NIST National Institute of Standards and Technology U.S. Department of Commerce

SRM SPOTLIGHT

July 2011

Editor: Regina R. Montgomery

Inside:

New and Renewal NIST SRMs/RMs

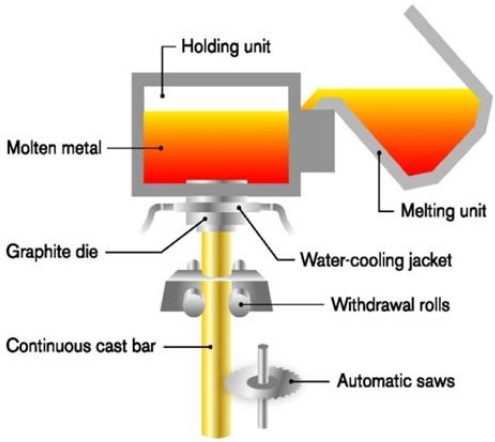
NIST SRM 1124 Free Cutting Brass (UNS 36000)

New Free Cutting Brass SRM Prepared by Continuous-Chill Casting for Excellent Homogeneity

The NIST Analytical Chemistry Division announces the release of new SRM 1124 Free Cutting Brass (UNS 36000), intended for use in the evaluation of chemical and instrumental methods of analysis. SRM 1124 is doped with declarable substance elements Cr and Cd and is cast by a continuous-chill casting process. With certified values for Ag, Cd, Cr, Fe, Ni, Pb, Sb, Sn and Zn, and reference values for Bi, P, and S, SRM 1124 can serve for evaluation and validation of test methods designed to monitor restricted substances and alloy contaminant elements in consumer products, plumbing products, electrical alloys, and electronics components. This is the broadest range of elements to be certified in a NIST brass or bronze SRM and the first new brass composition to be produced by NIST since 1965.

SRM 1124 was produced in bars by the continuous-chill casting process to create a highly homogeneous alloy. Each unit of SRM 1124 consists of one disk approximately 39 mm in diameter and 19 mm thick, certified through its entire thickness. The disks have been evaluated using laboratory wavelength dispersive X-ray fluorescence (XRF) spectrometry and spark source optical emission spectrometry methods commonly used by alloy producers, and by microXRF at the 50 µm size scale to demonstrate the level of heterogeneity in the castings. Analyses were also done using chips from the disks to ensure the accuracy of bulk composition values and to demonstrate that the material can be chipped by users who require validation of destructive test methods.

Illustration of the vertical continuous-chill casting process used to produce the custom composition, free cutting brass in cast bars that were sliced into disks.



Technical Contact: John Sieber
Email: john.sieber@nist.gov

NIST SRM 1959 Drugs of Abuse in Frozen Human Serum

NIST recently introduced a reference material for seven drugs of abuse in human serum. This SRM will help laboratories evaluate the accuracy of their measurement procedures for several common drugs of abuse and their metabolites in human serum and blood. Blood or serum is often a preferred matrix for this testing because it is less susceptible than urine to adulteration and blood drug levels are believed to directly reflect the degree of impairment of an individual. Some states also require the use of blood samples rather than urine to establish that an individual has been driving under the influence of drugs. SRM 1959 Drugs of Abuse in Frozen Human Serum consists of human serum that has been fortified (spiked) with benzoylecgonine, methadone, methamphetamine, morphine, phencyclidine, nordiazepam, and 11-nor-Δ-9-tetrahydrocannabinol-9-carboxylic acid. This is NIST's first SRM for drugs of abuse in serum and complements existing reference materials for these analytes in urine and hair.

Technical Contact: Karen Phinney
Email: karen.phinney@nist.gov

NIST 2393 CAG Repeat Length Mutation in Huntington's Disease

The new Standard Reference Material 2393 CAG Repeat Length Mutation in Huntington's Disease will help clinical genetics labs accurately diagnose Huntington's disease, an inherited degenerative brain disorder that usually begins between ages 35 and 50 and progressively leads to physical impairment, dementia, and death.

The Huntington's disease mutation is characterized by an excessive number of CAG repeats on the fourth chromosome. Since 1993, a genetic test has been available to count the number of CAG triplet repeats that exist, determining if a person will develop Huntington's disease, and if so, how severe it will be. Individuals with up to 26 repeats are normal. Individuals with 27 to 35 repeats also are unaffected, but the number of repeats can increase in their children. Individuals with 36 to 39 repeats may or may not develop symptoms of Huntington's disease; however, if they do, it will likely be at a much later onset and slower progression than more pronounced cases. Individuals with 40 or more repeats will definitely be affected, while individuals with 60 or more repeats will develop symptoms in childhood.

Since a positive diagnosis of Huntington's disease undoubtedly will affect decisions about careers, relationships, having children, and other life events, there is no room for error. But errors can occur sometimes because the test requires making many copies of the patient's DNA using polymerase chain reaction (PCR), the standard technique for "amplifying" or making multiple copies of a DNA molecule. PCR can create extraneous CAG repeats due to enzyme slippage during replication—an anomaly known as "stutter"—that makes the triplet count appear lower than it really is. Stutter frequency increases as the repeat number increases. Laboratories can determine the amount of stutter generated by their systems when compared to the stutter shown in the Certificate of Analysis for SRM 2393. The SRM consists of six samples of DNA measured and certified by NIST for triplet repeats ranging in number from 15 to 75. The certified values are free of stutter.

Technical Contact: Margaret Kline
Email: margaret.kline@nist.gov

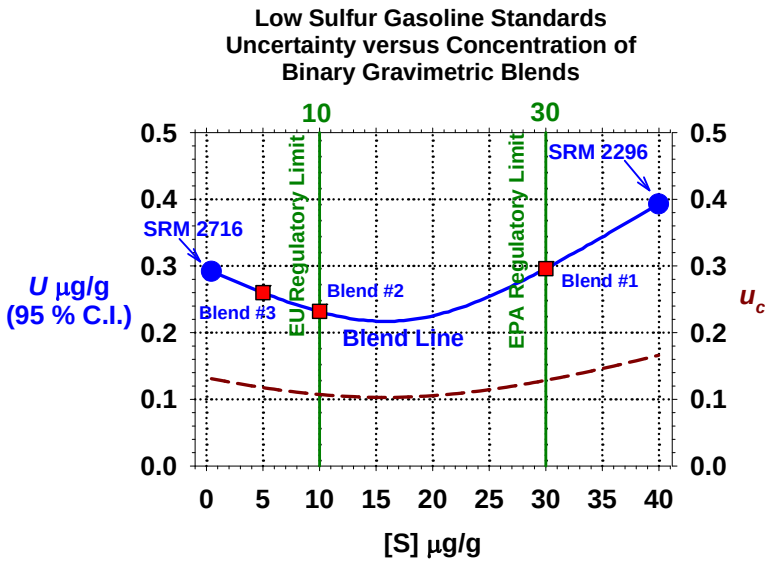
NIST SRM 2716 Sulfur in Gasoline Supports EPA Regulations for Ultra-Low Sulfur in Motor Fuel

NIST recently issued an ultra-low sulfur in gasoline reference material, SRM 2716, primarily intended to help the petroleum and motor fuel sectors make accurate sulfur measurements between 1 µg/g and 40 µg/g (1 µg/g = 1 x 10^{-6} g/g ≡ 1 ppm) to ensure regulatory, contractual, and operational compliance with low-sulfur diesel and gasoline transportation fuel regulations.

This SRM is certified at 0.44 µg/g ± 0.30 µg/g total sulfur (95 % confidence level). The petroleum industries in developed countries are subject to a myriad of environmental regulations. One of the most important and expensive is the regulatory limit on the sulfur content in transportation fuels now enforced in the United States and European Union, each of which has implemented regulations that set the upper limit for gasoline at 30 ppm and 10 ppm, respectively. Lower sulfur content in petroleum fuels makes possible combustion after-treatment technologies that reduce the SO_2 and particulate emissions from automobiles and trucks and mitigates their impact on the environment and human health. Low-sulfur fuels are expensive to produce because the desulfurization step is expensive. At these low levels, high-accuracy standards with concentrations at or near the specification limits are required. Small uncertainties in the standards make possible production of gasoline targeted closer to the specification, which results in substantial operational savings.

The figure below illustrates the practical use of this SRM in the preparation of traceable calibration standards for use in industrial quality control laboratories. The user may mix any two gasoline SRMs to produce a calibration standard of the desired concentration intermediate to the two end members. The figure shows the use of the new standard as the left end member, SRM 2716, combined with SRM 2296 (Reformulated Gasoline,40.0 µg/g ± 0.4 µg/g total sulfur). The solid blue line gives the expanded uncertainty (U) of the blends as a function of concentration and the red dashed line is the combined standard uncertainty, u_c. Three different blends at 5 µg/g, 10 µg/g, and 30 µg/g sulfur are indicated by the solid red squares. Note that the uncertainties in blends #2 and #3 are smaller than either end member. The blend at 30 µg/g, the Environmental Protection Agency's regulatory limit, has an expanded uncertainty of 0.3 µg/g sulfur.

Technical Contact: Robert Vocke, Jr.
Email: robert.vocke@nist.gov

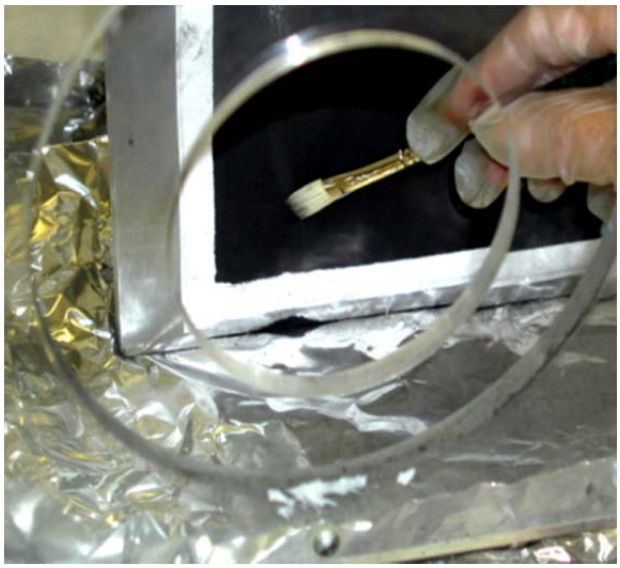


NIST SRM 2786 Fine Particulate Matter (<4 µm) and NIST SRM 2787 Fine Particulate Matter (<10 µm)

NIST has issued two new reference materials, SRM 2786 Fine Particulate Matter (<4 µm) and SRM 2787 Fine Particulate Matter (<10 µm), intended for use in evaluating analytical methods for the determination of selected polycyclic aromatic hydrocarbons (PAHs), nitro-substituted PAHs, polybrominated diphenyl ether (PBDE) congeners, hexabromocyclododecane (HBCD) isomers, sugars, polychlorinated dibenzo-p-dioxin (PCDD) and dibenzofuran (PCDF) congeners, inorganic constituents, and particle-size characteristics in atmospheric particulate material and similar matrices.

Organic chemicals adsorbed to fine particulate matter (PM) in the ambient air account for a major component of the PM's mass. These organic chemicals include tracer compounds that can lead back to the material's source as well as toxic compounds that may contribute to adverse human health effects. A working group of PM investigators from the U.S. Environmental Protection Agency Supersites and related research programs was established to improve the quality and comparability of data on the organic composition of PM. One of the group's recommendations was the development of SRMs composed of contemporary fine PM. SRMs 2786 and 2787 were prepared from atmospheric PM collected in 2005 from an air intake filtration system of a major exhibition center in Prague, Czech Republic. The PM was removed from the reusable surface filters and then resuspended in a particle suspension unit and ultra-high-volume sampler (UHVS). The face velocity of the cyclone in the UHVS was adjusted to control the particle size of material collected on Teflon membrane filters, and two fine particulate matter fractions were collected, <4 µm and <10 µm. A unit of each SRM consists of one bottle containing between 100 mg and 140 mg of fine PM. These new SRMs complement two currently available materials collected in the mid-1970s, SRM 1648a Urban Particulate Matter and SRM 1649b Urban Dust, which were sieved to <53 µm and <63µm, respectively, and SRM 2783 Air Particulate on Filter Media.

Technical Contact: Michele Schantz
Email: michele.schantz@nist.gov



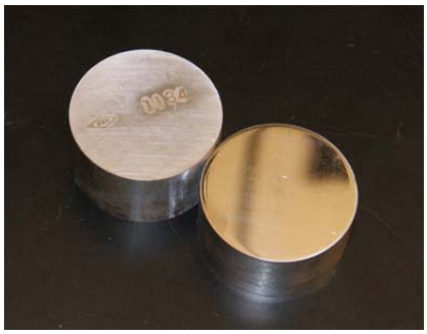
Popular Low-Alloy, High-Silicon Steel SRMs Upgraded and Back in Stock
SRM 125b and SRM 1134 Low-Alloy, High Silicon Steel

The National Institute of Standards and Technology has completed the analyses needed to put SRM 125b Low-Alloy, High-Silicon Steel back into stock and to upgrade the certificates for both chip-form SRM 125b and its solid-form counterpart SRM 1134 to current standards for contents and format under the NIST Quality System. New determinations by X-ray fluorescence spectrometry (XRF) were included in re-evaluation of all certified and reference values, which now have the required estimates of uncertainty. SRMs 125b and 1134 now have certified and reference values for 11 elements including silicon at a mass fraction of 2.889 % and carbon at 0.0261 %.

When low-carbon steel is alloyed with small amounts of silicon, the silicon increases the electrical resistivity, making the steel useful for transformer cores and rotor/stator parts in electric motors. Silicon steels are of greatest use to designers of motion control products where the additional cost is justified by increased performance. These steels are available in an array of grades and thicknesses so the amount of silicon in the material may be tailored for various applications.

These two SRMs were issued in 1970 and have been serving the steel industry for over 40 years. They are used by steel manufacturers and testing laboratories in the United States and around the world. Typically, solid-form samples are used to calibrate or validate test methods for XRF and spark source optical emission spectrometry (SSOES), and chipped material is used with inductively coupled plasma spectrometry and combustion with infrared detection test methods.

Technical Contact: John Sieber
Email: john.sieber@nist.gov



Renewals

SRM 1686b Nitric Oxide in Nitrogen (Nominal 500 µmol/mol) Lot# 42-M-XX

SRM 2636a Carbon Monoxide in Nitrogen (Nominal 250 µmol/mol) Lot# 57-F-XX

SRM 2683c Bituminous Coal (Sulfur, Mercury, and Chlorine)

SRM 3128 Lead (Pb) Standard Solution

SRM 3130a Lutetium (Lu) Standard Solution

SRM 3148a Scandium (Sc) Standard Solution

SRM 3157a Terbium (Tb) Standard Solution

Revisions

Certificate Revisions: Are You Using These Materials?

This is a list of our most recent certificate revisions. NIST updates certificates for a variety of reasons, such as to extend the expiration date or to include additional information gained from stability testing. Users of NIST SRMs should ensure that they have the current certificates. If you do not have the current certificate for your material, you can print or view a copy at our website at **http**://**www.nist.gov/srm** or contact the Measurement Services Division at:

Phone: 301-975-2200 **Fax:** 301-926-4751 **Email**: srminfo@nist.gov

SRM 99b Soda Feldspar
Editorial changes

SRM 723d Tris Acidimetric
New expiration date: 01 June 2012
Editorial changes

SRM 1134 Low-Alloy High Silicon Steel
Editorial changes

SRM 1507b THC-COOH in Freeze-Dried Urine
New expiration date: 31 December 2016
Editorial changes

SRM 1659a Methane in Air – 10 µmol/mol Lot# 11-G-XX
New expiration date: 01 September 2017
Editorial changes

SRM 1957 Organic Contaminants in Non-Fortified Human Serum
Editorial changes

SRM 2165 Low Alloy Steel
Update of values
Editorial changes

SRM 2166 Low Alloy Steel
Update of values
Editorial changes

SRM 2167 Low Alloy Steel
Update of values
Editorial changes

SRM 2168 High-Purity Iron
Update of values
Editorial changes

Revisions (continued)

SRM 2628a Nitric Oxide in Nitrogen 10 µmol/mol Lot #49-H-XX
Update of values

SRM 3101a Aluminum (Al) Standard Solution
Editorial changes

SRM 3102a Antimony (Sb) Standard Solution
Editorial changes

SRM 3103a Arsenic (As) Standard Solution
Editorial changes

SRM 3104a Barium (Ba) Standard Solution
Editorial changes

SRM 3105a Beryllium (Be) Standard Solution
Editorial changes

SRM 3109a Calcium (Ca) Standard Solution
Editorial changes

SRM 3111a Cesium (Cs) Standard Solution
Editorial changes

SRM 3112a Chromium (Cr) Standard Solution
Editorial changes

SRM 3117a Europium (Eu) Standard Solution
Editorial changes

SRM 3119a Gallium (Ga) Standard Solution
Editorial changes

SRM 3121 Gold (Au) Standard Solution
Editorial changes

SRM 3165 Vanadium (V) Standard Solution
New expiration date: 02 September 2016

SRM 3280 Multivitamin/Multielement Tablets
Technical changes
Editorial changes

Revisions (continued)

RM 8441a Wheat Hardness
New expiration date: 03 January 2017
Technical changes
Editorial changes

RM 8491 Sugarcane Bagasse Whole Biomass Feedstock
New expiration date: 01 June 2020
Technical changes

RM 8492 Eastern Cottonwood Whole Biomass Feedstock
New expiration date: 01 June 2020
Technical changes

RM 8493 Monterey Pine Whole Biomass Feedstock
New expiration date: 01 June 2020
Technical changes

RM 8494 Wheat Straw Whole Biomass Feedstock
New expiration date: 01 June 2020
Technical changes

RM 8541 USGS24 Graphite (Carbon Isotopes in Graphite)
New validity date: 31 December 2020

RM 8542 IAEA-CH-6 Sucrose (Carbon Isotopes in Sucrose)
New expiration date: 31 December 2020
Minor editorial changes

RM 8544 NBS19 Limestone (Carbon and Oxygen Isotopes in Carbonate)
New expiration date: 31 December 2020
Editorial changes

RM 8599 Henderson Molybdenite
Editorial changes

ORDER NIST SRMs ONLINE

You can now order NIST SRMs through our new online ordering system, which is continually updated. **PLEASE NOTE:** Purchase orders and credit cards may be used when ordering an SRM online. This system is efficient, user-friendly, and secure. Our improved search function finds keywords on SRM detail pages as well as words in titles.

Also note that we are placing many historical archive certificates online for your convenience.

https://srmors.nist.gov

Please Register Your Certificate Online!

Registering will ensure that you have the most recent certificates.

http://tsapps.nist.gov/msdsurvey/register/default.aspx?ID=2

January 2011 Standard Reference Materials® Catalog/CD

If you would like a copy of our January 2011 SRM Marketing Catalog or a CD, please contact us:

Phone: 301-975-2200
Fax: 301-948-3730
Email: srminfo@nist.gov

NIST SRM 2011/2012 Exhibit Schedule

ISO/REMCO 34th Meeting
July 11-15, 2011
Delft, The Netherlands

AACC Clinical Lab Expo
July 26-28, 2011
Georgia World Congress Center
Atlanta, GA

NCSL Symposium
August 21-25, 2011
Gaylord National Convention Center
National Harbor, MD

Dioxin 2011
August 21-25, 2011
Crowne Plaza Brussels
Brussels, Belgium

American Chemical Society (ACS)
August 28-September1, 2011
Denver Convention Center
Denver, CO

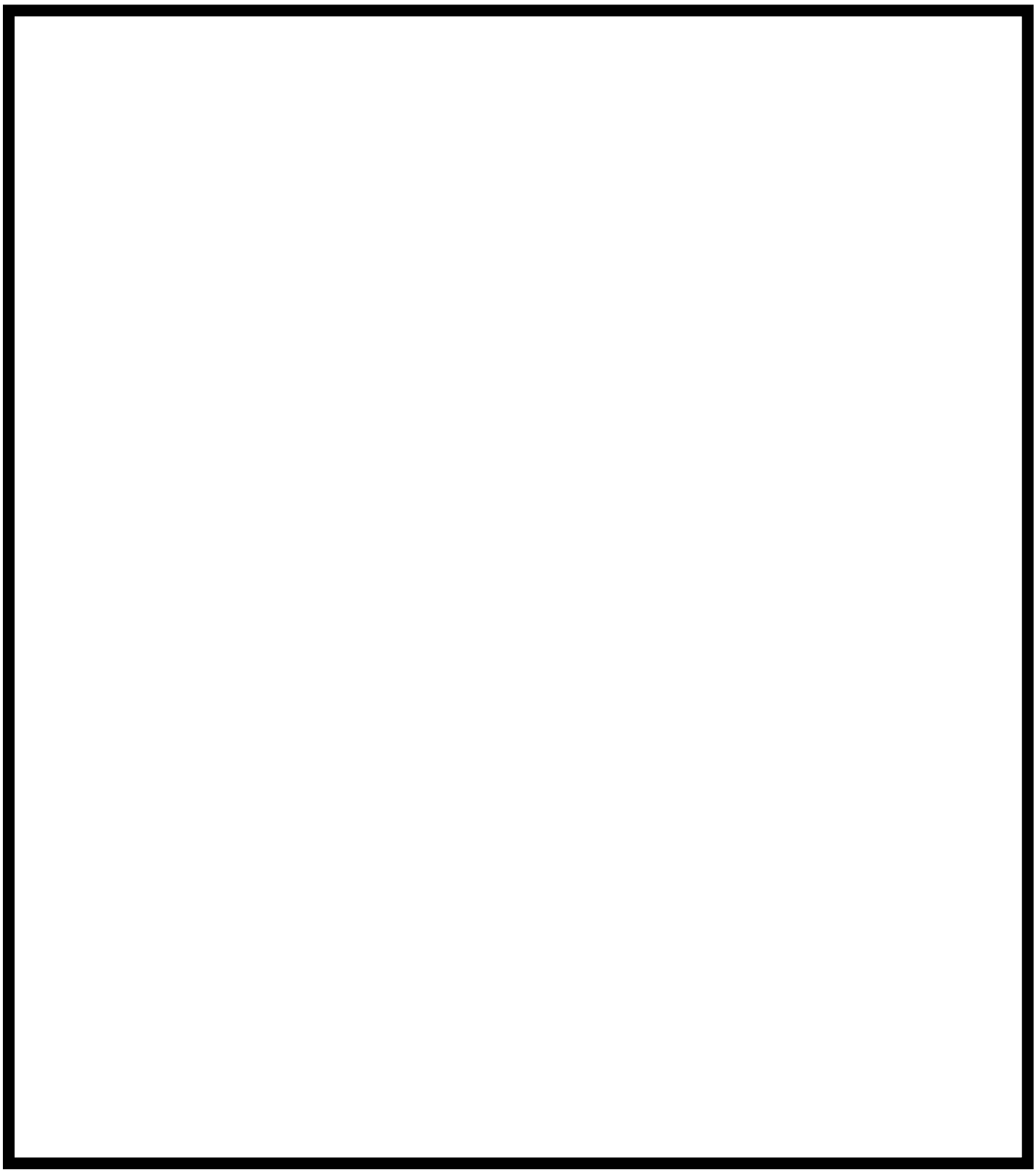
AOAC International
September 18-21, 2011
Sheraton New Orleans
New Orleans, LA

MS&T Show
October 16-20, 2011
Greater Columbus Convention Center
Columbus, OH

Air Quality VIII
October 24-27, 2011
Marriott Crystal Gateway
Arlington, VA

ChemShow
November 1-3, 2011
Jacob Javits Convention Center
New York City, NY

Material Research Society Fall Meeting (MRS)
November 28-December 2, 2011
Hynes Convention Center
Boston, MA



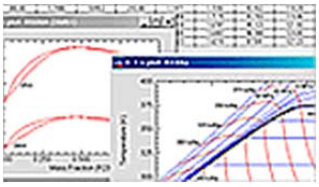
Other NIST Measurement Services Websites of Interest

Standard Reference Materials

Standard Reference Materials
www.nist.gov/srm

Historical Archived Certificates/Reports of Investigation
https://www-s.nist.gov/srmors/certArchive.cfm

Standard Reference Data



NIST Scientific and Technical Databases
http://www.nist.gov/srd

NIST Data Gateway
http://srdata.nist.gov/gateway

Calibrations

Calibrations Services
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We appreciate your feedback!