

	<b>DEPARTMENT OF COMMERCE</b> National Institute of Standards and Technology National Voluntary Laboratory Accreditation Program	<b>ISSUE DATE:</b> October 10, 2003
	<b>LAB BULLETIN</b>	<b>NUMBER:</b> LB-9-2003
		<b>LAP:</b> Calibration
<b>SUBJECT:</b> Magnetism in Mass Measurements		

This bulletin applies to calibration laboratories accredited by NVLAP for Echelon I and II (OIML R111 classes E<sub>1</sub>, E<sub>2</sub>, F<sub>1</sub>, F<sub>2</sub>, and ASTM classes 0, 1, 2, 3) mass measurements. At issue is the potential adverse influence of magnetism on mass measurements and/or the use of magnetized weights.

This issue was discussed at length during the NCSL International's U.S. Measurement Requirements Committee Ad Hoc Focus Group meeting, held during the 2003 annual conference in Tampa, Florida. Several factors were discussed including the scientific basis for measuring magnetism, the handling of the effects in the uncertainty budgets for the calibration of mass standards, and the costs and impact of routine magnetism surveillance.

A consensus was reached as follows:

Since it is not known how best to test for the presence of a magnetic field, what the accuracy requirements of the gaussmeter would be, and how to quantify the measured magnetic effects as a component of uncertainty, accredited laboratories should not be required to screen all customer weights for the presence of a magnetic field or to include a component for magnetism in their uncertainty budgets.

Accordingly, NVLAP is taking the following position:

1. Accredited laboratories may choose to screen or not to screen all customer weights prior to calibration.
2. Accredited laboratories may choose to include or not to include a component in the uncertainty budget attributed to magnetism. If they do, they shall state the basis on which the component was calculated.
3. Each calibration report or certificate shall contain:
  - a) a clear statement indicating whether or not the subject weights were screened for magnetism; and
  - b) a clear statement indicating that a component attributed to the effects of magnetism was included or not included in the uncertainty statement.
4. The normal contract review process should include a discussion of the laboratory's practices regarding screening for magnetism. All discussions should be documented.

(continued on reverse)

The relevant requirements of NIST Handbook 150 are:

Clause 4.4. Review of requests, tenders and contracts:

4.4.1 The laboratory shall establish and maintain procedures for the review of requests, tenders and contracts. The policies and procedures for these reviews leading to a contract for testing and/or calibration shall ensure that:

- a) the requirements, including the methods to be used, are adequately defined, documented and understood;

Clause 5.4.2, Selection of methods:

The laboratory shall use test and/or calibration methods, including methods for sampling, which meet the needs of the client and which are appropriate for the tests and/or calibration it undertakes. Methods published in international, regional, or national standards shall preferably be used. . . . When necessary, the standard shall be supplemented with additional details to ensure consistent application.

Clause 5.4.6.3 Estimation of uncertainty of measurement:

When estimating the uncertainty of measurement, all uncertainty components which are of importance in the given situation shall be taken into account using appropriate methods of analysis.

Clause 5.10.1 Reporting the results:

The results of each test, calibration, or series of tests or calibrations carried out by the laboratory shall be reported accurately, clearly, unambiguously and objectively, and in accordance with any specific instructions in the test or calibration methods.

Additional information is available in the following references:

1. NCSLI U.S. Measurements Committee Summary Report of an Ad Hoc Focus Group Meeting on "Magnetism in Mass Measurements," September 12, 2003. Available on the NVLAP web site, Program-Specific Handbooks page.
2. Richard Davis, Magnetization of Mass Standards as Determined by Gaussmeters, Magnetometers and Susceptometers, July 2003. Available from the NCSLI.

The following papers were presented last June at the South Yorkshire International Weighing Conference, 2003. Copies can be obtained from the South Yorkshire Trading Standards Unit at <http://www.sytsu.co.uk>.

3. "The new OIML R111 specification ? implication on the magnetic properties of mass standards," Michael Glaeser (PTB).
4. "Sartorius susceptometer for precise measurement of susceptibility and magnetization of weights," Thomas Froehlich (Sartorius), Thomas Fehling (Sartorius), Detlef Heydenbluth (Technical University of Ilmenau, Germany).
5. "What the mass community need to know about magnetic properties and their traceable measurement," Michael Hall, NPL.