Accreditation Requirements and Operating Criteria for Horseracing Laboratories

ILAC-G7:06/2009

The ILAC Secretariat
PO Box 7507
Silverwater NSW 2128
Australia
Fax: +61 2 9736 8373
Email: ilac@nata.com.au

TABLE OF CONTENTS

PREAMBLE

The document *Accreditation requirements and operating criteria for horseracing laboratories* was revised from the 1996 version for publication by ILAC (the International Laboratory Accreditation Cooperation) in May 2009.

PURPOSE

The purpose of this document is to provide:

- **Part A:** A compilation of test-method-related requirements for horseracing laboratories that accreditation bodies have submitted
- **Part B:** Recommendations for establishing the presence of prohibited substances that have been agreed within the horseracing industry
- **Part C**: Additional recommendations on compliance with an appropriate performance specification, and the adoption of harmonised definitions for terms commonly used by racing chemists.

RECOMMENDATIONS TO ACCREDITATION BODIES

Accreditation bodies are encouraged to submit additions or other modifications to Part A through:

ILAC Secretariat
E-mail: ilac@nata.com.au

Additions may, for example, be compliances or non-compliances that assessors have noted.

Suggestions on Parts B and C would be welcome and should be sent to either:

The President of the Association of Official Racing Chemists
E-mail and other contact details can be found on the AORC website:
http://www.aorc-online.org

or

Dr Terence Wan,
Convenor of the ILAG-G7 Revision Working Group
E-mail: terence.sm.wan@hkjc.org.hk

With reference to compliance with an appropriate performance specification, accreditation bodies are encouraged to identify the performance specification met by a horseracing laboratory in its scope of accreditation. Some examples for the scope of accreditation are:

Field of testing Chemical testing, *or* Forensic testing

Materials tested	Equine and canine body fluids, *or* Body fluids, tissue, and excreta from animals; materials that an animal may have received or may have been intended to receive
Tests performed	Qualitative and, where relevant, quantitative analyses for prohibited substances as defined by the International Federation of Horseracing Authorities, *or* . . . as defined by the Rules of Racing of such-and-such racing authorities or regulatory bodies
Techniques used	In-house methods XXX to YYY, *or* such-and-such analytical techniques, *or both*
Recommended Additional Information	Meets the performance specification of the International Federation of Horseracing Authorities, *or (within the United States)* . . . of the Association of Racing Commissioners International, *or (within Canada)* . . . of the Canadian Pari-Mutuel Agency, *or* . . . of such-and-such racing authority or regulatory body.

AUTHORSHIP

This document was first put together by an ILAC working group convened by Dr David L Crone and then revised by another ILAC working group convened by Dr Terence S M Wan. **Part A** (accreditation requirements) was compiled and revised by the working groups. **Parts B and C** (operating criteria) were prepared and revised by the horseracing industry.

INTRODUCTION

The general requirements for accreditation of laboratories are laid down in ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*. These requirements apply to all types of calibration and objective testing but need amplification in certain cases.

This document's **Part A** amplifies some of the requirements of ISO/IEC 17025 for horseracing laboratories, and **Parts B and C** detail operating criteria that should normally be adopted.

Where there are differences of interpretation, ISO/IEC 17025 is the authoritative document, and individual accreditation bodies will adjudicate on unresolved matters.

Part A of the document deals with the amplification of ISO/IEC 17025 for certain aspects of a horseracing laboratory's operation. It does not cover all the requirements of ISO/IEC 17025, with which all laboratories, including horseracing laboratories, must comply.

Part B contains recommendations for establishing the presence of prohibited substances. Horseracing laboratories should normally comply with these.

Part C contains the following recommendations: (i) compliance with an appropriate performance specification as required by the relevant authority; and (ii) adoption of harmonised definitions for terms commonly used by racing chemists.

PART A: INTERPRETATION OF ISO/IEC 17025

The following requirements must be met by all horseracing laboratories operating to ISO/IEC 17025:

1. The laboratory must have measures to ensure that incidences of 'false-negative' results are kept to a minimum. These should include:
   - an exchange programme with other similar testing laboratories for cross-checking negative samples, or failing this, blind re-submission of negative samples into the analytical system
   - blind submission of spiked samples or known positive samples into the analytical system.

   [Ref: ISO/IEC 17025:2005, Clause 5.9]

2. Every analytical batch must be accompanied by quality-control measures which will include analysis of appropriate blank(s), calibration of instrument performance parameters using suitably selected chemical standards and, where appropriate, recovery of spiked controls in a representative matrix.
   [Ref: ISO/IEC 17025:2005, Clause 5.9]

3. The storage and handling of controlled drugs must comply with local legislation.
   [Ref: ISO/IEC 17025:2005, Clause 1.5]

4. The laboratory must document the minimum schedule of screening tests to be performed for different types of samples and must also document what tests it has carried out on each sample.
   [Ref: ISO/IEC 17025:2005, Clause 5.4.1]

5. The laboratory must document for each screening test how they decide which samples to investigate further.
   [Ref: ISO/IEC 17025:2005, Clause 5.4.1]

6. Limits of detection for representative analytes must be determined and documented for all screening methods. Compilations must be updated as data accumulates.
   [Ref: ISO/IEC 17025:2005, Clause 5.4.5]

7. All records, including those for negative results, must be checked.
   [Ref: ISO/IEC 17025:2005, Clause 5.4.7.1]

These test-method-related requirements are not comprehensive and accreditation bodies may suggest additions to this compilation.

PART B: GUIDE FOR ESTABLISHING THE PRESENCE OF PROHIBITED SUBSTANCES

(Part B has also been issued separately by the AORC as *Guide for establishing the presence of prohibited substances*, Issue 3, May 2009.)

PREAMBLE

1. This guide has been adopted by the Association of Official Racing Chemists (AORC) and by laboratory heads connected with the International Federation of Horseracing Authorities and the Association of Racing Commissioners International.

2. The presence of a prohibited substance is established when sufficient valid analytical data supports its presence and no significant data refutes it.

3. The guide provides a set of internationally agreed recommendations for establishing the presence of a prohibited substance, although the concept of rigid standardization is rejected.

4. The guide should not be followed exclusively of other scientific considerations where necessary to establish the presence of a prohibited substance.

5. It is recognized that some laboratories will be able to establish the presence of a wider range of prohibited substances or lower concentrations of prohibited substances than other laboratories. Such individual capabilities must be allowed to develop, as they will lead to improvements generally.

FORENSIC INTEGRITY

6. The sample must have been received, identified, its receipt recorded and then stored under appropriate conditions, all according to the laboratory's documented procedures.

7. Nothing must be introduced into this original sample without stringent documented controls.

8. A chain of custody must be maintained and recorded.

    8.1 The original sample must be kept securely with only authorized access.

    8.2 During tests used as evidence, the partially processed test sample should not be left unattended unless secure with only authorized access.

9. For the analysis of primary or “A” samples, unless the “A” sample is analysed on its own (with controls as detailed in this document) a positive identification or quantification must include analysis of two portions of the original sample. These need not be identical tests but must give consistent findings.

10. All analytical data (including quality control data), data transfers, calculations, chain-of-custody records, and reported conclusions must be verified.

11. The analyst(s) in charge of the work and the analyst(s) verifying the work must be suitably qualified and experienced and able to act as expert witnesses for the purposes of giving evidence.

REGULATORY IDENTIFICATION

General Considerations

12. The use of independent, diagnostic data is essential. The detection of prohibited substances should be confirmed by a second technique based on a different analytical principle unless the primary method is accepted as a definitive method. Mass spectrometry or a similarly definitive technique, if applicable to the analyte in question, must be included.

13. A report of a prohibited substance must result from the application of documented test methods to the sample of interest.

    13.1 Documented test methods need not be analyte specific.

    13.2 Significant deviations from the documented procedure must be recorded.

14. The data record must include evidence of the stability and integrity of the analytical system and the absence of interference between sequentially analysed test samples.

    14.1 The concurrent analysis of a system blank (water, buffer, or biological sample free from the analyte in question) is necessary to demonstrate the absence of contamination during analysis. Injection should be immediately before the test sample.

    14.2 Elimination of an 'injector memory' effect should be demonstrated by injection of a negative control (biological sample or extract negative for the analyte in question) as part of the confirmatory sequence, before the test sample and after any earlier injection which may have contained the analyte in question.

    14.3 Where the analysis of a system blank or negative control is impractical, e.g., for the analysis of Total Carbon Dioxide or endogenous compounds, a control known to contain a lower concentration of the analyte than that present in the test sample may be used instead.

15. Quantification of a sample component is not necessary for a report of a non-threshold substance.

    15.1 When quantitative results are a purpose of testing, the additional clauses for regulatory quantification in this document apply.

    15.2 A spiked control may be used to establish the required confirmatory detection capability when split-sample verification is part of the jurisdictional process. Appropriate caution must be used and recorded to demonstrate the absence of cross-contamination between the spiked control and the test sample.

16. The identification of a prohibited substance must normally result from direct comparison with a reference material analysed in parallel or series with the test sample.

    16.1 The use of library spectra or data other than that generated by a reference material as prescribed would require justification.

    16.2 Certified reference materials and reference materials obtainable from reference material producers which are institutions with appropriate recognition (such as LGC, WHO, The British Pharmacopoeia, The United States Pharmacopeia, and other national pharmaceutical authorities) are acceptable after a simple check for identity.

    16.3 A reference material is generally accepted for use if it is a chemical with well-established structure, which has been validated in the laboratory by comparison with a certified reference material or by comparison with non-controversial published data or has been structurally characterized.

    16.4 An acceptable reference material may also be an isolate from (i) a urine or blood sample after an authenticated administration, or (ii) an *in-vitro* incubation with liver cells or microsomes, providing the analytical data from it are sufficient to fully justify its identity as a metabolite of the substance administered or incubated.

17. There must be written laboratory criteria for what constitutes a ‘match’ between a reference material and a sample component.

Generic Criteria for Common Techniques

18. Mass spectrometry

    18.1 The performance of the mass spectrometer, including accuracy of the mass assignment, ion resolution, and (except for tandem mass spectrometry) isotopic abundance, must be determined and recorded within the time frame of the sample analysis using appropriate mass-spectrometric calibration standard(s).

    18.2 The laboratory must document the mass-spectral agreement that the component of interest in the test sample must have in common with the reference material. For full-scan techniques, the base peak and molecular or quasimolecular ion if present should be included.

    18.3 Single or averaged spectra or reconstructed ion chromatograms are acceptable for measuring ion-intensity ratios.

    18.4 Full-scan data is preferred over selected-ion monitoring, since co-eluting interfering substances can be more readily recognized and dealt with.

    18.5 Selected-ion monitoring or selected-reaction monitoring has use where full-scan collection is not applicable or where quantification is necessary.

18.6 Use of selected-ion monitoring or selected-reaction monitoring instead of full scan should be defensible. When using selected-ion or selected-reaction monitoring, specific and significant ion(s) must be monitored to ensure proper forensic identification when the data is considered along with data provided by other analytical techniques. The signal-to-noise ratio must be greater than a specified limit.

18.7 Where relevant, the AORC *Guidelines for the Minimum Criteria for Identification by Chromatography and Mass Spectrometry* (April 2003 or later version) should be followed, a copy of which can be found on the AORC website under the following link: http://www.aorc-online.org/AORC MS Criteria.pdf .

19. Gas or liquid chromatography

19.1 The retention time (or relative retention time) of the component of interest in the test sample must agree within a specified retention-time window with that of the reference material. The retention-time window should be commensurate with the resolving power of the chromatographic system.

19.2 Where relevant, the AORC *Guidelines for the Minimum Criteria for Identification by Chromatography and Mass Spectrometry* (April 2003 or later version) should be followed, a copy of which can be found on the AORC website under the following link: http://www.aorc-online.org/AORC MS Criteria.pdf .

20. Thin-layer chromatography

20.1 The R_f of the component of interest in the test sample must agree within a specified limit with the R_f of the reference material run on the same plate. The reference material should be run either side of the test sample.

20.2 The component of interest in the test sample must respond consistently with the reference material to methods used for locating them.

21. Immunoassays

21.1 Immunoassay tests must be characterized for detection limits, reproducibility, and specificity.

21.2 A spiked control (or administration control) and a negative control must be included with each set of test samples to ensure proper test performance.

21.3 Instrumental readouts for immunoassay tests are necessary for quantitative or semi-quantitative measurements.

21.4 The documented test methods must define levels that result in acceptably low proportions of unconfirmable hits. (These levels must not be construed as official thresholds.)

22. Ultraviolet or fluorescence spectroscopy

22.1 The spectrum of the component of interest in the test sample must agree within specified limits with that of the reference material. The wavelength maxima should agree within a margin commensurate with the resolution of the instrument.

REGULATORY QUANTIFICATION

23. Equipment

23.1 The equipment must be appropriate for the desired objective and purpose of measurement.

23.2 Apparatus for measuring simple physical parameters, such as weight, volume, temperature, must be calibrated to a degree commensurate with the required accuracy of the final result by laboratories accredited by ILAC Full Members or an appropriate national metrology institute.

23.3 Such calibrations must be traceable to national standards of measurement.

23.4 All analytical equipment must have documented calibration and maintenance schedules and no equipment should be used for measurement beyond its calibration time interval.

24. Method

24.1 The method should be robust to variations in the matrix and experimental conditions. Tolerances where critical must be specified.

24.2 The method must be clearly documented. Significant deviations from the documented procedure must be recorded.

24.3 A range of calibration standards prepared in an appropriate matrix should be analysed concurrently with test samples and the data must be recorded.

24.4 The calibration range should be appropriate to the analysis. A zero-level sample must be included as a system blank where practical.

24.5 Measurands (such as Total Carbon Dioxide) with empirical thresholds established by a specific method must be determined by the same method. A second analytical technique may not be necessary to identify its presence in a sample.

25. Internal standards

25.1 Internal-standard techniques are preferable for methods based on extraction then chromatography, although other quantitative techniques are acceptable.

25.2 The internal standard should be added as early in the procedure as possible.

25.3 The internal standard must be of appropriate purity.

25.4 The internal standard should have similar chemical and physical properties to the analyte of interest. Isotopically labelled analytes are the preferred internal standards where quantification is by mass spectrometry.

25.5 The internal standard should be essentially stable to the analytical procedure.

26. Reference materials

26.1 The purity of certified reference materials can be accepted as stated by the reference material producer, if due regard is paid to all handling recommendations.

26.2 The purity of other reference materials must be thoroughly established by:
- comparison with a certified reference material of known purity, or
- checking the supplier's data by analysis, or
- analysis by more than one technique.

26.3 Suppliers' storage and shelf-life information should be paid due regard, and materials checked for stability after prolonged storage.

27. Validation

27.1 The suitability of the method must be demonstrated by acceptable and defensible recorded validation data.

27.2 The laboratory must be able to substantiate that the data is specific to the threshold substance.

27.3 Sample carryover must be demonstrated to be insignificant.

27.4 Validation should characterize trueness and precision.

27.5 The detection limit should be determined as part of the validation if close to or higher than the threshold.

27.6 The laboratory must determine and document its policy on the estimation of the measurement uncertainty (MU) and the level of confidence associated with the MU.

27.7 The measurement uncertainty (MU) should preferably be determined by recognized methods at or around the threshold or the limit of quantification if this is higher than the threshold. A threshold is then considered exceeded with the stated level of confidence when the determined value in the sample exceeds the threshold plus the MU. Alternatively, MU may be estimated at or around the particular value determined in a sample, and a threshold is considered exceeded with the stated level of confidence when the determined value minus the MU exceeds the set threshold.

28. Quality control

    28.1 Samples should be analysed at least in duplicate.

    28.2 The stability of stock solutions of reference materials should be known.

    28.3 Separately weighed reference material must be used to prepare the stock solutions for the calibration standards and quality controls.

    28.4 Quality controls at appropriate concentrations should be analysed concurrently with test samples.

    28.5 Criteria for acceptable quality-control results should be determined and documented.

29. Provisional thresholds

    29.1 Some thresholds may not be absolute quantities or ratios but a specification agreed with the racing authority, and not all the clauses in this 'Regulatory Quantification' section may apply.

REFEREE ANALYSIS

30. The objective of the referee analysis (also known as B-sample analysis or split-sample analysis) is to ensure that the findings of the first analysis are correct by conducting a confirmatory analysis for the presence of the reported substance(s) on the split or remaining portion of the sample, whenever possible by an independent laboratory accredited to the requirements of ISO/IEC 17025.

31. Referee analysis is not intended to be a new analysis requiring screening and confirmatory testing for unnamed substances.

32. Where possible the AORC *Guidelines for Referee Analysis* (March 2008 or later version) should be followed, a copy of which can be found on the AORC website under the following link: http://www.aorc-online.org/AORC Referee Guidelines.pdf.

PART C: ADDITIONAL RECOMMENDATIONS

PERFORMANCE SPECIFICATION

Authorities who are signatories to the relevant articles of the *International Agreement on Breeding, Racing and Wagering* (IABRW) of the International Federation of Horseracing Authorities (IFHA) should expect their horseracing laboratories to seek accreditation on the basis that they can reliably meet the performance specification adopted by the IFHA. This specification is listed as Appendix 4, *Performance Specification of the Laboratories for Doping Control Required by the International Federation of Horseracing Authorities*, of the IABRW (May 2009 or later version) and can be found on the IFHA website under the following link: http://www.horseracingintfed.com/racingDisplay.asp?section=10#an4 .

Other performance specifications that a horseracing laboratory may seek accreditation to include:

(i) the "AORC Proficiency Test List" of the *Proficiency Testing Program Protocol* of the Association of Official Racing Chemists (AORC). The current version can be found on the AORC website under the following link: http://www.aorc-online.org/AORC PT Druglist.pdf ; and

(ii) the "Proficiency Testing Parameters" of the Canadian Pari-Mutuel Agency Reference & Research Laboratory, which can be found in: http://palcan.scc.ca/specs/pdf/564_e.pdf.

Where an authority uses a performance specification that differs from any of the above, its horseracing laboratory is required to reliably meet that performance specification.

HARMONISED DEFINITIONS FOR TERMS COMMONLY USED BY RACING CHEMISTS

In order to avoid misunderstanding and confusion, it is recommended that harmonised definitions be adopted for terms commonly used by racing chemists and which are specific to this discipline. The AORC document "*A Glossary of Terms Commonly Used in Racing Chemistry*" can be found on the AORC website under the following link: http://www.aorc-online.org/AORC Glossary.pdf.