



# How To Make NIST Traceable Materials

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## The NIST Mission

Strengthen the U.S. economy and  
improve the quality of life by working  
with industry to develop and apply:  
technology  
measurements and  
*standards.*

## NIST provides

- 1) Calibrations (thermometers)
- 2) Standard reference materials (2390, 2391b, 2392,I, 2395)
- 3) Standard reference data
- 4) Test methods
- 5) Proficiency evaluation materials
- 6) Measurement quality assurance programs  
(Interlaboratory challenge exercises, and material evaluations)
- 7) Laboratory accreditation services

to assist customers in establishing the traceability of results, of measurements or values of standards.

## Responsibilities

A claim of traceability for the result of a measurement or value of a standard is the responsibility of the *provider* of that result or value, whether that provider is NIST or another organization.

Assessing the validity of such a claim is the responsibility of the *user* of that result or value.

NIST's role is *not* to:

define, specify, assure or certify

Traceability, results of measurements or values of standards **except** those that **NIST itself** provides, either directly or through an official NIST program or collaboration.

NIST's role is to:

- Develop and disseminate technical information on traceability and
- Conduct coordinated outreach programs on issues of traceability and related requirements.

## Traceability defined

According to the International Vocabulary of Basic and General Terms in Metrology (ISO VIM, 2nd ed., 1993, definition 6.10), traceability is the:

“property of the result of a measurement or the value of a standard whereby it can be related to stated references, usually **national** or **international standards**, through an *unbroken chain* of comparisons all having stated uncertainties.”

## What do I need to do to support a claim of traceability?

the provider of a measurement result or value of a standard must document:

- 1) the measurement process or system used to establish the claim
- 2) provide a description of the chain of comparisons that were used to establish a connection to a particular stated reference.

## Common elements to all valid statements or claims of traceability:

- 1) Clearly defined measurand.
- 2) Complete description of the measurement system used to perform the measurement.
- 3) Stated measurement result or value, with a documented uncertainty.
- 4) Complete specification of the stated reference at the time the measurement system or working standard was compared to it.

## Internal measurement assurance

- 1) May be quite simple or very complex
  - the level or rigor to be determined depending on the level of uncertainty at issue
  - what is needed to demonstrate its credibility.
- 2) The user of a measurement result is responsible for determining what is adequate to meet their needs.

## Make Your Own (MYO) NIST Traceable Material

Prepare a “lot” of DNA samples:

Stains

Swabs

Cell pellets

Extracts, etc.

## MYO continued

Assure that the MYO samples are:

Homogenous

Stable

Reproducible

## MYO continued

Analyze the appropriate NIST SRM and MYO “in parallel”

Confirm that your results for the SRM are correct (agree with certificate) and your results for the MYO are consistent (agree with your prior results).

## MYO continued

Maintain the records of the now NIST traceable MYO and the SRM analysis.

## Use of the MYO

You may use the MYO as frequently as you desire in your Laboratory System as a NIST traceable material.

Keep a record of the use of the MYO and results.

## Remember:

The “Lot” is Traceable not the source of the material.

**IF AT ANY TIME THERE IS A DISCREPANCY WITH THE RESULTS OBTAINED FOR THE MYO A NEW LOT MUST BE MADE AND ANALYZED IN PARALLEL WITH THE SRM !!!**

## Remember:

There must always be a **direct** comparison to the appropriate NIST SRM to be traceable to NIST.

A second “lot” of material compared to the MYO **is not** traceable to NIST, it is traceable to the MYO

The level of uncertainty increases the further away you are from the SRM.

## For More Information

<http://www.nist.gov/traceability/>

## What About Thermometers?

### **Checklist for Traceability through Calibration**

[http://www.nist.gov/traceability/  
suppl\\_matls\\_for\\_nist\\_policy\\_rev  
.htm#Checklist](http://www.nist.gov/traceability/suppl_matls_for_nist_policy_rev.htm#Checklist)

## All about Mercury in Glass Thermometers

[http://ts.nist.gov/ts/htdocs/230/233/calibrations  
/Publications/series-pdf/SP250-23.pdf](http://ts.nist.gov/ts/htdocs/230/233/calibrations/Publications/series-pdf/SP250-23.pdf)

NIST Measurement Services: Liquid-in-Glass  
Thermometer Calibration Service, J. A. Wise,  
Natl. Inst. Stand. Technol. Spec. Publ. 250-23  
(Sept.1988). 128 pages



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