs, 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

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.

The concentrations listed in Table 1 do not correlate to impairment or per se concentrations.

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 Immunoassay screening concentrations are based on a target analyte. Therefore, all compounds in the immunoassay screening column of Table 1 do not have an associated screening concentration listed. Compounds without an immunoassay screening concentration listed (-) 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, refer to the compounds and concentrations listed in the non-IA column within Table 1.

4.8 If a compound does not need to be accounted for in the screen and/or confirmation, this is indicated by N/A in the table.

Table 1 – Required Minimum Analytical Scope and Sensitivity for Toxicology Testing in Impaired Driving Investigations

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

¹Immunoassay-based screening technique²Confirmation is based on free drug concentrations

Annex A
(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*, Vol. 37(8), 2013, pp. 552-8.
- 2] Farrell, Laurel J., Kerrigan, Sarah, Logan, Barry K. Recommendations for Toxicological Investigation of Drug-Impaired Driving. *Journal of Forensic Sciences*, Vol. 52(5), 2007, pp. 1214-8.

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