NIST Special Publication 260
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National Institute of
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STANDARD REFERENCE MATERIALS CATALOG 1995-1996

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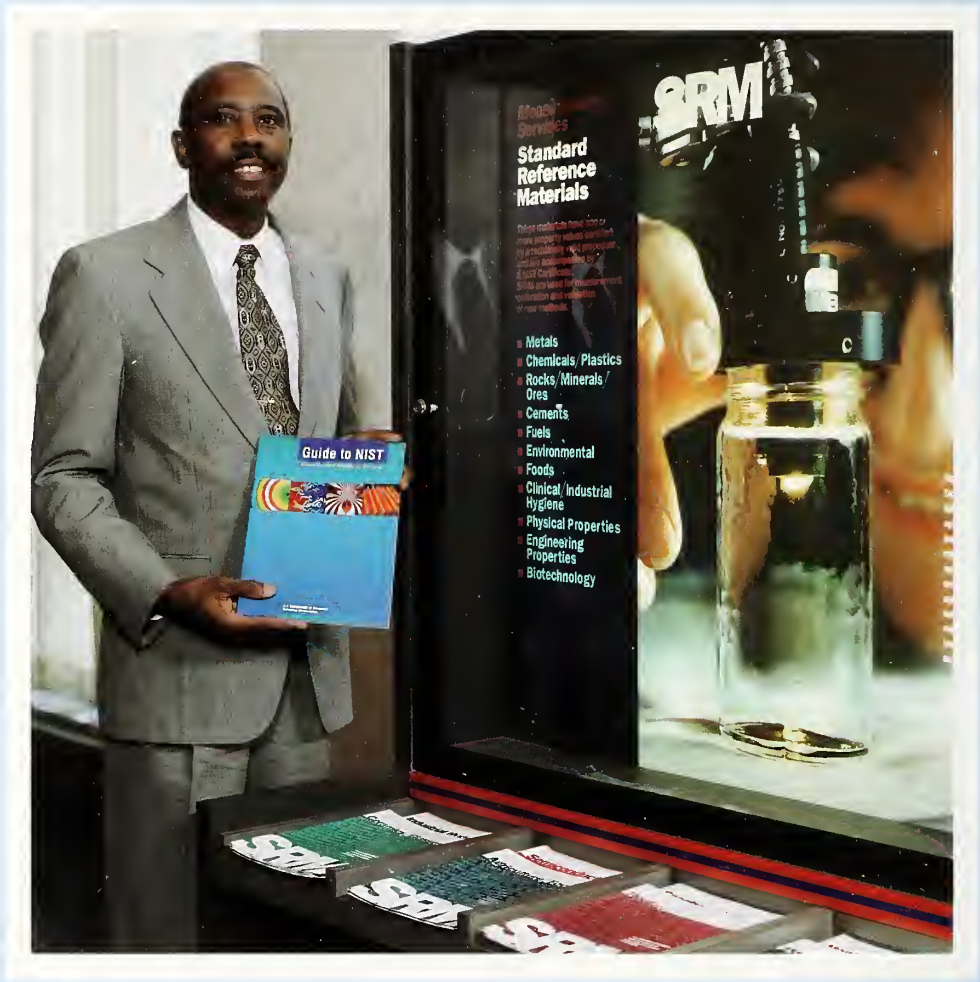

Thomas E. Gills, *Chief*, Standard Reference Materials Program

NIST

Standard Reference Materials®
Catalog
1995–96

NIST Special Publication 260

Nancy M. Trahey, Editor

Standard Reference Materials Program
National Institute of Standards and Technology
Gaithersburg, MD 20899-0001

For Information or To Order

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See page 8 for Instructions

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Foreword

The National Institute of Standards and Technology (NIST), formerly the National Bureau of Standards, was created by a Congressional act in 1901 to be the source and custodian of standards for physical measurement in the United States and charged with the responsibility for establishing a measurement foundation to facilitate both national and international commerce. This mission was purposely stated in broad terms in order to allow the agency the flexibility to reorient its programs in response to changing national needs and priorities. As a result of its congressionally mandated mission, first the National Bureau of Standards and now NIST has aimed its research and service activities toward:

> *helping U.S. industry improve its competitiveness through new technologies, modernized production processes, improved quality control and rapid commercialization.*

At the same time, the Institute has two very important goals in serving the needs of its other major customers – government at all levels, academia, and the general public. They are:

> *improving public health, safety, and the environment through selected research programs, and*
>
> *conducting fundamental research that advances science and engineering.*

The evolving linkage between the United States and world economy has resulted in an increased awareness of the need for comparability among data used to assess product quality and/or evaluate processes. Standard Reference Materials (SRMs) represent one mechanism by which measurement quality and traceability to national and international standards can be achieved when they are properly used. As a part of its congressional mandate the goals of NIST are to: develop reference and definitive methods of analysis, certify and issue standards, and assure their effective use in the measurement community, thereby helping to achieve accurate measurements in the United States and throughout the world.

The Standard Reference Materials Program distributes over 1300 different SRMs developed and certified in the NIST laboratories. NIST has a customer base for its standards of over 60,000 users with approximately 25% located outside the United States. All currently available SRMs are described in this Standard Reference Materials Catalog, Special Publication 260. In addition to the current stock of SRMs, the Program will partner with customers to evaluate proposed SRMs for their potential to meet industry-wide requirements, to develop SRMs based on identified needs, and issue new SRMs that will help standardization efforts.

As the world commerce and trade markets have become more global, customers are using SRMs more to achieve conformance to process requirements and measurement quality that address international as well as national needs for commerce and trade. All measurements using SRMs have the capability of being traceable to a common and recognized set of standards and consequently the compatibility of laboratories can be realized.

Continued support for the SRM Program is appreciated.

Thomas E. Gills, Chief
Standard Reference Materials Program
National Institute of Standards and Technology

Acknowledgments

The editor acknowledges the assistance of the Standard Reference Materials Program staff in the review of this catalog. The constructive criticism provided by other members of the NIST technical staff is also appreciated. Very special thanks is due I. E. Putman of NIST who electronically typeset this catalog in its entirety.

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Abstract and Key Words

This catalog provides technical and general ordering information for the Standard Reference Materials (SRMs) and Reference Materials (RMs) currently available from the National Institute of Standards and Technology (NIST) Standard Reference Materials Program (SRMP). The materials are arranged according to technical category and classified as follows: Standard Reference Materials for Chemical Composition; Standard Reference Materials for Physical Properties; and Standard Reference Materials for Engineering Materials. Technical descriptions are given for all materials and may include certified values. However, these values are incomplete as they appear in the catalog and therefore cannot be referenced for actual measurement purposes. The certificates issued by the SRMP are the only legitimate sources of certified information for NIST reference materials.

Key Words: analysis, calibration, Certified Reference Materials, characterization, composition, concentration, material, measurement, property, quality assurance, quality control, Reference Materials, Standard Reference Materials, standardization.

NIST Policy Regarding Use of Metric (SI) Units

The following policy was established in February 1991:

> "In accordance with the Metric Conversion Act of 1975 as amended by Section 5164 of the Omnibus Trade and Competitiveness Act of 1988 and as required by related provisions of the Code of Federal Regulations, *the National Institute of Standards and Technology (NIST) will use the modern metric system of measurement units (International System of Units – SI) in all publications.* When the field of application or the special needs of users of NIST publications require the use of non-SI units, the values of quantities will be first stated in SI units and the corresponding values expressed in non-SI units will follow in parentheses."

The technical information contained in this catalog is consistent with the above policy. Only SI units and symbols have been used to describe the reference materials contained herein. Therefore, abrogated or obsolete quantifiers (i.e., the term, ppm), no longer appear, but rather have been replaced with the correct SI term, (mg/kg), and reference material values previously expressed in only in-lb units, have been converted to the appropriate SI units [1,2]. Due to space limitations, the non-SI units converted are not shown in the catalog.

There is one notable exception to this policy – use of the quantifier, "Wt. %". While this quantifier is not a SI unit, it is very widely used in industry and thus appears in many SRM certificates and throughout this catalog. However, in accordance with the above policy, future SRM certifications which heretofore would have been expressed in "Wt. %", will instead be expressed as a fraction or a percent of the appropriate SI unit which pertains to the quantity(ies) certified.

Note to SRM Users: *Individual SRM certificates should be consulted to ascertain if certification data have been expressed in both SI and non-SI units.*

[1] The International System of Units (SI), NIST Special Publication 811, 1994 Edition.

[2] ASTM E380-93 Standard Practice for Use of the International System of Units (SI) (the Modernized Metric System), ASTM, 1916 Race Street, Philadelphia, PA 19103.

NIST Policy On Measurement Uncertainty Statements

The following policy was established in January 1993:

> "[ ]..... All NIST measurement results are to be accompanied by quantitative statements of uncertainty [1]. To ensure that such statements are consistent with each other and with present international practice, this NIST policy adopts in substance the approach to expressing measurement uncertainty recommended by the International Committee for Weights and Measures (CIPM)."

[The CIPM approach is based on Recommendation INC-1 (1980) of the Working Group on the Statements of Uncertainties. More recently, at the request of the CIPM, a joint BIPM/IEC/ISO/OIML working group developed a comprehensive reference document on the general application of the CIPM approach [2]. The development of this document is providing further impetus to the worldwide adoption of the CIPM approach.]

The uncertainty statements contained in certificates for SRMs produced after January 1993, are in compliance with the above policy. To the fullest extent possible, these certificates describe the uncertainty components associated with each certified value reported, in terms recommended by the CIPM approach. The NIST technical division(s) that approved the certification protocol, produced the SRM, and evaluated the certified value(s) and associated uncertainty(ies) resulting therein, are responsible for employing the statistical methods that are in accordance with this policy.

Note to SRM Users: *It is essential that all statistical information contained in a NIST SRM certificate be carefully reviewed before the certified value(s) and associated uncertainty(ies) are applied to a measurement process or program.*

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[1] Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results NIST Technical Note 1297, 1994 Edition.

[2] ISO Guide to the Expression of Uncertainty of Measurement: 1993 (E); ISO Technical Advisory Group on Metrology, Working Group 3, First Edition 1993.

How to Use This Catalog

The *NIST Standard Reference Materials Catalog 1995–96* lists Standard Reference Materials (SRMs) and Reference Materials (RMs) issued by the NIST Standard Reference Materials Program. It consists of a guide and three (3) indexes, each of which groups the SRMs and RMs according to a distinctive characteristic or descriptor. Selection of the guide or one index over another to locate the information desired will depend on the user's prior knowledge of a specific SRM or RM and intended SRM or RM application.

Guide to SRM/RM Technical Categories – This is a general listing based on the three major categories into which all the SRMs and RMs have been assigned. The *categories* are divided into sequentially numbered sections, each of which describes a material class or technical property class. The *sections* are further divided into subsections, each of which describes a specific type of material or technical property and the physical form(s) of the SRMs and RMs contained therein. The titles of the *subsections* are the descriptors for the tables comprising the catalog.

EXAMPLE

Category	–	Standard Reference Materials for CHEMICAL COMPOSITION, 25 through 91 (page nos.)
Section	–	102. Nonferrous Metals, 36 through 47 (page no.)
Subsection (Descriptor)	–	Zinc Base Alloys (chip and disk forms), 46 (page no.)

SRM/RM Subject Index – This index is based on short word descriptors (one to four words) of the SRMs and RMs in the catalog. These descriptors may identify a section, subsection, a material class, a specific SRM property, a specific SRM application, or a measurement technique. Some descriptors may coincidently also identify an individual SRM or RM; however, only a few SRMs or RMs will be so described. The index is arranged in *alphabetical order of the first word of the descriptor.* Because of the variety of descriptors used, some SRM and RM materials may be cross-referenced.

EXAMPLE

Index Entry	–	ALLOYS (NONFERROUS)
Descriptor (s)	–	See NONFERROUS METALS, 39 through 47 (page nos.)
Index Entry	–	ZINC
Descriptor	–	Spelter (ZINC BASE ALLOYS), 46 (page no.)

SRM/RM Numerical and Certificate Index – This index is based on the unique numerical identifier assigned to each and every SRM and RM issued by NIST. This identifier is the *SRM or RM Number,* an integral part of the reference material name which appears on each SRM certificate or RM report of investigation. The index lists all the SRMs and RMs sequentially by this number, beginning with SRM 1c and ending with RM 9529. A short word descriptor of the SRM or RM, the category subsection in which it is assigned, and the *certificate or report-of-investigation date of issue* are also provided for reference.

EXAMPLE

SRM – 94c
Descriptor – Zn Base Die Casting Alloy
Certificate Date – Dec 94
Section Code – 102
Page – 46 (page no.)

SRM/RM Material Safety Data Sheet (MSDS) Index – The index is similar to the Numerical and Certificate Index but it lists *only* those SRMs/RMs for which *Material Safety Data Sheets (MSDSs)* are required. The identifier is the *SRM or RM Number* and the short word descriptor used in the Numerical Index. These are followed by the *MSDS Number*, which usually carries the same SRM/RM number identifier, *and its date of issue*. In accordance with applicable national and international regulations, a copy of the MSDS accompanies every shipment of its relevant SRM/RM.

EXAMPLE

SRM – 1450b
Descriptor – Thermal Resistance Board
MSDS Number – 1450b
MSDS Date – Apr 92
Page – 166

HOW TO LOCATE SPECIFIC INFORMATION

About an unknown SRM or RM material needed for a particular technical application –

Refer to the **Guide to SRM/RM Technical Categories**, select the most appropriate of the three categories, review all the sections and subsections therein and note the page numbers.

About a material from a specific class of materials and of known technical application –

Refer to the **SRM/RM Subject Index,** check for alternative descriptors and cross-references, and note page numbers.

About a material whose SRM or RM number is known –

Refer to the **SRM/RM Numerical and Certificate Index** and note the page number.

Whether or not a SRM or RM has (or requires) a Material Safety Data Sheet –

Refer to the **SRM/RM Material Safety Data Sheet Index.**

Program Information

The National Institute of Standards and Technology (NIST) offers for sale over 1,300 different materials through its Standard Reference Materials Program. These materials are primarily Standard Reference Materials (SRMs) certified for their chemical compositions, chemical properties, or physical properties, but also include other reference materials. All materials bear distinguishing names and numbers by which they are permanently identified. Thus, each material bearing a given description is identical (within the specified limits) to every other sample bearing the same designation—with the exception of individually certified items, which are further identified by serial number.

Definitions

From "Terms and definitions used in connection with reference materials," ISO Guide 30–1992 (E):

1. "Reference Material (RM): A material or substance, one or more properties of which are sufficiently well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials."
2. "Certified Reference Material (CRM): A reference material, one or more of whose property values are certified by a technically valid procedure, accompanied by or traceable to a certificate or other documentation which is issued by a certifying body."

NIST Standard Reference Materials (SRMs): Certified reference materials issued by NIST. These are well-characterized materials produced in quantity to improve measurement science. SRMs are certified for specific chemical or physical properties, and are issued by NIST with certificates that report the results of the characterization and indicate the intended use of the material. They are prepared and used for three main purposes:

(1) To help develop accurate methods of analysis (reference methods);
(2) To calibrate measurement systems used to:
  (a) facilitate exchange of goods,
  (b) institute quality control,
  (c) determine performance characteristics, or
  (d) measure a property at the state-of-the-art limit; and
(3) To assure the long-term adequacy and integrity of measurement quality assurance programs.

NIST certified values are obtained by one or more of the following measurement routes:

(1) A previously validated reference method,
(2) Two or more independent, reliable measurement methods, or
(3) A network of cooperating laboratories, technically competent and thoroughly knowledgeable with the material being tested.

An in-depth discussion of the use of SRMs can be found in NIST Special Publication 260-100 "Standard Reference Materials HANDBOOK FOR SRM USERS" written by John K. Taylor (February 1993, edited by N. M. Trahey).

A number of Reference Materials (RMs) listed in this catalog are sold, but not certified, by NIST. However, they meet the ISO definition for RMs, and many meet the definition for CRMs. The documentation issued with these materials is either a:

(1) "Report of Investigation," the sole authority being the author of the report. RMs are intended to further scientific or technical research on particular materials. The principal consideration in issuing RMs is to provide a homogeneous material so that investigators in different laboratories are assured that they are investigating the same material.
(2) "Certificate," issued by the certifying agency (other than NIST), e.g., other national laboratories, other government agencies, other standardizing bodies, or other non-profit organizations. When deemed to be in the public interest and when alternate means of national distribution do not exist, NIST acts as the distributor for such materials. This service is available to organizations that qualify and have the reference materials that would help meet national measurement needs.

SRM Catalog

New catalogs of NIST SRMs (and RMs) are published approximately every 2 years, listing materials available and renewal materials in preparation, and deleting discontinued materials. The Catalog is supplemented by Price Lists issued simultaneously with each new catalog and annually to keep the catalog current between editions. These supplements list current prices, and reflect any changes in material availability—listing new and renewal materials and deleting discontinued ones.

A guide and three indexes are provided for user convenience. They are described in the section, **How to Use This Catalog.**

Preparation and Availability of SRMs

New and renewal SRMs are being prepared continually. While these SRMs are included in the next edition of the catalog and its supplements, prospective users whose names are on the SRM mailing list are also notified as soon as the new items become available. Requests for placement on the SRM mailing list can be submitted at any time to the Standard Reference Materials Program.

Renewal SRMs are intended to be completed before the supply of an existing SRM is exhausted. However, this is not always possible and an SRM may be out of stock for a time. When this occurs, those ordering the material are so notified and possible substitute SRMs are suggested. When a renewal is issued, customers who have ordered the previous lot are promptly notified of the price and availability of the renewal. If little demand exists or if an alternate source of supply becomes available, production of an SRM may be discontinued permanently.

Renewal SRMs may not be identical to the preceding lot; however, they meet the same specifications and can be used for the same purpose. For example, the first 0.1% carbon Bessemer steel was prepared in 1909 (Standard Sample No. 8). Since then a number of renewals, 8a, 8b, 8c, etc., have been prepared. The current SRM 8j 0.1C, represents the eleventh lot of the material. Each lot differs somewhat in detailed analysis; thus the use of the specific certificate for that lot is essential.

Guide for Requesting Development of SRMs

NIST has the responsibility to develop, produce, and distribute SRMs that provide a basis for comparison of measurements on materials, and that aid in the control of production processes. To carry out this function, the Standard Reference Materials Program evaluates the requirements of science, industry, and government for well-characterized reference materials, and directs the production and distribution of such materials.

To become a SRM, a candidate material must meet one or more of these criteria:

1. It would permit users to attain more accurate measurements.
2. Its production elsewhere would not be economically or technically feasible.
3. It would be an industry-wide standard for commerce from a neutral source not otherwise available to the public.
4. Its production by NIST would assure continued availability of a well-characterized material important to science, industry, or government.

NIST has recognized and responded to requests to enlarge the scope of the Standard Reference Materials Program to include all types of well-characterized materials for use in calibrating measurement systems, or for producing scientific data that can be referred to a common base. However, the requests for new SRMs greatly exceed NIST's capacity to produce and certify such materials. Consequently, requests for new SRMs of limited need or use are deferred in favor of requests that clearly show a critical need. To determine which requests receive priority, NIST seeks and uses information supplied by industry and such organizations as the American Petroleum Institute (API), American Society for Testing and Materials (ASTM), etc., to objectively assess the urgency and importance of proposed new reference materials.

Requests to the Standard Reference Materials Program for the development of a new SRM should provide the following information:

1. Short title of the proposed SRM.
2. Purpose for which the SRM would be used.
3. Reasons why the SRM is needed.
4. Technical characteristics and requirements for the material. Include additional requirements and reasons if more than one SRM is necessary for standardization in this area.
5. Estimates of the probable present and future (5–10 years) demand for such an SRM, nationally and internationally.
6. Justification for SRM preparation by NIST, particularly if a similar one could be produced or obtained from another source.
7. Pertinent information to aid justification for the SRM, such as: (a) an estimate of the potential range of application, monetary significance of the measurement affected, scientific and technological significance including, when feasible, estimates of the impact upon industrial productivity, growth, quality assurance or control, and (b) supporting letters from industry leaders, trade organizations, interested standards committees, and others.

All such requests should be addressed to:

National Institute of Standards and Technology
Standard Reference Materials Program
Room 112, Building 202
Gaithersburg, MD 20899-0001

ATTN: SRM Development

Ordering NIST Reference Materials

General

Purchase orders (in English) for all NIST SRMs/RMs should be directed to:

National Institute of Standards and Technology
Standard Reference Materials Program
Room 204, Building 202
Gaithersburg, MD 20899-0001
USA

Telephone: (301) 975–6776
Fax: (301) 948–3730
E-Mail: SRMINFO@enh.nist.gov

Each purchase order should give the number of units, catalog number, and name of each reference material requested.

Example: 1 each, SRM 79a, Fluorspar (Customs Grade).

The following information must be included with each order: a billing address, a shipping address, name of customer, telephone number, fax number, purchase order number, a customer identification number, i.e., a social security number (SSN) for consumer customers, tax identification number (TIN) for commercial customers, or agency code (ALC) for U.S. government customers.

Note: NIST SRMs/RMs are only distributed in the units of issue listed in this catalog and its supplement (price list). Also, purchase orders or inquiries submitted in a language other than English, will take several weeks to process.

Acceptance of an order does not imply acceptance of any provisions set forth in the order that are contrary to the policy, practice, or regulations of the National Institute of Standards and Technology or the United States Government.

Out-of-Stock Materials

Orders for "out-of-stock" SRMs/RMs, are generally filled with the renewal reference materials – if available; otherwise the orders will be canceled. Customers are notified when an order is canceled and their names are placed on a notification list. This list is used to contact customers when the reference material (or its renewal) is again available. Upon notification, customers are told the price of the material and are asked to submit a new order if they still wish to purchase it.

For some SRMs/RMs, production lots are small and stock outages occur frequently. In these cases, the notification list is used to fill orders on a "*first come, first served*" basis. Customers are contacted when the reference materials are again available and are asked to confirm their original purchase orders.

Terms and Conditions

Prices quoted for SRMs/RMs are in U.S. dollars ($), and are published in the catalog supplement (price list). The prices shown therein are subject to change without notice and orders will be invoiced for the prices in effect at the time of shipment. Shipping and handling charges for regular and special (for SRMs in restricted categories) shipments, are also applied to all orders. These charges will be added to the invoices.

Note: A 10% discount is given on individual purchase orders for 50 or more SRM units (single SRM, or combination of SRMs).

Payment of all invoices is expected within 30 days of receipt for domestic orders – 45 days of receipt for foreign orders, and may be made by any of the following:

- Banker's draft against U.S.A. bank,
- Bank to bank transfer to U.S.A. bank,
- Cash against documents,
- VISA or Mastercard only,
- International money order.

Late Charges

In accordance with U.S. Treasury regulations, late charges will be levied for each 30/45-day period, or portion thereof, that an invoice payment is overdue.

Proforma Invoice (Price Quotation)

Proforma invoice service requires 3 to 4 weeks to process and is furnished *only* to those customers requiring such service.

Domestic Shipments

SRM/RM shipments within the continental U.S. are shipped F.O.B. Gaithersburg, MD. There are several shipping modes which can be used, including UPS Ground, Federal Express, Roadway Package Service, Air Freight, and Motor Freight (Collect). Unless otherwise instructed by the customer, the mode of shipment will be selected by NIST. Fewer shipping modes are available to SRMs/RMs in restricted categories and NIST reserves the exclusive right to select the proper shipping mode for these types of shipments. For restricted SRM/RM shipments, an additional charge is incurred for each shipping container used. This charge is added to the invoice.

Foreign Shipments (and shipments to Alaska and Hawaii)

SRM/RM shipments outside the contiguous U.S. are also shipped F.O.B. Gaithersburg, MD by one of the following modes, including UPS International, Federal Express International (subject to size, weight, and category of material limitations), Air Parcel Post, and Air Freight. Unless otherwise instructed by the customer, the mode of shipment will be selected by NIST. Any other mode of shipment requested by the customer must be paid by the customer. Fewer shipping modes are available to SRMs/RMs in restricted categories and NIST reserves the exclusive right to select the proper shipping mode for these types of shipments.

Restricted Shipments – Dangerous Goods (Hazardous Materials)

Some SRMs/RMs are classified as "Dangerous Goods" by the U.S. Department of Transportation (DOT), the International Civil Aviation Organization (ICAO), or the International Air Transport Association (IATA). These organizations have published regulations and procedures for packaging and shipping dangerous (hazardous) goods which must be followed to safely transport these materials. Such regulations and procedures are very specific and do not allow exceptions. NIST reserves the exclusive right to select the proper packaging and shipping mode to assure the shipments comply with these regulations and procedures.

Restricted Shipments — Temperature Sensitive Materials

Some SRMs are extremely temperature-sensitive and will perish unless shipped by the most expedient mode available. To ensure the stability of these materials, they must be packaged with Cool Packs or dry ice which will maintain the necessary low temperatures for a short period of time. However, *several SRMs are so temperature-sensitive that they are restricted to domestic sales only*, and must be shipped according to a set schedule.

Documentation (All documents are printed in English)

The documentation NIST furnishes are:

a. Commercial invoice(s),
b. Packing slip(s),
c. Air waybill for air shipments (provided UPON REQUEST ONLY),
d. NAFTA Certificate(s) (when applicable),
e. SRM/RM Certificate(s) — one (1) for each unit ordered,
f. Material Safety Data Sheet(s) — one (1) for each type or ordered material requiring it.

CUSTOMERS ARE REQUIRED TO INSPECT ALL PACKAGES AND DOCUMENTATION IMMEDIATELY UPON RECEIPT OF SHIPMENT. ANY DAMAGE, SHORTAGES OR DEFECTS MUST BE REPORTED TO SRM PROGRAM CUSTOMER RELATIONS AT (301) 975-6776, WITHIN FIVE (5) DAYS OF RECEIPT OF SHIPMENT.

Rush Shipments

Requests for rush shipments will be accommodated when possible. However, they will be made in compliance with existing regulations pertaining to the SRMs/RMs being shipped and when hazardous materials are involved, all regulations governing their transportation will take precedence. The following types of rush shipments are available:

- Same day shipping — Orders must be placed by **10:00 AM Eastern Standard Time (EST)**. In addition to the normal shipping fees, a processing fee of $50.00 will be added to the customer's invoice.
- Next day shipping — In addition to the normal shipping fees, a processing fee of $25.00 will be added to the customer's invoice.

  (Exception: Hazardous materials will not be shipped the same day.)

Returned Goods

NIST SRMs/RMs are generally not returnable – with the exception of defective goods or shipments made in error by NIST. However, normal transaction of business inevitably requires the occasional return of merchandise for exchange or credit. NIST has therefore instituted the following returned goods policy:

- Return shipments are accepted by NIST only **after** specific arrangements to do so have been made. To return a SRM/RM, SRM Program Customer Relations must be contacted to obtain a *Return Authorization Number and shipping instructions*. REQUESTS FOR RETURN AUTHORIZATION MUST BE MADE WITHIN THIRTY (30) DAYS OF RECEIPT OF SHIPMENT.

- Return shipments of hazardous SRMs/RMs authorized by SRM Program Customer Relations, must be packed, marked, labeled, and shipped in accordance with national and international regulations governing their transportation. Opened, leaking or damaged hazardous SRM/RM units and/or their containers CANNOT BE RETURNED TO NIST but should be disposed of in accordance with applicable laws and regulations.

Returns which will not be authorized or accepted UNDER ANY CIRCUMSTANCES include:

- **Perishable SRM/RMs,**
- **Unsealed, partially used, modified or mutilated SRMs/RMs,**

SRM/RM Certificates and Material Safety Data Sheets

Each SRM/RM shipment contains sufficient copies of Certificates and MSDSs (if applicable) for the number of units ordered. However, if these documents are misplaced, NIST will provide additional copies free of charge upon request and when proof of purchase has been provided. Customers may call, fax, or use the following e-mail addresses to send in their requests:

for Certificates – SRMCERT@enh.nist.gov
for MSDSs – SRMMSDS@enh.nist.gov

Requests will usually be processed within twenty-four (24) hours. Documents under or equalling ten (10) pages will be faxed; documents exceeding ten (10) pages will be mailed. If the documentation is urgently needed, the customer must provide a Federal Express account number.

NIST also provides copies of misplaced 'Archive certificates' free of charge to customers who possess NIST SRMs/RMs that are no longer for sale. This service is available on a one-time-only basis.

Other Services of the National Institute of Standards and Technology

Calibration and Related Measurement Services

The measurement services of NIST include calibrations, special tests, and Measurement Assurance Programs (MAPs). The calibrations and MAPs of NIST satisfy the most demanding and explicit measurement requirements, in that these services are carried out regularly under pre-established and well-defined conditions; the measurement processes involved are well-characterized, stable and in a state of statistical control; and quality control procedures are well-defined and strictly followed. These services are described in NIST Special Publication 250, *Calibration Services Users Guide*. For more information on available calibration services, or how to obtain a copy of Special Publication 250, inquiries should be directed to:

Calibrations Program
National Institute of Standards and Technology
Room A104, Building 411
Gaithersburg, MD 20899-0001

Telephone: (301) 975–2002
Fax: (301) 926–2884
E-Mail: CALIBRATIONS@enh.nist.gov

Standard Reference Data Program

The Standard Reference Data (SRD) Program provides well-documented numeric data to scientists and engineers for use in technical problem-solving, research, and development. These recommended values are based on data which have been extracted from the world's literature, assessed for reliability, and then evaluated to select the preferred values. The primary vehicles for dissemination of this data are the *NIST Standard Reference Database Series* and the *Journal of Physical and Chemical Reference Data (JPCRD)*. Databases and publications are described in SP 782 – NIST Standard Reference Data Products Catalog. To obtain a copy, please contact the following:

Standard Reference Data Program
National Institute of Standards and Technology
Room A320, Building 221
Gaithersburg, MD 20899-0001

Telephone: (301) 975–2208
Fax: (301) 926–0416
E-Mail: SRDATA@enh.nist.gov

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Proficiency Sample Programs for Hydraulic Cements, Pozzolans, and Portland Cement Concrete;
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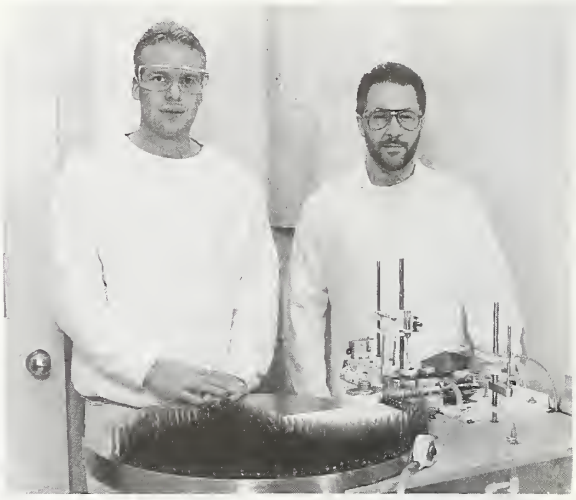

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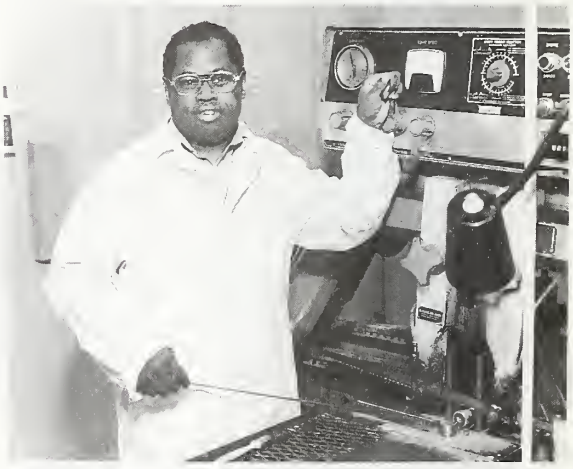

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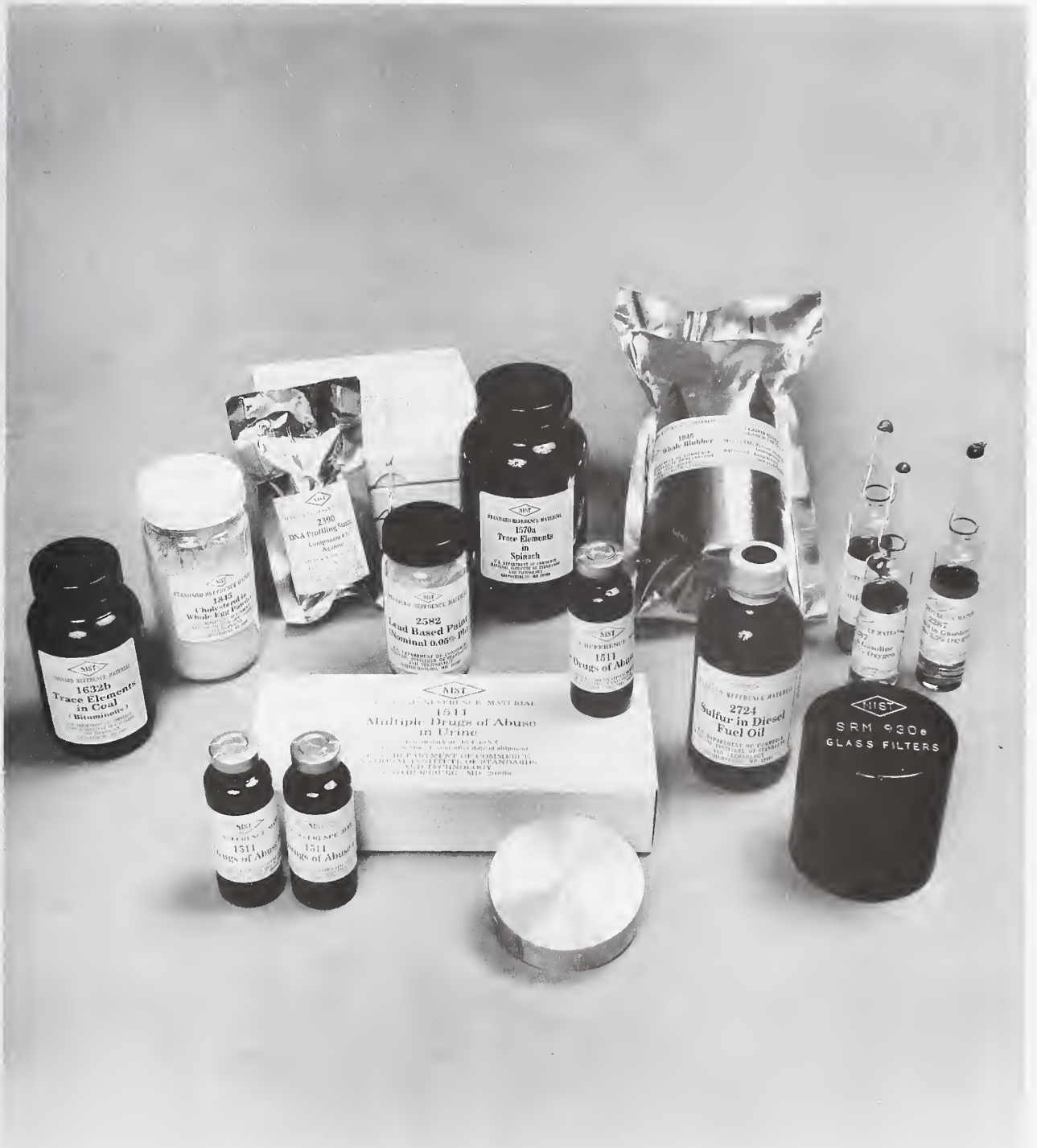
Chemical Composition



Standard Reference Materials for Chemical Composition

101. Ferrous Metals

Plain Carbon Steels (chip form)

These SRMs are for checking chemical methods of analysis. They consist of steel alloys selected to provide a wide range of analytical values for elements. They are furnished in 150-g units (unless otherwise noted) as chips usually sized between 0.4 mm to 1.2 mm, prepared from selected portions of commercial ingots.

SRM	Type	Elemental Composition (in Wt. %)				
		C	Mn	P	S	Si
8j	0.1C	0.081	0.505	0.095	0.077	0.058
11h	0.2C	0.200	0.510	0.010	0.026	0.211
12h	0.4C	0.407	0.842	0.018	0.027	0.235
13g	0.6C	0.613	0.853	0.006	0.031	0.355
14g	AISI 1078	0.735	0.456	0.006	0.019	0.232
15h	0.1C	0.076	0.373	0.005	0.019	0.008
16f	1.1C	0.97	0.404	0.014	0.026	0.214
19h	0.2C	0.215	0.393	0.016	0.022	0.211
20g	AISI 1045	0.462	0.665	0.012	0.028	0.305
152a	0.5C (Tin bearing)	0.486	0.717	0.012	0.030	0.202
178	0.4C	0.395	0.824	0.012	0.014	0.163
337a	1.1C (Carbon & Sulfur) (300 g)	0.969			0.024	
368	AISI 1211	0.089	0.82	0.084	0.132	0.007

SRM	Cu	Ni	Cr	V	Mo	Co	Ti	Sn	Al (total)	N
8j	0.020	0.113	0.047	0.015	0.038					
11h	0.061	0.028	0.025	0.001			0.004			
12h	0.073	0.032	0.074	0.003	0.006				(0.038)	0.006
13g	0.066	0.061	0.050	0.001					0.048	
14g	0.047	0.030	0.081	0.0008	0.011				0.025	
15h	0.013	0.017	0.018	<0.001	0.009				0.061	
16f	0.006	0.008	0.020	0.002	0.003	0.003				
19h	0.466	0.248	0.173	0.003	0.038				0.002	
20g	0.034	0.034	0.036	0.002	0.008				0.040	
152a	0.023	0.056	0.046	0.001	0.036			0.032		
178	0.032	0.010	0.016	0.001	0.003					
368	0.010	0.008	0.030	0.001	0.003					0.010

Values in parentheses are not certified and are given for information only.
NOTE: SRM 21e, 0.5 C, in In Prep.

101. Low Alloy Steels (chip form)

SRM	Type	Elemental Composition (in Wt. %)						
		C	Mn	P	S		Si	Cu
					Grav	Comb		
30f	Cr–V (SAE 6150)	0.490	0.79	0.011		0.009	0.283	0.074
32e	Ni–Cr (SAE 3140)	0.409	0.798	0.008	0.022	0.021	0.278	0.127
33e	Ni–Mo (SAE 4820)	0.186	0.525	0.005		0.009	0.262	0.070
36b	Cr–Mo	0.114	0.404	0.007		0.019	0.258	0.179
72g	AISI 4130	0.278	0.492	0.009		0.014	0.223	0.011
100b	Manganese (SAE 340)	0.397	1.89	0.023	0.029	0.028	0.210	0.064
106b	Cr–Mo–Al (Nitralloy G)	0.326	0.506	0.008	0.016	0.017	0.274	0.117
125b	High Silicon	0.028	0.278	0.029		0.008	2.89	0.071
129c	High Sulfur (SAE 112)	0.125	0.769	0.076		0.245	0.020	0.013
131e	High Silicon	0.0035				0.0004		
139b	Cr–Ni–Mo (AISI 8640)	0.403	0.778	0.013		0.019	0.242	0.097
155	Cr–W	0.905	1.24	0.015	0.010	0.011	0.322	0.083
163	Cr (100 g)	0.933	0.897	0.007		0.027	0.488	0.087
179	High Silicon	0.027	0.094	0.006		0.026	3.19	0.056
291	Cr–Mo (ASTM A213)	0.177	0.550	0.008		0.020	0.230	0.047
293	Cr–Ni–Mo (AISI 8620)	0.222	0.960	0.018		0.022	0.300	0.032
2171	Ni–Cr–Cu–Mo (HSLA 100)	0.066	0.73	0.006		0.0012	0.338	1.47

SRM	Ni	Cr	V	Mo	Sn	Al (total)	N
30f	0.070	0.945	0.182				0.010
32e	1.19	0.678	0.002	0.023	(0.011)		0.009
33e	3.36	0.068	(0.001)	0.224	(0.002)	0.030	
36b	0.203	2.18	0.004	0.996			
72g	0.016	0.905	0.003	0.170		(0.041)	(0.008)
100b	0.030	0.063	0.003	0.237			0.004
106b	0.217	1.18	0.003	0.199		1.07	
125b	0.038	0.019		0.008	0.003	0.329	Ca 0.0051
129c	0.251	0.014	0.012	0.002			
139b	0.510	0.488	0.004	0.182			0.007
155	0.100	0.485	0.014	0.039			W 0.517
163	0.081	0.982		0.029			0.007
179	0.050	0.022	< 0.01	0.014	0.004	0.0028	
291	0.065	1.33		0.538		0.002	
293	0.480	0.510	0.004	0.204		0.039	
2171	3.35	0.550	0.003	0.546		0.019	Nb 0.024

Values in parentheses are not certified and are given for information only.

101. Special Low Alloy Steels (chip and pin forms)

SRM	Type	Elemental Composition (in Wt. %)							
		C	Mn	P	S	Si	Cu	Ni	Cr
361	AISI 4340	0.383	0.66	0.014	0.0143	0.222	0.042	2.00	0.694
362	AISI 94B17 (mod.)	0.160	1.04	0.041	0.0360	0.39	0.50	0.59	0.30
363	Cr–V (mod.)	0.62	1.50	0.029	0.0068	0.74	0.10	0.30	1.31
364	High Carbon (mod.)	0.87	0.255	0.01	0.0250	0.065	0.249	0.144	0.063
2159	Carbon & Sulfur only (pin)	0.016			0.0023				
2160	Carbon & Sulfur only (pin)	0.584			0.012				
2165	E	0.0059	0.144	0.0052	0.0038	(0.004)	0.0013	0.155	0.050
2166	F	0.015	0.066	0.0012	0.0023	0.010	0.015	0.022	0.024
2167	G	0.051	0.022	0.0031	0.0091	0.026	0.0014	0.002	0.0015
2168	High-Purity Iron	0.0007	0.0006	0.0015	0.0010	(<5.0)*	0.0005	0.0012	0.0003

SRM	V	Mo	W	Co	Ti	As	Sn	Al (total)	Nb	Ta	Zr	N	Ca
361	0.011	0.19	0.017	0.032	0.020	0.017	0.010	0.021	0.022	0.020	0.009	(0.0037)	0.00010
362	0.040	0.068	0.20	0.30	0.097	0.092	0.016	0.083	0.29	0.20	0.19	(0.00404)	0.00021
363	0.31	0.028	0.046	0.048	0.050	0.010	0.104	0.24	0.049	(0.053)	0.049	(0.0041)	0.00022
364	0.105	0.49	0.10	0.15	0.24	0.052	0.008	(0.008)	0.157	0.11	0.068	(0.0032)	0.00003
2165	0.0040	0.0055		0.0012	0.0051	0.0010	0.002	(0.006)	0.0004	(0.004)			
2166	0.009	0.0035		0.0022	0.0007	0.0035	0.0010	0.012	0.005	(0.011)	(0.0004)		
2167	0.033	0.020		0.0050	0.010	0.0005	0.006	0.0045	0.0095	(0.002)	(0.004)		
2168	(<1.0)*	(<7.0)*	(<7.0)*	0.0006	(<3.0)*	(<1.0)*	(<1.0)*	(<5.0)*	(<5.0)*	(<1.0)*	(<5.0)*	0.0007	(<2.0)*

SRM	B	Pb	Sb	Bi	Ag	Se	Te	Ce	La	Nd	Fe
361	0.00037	0.000025	0.0042	(0.0004)	0.0004	(0.004)	(0.0006)	0.0040	(0.001)	0.00075	(95.6)
362	0.0025	0.00048	0.013	(0.002)	0.0011	(0.0012)	(0.0005)	0.0019	(0.001)	0.00075	(95.3)
363	0.00078	0.00186	0.002	(0.0008)	0.0037	(0.00016)	(0.0009)	0.0030	(0.002)	0.0012	(94.4)
364	0.0106	0.0230	0.034	(0.009)	(0.00002)	(0.00021)	(0.0002)	0.00057	(0.0002)	0.00018	(96.7)
2165	(0.0009)	0.0003	0.0010	(<0.0001)	0.0002	(0.0035)	(0.003)				
2166	(0.0004)	0.003	0.0005	(<0.0001)	0.0005	(0.0035)	(0.003)				
2167	(0.001)	(<0.0001)	0.0020	(<0.0001)	0.0007		(0.0003)				
2168	(<1.0)*	(<1.0)*	(<3.0)*	(<3.0)*		(<2.0)*	(<1.0)*				

SRM	Mg	Zn	Pr	Ge	O	H	Au	Hf	Sr
361	0.00026	(0.0001)	(0.0003)	[0.006]	(0.0009)	(<0.0005)	(<0.00005)	(0.0002)	(<0.0005)
362	0.00068	(0.00012)	(0.0003)	[0.002]	(0.00107)	(<0.0005)	(<0.00005)	(0.0003)	(<0.0005)
363	0.00062	(0.0004)	(0.0004)	[0.010]	(0.00066)	(<0.0005)	0.0005	(0.0005)	(<0.0005)
364	0.00016	[0.001]	(0.0001)	[0.003]	(0.0010)	(<0.0005)	0.0001	(0.0013)	(0.001)
2165	(<0.0001)								
2166	(<0.0001)								
2167	(<0.0001)								
2168	(<5.0)*	(<5.0)*			0.010	Cd (<1.0)*			

Values in parentheses are not certified and are given for information only.
Values in brackets are approximate values from heat analysis and are given for information only.
*Value is in mg/kg (SI unit).

101. High Alloy Steels (chip form)

SRM	Type	Elemental Composition (in Wt. %)					
		C	Mn	P	S	Si	Cu
					Comb		
126c	High Nickel (36% Ni)	0.025	0.468	0.004	0.005	0.194	0.040
344	Cr–Ni (Mo Precipitation Hardening)	0.069	0.57	0.018	0.019	0.395	0.106
345a	Cr–Ni (Cu Precipitation Hardening)	0.040	0.79	0.024	0.012	0.61	3.39
346a	Valve Steel	0.502	9.16	0.031	0.002	0.219	0.375
348a	High Temperature Alloy (A286) Ni–Cr	0.044	0.64	0.023	0.0007	0.43	0.14
862	High Temperature Alloy L605	0.120	1.59	0.002	0.0008	0.017	0.0010
868	High Temperature Alloy Fe–Ni–Co	0.022	0.052	<0.003	0.0025	0.097	0.022

SRM	Ni	Cr	V	Mo	Co	Ti	Al (total)	Nb	Ta	B	Fe
126c	36.05	0.062	0.001	0.011	0.008						
344	7.28	14.95	0.040	2.40		0.076	1.16				
345a	4.27	15.52	0.080	0.43	0.099	(<0.01)	(<0.01)	0.27	(<0.01)	(<0.001)	**N 0.031**
346a	3.43	21.08	0.096	0.237	(0.05)	(<0.001)	(0.001)	(0.01)	**Sn (0.008)**	(<0.001)	**N 0.442**
348a	24.2	14.8	0.23	1.18	0.15	2.12	0.24	(0.07)	**W (0.07)**	0.0055	(55.2)
862	9.74	20.0	0.005	**N 0.026**	51.5	**W 15.1**	(<0.01)	(<0.005)	(<0.01)	(<0.0001)	1.80
868	37.78	0.077	0.077	0.014	16.1	1.48	0.99	2.99	0.003	0.0078	40.5

Values in parentheses are not certified and are given for information only.

101. Gases in Metals (rod form)

These SRMs are for determining hydrogen, oxygen, and nitrogen by vacuum fusion, inert gas fusion, and neutron activation methods.

SRM	Type	Oxygen (in mg/kg*)	Hydrogen (in mg/kg*)	Nitrogen (in mg/kg*)
1090	Ingot Iron	491		(60)
1091a	Stainless Steel (AISI 431)	132.2		(876)
1093	Valve Steel	60		
1094	Maraging Steel	4.5		(71)
**1095	Steel (AISI 4340)	9	(<5)	(37)
**1096	Steel (AISI 94B17)	10.7	(<5)	40.4
**1097	Cr–V Steel (mod.)	6.6	(<5)	(<11)
**1098	Steel (High Carbon)	10	(<5)	32
**1099	Electrolytic Iron	61	(<5)	(13)
1754	Low Alloy Steel (AISI 4320)	24		81

Values in parentheses are not certified and are given for information only.
*SI unit. Replaces terms "ppm" and "μg/g".
These SRMs are sold **only as a set designated SRM 1089.

101. Stainless Steels (chip form)

SRM	Type	Elemental Composition (in Wt. %)					
		C	Mn	P	S	Si	Cu
73c	Cr (SAE 420)	0.310	0.330	0.018	0.036	0.181	0.080
101g	AISI 304 L (100 g)	0.0136	0.085	0.007	0.0078	1.08	0.029
121d	Cr–Ni–Ti (AISI 321)	0.067	1.80	0.019	0.013	0.54	0.121
123c	Cr–Ni–Nb (AISI 348)	0.056	1.75	0.024	0.014	0.59	0.103
133b	Cr–Mo	0.128	1.07	0.018	0.328	0.327	0.080
160b	Cr–Ni–Mo (AISI 316)	0.044	1.64	0.020	0.016	0.509	0.172
166c	Carbon Only (100 g)	0.0078					
339	Cr–Ni–Se (SAE 303Se)	0.052	0.738	0.129	0.013	0.654	0.199
343a	Cr–Ni (AISI 431)	0.149	0.42	0.026	0.001	0.545	0.162
367	Cr–Ni (AISI 446)	0.093	0.315	0.018	0.016	0.58	
893	Cr (SAE 405)	0.027	0.378	0.022	0.0003	0.326	0.261
895	Cr–Mn (SAE 201)	0.066	7.09	0.038	0.0033	0.399	0.439

SRM	Ni	Cr	V	Mo	Co	Ti	Nb	Ta	Pb	Se	N
73c	0.246	12.82	0.030	0.091							0.037
101g	10.00	18.46	0.041	0.004	0.09						
121d	11.17	17.43		0.165	0.10	0.342					
123c	11.34	17.40		0.22	0.12		0.65	<0.001			
133b	0.230	12.63	0.071	0.052							
160b	12.26	18.45	0.047	2.38	0.101				0.001		0.039
339	8.89	17.42	0.058	0.248	0.096					0.247	
343a	2.16	15.64	0.056	0.164	(0.04)	(<0.001)	(0.01)	Al (0.001)	(<0.0001)	B (<0.001)	0.078
367	0.29	24.19	0.08								0.168
893	0.192	13.55	0.080	0.023	0.020	(0.01)	(<0.0005)	(<0.001)	(0.0001)	(<0.0001)	Al (0.20)
895	5.34	16.72	0.079	0.337	0.126	(<0.0004)	(<0.009)	(<0.001)	(0.0001)	(<0.0001)	W (0.03)

Values in parentheses are not certified and are given for information only.

101. Tool Steels (chip form)

SRM	Type	Elemental Composition (in Wt. %)						
		C	Mn	P	S		Si	Cu
					Grav	Comb		
50c	W–Cr–V	0.719	0.342	0.022	0.010	0.009	0.311	0.079
132b	Tool Steel (AISI M2)	0.864	0.341	0.012		0.004	0.185	0.088
134a	Mo–W–Cr–V	0.808	0.218	0.018	0.007	0.007	0.323	0.101

SRM	Ni	Cr	V	Mo	W	Co	Sn	As	N
50c	0.069	4.13	1.16	0.082	18.44		0.018	0.022	0.012
132b	0.230	4.38	1.83	4.90	6.28	0.029			
134a	0.088	3.67	1.25	8.35	2.00				

NOTE: SRM 2172, Tool Steel, is In Prep.

Steel SRMs described in this and the following three (3) pages are furnished in various forms. The 600 series is for microchemical methods of analysis, such as electron probe microanalysis and laser probe analysis. The 1100, 1200, and 1700 series are for optical emission and X-ray spectrometric methods of analysis. These materials have been prepared to ensure high homogeneity.

Nominal Sizes for Solid Steel SRMs:

600 Series: 3.2 mm diameter, 51 mm long.
1100 and 1200 Series: 31 mm diameter, 19 mm thick.
1700 Series: 34 mm diameter, 19 mm thick.
A "C" preceding the SRM number indicates a chill cast sample; 31 mm diameter, 19 mm thick.

101. Low Alloy Steels (disk and rod forms)

SRM	Type	Elemental Composition (in Wt. %)				
		C	Mn	P	S	Si
661	AISI 4340	0.392	0.66	0.015	0.015	0.223
663	Cr–V (mod.)	0.57	1.50	0.029	0.0055	0.74
664	High Carbon (mod.)	0.871	0.258	0.010	0.025	0.066
665	Electrolytic Iron	0.008	0.0057	0.0025	0.0059	0.0080
1134	High Silicon	0.026	0.277	0.028	0.009	2.89
1135	High Silicon	0.027	0.094	0.006	0.026	3.19
1218	High Silicon, Low Carbon & Sulfur	0.0029	0.014	(0.002)	0.0011	(3.2)
C1221	Resulfurized/Rephosphorized AISI 1211 (mod.)	0.020	0.102	0.090	0.112	0.876
1222	Cr–Ni–Mo (AISI 8640)	0.43	0.78	0.013	0.022	0.24
1224	Carbon (AISI 1078)	0.75	0.41	0.009	0.039	0.173
1225	Low Alloy (AISI 4130)	0.274	0.48	0.007	0.014	0.221
1226	Low Alloy	0.085	0.274	0.0022	0.0044	0.231
1227	Basic Open Hearth, 1% C	0.97	0.402	0.014	0.026	0.215
1228	0.1% C	0.072	0.365	0.004	0.018	0.007
1254	Low Alloy (Calcium only)	**Ca 0.0053**				
1261a	AISI 4340	0.391	0.67	0.016	0.015	0.228
1262b	AISI 94B17	0.160	1.05	0.044	0.037	0.40
1263a	Cr–V (mod.)	0.57	1.50	0.029	0.0055	0.74
1264a	High Carbon (mod.)	0.871	0.258	0.010	0.025	0.066
1265a	Electrolytic Iron	0.008	0.0057	0.0025	0.0059	0.0080
1269	Line Pipe (AISI 1526 mod.)	0.298	1.35	0.012	0.0061	0.189
1270	Cr–Mo Low Alloy, A336 (F–22)	0.077	0.626	0.0065	0.0065	0.247
1271	Ni–Cr–Cu–Mo (HSLA 100)	0.064	0.73	0.005	0.0013	0.334
C1285	Low Alloy (A242 mod.)	0.058	0.332	0.072	0.020	0.36
1286	Low Alloy (HY 80)	0.196	0.152	0.008	0.017	0.130
1761	Low Alloy Steel	1.03	0.678	0.040	0.035	0.18
1762	Low Alloy Steel	0.337	2.00	0.034	0.030	0.35
1763	Low Alloy Steel	0.203	1.58	0.012	0.023	0.63
1764	Low Alloy Steel	0.592	1.21	0.020	0.012	0.057
1765	Low Alloy Steel	0.006	0.144	0.0052	0.0038	(0.004)
1766	Low Alloy Steel	0.015	0.067	0.002	0.0024	0.010
1767	Low Alloy Steel	0.052	0.022	0.0031	0.0090	0.026
1768	High-Purity Iron	0.0010	0.0014	0.0013	0.0003	(<10.0)*

Values in parentheses are not certified and are given for information only.
*Value is in mg/kg (SI unit).

NOTE: SRM 1217a, Nickel Steel, is In Prep.

101. Low Alloy Steels (disk and rod forms) – Continued

SRM	Cu	Ni	Cr	V	Mo	W	Co	Ti
661	0.042	1.99	0.69	0.011	0.19	0.017	0.032	0.020
663	0.098	0.32	1.31	0.31	0.30	0.046	0.048	0.050
664	0.250	0.142	0.066	0.106	0.49	0.102	0.15	0.23
665	0.0058	0.041	0.007	0.0006	0.005	(<0.0001)	0.007	0.0006
1134	0.070	0.038	0.019		0.008			
1135	0.056	0.050	0.022	<0.01	0.014			
1218	0.003	(0.002)	0.006	(<0.001)	(0.003)		(0.002)	(0.004)
C1221	0.041	0.067	0.049	(0.0007)	0.038		(0.010)	(0.0014)
1222	0.097	0.51	0.48	0.005	0.18		(0.016)	(0.002)
1224	0.072	0.054	0.071	0.002	0.013			
1225		0.018	0.91	0.004	0.166			
1226	0.125	5.42	0.467	0.0018	0.446	(0.005)	0.029	0.0021
1227	0.006	0.007	0.019	0.002	0.003	0.003	(0.0008)	
1228	0.012	0.018	0.016	<0.001	0.009			
1261a	0.042	2.00	0.693	0.011	0.19	0.017	0.032	0.020
1262b	0.51	0.59	0.30	0.041	0.070	0.20	0.57	0.100
1263a	0.098	0.32	1.31	0.31	0.030	0.046	0.048	0.050
1264a	0.250	0.142	0.066	0.106	0.49	0.102	0.15	0.24
1265a	0.0058	0.041	0.0072	0.0006	0.0050	<1	0.0070	(0.0001)
1269	0.095	0.108	0.201	0.004	0.036	(0.001)	(0.014)	(0.009)
1270	0.114	0.174	2.34	0.013	0.956	(0.003)	0.038	(0.003)
1271	1.48	3.34	0.552	0.003	0.543			
C1285	0.37	1.17	0.80	0.150	0.164	(0.03)	0.036	**Ce (0.0021)**
1286	0.043	2.81	1.53	0.0057	0.334	(0.13)	0.116	0.040
1761	0.30	1.99	0.220	0.053	0.103	(0.02)	(0.028)	0.18
1762	0.120	1.15	0.92	0.200	0.35	(0.01)	0.062	0.095
1763	0.43	0.51	0.50	0.30	0.50	(0.03)	0.095	0.31
1764	0.51	0.202	1.48	0.106	0.200	(<0.01)	(0.01)	0.028
1765	0.0013	0.154	0.051	0.0040	0.005		0.0012	0.0055
1766	0.015	0.021	0.024	0.009	0.0035	(0.001)	0.0020	0.0005
1767	0.0014	0.002	0.0015	0.033	0.020		0.0050	0.011
1768	0.0006	0.0014	(<2.0)*	(<1.0)*	(<3.0)*	(<2.0)*	0.0025	(<10.0)*

Values in parentheses are not certified and are given for information only.
*Value is in mg/kg (SI unit).

101. Low Alloy Steels (disk and rod forms) – Continued

SRM	As	Sn	Al (total)	B	Pb	Ag	Ge
661	0.017	0.011	0.021	0.0005	0.000025	0.0004	[0.006]
663	0.010	(0.095)	0.024	0.0009	0.0022	(0.0038)	[0.010]
664	0.052	[0.005]	(0.008)	0.011	0.024	(0.00002)	[0.003]
665	(0.0002)	(<0.0005)	(0.0007)	0.00013	0.000015	(<0.00002)	(<0.0050)
1134		0.003	0.329				
1135		0.004	0.0028				
1218			0.005				
C1221			0.111				
1222			(0.038)				
1224			0.060				
1226		(0.003)	0.054		(0.0001)		
1227			(0.028)				
1228			0.061				
1261a	0.017	0.010	0.021	0.0005	0.000025	0.0004	[0.006]
1262b	0.096	0.016	0.081	0.0025	0.0004	0.0011	[0.002]
1263a	0.010	0.104	0.24	0.00091	0.0022	0.0037	[0.010]
1264a	0.052	(0.008)	(0.0080)	(0.011)	0.024	(0.000002)	[0.003]
1265a	(0.0002)	<2	(0.0007)	0.00013	0.000015	<0.2	<50
1269	(0.006)	(0.039)	0.016	(<0.0001)	0.005	(0.0002)	
1270	(0.02)	(0.02)	(0.005)	(0.0033)	(0.0016)	(0.0001)	
1271			0.020				
C1285	(0.022)	0.35	(0.12)				
1286	0.019	0.012	0.109	(0.006)	(0.0002)		
1761	0.011	(0.05)	0.06	0.0020			
1762	0.018	0.046	0.069	0.0049			
1763	0.055	0.011	0.043	0.0054			
1764	0.010	(0.02)	0.009	0.0010			
1765	0.0010	0.002	(0.006)	0.0009	0.0003	0.0002	
1766	0.0035	0.0010	0.012	0.00012	0.003	0.0005	
1767	0.0005	0.006	0.004	0.0010	(0.0001)	0.0008	
1768	(<1.0)*	(<1.0)*	0.0024	(<2.0)*	(<1.0)*		

SRM	O	N	H	Nb	Se	Ta	Zr
661	(0.0009)	(0.0037)	[<0.0005]	0.022	0.004	0.020	0.009
663	(0.0007)	(0.0041)	[<0.0005]	0.049	[0.0001]	(0.053)	0.050
664	[0.0017]	[0.003]	[<0.0005]	0.157	[0.0003]	0.11	0.069
665	(<0.0070)	(<0.0020)	(<0.0005)				
1218							(0.002)
C1221							(0.0017)
1222		(0.007)		(0.002)			(0.001)
1226				(0.005)			(0.010)
1227							(0.0006)
1261a	(0.0009)	(0.0037)	(<0.0005)	0.022	0.004	0.021	0.009
1262b	(0.0011)	(0.0040)	(<0.0005)	0.30	(0.0012)	0.20	0.22
1263a	(0.00066)	(0.0041)	(<0.0005)	0.049	(0.00016)	(0.053)	0.050
1264a	(0.0010)	(0.0032)	(<0.0005)	0.157	(0.00021)	0.11	0.69
1265a	<70	<20	<5				
1271				0.025			
C1285							(0.02)
1286				(0.012)			(0.021)
1761		0.0044		0.02		0.05	0.01
1762		0.0022		0.07		0.02	0.03
1763		0.0044		0.10		0.01	0.04
1764		0.0023		0.042		0.029	0.0015
1765		0.0010		0.0004	(0.0035)	(0.004)	(0.0002)
1766		0.0033		0.005	(0.0035)	(0.006)	(0.0004)
1767		0.0008		0.010		(0.002)	(0.004)
1768	0.036	0.002	Cd (<1.0)*	(<5.0)*	(<1.0)*	(<1.0)*	(<1.0)*

Values in parentheses are not certified and are given for information only.
Values in brackets are approximate values from heat analysis and are given for information only.
*Value is in mg/kg (SI unit).

101. Low Alloy Steels (disk and rod forms) – Continued

SRM	Sb	Bi	Ca	Mg	Te	Zn
661	0.0042	0.0004	(<0.0001)	(0.0001)	0.0006	(0.0001)
663	0.002	(0.0008)	(<0.0001)	(0.0005)	(0.0022)	(0.0004)
664	(0.035)	(0.0009)	(<0.0001)	(0.0001)	[0.0002]	[0.001]
665	(<0.00005)	(<0.00001)	(<0.00001)	(<0.00002)	(<0.00001)	(<0.0003)
1261a	0.0042	0.0004	0.00002	0.00018	0.0006	(0.0001)
1262b	0.012	(0.002)	(0.0001)	0.0006	(0.001)	(0.0005)
1263a	0.002	(0.0008)	0.00013	0.00049	0.0009	(0.0004)
1264a	0.034	(0.0009)	0.00004	0.00015	0.00018	[0.001]
1265a						<3
1254			0.0053			
C1285	(0.04)					
1765	0.0010	(<0.0001)		(<0.0001)	(0.003)	
1766	0.0005	(<0.0001)		(<0.0005)	(0.003)	
1767		(<0.0001)	(0.0003)	(<0.0001)	(0.0003)	
1768	(<1.0)*	(<4.0)*	(<1.0)*	(<6.0)*	(<1.0)*	(<1.0)*

SRM	Au	Ce	Hf	La	Nd	Pr	Fe
661	(<0.0005)	0.013	[0.00002]	0.0004	0.0003	(0.00014)	(95.6)
663	0.0005	(0.0016)	[0.0015]	0.0006	(0.0007)	(0.00018)	(94.4)
664	0.0001	(0.00025)	[0.005]	0.00007	(0.00012)	(0.00003)	(96.7)
665							99.9
1261a	(<0.00005)	0.0014	(0.0002)	0.0004	0.00029	(0.00014)	(95.6)
1262b	(0.00005)	0.0019	(0.0003)	(0.0004)	0.0006	(0.00012)	(95.3)
1263a	0.0005	0.0014	(0.0005)	0.0006	0.00060	(0.00018)	(94.4)
1264a	0.0001	0.00022	(0.0013)	0.00007	0.00007	(0.00003)	(96.7)
1265a							99.9
1764							(95.2)
1766		(0.002)					

Values in parentheses are not certified and are given for information only.
Values in brackets are approximate values from heat analysis and are given for information only.
*Value is in mg/kg (SI unit).

101. Stainless Steels (disk form)

SRM	Type	Elemental Composition (in Wt. %)							
		C	Mn	P	S	Si	Cu	Ni	Cr
C1151a	23Cr–7Ni	0.034	2.39	0.017	0.038	0.29	0.385	7.25	22.59
C1152a	18Cr–11Ni	0.142	0.95	0.023	0.0064	0.64	0.097	10.86	17.76
C1153a	17Cr–9Ni	0.225	0.544	0.030	0.019	1.00	0.226	8.76	16.70
C1154a	19Cr–13Ni	0.100	1.44	0.06	0.051	0.53	0.44	13.08	19.31
1155	Cr–Ni–Mo (AISI 316)	0.046	1.63	0.020	0.018	0.502	0.169	12.18	18.45
1171	Cr–Ni–Ti (AISI 321)	0.067	1.80	0.018	0.013	0.54	0.121	11.2	17.4
1172	Cr–Ni–Nb (AISI 348)	0.056	1.76	0.025	0.014	0.59	0.105	11.35	17.40
1219	Cr–Ni (AISI 431)	0.149	0.42	0.026	0.001	0.545	0.162	2.16	15.64
1223	Chromium Steel	0.127	1.08	0.018	0.329	0.327	0.081	0.232	12.64
C1287	High Alloy (AISI 310 mod.)	0.36	1.66	0.029	0.024	1.66	0.58	21.16	23.98
C1288	High Alloy (A–743)	0.056	0.83	0.023	0.010	0.41	3.72	29.3	19.55
C1289	High Alloy (AISI 414 mod.)	0.014	0.35	0.017	0.021	0.156	0.205	4.13	12.12
1295	Cr (SAE 405)	0.027	0.387	0.022	0.0003	0.321	0.260	0.194	13.52
C1296	28Cr–3Mo (SAE 460)	0.038	0.256	0.024	0.013	0.66	0.056	0.373	27.90
1297	Cr–Ni–Mn (SAE 201)	0.066	7.11	0.038	0.0033	0.397	0.442	5.34	16.69

SRM	V	Mo	Co	Ti	N	Al	Nb	Ta	W	Pb	Zr
C1151a	0.040	0.79	0.033		(0.21)	(0.003)	(0.015)	(0.004)		0.0039	
C1152a	0.033	0.44	0.22		(0.055)	(0.004)	(0.15)	(0.001)		0.0047	
C1153a	0.176	0.24	0.127	(0.013)	(0.11)	(0.004)	(0.48)	(0.03)		0.006	(0.0001)
C1154a	0.135	0.068	0.38	(0.004)	(0.077)		(0.22)	(0.045)		0.017	(0.001)
1155	0.047	2.38	0.101							0.001	
1171		0.165	0.10	0.34							
1172		0.22	0.12				0.65	< 0.001			
1219	0.056	0.164	(0.04)	(< 0.001)	0.078	(0.001)	(0.01)	Sn (0.008)	(0.02)	(< 0.0001)	B (< 0.001)
1223	0.068	0.053	Mg (< 0.0005)		(0.05)	(< 0.005)		Sn (0.004)	Ca (< 0.0005)		(0.0001)
C1287	0.09	0.46	0.31	0.050	(0.034)	(0.06)	(0.07)	O (0.017)		0.008	(0.006)
C1288	0.086	2.83	0.10	0.012	(0.028)	(0.0025)	(0.22)	O (0.029)	(0.2)	0.0041	(0.002)
C1289	0.007	0.82	0.035	0.005	(0.017)	(0.0016)	(0.10)	O (0.027)		0.0005	(0.001)
1295	0.082	0.023	0.020	(0.01)	Sn (0.02)	(0.20)	(< 0.0005)	(< 0.001)	(0.002)	(0.0001)	As (0.006)
C1296	0.134	3.43	0.026	0.23	Sn (< 0.01)	0.035	0.20	(< 0.001)	(< 0.01)	(< 0.001)	As (< 0.01)
1297	0.080	0.331	0.127	(< 0.0004)	Sn (< 0.010)	(0.003)	(< 0.009)	(< 0.001)	(0.03)	(< 0.0001)	As (0.005)

Values in parentheses are not certified and are given for information only.

101. Specialty Steels (disk form)

SRM	Type	Elemental Composition (in Wt. %)										
		C	Mn	P	S	Si	Cu	Ni	Cr	V	Mo	W	Co
1157	Tool (AISI M2)	0.836	0.34	0.011	0.004	0.18	0.088	0.228	4.36	1.82	4.86	6.28	0.028
1158	High Nickel (Ni 36)	0.025	0.468	0.004	0.005	0.194	0.039	36.03	0.062	0.001	0.010		0.008
1233	Valve Steel	0.502	9.16	0.031	0.002	0.219	0.375	3.43	21.08	0.096	0.237	(0.01)	

NOTE: SRM 1771, Cr-Al, and SRM 1772, Tool Steel S-7, are In Prep.

101. High Temperature Alloys (disk form)

SRM	Type	Elemental Composition (in Wt. %)					
		C	Mn	P	S	Si	Cu
1230	A 286	0.044	0.64	0.023	0.0007	0.43	0.14
1244	Inconel 600	0.062	0.29	0.010	0.003	0.12	0.26
1245a	Inconel 625	0.037	0.18	0.012	0.001	0.41	0.37
1246	Incoloy 800	0.082	0.91	0.018	0.001	0.18	0.49
1247	Incoloy 825	0.021	0.38	0.018	0.002	0.32	1.75
1250	Fe–Ni–Co	0.022	0.052	<0.003	0.0025	0.097	0.022
C2400	High Alloy Steel, ACI (17/4 PH)	0.036	0.71	0.013	0.003	0.61	2.63
C2401	High Alloy Steel (ACI–CD–4M Cu)	0.062	1.03	0.025	0.027	0.74	3.17
C2402	Hastelloy C	0.010	0.64	0.007	0.018	0.85	0.19

SRM	Ni	Cr	Mo	Co	Ti	Al	Nb	Ta	Fe	W	B
1230	24.2	14.8	1.18	0.15	2.12	0.24	(0.07)	**V 0.23**	(55)	(0.07)	0.0055
1244	73.2	15.7	0.20	0.058	0.25	0.26	(0.14)		9.6		<0.05
1245a	59.7	22.0	8.5	0.071	0.28	0.19	3.5	<0.01	4.5	<0.001	
1246	30.8	20.1	0.36	0.076	0.32	0.30	(0.09)		46.2		<0.001
1247	43.5	23.4	2.73	0.089	0.75	0.060	(0.46)		26.5		0.002
1250	37.78	0.077	0.014	16.1	1.48	0.99	2.99	0.003	40.5	**V 0.077**	0.0078
C2400	4.07	17.06	0.23	0.10			0.15	**V 0.092**		(0.1)	(0.0004)
C2401	5.46	25.1	2.13	0.19			(0.002)	**V 0.20**		(0.18)	(0.0004)
C2402	51.5	16.15	17.1	1.50	**Sn (0.001)**		(<0.01)	**V 0.22**	7.3	4.29	(0.0004)

Values in parentheses are not certified and are given for information only.

NOTE: SRM 1249, Inconel 718, SRM 1775, Refractory Alloy MP35N, and SRM 2175, Refractory Alloy MP35N, are In Prep.

101. Steelmaking Alloys (powder form)

These SRMs are for checking chemical methods of analysis for major constituents and for selected minor elements. They are furnished as fine powders (usually <0.1 mm).

SRM	Type	Unit Size (in g)	Elemental Composition (in Wt. %)							
			C	Mn	P	S	Si	Cu	Ni	O
57a	Silicon Metal	60	0.024	0.015	0.003	0.003	98.55	0.004	0.008	(~0.3)
58a	Ferrosilicon (73% Si-Regular Grade)	75	0.014	0.16	0.009	<0.002	73.20	0.024	0.012	(0.20)
59a	Ferrosilicon	50	0.046	0.75	0.016	0.002	48.10	0.052	0.033	
64c	Ferrochromium, High Carbon	100	4.68	0.16	0.020	0.067	1.22	0.005	0.43	
68c	Ferromanganese, High Carbon	100	6.72	80.04	0.19	0.008	0.225			
90	Ferrophosphorus	75			26.2					
195	Ferrosilicon (75% Si-High-Purity Grade)	75	0.034	0.17	0.017	0.001	75.3	0.047	0.032	(0.42)
196	Ferrochromium, Low Carbon	100	0.035	(0.282)	0.020	0.003	0.373			
347	Magnesium Ferrosilicon	100	0.017	0.53	0.023	0.005	47.6	0.065	0.082	
689	Ferrochromium Silicon	100	0.043	0.32	0.026	0.002	39.5	0.013	0.20	(0.06)

SRM	Cr	V	Mo	Ti	Al	Nb	Zr	Ca	Fe	B	As
57a	0.024	0.013	**Pb <0.001**	0.040	0.47		0.002	0.17	0.50	0.001	<0.001
58a	0.020	(0.002)	(0.01)	0.051	0.95	**Co <0.01**	0.002	0.30	25.23	0.0010	(0.0020)
59a	0.080				0.35			0.042	50.05	0.058	
64c	68.00	0.15		0.02		**Co 0.051**		**N 0.045**	24.98		
68c	0.074								12.3		0.021
90											
195	<0.01	(0.001)	(0.01)	0.037	0.046	**Co <0.01**	0.011	0.053	23.6	0.0010	(0.0024)
196	70.83	(0.12)									
347	0.14			0.036	0.78		**Co 0.004**	0.81	**Mg 4.49**	**Ce 0.45**	**La 0.26**
689	36.4	0.09	Pb(0.004)	0.40	0.049	**Co 0.034**	**Bi (<0.003)**	**N (0.002)**	23.2	0.0017	(0.009)

Values in parentheses are not certified and are given for information only.

101. Cast Irons (chip form)

These SRMs are furnished in 150-g units (unless otherwise noted) for use in checking chemical methods of analysis.

SRM	Type	Elemental Composition (in Wt. %)							
		C		Mn	P	S		Si	Cu
		Total	Graphitic			Grav	Comb		
4L	Cast	3.21	2.66	0.825	0.149		0.043	1.33	0.240
6g	Cast	2.85	2.01	1.05	0.557		0.124	1.05	0.502
7g	Cast (High Phosphorus)	2.69	2.59	0.612	0.794	0.061	0.060	2.41	0.128
82b	Cast (Ni–Cr)	2.85	2.37	0.745	0.025		0.007	2.10	0.038
107c	Cast (Ni–Cr–Mo)	2.99	1.98	0.480	0.079		0.059	1.21	0.205
115a	Cast (Cu–Ni–Cr)	2.62	1.96	1.00	0.086	0.064	0.065	2.13	5.52
122i	Cast	3.47		0.530	0.28		0.087	0.89	0.033
334	Gray Cast (Carbon & Sulfur)	2.83					0.043		
338	White Cast (Carbon & Sulfur)	3.33					0.015		
341	Ductile	1.81	1.23	0.92	0.024	0.007	0.007	2.44	0.152
342a	Nodular	1.86	1.38	0.274	0.019		0.006	2.73	0.135
890	HC 250 + V	2.91		0.62	0.025		0.015	0.67	0.055
891	Ni–Hard, Type I	2.71		0.55	0.038		0.029	0.56	0.150
892	Ni–Hard, Type IV	3.33		0.76	0.054		0.015	1.83	0.270

SRM	Ni	Cr	V	Mo	Co	Ti
4L	0.042	0.118	0.024	0.040	Zn(<0.001)	(0.03)
6g	0.135	0.370	0.056	0.035		0.059
7g	0.120	0.048	0.010	0.012		0.044
82b	1.22	0.333	0.027	0.002		0.027
107c	2.20	0.693	0.015	0.83		0.019
115a	14.49	1.98	0.014	0.050		0.020
122i	0.047	0.151	0.012	0.008		0.024
341	20.32	1.98	0.012	0.010		0.018
342a	0.058	0.034		0.006		0.020
890	0.397	32.4	0.45	0.018	(0.03)	
891	4.48	2.23	0.039	0.27	0.19	(0.01)
892	5.53	10.18	0.041	0.20	0.31	(0.02)

SRM	As	Sn	Al (total)	Mg	N	Fe
4L	(0.03)	(0.004)	(0.004)	Sb (<0.001)	(0.0016)	Pb (0.001)
6g	0.042				0.005	
7g	0.014				0.004	
341				0.068		
342a				0.070		
890	(0.008)		(<0.01)		(0.089)	(61.8)
891	(0.004)	(<0.01)	(0.008)		(0.012)	(88.5)
892	(0.006)	(0.02)	(0.009)		(0.019)	(77.4)

Values in parentheses are not certified and are given for information only.

NOTE: SRM 3e, White Iron and SRM 5m, Cast Iron, are In Prep.

101. Cast Steels, White Cast Irons and Ductile Irons (disk form)

These SRMs are for analysis of cast steels and cast irons by rapid instrumental methods.

SRM	Type	Elemental Composition (in Wt. %)							
		C	Mn	P	S	Si	Cu	Ni	Cr
C1137a	White Cast Iron	2.86	0.52	0.087	0.017	1.15	0.192	2.17	0.643
1138a	Cast Steel (No. 1)	0.118	0.35	0.035	0.056	0.25	0.09	0.10	0.13
1139a	Cast Steel (No. 2)	0.790	0.92	0.012	0.013	0.80	0.47	0.98	2.18
C1145a	White Cast Iron	2.92	0.187	0.215	0.191	0.271	0.46	0.62	0.63
C1146a	White Cast Iron	1.97	1.60	0.55	0.016	3.93	1.48	3.07	2.56
C1173	Cast Steel 3	0.453	0.174	0.031	0.092	1.38	0.204	4.04	2.63
1173	Ni–Cr–Mo–V Steel	0.423	0.19	0.033	0.092	1.28	0.204	4.06	2.70
C1290	High Alloy (HC–250 + V)	3.04	0.66	0.030	0.013	0.971	0.065	0.917	30.5
C1291	High Alloy (Ni–Hard, Type I)	2.67	1.14	0.028	0.032	1.34	0.26	4.34	2.78
C1292	High Alloy (Ni–Hard, Type IV)	3.47	0.55	0.049	0.016	0.59	0.36	5.04	11.4
C2423	Ductile Iron A	3.76	0.98	0.27	(0.0006)	1.67	1.55	0.146	0.322
C2423a	Ductile Iron B	3.66	0.91	0.246	(<0.001)	1.59	1.61	0.147	0.322
C2424	Ductile Iron C	2.68	0.268	0.041	0.024	3.37	0.125	0.061	0.13
C2424a	Ductile Iron D	2.76	0.207	0.034	0.016	3.30	0.099	0.045	0.15

SRM	V	Mo	Ti	As	Al		Co
C1137a	0.019	0.86	(0.04)		(0.007)	**Mg 0.032**	**Ce0.016**
1138a	0.020	0.05	(0.0012)	(<0.005)	(0.067)	**Fe (98.7)**	
1139a	0.26	0.51	(0.004)	(<0.005)	(0.13)	**Fe (93.0)**	
C1145a	0.112	0.48	0.012	(0.02)	(0.04)		0.058
C1146a	0.20	1.52	0.20	(0.16)	(0.028)	**Pb 0.0018**	0.13
C1173	0.42	1.46	0.037	(0.02)	(0.005)	**Pb (0.0006)**	(0.064)
1173	0.42	1.50	(0.015)			**Nb (0.045)**	(0.064)
C1290	0.442	(0.041)					
C1291	0.031	0.32					
C1292	0.041	0.25					
C2423	0.048	0.155	0.10		(0.09)		(0.02)
C2423a	0.043	0.159	0.10		(0.08)		(0.02)
C2424	0.083	0.019	0.050		(<0.01)		(0.05)
C2424a	0.081	0.019	0.045		(<0.01)		(0.05)

SRM	Mg	Ce	La	B
C2423	0.058	0.036	0.011	(0.01)
C2423a	0.076	0.031	0.0042	(0.01)
C2424	0.006	0.0046	0.0011	(0.002)
C2424a	0.014	0.0053	0.0010	(0.001)

Values in parentheses are not certified and are given for information only.

NOTE: SRM C1150b, White Cast Iron and C2425b, Ductile Iron, are In Prep.

102. Nonferrous Metals

Aluminum Base Alloys (chip and disk forms)

These SRMs are for analyses of casting and other aluminum alloys by chemical and instrumental methods. SRMs 1710 through 1719 are specially prepared to include low levels of cadmium and lead encountered in the analysis of recycled aluminum.

SRM	Type	Unit Size (in g)	Elemental Composition (in Wt. %)						
			Mn	Si	Cu	Ni	Cr	V	Cd
87a	Al–Si	75	0.26	6.24	0.30	0.57	0.11	<0.01	
855a	Casting Alloy 356	30	0.057	7.07	0.13	0.016	0.013	(0.012)	**Mn 0.060**
856a	Casting Alloy 380 (fine millings)	30	0.35	9.21	3.51	0.37	0.055		
858	Alloy 6011	35	0.48	0.79	0.84	0.0006	0.0011	0.0030	
859	Alloy 7075	35	0.078	0.17	1.59	0.063	0.176	0.0082	
1258	Alloy 6011	disk	0.48	0.78	0.84	0.0006	0.0011		
1259	Alloy 7075	disk	0.079	0.18	1.60	0.063	0.173		
1710	Alloy 3004	disk							0.000843
1711	Alloy 3004	disk							0.002090
1712	Alloy 3004	disk							0.005165
1713	Alloy 5182	disk							0.000878
1714	Alloy 5182	disk							0.002013
1715	Alloy 5182	disk							0.00502

SRM	Ti	Sn	Ga	Fe	Pb	Mg	Zn	Zr	Be
87a	0.18	0.05	0.02	0.61	0.10	0.37	0.16		
855a	0.15	0.010	**Sr 0.018**	0.14	0.019	0.37	0.085	(0.003)	**Ca (0.001)**
856a	0.068	0.10		0.92	0.10	0.061	0.96		
858	0.042			0.078		1.01	1.04		<0.0001
859	0.041			0.202		2.45	5.46		0.0026
1258	(0.04)		(0.010)	0.079		0.98	1.03		<0.0001
1259	(0.04)		(0.022)	0.205		2.48	5.44		0.0025
1710					0.00177				
1711					0.00639				
1712					0.01559				
1713					0.001712				
1714					0.00653				
1715					0.01509				

Values in parentheses are not certified and are given for information only.

NOTE: SRM 853a, Alloy 3004 and SRM 854a, Alloy 5182;
SRM 1240c, Alloy 3004 and SRM 1241c, Alloy 5182, are In Prep.
SRM 1255b, Alloy 356 and SRM 1256b, Alloy 380;

102. Cobalt Base Alloys (chip and disk forms)

SRM	Type	Elemental Composition (in Wt. %)					
		C	Mn	P	S	Si	Cu
862	High Temperature Alloy L605–(chip)	0.120	1.59	0.002	0.0008	0.017	0.0010
1242	High Temperature Alloy L605–(disk)	0.126	1.58	0.002	0.0007	0.016	0.0010

SRM	Ni	Cr	V	Fe	W	Co	N	Al	Ta	Nb	B
862	9.74	20.0	0.005	1.80	15.1	51.5	0.026	(<0.01)	(<0.01)	(<0.005)	(<0.0001)
1242	9.78	20.0	0.005	1.80	15.1	51.5	0.026	(<0.01)	(<0.01)	(<0.005)	(<0.0001)

Values in parentheses are not certified and are given for information only.

102. Copper Base Alloys (chip and rod forms)

SRM	Type	Unit Size (in g)	Elemental Composition (in Wt. %)				
			Cu	Ni	Fe	Zn	Pb
158a	Bronze, Silicon	150	90.93	0.001	1.23	2.08	0.097
458	Beryllium-Copper (17510)	50	(97.9)	1.60	0.060	0.002	0.002
459	Beryllium-Copper (17200)	50	(97.7)	0.039	0.079	0.002	0.001
460	Beryllium-Copper (17300)	50	(97.5)	0.031	0.098	0.004	0.258
871	Bronze, Phosphor (CDA 521)	100	91.68		<0.001	0.025	0.010
872	Bronze, Phosphor (CDA 544)	100	87.36	0.003	4.0	4.13	
874	Cupro-Nickel, 10% (CDA 706) "High-Purity"	100	88.49	10.18	1.22	0.002	<0.0005
875	Cupro-Nickel, 10% (CDA 706) "Doped"	100	87.83	10.42	1.45	0.11	0.0092
879	Nickel Silver (CDA 762)	100	57.75	12.11	0.0020	30.04	0.002
880	Nickel Silver (CDA 770)	100	54.51	18.13	0.004	27.3	0.002
1034	Unalloyed Copper	rod	(99.96)	*(0.6)	*(2.0)	*(<11)	*(0.5)
1035	Leaded-Tin Bronze Alloy	50	(78.5)	(0.75)	(0.001)	(0.25)	(13.5)

SRM	Mn	Sb	Sn	Cr	P	Ag	Si	Al	Te	Cd	Se
158a	1.11		0.96		0.026		3.03	0.46			
458	(<0.002)	(<0.005)	0.004	0.004		(<0.01)	0.035	0.030			
459	(<0.003)	(<0.005)	0.005	0.005		(<0.003)	0.077	0.044			
460	(<0.003)	(<0.005)	0.006	0.005		(<0.002)	0.77	0.048			
871			8.14		0.082						
872			4.16		0.26						
874	0.0020	<0.001	0.007		0.002		(0.0006)			<0.0002	0.00015
875	<0.0007	<0.001	0.009		0.0020		(0.0008)		(<0.0001)	0.0022	0.0004
879	<0.001										
880	<0.001										
1034	*(<0.1)	*(0.2)	*(<0.2)	*(0.3)		*(8.1)	*(<2)	*(<2)	*(0.5)	*(<1)	*(3.3)
1035			(6.8)		(0.004)						

SRM	Bi	O	Co	C	Au	H	S	As	Mg	Ti
458			0.076	**Be 0.360**			(<0.002)	**Zr (<0.002)**	0.003	(<0.002)
459			0.221	**Be 1.82**			(<0.001)	**Zr (<0.002)**	0.007	(<0.003)
460			0.217	**Be 1.86**			(<0.001)	**Zr (<0.002)**	0.005	(<0.003)
874	<0.0002	(0.06)		(0.0023)		(0.0016)	(0.0011)	(<0.0006)	(0.0002)	(0.0001)
875	0.003	(0.14)		(0.0035)		(0.004)	(0.0011)	(0.0010)	(0.0010)	(<0.0002)
1034	*(0.2)	*(363)	*(0.2)		*(<0.05)		*2.8	*(0.2)	*(<1)	
1035		(0.64)					**22.3			

Values in parentheses are not certified and are given for information only.
* Value is in mg/kg (SI unit).
** Sulfur value is in mg/kg (SI unit).

102. Copper Base Alloys (block and disk forms)

The SRMs with a "C" prefix are chill-cast blocks, 31 mm square, 19 mm thick; the others are wrought disks, 31 mm in diameter and 19 mm thick. Both forms have nearly identical elemental compositions.

SRM		Type	Elemental Composition (in Wt. %)							
			Cu	Zn	Pb	Fe	Sn	Ni	Al	Sb
1104		Free-Cutting Brass	61.33	35.31	2.77	0.088	0.43	0.070		
1107		Naval Brass B	61.21	37.34	0.18	0.037	1.04	0.098		
1108		Naval Brass C	64.95	34.42	0.063	0.050	0.39	0.033		
1110		Red Brass B	84.59	15.20	0.033	0.033	0.051	0.053		
1111		Red Brass C	87.14	12.81	0.013	0.010	0.019	0.022		
1112	C1112	Gilding Metal A	93.38	6.30	0.057	0.070	0.12	0.100		
1113	C1113	Gilding Metal B	95.03	4.80	0.026	0.043	0.064	0.057		
1114	C1114	Gilding Metal C	96.45	3.47	0.012	0.017	0.027	0.021		
1115	C1115	Commercial Bronze A	87.96	11.73	0.013	0.13	0.10	0.074		
1116	C1116	Commercial Bronze B	90.37	9.44	0.042	0.046	0.044	0.048		
1117	C1117	Commercial Bronze C	93.01	6.87	0.069	0.014	0.021	0.020		
	C1122	Beryllium-Copper	97.45	(0.01)	(0.003)	0.16	(0.01)	(0.01)	0.17	
	C1123	Beryllium-Copper	97.10	0.01	(0.001)	0.04	(0.01)	(0.01)	0.02	
1276a		Cupro-Nickel (CDA 715)	67.8	0.038	0.004	0.56	0.023	30.5		0.0004

SRM		Be	Cd	Mn	P	Si	Ag
1104					0.005		
	C1106			0.005			
1108	C1108			0.025			
1112	C1112				0.009		
1113	C1113				0.008		
1114	C1114				0.009		
1115	C1115				0.005		
1116	C1116					0.008	
1117	C1117				0.002		
	C1122	1.75		(0.004)	(0.004)	0.17	(0.005)
	C1123	0.46		(0.002)	(0.002)	0.03	(0.009)
1276a			0.0002	1.01	0.006		

SRM		Co	Cr	Se	Mg
	C1122	0.220	(0.002)		
	C1123	2.35	(0.001)		
1276a		0.045		0.0005	0.12

Values in parentheses are not certified and are given for information only.

NOTE: SRM 1275a, Cupro-Nickel (CDA 706), in In Prep.

102. Copper "Benchmark" (chip and rod forms)

SRM		Type	Cu (in Wt. %)	Elemental Composition (in mg/kg*)							
Chip	Rod			Sb	As	Bi	Cr	Co	Fe	Pb	Mn
393		Unalloyed Copper "O"	99.998	0.25	0.41	<0.1	<0.5	0.02	<1	0.039	<0.01
394	494	Unalloyed Copper I	99.908	4.5	2.6	0.35	2.0	0.5	147	26.5	3.7
395	495	Unalloyed Copper II	99.944	8.0	1.6	0.50	6.0		96	3.25	5.3
396	496	Unalloyed Copper III	99.955	<1	<0.2	0.07	4.3	0.4	143	0.41	7.5
	457	Unalloyed Copper IV	99.96	0.2	0.2	0.2	(0.3)	(0.2)	2.0	0.5	<0.1
398		Unalloyed	99.98	7.5	25	2.0	(0.3)	2.8	11.4	9.9	(0.3)
	498	Copper V	99.98	7.4	25	2.0	(0.3)	2.7	11	10	(0.3)
399	499	Unalloyed Copper VI	99.79	30	47	10.5	(0.5)	0.5	20.0	114	(0.3)
400	500	Unalloyed Copper VII	99.70	102	140	24.5	(0.5)	0.6	41	128	(0.2)
	C1252	Phosphorized Copper IX	99.89	42	115	21	7.4	90	(35)	60	(17)
	C1253	Phosphorized Copper X	99.42	(140)	432	70	216	495	(330)	244	(380)
454		Unalloyed Copper XI	99.84	24	46	19		(4)	(50)	66	

SRM		Ni	Se	Ag	S	Te	Sn	Zn	Al	Cd	Au	Mg
393		0.05	<0.05	0.10	<1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.05	<0.1
394	494	11.7	2.00	50.5	15	0.58	70	405	(<2)	(0.5)	(0.07)	(<1)
395	495	5.4	0.63	12.2	13	0.32	1.5	12.2	(<2)	(0.4)	(0.13)	(<1)
396	496	4.2	0.62	3.30	9.5	(0.02)	0.8	5.0	(<2)	(0.6)	(<0.05)	(<1)
	457	0.6	4.2	8.1	(4)	0.29	<0.2	<11	(<2)	(<1)	(<0.05)	(<1)
398		7.0	17.5	20.1	(11)	10.1	4.8	24	(<2)	(22)	(0.1)	(<1)
	498	7.0	17.5	20.1	(11)	10.1	5	25	(<2)	(<22)	(0.1)	(<1)
399	499	506	95	117	(10)	50	(~90)	45	(<2)	(<1)	(4)	(<1)
400	500	603	214	181	(9)	153	(~200)	114	(<2)	(<1)	(10)	(<1)
	C1252	128	53.6	166.6	(29)	51	(110)	60	(7)	14	34.9	(20)
	C1253	(500)	164	495	55	199	(470)	350	(180)	74	74.4	(80)
454		(150)	479	286		27	2.2	7			7.5	

SRM		Si	Be	B	Ca	Li	Pd	P	Ti	Zr
393	494	<0.5	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.5	<0.5
394	494	(<2)								
395	495	(<2)								
396	496	(<2)								
398		(<2)								
	498	(<2)								
399	499	(<2)								
400	500	(<2)								
	C1252	(13)	(<5)		(6)	(0.03)				
	C1253	(350)	(12)		(1)	(9)		518		
454							(0.1)			

Values in parentheses are not certified and are given for information only.
*SI unit. Replaces terms "ppm" and "μg/g".

102. Naval Brass (disk form)

This series of SRMs was produced through a cooperative program between NIST and the Institute for Non-Ferrous Metals (IMN), Gliwice, Poland and funded under the auspices of the Second Maria Sklodowska-Curie Fund. Development, characterization and certification of the monolithic brasses were carried out by the IMN; homogeneity testing was performed by NIST. A detailed technical discussion of these SRMs will be given in a Special Publication due to be published in mid-1995. Each SRM unit is in the form of disk, ~39.5 mm in diameter and 20 mm thick.

SRM	Type	Elemental Composition (in Wt. %)				
		Cu	Pb	Fe	Sn	Ni
1776	Naval Brass WK1	59.97	0.17	0.28	0.11	0.28
1777	Naval Brass WK2	60.56	0.33	0.16	1.34	0.21
1778	Naval Brass WK3	62.10	0.11	0.06	0.49	0.13
1779	Naval Brass WK4	63.28	0.05	0.08	1.04	0.07
1780	Naval Brass WK5	64.92	0.006	0.01	0.47	0.005

SRM	Al	Sb	Mn	P	Si	Bi
1776	0.11	0.024	0.12	0.030	0.30	0.014
1777	0.08	0.019	0.09	0.018	0.23	0.012
1778	0.04	0.013	0.04	0.018	0.15	0.009
1779	0.01	0.006	0.02	0.011	0.08	0.005
1780	0.004	0.002	0.006	0.006	0.006	0.001

102. Lead Base Alloys (chip and disk forms)

SRM		Type	Elemental Composition (in Wt. %)							
Chip	Disk		Cu	Ni	As	Sn	Sb	Bi	Ag	Fe
1129		Solder 63Sn–37Pb	0.16	0.010	0.055	62.7	0.13	0.13	0.075	
127b	1131	Solder 40Sn–60Pb	0.011	0.012	0.01	39.3	0.43	0.06	0.01	
53e	1132	Bearing Metal(Pb–Sb–Sn)	0.054	0.003	0.057	5.84	10.26	0.052		<0.001

102. Lead Base Material (disk form)

These SRMs are issued in the form of disks, 50 mm in diameter and 16 mm thick. They are intended for use with optical emission spectrometric methods of analysis.

SRM / Type	C2415 Battery Lead	C2416 Bullet Lead	C2417 Lead-Base Alloy	C2418 High-Purity Lead
	Elemental Composition (in Wt. %)			
Sb	2.95	0.79	0.010	(<0.0001)
As	0.20	0.056	0.011	(<0.0001)
Bi	0.054	0.10	0.010	(<0.0005)
Cu	0.095	0.065	0.010	(<0.0001)
S	0.0026	0.0015	(<0.0005)	
Ag	0.002	0.0044	0.010	0.0001
Sn	0.33	0.09	(<0.010)	(<0.0005)
Al	(<0.0003)	(<0.0001)	(<0.0001)	(<0.0001)
Cd	0.002	(0.0002)	(<0.0002)	0.0003
Ca	(<0.001)	(<0.001)	(<0.001)	(<0.0005)
Co		(<0.0002)	(<0.0002)	(<0.0005)
Fe	<0.001	(<0.0005)	(<0.0003)	(<0.0005)
Mn	<0.001	(<0.0005)	(<0.0003)	(<0.0005)
Ni	<0.001	(<0.0005)	(<0.0005)	(<0.0005)
Te	0.0045	(<0.0005)	(<0.0005)	(<0.0005)
Zn	<0.001	(<0.0005)	(<0.0005)	(<0.0005)

Values in parentheses are not certified and are given for information only.

102. Tin Base Alloys (chip form)

SRM	Type	Unit Size (in g)	Elemental Composition (in Wt. %)								
			Pb	Sn	Sb	Bi	Cn	Fe	As	Ag	Ni
54d	Bearing Metal	170	0.62	88.57	7.04	0.044	3.62	0.027	0.088	0.0032	0.0027

102. Nickel Base Alloys (chip and disk forms)

SRM	Type	Unit Size (in g)	Elemental Composition (in Wt. %)							
			C	Mn	P	S	Si	Cu	Ni	Cr
349a	Waspaloy Ni–Co–Cr	150	0.035	0.019	0.003	0.0024	0.018	0.007	58.1	19.3
864	Inconel, 600	100	0.064	0.29	0.010	0.003	0.12	0.26	73.1	15.7
865	Inconel, 625	100	0.037	0.18	0.012	0.001	0.41	0.36	59.5	21.9
866	Incoloy, 800	100	0.082	0.92	0.017	0.001	0.17	0.49	30.8	20.1
867	Incoloy, 825	100	0.021	0.39	0.018	0.002	0.32	1.74	43.5	23.4
882	Ni–Cu–Al	100	0.006	0.0007		0.0014	0.006	31.02	65.25	
1159	Electronic and Magnetic Alloy Ni–Fe	disk	0.007	0.305	0.003	0.003	0.32	0.038	48.2	0.06
1160	Electronic and Magnetic Alloy Ni–Mo	disk	0.019	0.550	0.003	0.001	0.37	0.021	80.3	0.05
1243	Waspaloy	disk	0.024	0.019	0.003	0.0018	0.018	0.007	58.78	19.20
C1248	Ni–Cu	disk	0.266	0.31	0.002	0.0008	1.61	29.80	65.75	0.095

SRM	Mo	Co	Ti	Al	B	Fe	Nb
349a	4.25	12.46	3.06	1.23	0.005	1.15	**V 0.12**
864	0.20	0.059	0.26	0.26	< 0.005	9.6	(0.14)
865	8.6	0.072	0.28	0.21	< 0.001	4.5	3.5
866	0.36	0.075	0.31	0.29	< 0.001	46.1	(0.09)
867	2.73	0.089	0.75	0.062	0.002	26.6	(0.45)
882			0.57	2.85		0.009	
1159	0.010	0.022				51.0	
1160	4.35	0.054				14.3	
1243	4.25	12.46	3.06	1.23	0.005	0.79	**V 0.12**
C1248	0.006	**Pb 3.8 mg/kg***	**Sn 1.1 mg/kg***	0.009		2.10	**Zn 3 mg/kg***

Values in parentheses are not certified and are given for information only.
*SI unit. Replaces terms "ppm" and "μg/g".
NOTE: SRM 863, Inconel 718, is In Prep.

102. Trace Elements in Nickel Base Superalloys (chip form)

SRM	Type	Unit Size (in g)	Trace Composition (in mg/kg*)				
			Pb	Bi	Se	Te	Tl
897	"Tracealloy" A	35	11.7	(0.5)	9.1	1.05	0.51
898	"Tracealloy" B	35	2.5	(1.0)	2.00	0.54	2.75
899	"Tracealloy" C	35	3.9	(0.3)	9.5	5.9	0.252

SRM	Base Composition (in Wt. %)											
	C	Cr	Co	Ni	W	Nb	Al	Ti	B	Zr	Ta	Hf
897, 898, 899	(0.12)	(12.0)	(8.5)	(Bal)	(1.75)	(0.9)	(2.0)	(2.0)	(0.010)	(0.10)	(1.75)	(1.2)

Values in parentheses are not certified and are given for information only.
*SI unit. Replaces terms "ppm" and "μg/g".

102. Nickel Oxides (powder form)

SRM	Type	Unit Size (in g)	Elemental Composition (in Wt. %)								
			Mn	Si	Cu	Cr	Co	Ti	Al	Fe	Mg
671	Oxide 1	25	0.13	0.047	0.20	0.025	0.31	0.024	0.009	0.39	0.030
672	Oxide 2	25	0.095	0.11	0.018	0.003	0.55	0.009	0.004	0.079	0.020
673	Oxide 3	25	0.0037	0.006	0.002	0.0003	0.016	0.003	0.001	0.029	0.003

SRM	Trace Composition (in mg/kg*)											
	Pb	Se	Bi	As	Sn	Sb	Cd	Ga	Ag	Te	Tl	Zn
671	16	2.0	0.07	(59)	(2.7)	(0.4)	(0.7)	(0.8)	(0.5)	(<0.2)	(<0.1)	(160)
672	38	0.40	0.3	(74)	(4)	(0.5)	(1.7)	(0.4)	(0.3)	(<0.2)	(<0.1)	(140)
673	3.5	0.2	0.06	(0.4)	(<0.5)	(<0.5)	(0.05)	(<0.1)	(<0.1)	(0.4)	(<0.1)	(1.7)

Values in parentheses are not certified and are given for information only.
*SI unit. Replaces terms "ppm" and "μg/g".

102. Titanium Base Alloys (chip and disk forms)

SRM	Type	Unit Size (in g)	Elemental Composition (in Wt. %)				
			C	Mn	Cr	Cu	Mo
173b	Al–V	50	0.025			0.008	0.013
176	Al–Sn	100	0.015	0.0008		0.003	0.0003
641	8 Mn (A)	disk		6.68			
642	8 Mn (B)	disk		9.08			
643	8 Mn (C)	disk		11.68			
644	Cr–Fe–Mo	disk			1.03		3.61
647	Al–Mo–Sn–Zr	50	0.006				1.96
648	Al–Sn–Zr–Cr–Mo	50	0.011		3.84		3.75
649	V–Al–Cr–Sn	50	0.011	(<0.01)	2.96	(<0.001)	
650	Unalloyed A	30		0.016	0.002	0.033	0.002
651	Unalloyed B	30		0.005	0.037	0.032	0.031
652	Unalloyed C	30		0.046	0.082	0.081	0.039
654b	Al–V	disk			(0.025)	0.004	(0.013)
1128	V–Al–Cr–Sn	disk	0.011	(<0.01)	2.96	(<0.003)	(0.006)
2431	6Al–2Sn–4Zr–10Mo	50	0.006	(<0.01)	(<0.01)	(<0.01)	6.01
2432	10V–2Fe–3Al	50	0.008	(<0.01)	(<0.01)	(<0.005)	

SRM	Fe	Al	V	Sn	Si	N	W	Zr
173b	0.23	6.36	4.31	(0.03)	0.046	0.015		
176	0.070	5.16		2.47		0.010		
644	1.36							
647	0.075	5.88	(<0.02)	2.02		(<0.01)		3.90
648	0.15	5.13		1.98	0.027	(0.01)		1.84
649	0.133	3.08	15.1	3.04		(0.01)		
650	0.024	<0.01	0.009	0.03	0.004		1.55	
651	0.058	<0.006	0.021	0.026	0.011		0.39	
652	0.67	0.039	0.024	0.053	0.16		0.5	
654b	0.023	6.34	4.31	0.023	0.045		Ni 0.028	0.008
1128	0.134	3.06	15.13	3.04		(0.01)		
2431	0.056	5.73	(<0.01)	1.98	0.088	Ni (<0.01)	(<0.001)	4.06
2432	1.77	3.15	10.00	B (<0.001)	0.029	Ni (<0.01)	(<0.001)	(<0.01)

Values in parentheses are not certified and are given for information only.
NOTE: SRM 2433, 8Al-1Mo-1V, is In Prep.

102. Zinc Base Alloys (chip and disk forms)

SRM	Type	Unit Size (in g)	Elemental Composition (in Wt. %)							
			Cu	Al	Mg	Fe	Pb	Cd	Sn	Cr
94c	Die Casting Alloy	150	1.01	4.13	0.042	0.018	0.006	0.002	0.006	
625	Zinc-base A–ASTM AG 40A	disk	0.034	3.06	0.070	0.036	0.0014	0.0007	0.0006	0.0128
626	Zinc-base B–ASTM AG 40A	disk	0.056	3.56	0.020	0.103	0.0022	0.0016	0.0012	0.0395
627	Zinc-base C–ASTM AG 40A	disk	0.132	3.88	0.030	0.023	0.0082	0.0051	0.0042	0.0038
628	Zinc-base D–ASTM AC 41A	disk	0.611	4.59	0.0094	0.066	0.0045	0.0040	0.0017	0.0087
629	Zinc-base E–ASTM AC 41A	disk	1.50	5.15	0.094	0.017	0.0135	0.0155	0.012	0.0008
630	Zinc-base F–ASTM AC 41A	disk	0.976	4.30	0.030	0.023	0.0083	0.0048	0.0040	0.0031
631	Zinc spelter (mod.)	disk	0.0013	0.50	(<0.001)	0.005	(0.001)	0.0002	0.0001	0.0001

SRM	Mn	Ni	Si	In	Ga	Ca	Ag	Ge
94c	0.014	0.006						
625	0.031	0.0184	0.017					
626	0.048	0.047	0.042					
627	0.014	0.0029	0.021					
628	0.0091	0.030	0.008					
629	0.0017	0.0075	0.078					
630	0.0106	0.0027	0.022					
631	0.00015	(<0.0005)	(0.002)	0.0023	(0.002)	<0.001	(<0.0005)	(0.0002)

Values in parentheses are not certified and are given for information only.

102. Zirconium Base Alloys (chip and disk forms)

SRM	Type	Unit Size (in g)	Elemental Composition (in Wt. %)										
			C	Mn	Hf	Cu	Ni	Cr	Ti	Sn	Fe	N	Al
360b	Zircaloy-4	100	0.011	0.0010	0.008	0.002	0.0025	0.10	0.002	1.55	0.21	0.0045	0.004

SRM	Type	Unit Size	Elemental Composition (in mg/kg*)										
			Hf	C	Cr	Cu	Fe	Mn	Mo	Ni	N	Si	Ti	W
1235	Zirconium B	disk	95	(170)	(60)	(80)	(850)	(25)	(40)	(65)	(32)	(95)	(90)	(50)

Values in parentheses are not certified and are given for information only.
*SI unit. Replaces terms "ppm" and "μg/g".

102. Gases in Metals (platelet form)

SRM	Type	Hydrogen (in mg/kg*)
352c	Unalloyed Titanium for Hydrogen	49

*SI unit. Replaces terms "ppm" and "μg/g".

103. Microanalysis

Metals (rod and wire forms)

SRM	Type	Elemental Composition (in Wt. %)				
		Au	Cu	Ag	W	Mo
480	Tungsten–20% Mo Alloy				78.5	21.5
481	Au 100 A	100.00				
	Au–20% Ag B	80.05		19.96		
	Au–40% Ag C	60.05		39.92		
	Au–60% Ag	40.03		59.93		
	Au–80% Ag E	22.43		77.58		
	Ag 100 F			100.00		
482	Au 100 A	100.00				
	Au–20% Cu B	80.15	19.83			
	Au–40% Cu C	60.36	39.64			
	Au–60% Cu	40.10	59.92			
	Au–80% Cu E	20.12	79.85			
	Cu 100 F		100.00			

103. Synthetic Glasses (rod form)

	SRM 1872			SRM 1873		
	Glass			Glass		
	K–453	K–491	K–968	K–458	K–489	K–963
	Composition (in Wt. %)					
Pb	(99.37)	(99.38)	(100.07)	(99.71)	(99.71)	(100.02)
Pb	54.21	54.69	54.74		(1.32)	
Si		(0.11)		23.05	(22.23)	(21.96)
Ge	28.43	26.10	25.93			(0.47)
Ba			(0.46)	41.79	39.53	39.21
Zn				3.01	2.93	2.95
P			(0.21)			(0.33)
Mg			(0.22)			(0.34)
Al		(0.10)			(0.11)	
B						
Zr		(0.26)	(0.48)		(0.40)	(0.61)
Ti		(0.14)	(0.16)		(0.27)	(0.32)
Ce		(0.59)			(0.80)	
Ta		(0.52)			(0.95)	
Fe		(0.17)			(0.35)	
Li						
Ni			(0.20)			(0.33)
Eu			(0.64)			(0.95)
U			(0.05)			(0.16)
Th			(0.12)			(0.06)
Cr			(0.19)			(0.31)
O	(16.73)	(16.45)	(16.67)	(31.86)	(31.70)	(32.00)
Total	(99.37)	(99.13)	(100.07)	(99.71)	(100.59)	(100.00)

Values in parentheses are not certified and are given for information only.

103. Thin Film for Transmission Electron Microscope

SRM	Type	Elemental Composition (in Wt. %)					
		Mg	Si	Ca	Fe	O	Ar
2063a	Mineral glass	7.97	25.34	11.82	11.06	43.2	(0.4)

Values in parentheses are not certified and are given for information only.

104. High-Purity Materials

High-Purity Metals (solid forms)

These SRMs are for determining impurity elements in high-purity metals.

SRM	Type	Unit Size	Elemental Composition (in mg/kg*)				
			Cu	Ni	Sn	Pb	Zr
685R	High-Purity Gold (Rod)	5.9 mm × 25 mm long	0.1	(<0.05)	(<0.07)		
685W	High-Purity Gold (Wire)	1.4 mm × 102 mm long	0.1	(<0.05)	(<0.07)		
680a	High-Purity Platinum (Wire)	0.51 mm: L1 (10 cm) 0.51 mm; L2 (1 m)	0.1	<1		<1	<0.1
682	High-Purity Zinc	semicirc 57 mm	0.042	(<0.1)	(0.02)		
683	Zinc Metal	semicirc 57 mm	5.9		(0.02)	11.1	
726	Selenium, Intermediate Purity	shot, 450 g	<1	<0.5	<1	<1	**Mn <0.3**
728	Zinc, Intermediate Purity	shot, 450 g	In Prep				
†885	Refined Copper	pin, 200 g		<0.0001	<0.0001	0.0002	

SRM	Ag	Mg	In	Fe	O	Pd	Au	Rh	Ir	Cd	Tl
685R	[0.1]	(<0.2)	0.007	0.2	[<2]						
685W	[0.1]	(<0.2)	0.007	0.3	[2]						
680a	<0.1	<1		1.3	4	0.2	<1	<0.2	<0.01		
682	(0.02)	(<0.1)		(0.1)	(<0.5)					(0.1)	
683	1.3			2.2						1.1	(0.2)
726	<1	<1	**S 12**	1	**Cr <1**	**Mo <0.3**	**Te 0.3**	**As <2**	**Al <1**	**B <1**	**Ca <1**
†885	0.0005			<0.0005	0.31		**S 0.0018**	**Sb <0.0002**	**As <0.0002**	**Bi <0.0001**	**Zn <0.0001**

Values in parentheses are not certified and are given for information only.
Values in brackets are subject to greater error since only one method of analysis was employed.
* SI unit: Replaces terms "ppm" and "μg/g".
† SRM 885 values are in Wt. %.

104. Stoichiometry (powder form)

These SRMs are defined as primary, working, and secondary standards in accordance with recommendations of the Analytical Chemistry Section of the International Union of Pure and Applied Chemistry [Ref. Analyst 90, 251 (1965)]. These definitions are as follows:

Primary Standard:
a commercially available substance of purity 100 ± 0.02 percent (Purity 99.98 + percent).

Working Standard:
a commercially available substance of purity 100 ± 0.05 percent (Purity 99.95 + percent).

Secondary Standard:
a substance of lower purity which can be standardized against a primary grade standard.

SRM	Type	Unit Size (in g)	Certified Use	Stoichiometric Purity (in %)
17d	Sucrose	60	Polarimetric Value	(99.9)
40h	Sodium Oxalate	60	Reductometric Value	99.972
41c	Dextrose (D-Glucose)	70	Reductometric Value	99.9
83d	Arsenic Trioxide	60	Reductometric Value	99.9926
84j	Potassium Hydrogen Phthalate	60	Acidimetric Value	99.996
136e	Potassium Dichromate	60	Oxidimetric Value	99.984
350a	Benzoic Acid	30	Acidimetric Value	99.9958
723b	Tris(hydroxymethyl)aminomethane	50	Basimetric Value	99.9238
951	Boric Acid	100	Acidimetric and Boron Isotopic Value	100.00
987	Strontium Carbonate	1	Assay and Isotopic	99.98
999a	Potassium Chloride	60	Assay Standard for:	
			Potassium	In Prep
			Chloride	In Prep

Values in parentheses are not certified and are given for information only.

104. Microchemistry (powder form)

SRM	Type	Unit Size (in g)	Composition (in Wt. %)							
			C	H	N	Br	Cl	F	S	CH_3O-
141d	Acetanilide	In Prep								
142	Anisic Acid	2								20.40
143c	Cystine	2	29.99	5.03	11.66				26.69	
148	Nicotinic Acid	2	58.54	4.09	11.38					
2141	Urea	2			46.63					
2142	o-Bromobenzoic Acid	2				39.80				
2143	p-Fluorobenzoic Acid	2						13.54		
2144	m-Chlorobenzoic Acid	2					22.62			

104. Spectrometry, Single Element (solution form)

These SRMs are intended as standard stock solutions for use in atomic absorption spectrometry, optical emission (plasma) spectrometry, or any other analytical technique that requires aqueous solutions for calibrating instruments. Each SRM is a single element solution of 50 mL with a nominal concentration of 10 mg/mL, except where noted in the Element column.

SRM	Element	Acid Concentration
3101a	Aluminum	HNO_3 10%
3102a	Antimony	HNO_3 10% + HF 2%
3103a	Arsenic	HNO_3 10%
3104a	Barium	HNO_3 1%
3105a	Beryllium	HNO_3 10%
3106	Bismuth	HNO_3 10%
3107	Boron (5 mg/mL)	H_2O
3108	Cadmium	HNO_3 10%
3109a	Calcium	HNO_3 10%
3110	Cerium	HNO_3 10%
3111a	Cesium	HNO_3 1%
3112a	Chromium	HNO_3 10%
3113	Cobalt	HNO_3 10%
3114	Copper	HNO_3 10%
3115a	Dysprosium	HNO_3 10%
3116a	Erbium	HNO_3 10%
3117a	Europium	HNO_3 10%
3118a	Gadolinium	HNO_3 10%
3119a	Gallium	HNO_3 10%
3120	Germanium	Oxalic Acid 10%
3121	Gold	HCl 10%
3122	Hafnium	HNO_3 10% + HF 2%
3123a	Holmium	HCl 10%
3124a	Indium	HNO_3 10%
3126a	Iron	HNO_3 10%
3127a	Lanthanum	HNO_3 10%
3128	Lead	HNO_3 10%
3129a	Lithium	HNO_3 1%
3130a	Lutetium	HNO_3 10%
3131a	Magnesium	HNO_3 10%
3132	Manganese	HNO_3 10%
3133	Mercury	HNO_3 10%
3134	Molybdenum	HCl 10%
3135a	Neodymium	HNO_3 10%
3136	Nickel	HNO_3 10%
3137	Niobium	5% HNO_3 + HF 2%
3138	Palladium	HCl 10%
3139a	Phosphorus	HNO_3 0.05%
3140	Platinum	HCl 10%
3141a	Potassium	HNO_3 1%
3142a	Praseodymium	HNO_3 10%
3143	Rhenium	HNO_3 10%
3144	Rhodium (1 mg/mL)	HCl 10%
3145a	Rubidium	HNO_3 1%

104. Spectrometry, Single Element (solution form) – Continued

SRM	Element	Acid Concentration
3147a	Samarium	HNO_3 10%
3148a	Scandium	HNO_3 10%
3149	Selenium	HNO_3 10%
3150	Silicon	H_2O
3151	Silver	HNO_3 10%
3152a	Sodium	HNO_3 1%
3153a	Strontium	HNO_3 10%
3154	Sulfur	H_2O
3155	Tantalum	HNO_3 5% + HF 2%
3156	Tellurium	HCl 20%
3157a	Terbium	HNO_3 10%
3158	Thallium	HNO_3 10%
3159	Thorium	HNO_3 10%
3160a	Thulium	HNO_3 10%
3161	Tin	HCl 60%
3162a	Titanium	HNO_3 10% + HF 2%
3163	Tungsten	HNO_3 7% + HF 4%
3164	Uranium	HNO_3 10%
3165	Vanadium (5 mg/mL)	HNO_3 10%
3166a	Ytterbium	HNO_3 10%
3167a	Yttrium	HNO_3 10%
3168a	Zinc	HCl 10%
3169	Zirconium	HNO_3 10% + HF 2%

104. Spectrometry, Multi-Element (solution form)

SRMs 3171a and 3172a consist of single 50-mL solutions, each containing several elements in concentration ratios appropriate for natural water and similar type sample analysis. Multi-element SRM 3179 consists of a set of three 50-mL solutions, (3179-I, 3179-II and 3179-III), designed to be combined, diluted (I, 1:100; II and III, 1:1000) and used immediately, as the full combination of elements is unstable over extended periods of time. The elemental concentration ratios in the final combined and diluted solution of SRM 3179 are appropriate for the analysis of soil, sediment and sludge leachates.

Element	Source, Purity (in Wt. %)	Nominal Concentration (in µg/mL)
SRM 3171a Multielement Mix A1 Standard Solution (in HNO_3 5%)		
Aluminum	Metal, (99.99+)	100 ± 0.5
Antimony	Metal, (99.99)	100 ± 0.5
Beryllium	Metal, (99.9)	10 ± 0.1
Cadmium	Metal, (99.99+)	100 ± 0.5
Chromium	Metal, (99.99+)	100 ± 0.5
Iron	Metal, (99.99+)	100 ± 0.5
Magnesium	Metal, (99.999)	100 ± 0.5
Manganese	Metal, (99.99)	100 ± 0.5
Molybdenum	Metal, (99.99+)	100 ± 0.5
Nickel	Metal, (99.999)	100 ± 0.5
Potassium	KCl, (99.98)	500 ± 2.5
Sodium	NaCl, (99.98)	100 ± 0.5
Vanadium	Metal, (99.97)	100 ± 0.5

104. Spectrometry, Multi-Element (solution form) – Continued

	Element	Source, Purity (in Wt. %)	Nominal Concentration (in μg/mL)
SRM 3172a Multielement Mix B1 Standard Solution (in HNO_3 5%)			
	Arsenic	Metal, (99.83)	200 ± 1.0
	Barium	$BaCO_3$, (99.88)	10 ± 0.1
	Calcium	$CaCO_3$, (99.99)	10 ± 0.1
	Cobalt	Metal, (99.92)	100 ± 0.5
	Copper	Metal, (99.9)	100 ± 0.5
	Lead	Metal, (99.99)	100 ± 0.5
	Selenium	Metal, (99.99)	500 ± 2.5
	Silver	Metal, (99.999+)	100 ± 0.5
	Strontium	$SrCO_3$, (99.99)	10 ± 0.1
	Thallium	Metal, (99.99)	100 ± 0.5
	Zinc	Metal, (99.99+)	100 ± 0.5
SRM 3179 Multielement Mixes I, II, and III Standard Solutions (in HNO_3 5%)			
I	Aluminum	Metal, (99.99+)	100 ± 0.5
	Arsenic	Metal, (99.99)	200 ± 1.0
	Iron	Metal, (99.99+)	199 ± 1.0
	Lead	Metal, (99.99)	100 ± 0.5
	Magnesium	Metal, (99.999)	100 ± 0.5
	Manganese	Metal, (99.99)	100 ± 0.5
	Phosphorus	$NH_4H_2PO_4$, (99.9)	100 ± 0.5
	Potassium	KCl, (99.98)	100 ± 0.5
	Sodium	NaCl, (99.98)	100 ± 0.5
	Vanadium	NH_4VO_3, (99.99)	50 ± 0.2
	Zinc	Metal, (99.99+)	100 ± 0.5
II	Barium	$BaCO_3$, (99.99)	100 ± 0.5
	Cadmium	Metal, (99.99+)	100 ± 0.5
	Calcium	$CaCO_3$, (99.99)	100 ± 0.5
	Chromium	Metal, (99.99)	100 ± 0.5
	Cobalt	Metal, (99.98)	99.5 ± 0.5
	Copper	Metal, (99.99)	100 ± 0.5
	Lanthanum	La_2O_3, (99.99)	100 ± 0.5
	Lithium	Li_2CO_3, (99.9)	100 ± 0.5
	Molybdenum	Metal, (99.99+)	97.5 ± 0.5
	Nickel	Metal, (99.999)	100 ± 0.5
	Strontium	$SrCO_3$, (99.99)	100 ± 0.5
III	Silver	Metal, (99.999)	100 ± 0.5

104. Chromium Speciation (solution form)

These SRMs are intended for use in conjunction with the measurement of specific species of chromium, and consist of 50 mL solutions.

SRM	Source, Purity, %	Diluent	Element Concentration (in mg/mL)	
			Cr (III)	Cr (VI)
2108	Metal, (99.999+)	HCl, 1%	1.000 ± 0.005	< 0.001
2109	SRM 136e (99.984)	deionized H_2O	< 0.005	1.000 ± 0.005

104. Anion Chromatography (solution form)

These SRMs are single-component solutions prepared gravimetrically for use in anion chromatography, or any other technique that requires aqueous standard solutions for calibration on control materials.

SRM	Anion	Unit Size (in mL)	Nominal Concentration (in mg/kg*)
3181	Sulfate	50	1000
3182	Chloride	50	1000
3183	Fluoride	50	1000
3184	Bromide	50	1000
3185	Nitrate	50	1000
3186	Phosphate	50	1000

*SI unit. Replaces terms "ppm" and "μg/g".

104. Stable Isotopic Materials (solid forms)

The isotopic composition of these SRMs has been determined by mass spectrometry.

SRM	Type	Element/Isotopic Composition Certified	Unit Size (in g)
951	Boric Acid, assay and isotopic	Boron	100
952	Boric Acid, 95% enriched ^{10}B, assay and isotopic	Boron	0.25
975	Sodium Chloride	Chlorine	0.25
976	Copper Metal	Copper	0.4
977	Sodium Bromide	Bromine	0.25
978a	Silver Nitrate	Silver	0.25
979	Chromium Nitrate	Chromium	0.25
980	Magnesium Metal	Magnesium	0.25
981	Lead Metal, natural	Lead	1.0
*982	Lead Metal, equal atom ($^{208}Pb/^{206}Pb$)	Lead	1.0 wire
*983	Lead Metal, radiogenic (92% ^{206}Pb)	Lead	1.0 wire
984	Rubidium Chloride, assay and isotopic	Rubidium	0.25
985	Potassium Chloride, assay and isotopic	Potassium	1.0
986	Nickel	Nickel	1.0
987	Strontium Carbonate, assay and isotopic	Strontium	1.0
989	Rhenium, assay and isotopic	Rhenium	pkg. (50)
990	Silicon, assay and isotopic	Silicon	3 cm × 0.2 cm wafer
991	Lead–206 Spike, assay and isotopic	Lead	15
994	Gallium Metal, isotopic	Gallium	0.25
997	Thallium Metal, isotopic	Thallium	0.25

* These SRMs are radioactive, containing Lead-210 of natural origin. All users and purchasers must comply with all national and international regulations regarding the use and disposal of these SRMs.

104. Royal Canadian Mint Reference Materials (solid forms)

These RMs are a series each of fine silver, fine gold, and gold bullion products developed and certified by the Royal Canadian Mint (RCM), Ottawa, Canada. The fine silver and fine gold RMs are primarily intended for use as calibration standards for the determination of trace elements by solid sample spectrometric methods; the gold bullion RMs are primarily intended for use as quality control check standards for fire assay. There are eight RMs in the fine silver series, five RMs in the gold bullion series, and six RMs in the fine gold series. The RMs in the fine silver series are currently available only in block form (24 mm × 24 mm × 5 mm). The RCM expects to issue the wire and turnings forms at a future date. The RMs in the gold bullion series are also available in three forms – disc (25 mm dia. × 20 mm), foil (35 mm × 40 + mm × 1 mm), and wire (2 mm dia.). The RMs in the fine gold series are available in three forms – block (25 mm × 25 mm × 2.5 mm), wire (2 mm dia.), and turnings (25 g).

RM	8153/8154/8155			8156/8157/8158			8159/8160/8161		
Type	Fine Silver			Fine Silver			Fine Silver		
Form (Block, Wire, Turnings)	B	W*	T*	B	W*	T*	B	W*	T*
Unit Size (in g)	30	25	25	30	25	25	30	25	25
Components (in mg/kg)									
Bi		39.1			77.0			135	
Cu		63.3			491			35.5	
Fe		113			94			41.3	
Au		20.5			84			42.1	
Pb		36.5			65.5			98.3	
Ni		65.7			42.2			39.5	
Pd		86			48.5			115	
Pt		96.7			43			58	
Se		32.8			81.6			145	
Te		32.9			73.8			156	
Sn		25.0			62.3			124	
Zn		71.4			134			31.0	

RM	8162/8163/8164			8165/8166/8167			8168/8169/8170			8171/8172/8173		
Type	Fine Silver			Fine Silver			Fine Silver			Fine Silver		
Form (Block, Wire, Turnings)	B	W*	T*	B	W*	T*	B	W*	T*	B	W*	T*
Unit Size (in g)	30	25	25	30	25	25	30	25	25	30	25	25
Components (in mg/kg)												
Bi		65.3			83.5			28.9			75.1	
Cu		40.1			61.6			101			65.2	
Fe		25.0			35.6			15.4			48.9	
Au		52			15.0			75.0			26.7	
Pb		18.1			59.1			125			38.8	
Ni		27.4			35.0			13.5			57.0	
Pd		41.8			64.3			11.7			27.3	
Pt		17.3			17.9			24.4			12.3	
Se		55.8			32.2			3.9			44.4	
Te		62.9			(41.8)			6.6			25.8	
Sn		21.7			54.1			10.3			46.1	
Zn		(3.8)			18.6			8.3			7.2	

Values in parentheses are not certified and are given for information only.
* The Wire and Turnings forms are slated for future issue.

RM	8068/8069/8070			8071/8072/8073			8074/8075/8076			8077/8078/8079			8080/8081/8082		
Type	Gold Bullion			Gold Bullion			Gold Bullion			Gold Bullion			Gold Bullion		
Form (Disc, Wire, Foil)	D	W	F	D	W	F	D	W	F	D	W	F	D	W	F
Unit Size (in g)	30	25	25	30	25	25	30	25	25	30	25	25	30	25	25
Components (in Wt. %)															
Au		94.847			89.928			84.905			79.962			74.988	
Ag		4.15			8.03			12.08			15.09			15.04	
Cu		(1)			(2)			(3)			(5)			(10)	

Values in parentheses are not certified and are given for information only.

104. Royal Canadian Mint Reference Materials (solid forms) – Continued

RM	8050/8051/8052			8053/8054/8055			8056/8057/8058			8059/8060/8061			8062/8063/8064			8065/8066/8067		
Type	Fine Gold			Fine Gold			Fine Gold			Fine Gold			Fine Gold			Fine Gold		
Form (Block, Wire, Turnings)	B	W	T	B	W	T	B	W	T	B	W	T	B	W	T	B	W	T
Unit Size (in g)	30	25	25	30	25	25	30	25	25	30	25	25	30	25	25	30	25	25
Components (in mg/kg)																		
As		2.4			10.0			18.0			6.7			29.4			14.3	
Bi		3.4			24.0			34.0			6.8			53.9			11.0	
Cr		1.7			32.6			13.3			8.1			4.9			16.7	
Cu		1.6			98.1			46.9			5.7			9.8			13.8	
Fe		6.2			11.6			33.8			7.5			90.4			15.4	
Pb		1.9			21.9			30.5			6.4			49.7			11.5	
Mg		1.1			34.0			11.8			6.0			3.2			15.6	
Mn		1.1			58.9			22.5			10.8			64.3			20.5	
Ni		2.7			32.5			50.5			5.7			14.6			13.5	
Pd		1.3			43.1			19.8			5.0			119			13.1	
Pt					87.1			40.8			6.1			5.1			12.5	
Si					2.7			27.8			6.3			9.0			19.1	
Ag		9.5			20.3			81.7			7.1			49.7			15.1	
Sn		2.8			33.8			27.2			6.4			49.7			17.8	
Ti		0.7			12.7			25.3			5.9			2.6			16.5	
Zn		2.6			54.6			6.6			7.5			20.9			12.5	

104. Light Stable Isotopic Materials (gas, liquid and solid forms)

These RMs are for calibration of isotope-ratio mass spectrometers and associated sample preparation systems. They are distributed by NIST on behalf of the International Atomic Energy Agency (IAEA). Quantities of these materials are limited to *one (1) unit of each RM per laboratory every three (3) years*.

The isotopic compositions are given in parts per thousand (1000) difference from isotope-ratio standards – Vienna Standard Mean Ocean Water (VSMOW), Vienna PeeDee Belemnite (VPDB), atmospheric N_2 (Air), NBS28 Silica Sand (optical), and Canyon Diablo Troilite (CDT); with the exception of Lithium (Li), which is expressed as an absolute isotopic ratio.

RM	Type (IAEA Designation)	Unit Size	Nominal Isotopic Composition (in parts per 1000)						
			δD_{VSMOW}	$^6Li/^7Li$	$\delta^{13}C_{VPDB}$	$\delta^{15}N_{Air}$	$\delta^{18}O_{VSMOW}$	$\delta^{30}Si_{NBS28}$	$\delta^{34}S_{CDT}$
8535	VSMOW–water	30 mL	0 *				0 *		
8536	GISP–water	30 mL	−190				−24.8		
8537	SLAP–water	30 mL	−428 *				−55.5 *		
8538	NBS30–biotite	2 g	−66				+5.1		
8539	NBS22–oil	1 mL	−120		−29.7				
8540	PEFI–polyethylene foil	x mg	−100		−31.8				
8541	USGS24–graphite	0.8 g			−16				
8542	Sucrose ANU–sucrose	1 g			−10.5				
8543	NBS18–carbonatite	0.4 g			−5.0		+7.2		
8544	NBS19–limestone	0.4 g			+1.95 *		+28.6		
8545	LSVEC–lithium carbonate	0.4 g		0.0832†	−47		+3		
8546	NBS28–silica sand (optical)	0.4 g					+9.6	0 *	
8547	IAEA-N1–ammonium sulfate	0.4 g				+0.4			
8548	IAEA-N2–ammonium sulfate	0.4 g				+20.3			
8549	IAEA-N3–potassium nitrate	0.4 g				+2			
8550	USGS25–ammonium sulfate	0.5 g				−30.4			
8551	USGS26–ammonium sulfate	0.5 g				+53.5			
8552	NSVEC–gaseous nitrogen	300 µmol				−2.8			
8553	Soufre de Lacq–elemental sulfur	0.5 g							+16
8554	NZ1–silver sulfide	0.5 g							−0.3
8555	NZ2–silver sulfide	0.5 g							+21
8556	NBS123–sphalerite	0.5 g							+17
8557	NBS127–barium sulfate	0.5 g					+9.3		+20
8558	USGS32 – potassium nitrate	0.5 g				+179.9			

* Exactly defined isotopic abundances
† Absolute isotopic ratio

105. Health and Industrial Hygiene

Clinical Laboratory Materials (gas and solid forms)

These SRMs are for calibrating apparatus and validating analytical methods used in clinical and pathology laboratories. SRM 1400 Bone Ash and SRM 1486 Bone Meal are for use in determining selected major, minor, and trace elements in bone or similar matrices. SRM 2389 is for use in the chromatographic determination of amino acids.

SRM	Type	Purity/Constituent (in Wt. %)	Unit Size
900	Antiepilepsy Drug Level Assay (phenytoin, ethosuximide, phenobarbital, and primidone)		Set of 4 ampules
910	Sodium Pyruvate	98.7	25 g
911b	Cholesterol	99.8	2 g
912a	Urea	99.9	25 g
913	Uric Acid	99.7	10 g
914a	Creatinine	99.7	10 g
915a	Calcium Carbonate	99.9	20 g
916a	Bilirubin	98.3	100 mg
917a	D-Glucose (Dextrose)	99.7	25 g
918	Potassium Chloride	99.9	30 g
919a	Sodium Chloride	99.89	30 g
920	D-Mannitol	99.8	50 g
921	Cortisol (Hydrocortisone)	98.9	1 g
*924a	Lithium Carbonate	99.9	30 g
925	VMA (4–hydroxy–3–methoxymandelic acid)	99.4	1 g
928	Lead Nitrate	100.00	30 g
929	Magnesium Gluconate Dihydrate	**Mg 5.403**	5 g
937	Iron Metal (Clinical)	99.90	50 g
938	4–Nitrophenol	(99.75)	15 g
955a	Lead in Blood		Set of 4 ampules
*956a	Electrolytes in Serum for ISE	In Prep	Set of 9 ampules
968b	Fat Soluble Vitamins and Cholesterol in Human Serum	In Prep	Set of 6 ampules
998	Angiotensin I (Human)	94.1	0.5 mg
1400	Bone Ash	8 elements	50 g
1486	Bone Meal	8 elements	50 g
1595	Tripalmitin	99.5	2 g
1598	Inorganic Constituents in Bovine Serum		Set of 2 ampules
1599	Anticonvulsant Drug Level Assay (valproic acid and carbamazepine)		Set of 4 ampules
1951a	Cholesterol in Human Serum (Frozen)	In Prep	Set of 6 bottles
1952a	Cholesterol in Human Serum (Freeze-dried)		Set of 6 bottles
2389	Amino Acids in HCl	17 amino acids	Set of 5 ampules

Values in parentheses are not certified and are given for information only.
*Conforms to National Committee for Clinical Laboratory Standards (NCCLS) specification ACC–1.

105. Serum Materials

SRM 909a is a lyophilized human serum for use in determining specified constitutents. SRM 927b, the bovine serum albumin is in solution form; SRM 965 is a frozen human serum certified for three (3) levels of glucose.

SRM	Type	Unit Size	Analyte Concentrations (in mmol/L)		
				909a-1	909a-2
909a	Human Serum	909a-1; 3 bottles	Calcium	2.322	3.338
		909a-2; 3 bottles	Chloride	92.4	119.1
			Cholesterol	4.892	4.463
			Creatinine	0.084	0.463
			Glucose	4.95	15.41
			Lithium	0.465	2.657
			Magnesium	0.868	1.846
			Potassium	3.656	6.21
			Sodium	148.5	126.5
			Urea	5.535	19.47
			Uric Acid	0.234	0.525
909b	Human Serum	In Prep			
927b	Bovine Serum Albumin	Set of 10 ampules	Peptide Mass	72.01 g/L	
965	Glucose in Frozen Human Serum			In Prep	

105. Ethanol Solutions

SRM	Type	Certified Constituent	Unit Size
1828a	Ethanol-Water	Ethanol	In Prep

105. Toxic Substances in Urine (powder form)

SRMs 2670, 2671a and 2672a are for determining toxic substances in human urine. They consist of freeze-dried urine, provided in sets of four 30-mL bottles—two each at low and elevated levels.
NOTE: The values listed for these SRMs apply only to reconstituted urine.

SRM	Type	Low/Elevated Elemental Composition (in mg/L)				
		Al	As	Be	Cd	Ca
2670	Toxic Metals	(0.18)/(0.18)	(0.06)/0.48	(≤ 0.0005)/(0.033)	(0.00040)/0.088	0.105/0.105 g/L
2671a	Fluoride					
2672a	Mercury					

SRM	Cl	Cr	Cu	F	Au	Pb	Mg	Mn
2670	(4.4)/(4.4) g/L	(0.013)/0.085	0.13/0.37		(0.008)*/(0.24)	(0.01)/0.109	0.063/0.063 g/L	(0.03)/(0.33)
2671a				0.55/5.7				
2672a								

SRM	Hg	Ni	Pt	K	Se	Na	V	SO_4
2670	(0.002)/0.105	(0.07)/(0.30)	(0.008)*/(0.12)	(1.5)/(1.5) g/L	0.030/0.46	2.62/2.62 g/L	–/(0.12)	(1.3)/(1.3) g/L
2671a								
2672a	(0.002)/0.105							

Values in parentheses are not certified and are given for information only.
* Value is in µg/L.

105. Drugs of Abuse in Urine, Single Analyte (powder form)

These SRMs are for verifying the accuracy of methods used to determine marijuana, morphine glucuronide and cotinine, substances classed as drugs of abuse in humans or metabolites of drugs of abuse. SRMs 1507b and 2382 consist of freese-dried urine, provided in sets of four 20-mL bottles—three levels plus a blank. RM 8444 consists of freeze-dried urine in a set of four 10-mL vials—two levels and two blanks. Each SRM/RM consists of a single analyte drug of abuse.

SRM/RM	Type	Unit Size	Component (in µg/L)			
			I	II	III	IV
			Blank	Low	Medium	High
1507b	THC–9–COOH	Set of 4 bottles	x_D: < 1	11.7	24.1	49.6
2382	Morphine Glucuronide	Set of 4 bottles	x_D: < 1	209	437	853
8444	Cotinine	Set of 4 vials	0.8	54		488

105. Drugs of Abuse in Urine, Multi-Analyte (powder form)

These SRMs are for verifying the accuracy of methods used to determine cocaine, morphine and codeine and opiate-based substances classed as drugs of abuse in humans. Each SRM consists of multi-analyte drugs of abuse. SRMs 1508 and 2381 consist of freeze-dried urine, provided in sets of four 20-mL bottles—three levels plus a blank. SRM 1511 consists of a mixture of five substances—morphine, codeine, cocaine metabolite, marijuana metabolite and phencyclidine in freeze-dried urine and is provided as a set of three bottles, each containing all analytes (no blank).

SRM	Type	Unit Size	Component (in µg/L)					
			Cocaine	Benzoyl-ecgonine	Morphine	Codeine	THC–9–COOH	Phen-cyclidine
1508	Cocaine and Metabolites	Set of 4 bottles	90–429	103–510				
1511	Multi-drugs of Abuse	Set of 3 bottles		162	309	288	14.1	23.8
2381	Morphine and Codeine	Set of 4 bottles			134–580	130–560		

105. Drugs of Abuse in Hair (solid forms)

These SRMs were developed primarily to further research related to the accurate determination of drugs of abuse in human hair. The values provided on the Reports of Investigation are not certified. Rather they are "Best Estimates" based on proven NIST methods.

RM	Type	Unit Size (in mg)	Component (in mg/kg)			
			Cocaine	Benzoylecgonine	Morphine	Codeine
8448	Human Hair Segments	110–125	7.3	1.6	11.9	6.7
8449	Powdered Human Hair	100–120	7.0	4.0	4.3	2.9

105. DNA Profiling (solid forms)

These SRMs are intended for use in the standardization of forensic and paternity quality assurance procedures and instructional law enforcement or non-clinical research purposes. SRM 2390 DNA Profiling Standard, based on Restriction Fragment Length Polymorphism (RFLP) testing, is certified for the sizes of each allelic band of five commonly used DNA probes of two human DNA samples; one is from a female cell line, and the other is from a male source. SRM 2391 [Polymerase Chain Reaction] PCR-Based DNA Profiling Standard is certified for allele assignment of D1S80 loci for eight human DNA samples plus two human cell lines. Both SRMs consist of 20 components. SRM 2392 DNA Standard for Mitochrondrial Sequencing is currently under development. It will consist of a molecular tag with 108 basepairs and a DNA sequence that translates from the triplet nucleotide code to the single amino acid letter code and spells: **NIST*DNA*STANDARD*REFERENCE*MATERIAL.**

SRM	Type	Unit of Issue
2390	DNA Profiling	20 components: boxes A, B, and C
2391	PCR-Based DNA Profiling	20 components: boxes A and B
2392	DNA Mitochondrial Sequencing	In Prep

105. Materials on Filter Media

These SRMs consist of potentially hazardous materials deposited on filters to be used to determine the levels of these materials in industrial atmospheres. SRMs 2672d, 2677a and 2679a provide element values at four different levels; SRM 3087 provides element values at one level only.

SRM	Type	Unit Size	Element/Component (in μg/filter)				
				I	II	III	IV
2676d	Metals on Filter Media	Set of 6	Cadmium	0.97	2.81	10.04	(<0.0005)
			Lead	7.44	14.82	29.77	(<0.0005)
			Manganese	2.09	9.83	19.83	(<0.0005)
			Zinc	10.17	49.47	99.31	(0.26)
2677a	Beryllium and Arsenic on Filter Media	2 Sets of 5	Beryllium	0.129	0.643	2.58	0.050 ≤ 0.0005 Blank
			Arsenic	0.269	2.69	26.92	0.101 ≤ 0.0005 Blank
2679a	Quartz on Filter Media	Set of 4	Quartz	≤ 2	30.8	80.2	202.7
			Clay	(370)	(370)	(370)	(370)
3087	Metals on Filter Media	Set of 6 and 5 blanks	Barium	25.88			
			Cadmium	15.50			
			Chromium	10.33			
			Iron	25.84			
			Magnesium	25.83			
			Nickel	25.86			
			Lead	41.33			
			Selenium	25.84			
			Zinc	103.3			

Values in parentheses are not certified and are given for information only.

105. Trace Constituent Elements in Blank Filters

SRMs 2678 and 2681 are for use in evaluating the performance of air sampling filter methods with two different filter types or sizes commonly used in air sampling of industrial atmospheres. For both SRMs, either certified values (in μg), or limits of detection (X_D), for each of 30 constituent elements as well as 6 leachable anions and cations are provided.

SRM	Type	Diameter (in mm)	Pore Size (in μm)	Filter Weight (in g)
2678	Cellulose Acetate Membrane	47	0.45	0.09
2681	Ashless	42.5		0.14

105. Respirable Silica (powder form)

SRMs 1878a, 1879 and 1879a are crystalline silica materials with particles in the respirable range. They are intended for use in determining by X-ray diffraction, the levels of respirable silica in an industrial atmosphere according to NIOSH Analytical Method P&CAM 259 or equivalent methods.
Note: These SRMs are not certified for particle size.

SRM	Type	Unit Size	Component (in Wt. %)
1878a	Respirable Alpha Quartz	5 g	In Prep
1879	Respirable Cristobalite	5 g	Crystalline Cristobalite, 98.0
1879a	Respirable Cristobalite	5 g	In Prep

105. Lead in Paint (powder and sheet forms)

These SRMs are for use in determining lead in paint matrices. SRM 1579a consists of paint, obtained from old housing, that has been ground and homogenized into a powder, 99+% of which passes a 45 μm sieve. SRM 2579 consists of a set of five mylar sheets; four are coated with a single, uniform paint layer, the fifth sheet is a blank. SRM 2582 is a latex paint that has been ground and homogenized to pass a 100 μm sieve. SRMs 2580 and 2581 are intended to provide lead levels of approximately 5% and 0.5% respectively.

SRM	Type	Unit Size	Lead Concentration
1579a	Powdered Lead Base Paint	35 g	11.995 Wt.%
2579	Lead Paint Film	5 ea: 7.6 cm × 10.2 cm	3.53 to <0.0001 mg/cm^3
2580	Powdered Paint		In Prep
2581	Powdered Paint		In Prep
2582	Powdered Paint (Low Lead)	20 g	209 mg/kg

105. Asbestos

These SRMs are for use in identifying and quantifying asbestos types. SRM 1866a consists of a set of three common bulk mine-grade asbestos materials; chrysotile, grunerite (Amosite), riebeckite (Crocidolite), and one glass fiber sample. SRM 1867 consists of a set of three uncommon mine-grade asbestos materials; antophyllite, tremolite, and actinolite. The optical properties of SRMs 1866a and 1867 as observed by polarized light microscopy (PLM), have been characterized so that they may serve as primary calibration standards for the identification of asbestos types in building materials.

SRM 1868 consists of a set of two common bulk mine-grade asbestos materials; chrysotile and grunerite (Amosite), contained in matrices simulating building materials (calcium carbonate and glass fiber), in quantities at just below the U.S. EPA regulatory limit of 1%. This SRM is certified by weight for the quantity of each asbestos material present.

SRM 1876b is intended for use in evaluating the techniques used to identify and count chrysotile asbestos fibers by transmission electron microscopy (TEM). A unit consists of sections of mixed-cellulose-ester filters containing chrysotile asbestos fibers deposited by an aerosol generator.

RM 8411 consists of a section of collapsed mixed-cellulose-ester filters with a high concentration (138 fibers/0.01 mm^2) of chrysotile asbestos and a medium concentration (43 fibers/0.01 mm^2) of grunerite (Amosite) asbestos. It is intended for use in evaluating the techniques used to identify and count asbestos fibers by transmission electron microscopy (TEM).

SRM	Type	Unit Size
1866a	Common Commercial Asbestos	Set of 3: 4 g each
1867	Uncommon Commercial Asbestos	Set of 3: 5 to 10 g each
1868	Quantitative Asbestos in Building Materials	Set of 2: 5 to 10 g each
1876b	Chrysotile Asbestos for TEM	Set of 10: 3 mm × 3 mm
8411	Mixed Asbestos Research Filter	1 cm^2

106. Inorganics

106. Metal Constituents in Water and Sediments (liquid and solid forms)

These SRMs are for analysis of materials of health or environmental interest.

SRM/RM	Type	Unit Size	Elemental Composition
1640	Natural Water	250 mL	In Prep
1641c	Mercury in Water	6 × 20 mL	Hg: 1.47 mg/L
1643d	Trace Elements in Water	250 mL	In Prep
1646a	Estuarine Sediment	75 g	20 elements certified (see Category 111)
2704	Buffalo River Sediment	50 g	25 elements certified (see Category 111)

106. Simulated Rainwaters (liquid form)

This SRM was developed to aid in the analysis of acidic rainwater by providing a stable, homogeneous material at two levels of acidity.

SRM	Type	Unit Size	
2694a	Simulated Rainwater	Set of 4: 2 of 50 mL at each of 2 levels	
	Constituent Element/Parameter	**2694a–I**	**2694a–II**
	pH, 25 °C	4.30	3.60
	Electrolytic Conductivity (μS/cm, 25 °C)	25.4	129.3
	Acidity, meq/L	0.0544	0.283
	Fluoride, mg/L	0.057	0.108
	Chloride, mg/L	(0.23)	(0.94)
	Nitrate, mg/L	(0.53)	7.19
	Sulfate, mg/L	2.69	10.6
	Sodium, mg/L	0.208	0.423
	Potassium, mg/L	0.056	0.108
	Ammonium, mg/L	(0.12)	(1.06)
	Calcium, mg/L	0.0126	0.0364
	Magnesium, mg/L	0.0242	0.0484

Values in parentheses are not certified and are given for information only.

106. Thin Films for X-ray Fluorescence

These SRMs are for standardizing X-ray spectrometers. They may be useful in elemental analysis of particulate matter collected on filter media, and where X-ray spectrometer calibration functions are determined using thin film standards. Each SRM is individually certified and consists of a silica base glass film (0.5 μm thick) deposited on a 47-mm diameter polycarbonate filter mounted on an aluminum ring.

SRM	Type	Elemental Composition per area (in μg/cm²)											
		Al	Ca	Co	Cu	Fe	Pb	K	Mn	Si	Ti	V	Zn
1832	Thin-Glass Film	15	20	1	2				5	36		5	
1833	Thin-Glass Film					15	17	18		35	14		4

106. Carbon Modified Silicon (powder form)

This SRM is intended for the calibration of instruments used to measure total elemental carbon. The SRM consists of three (3), 1-g bottles of chemically modified microparticulate silica.

SRM	Type	Bottle	% Carbon
1216	Carbon Modified Silicon	I	0.7
		II	9.06
		III	17.04

106. Trace Elements (liquid and solid forms)

This SRM is for analysis of trace elements in materials of environmental interest.

SRM	Type	Unit Size	Trace Elements (in mg/kg* unless noted as Wt.%)			
			Al	Sb	As	Ba
1648	Urban Particulate Matter	2 g	3.42 Wt.%	(45)	115	(737)

SRM	Br	Cd	Ce	Cs	Cl	Cr	Co	Cu
1648	(500)	75	(55)	(3)	(0.45 Wt.%)	403	(18)	609

SRM	Hf	In	I	Fe	La	Pb	Mn	Ni
1648	(4.4)	(1.0)	(20)	3.91 Wt.%	(42)	0.655 Wt.%	(860)	82

SRM	K	Se	Na	Th	U	V	Zn
1648	1.05 Wt.%	27	0.425 Wt.%	(7.4)	5.5	140	0.476 Wt.%

Values in parentheses are not certified and are given for information only.
* SI unit. Replaces "ppm" and "μg/g".

106. Used Auto Catalysts (powder form)

These SRMs are intended for use in the evaluation of methods for the analysis of the platinum group metals and lead in auto catalysts. They were produced in cooperation with the International Precious Metals Institute and are issued as fine (<74 μm) powders.

SRM	Type	Unit Size	Elemental Composition (in mg/kg)			
			Pt	Pd	Rh	Pb
2556	Recycled Pellet	70 g	697.4	326.0	51.2	6228
2557	Recycled Monolith	70 g	1131	233.2	135.1	13931

107. Analyzed Gases

Mixtures and Pollutants

These SRMs are for calibrating apparatus used to measure various components of gas mixtures and atmospheric pollutants. All cylinders conform to the appropriate DOT specifications.

SRM	Type	Certified Component	Nominal Concentration (in μmol/mol)
1811	Aromatic Organic Gases in Nitrogen		
	Benzene	C_6H_6	0.25
	Toluene	$C_6H_5CH_3$	0.25
	Chlorobenzene	C_6H_5Cl	0.25
	Bromobenzene	C_6H_5Br	0.25
1812	Aromatic Organic Gases in Nitrogen		
	Benzene	C_6H_6	10
	Toluene	$C_6H_5CH_3$	10
	Chlorobenzene	C_6H_5Cl	10
	Bromobenzene	C_6H_5Br	10
1700a	Blood Gas: CO_2–10%, Bal N_2	CO_2 in N_2	10 mol % CO_2
1701a	Blood Gas: CO_2–5%, O_2–12%, Bal N_2	CO_2 & O_2 in N_2	5 mol % CO_2 12 mol % O_2
1702a	Blood Gas: CO_2–5%, O_2–20%, Bal N_2	CO_2 & O_2 in N_2	5 mol % CO_2 20 mol % O_2
1703a	Blood Gas: CO_2–10%, O_2–7%, Bal N_2	CO_2 & O_2 in N_2	10 mol % CO_2 7 mol % O_2
2607	Carbon Dioxide and Nitrous Oxide in Air		
	Carbon Dioxide	CO_2	340
	Nitrous Oxide	N_2O	0.3
2609	Carbon Dioxide and Nitrous Oxide in Air		
	Carbon Dioxide	CO_2	380
	Nitrous Oxide	N_2O	0.33
2610	Carbon Dioxide and Nitrous Oxide in Air		
	Carbon Dioxide	CO_2	380
	Nitrous Oxide	N_2O	0.33
1674b	Carbon Dioxide in Nitrogen	CO_2	7 mol %
1675b	Carbon Dioxide in Nitrogen	CO_2	14 mol %
2619a	Carbon Dioxide in Nitrogen	CO_2	0.5 mol %
2620a	Carbon Dioxide in Nitrogen	CO_2	1.0 mol %
2621a	Carbon Dioxide in Nitrogen	CO_2	1.5 mol %
2622a	Carbon Dioxide in Nitrogen	CO_2	2.0 mol %
2623a	Carbon Dioxide in Nitrogen	CO_2	2.5 mol %
2624a	Carbon Dioxide in Nitrogen	CO_2	3.0 mol %
2625a	Carbon Dioxide in Nitrogen	CO_2	3.5 mol %
2626a	Carbon Dioxide in Nitrogen	CO_2	4.0 mol %
2632a	Carbon Dioxide in Nitrogen	CO_2	300
2612a	Carbon Monoxide in Air	CO	10
2613a	Carbon Monoxide in Air	CO	20
2614a	Carbon Monoxide in Air	CO	45

107. Mixtures and Pollutants – Continued

SRM	Type	Certified Component	Nominal Concentration (in μmol/mol)
1677c	Carbon Monoxide in Nitrogen	CO	10
1678c	Carbon Monoxide in Nitrogen	CO	50
1679c	Carbon Monoxide in Nitrogen	CO	100
1680b	Carbon Monoxide in Nitrogen	CO	500
1681b	Carbon Monoxide in Nitrogen	CO	1000
2635a	Carbon Monoxide in Nitrogen	CO	25
2636a	Carbon Monoxide in Nitrogen	CO	250
2637a	Carbon Monoxide in Nitrogen	CO	2500
2638a	Carbon Monoxide in Nitrogen	CO	5000
2639a	Carbon Monoxide in Nitrogen	CO	1 mol %
2640a	Carbon Monoxide in Nitrogen	CO	2 mol %
2641a	Carbon Monoxide in Nitrogen	CO	4 mol %
2642a	Carbon Monoxide in Nitrogen	CO	8 mol %
2740	Carbon Monoxide in Nitrogen	CO	10 mol %
2741	Carbon Monoxide in Nitrogen	CO	13 mol %
2745	Carbon Monoxide in Nitrogen	CO	16 mol %
2727	Carbon Monoxide, Propane and Carbon Dioxide in Nitrogen	CO C_3H_8 CO_2	1.6 mol % 600 11 mol %
2728	Carbon Monoxide, Propane and Carbon Dioxide in Nitrogen	CO C_3H_8 CO_2	8 mol % 3000 14 mol %
1658a	Methane in Air	CH_4	1
1659a	Methane in Air	CH_4	10
1660a	Methane-Propane in Air	CH_4 C_3H_8	4 1
2750	Methane in Nitrogen	CH_4	50
2751	Methane in Nitrogen	CH_4	100
1683b	Nitric Oxide in Nitrogen	NO	50
1684b	Nitric Oxide in Nitrogen	NO	100
1685b	Nitric Oxide in Nitrogen	NO	250
1686b	Nitric Oxide in Nitrogen	NO	500
1687b	Nitric Oxide in Nitrogen	NO	1000
2627a	Nitric Oxide in Nitrogen	NO	5
2628a	Nitric Oxide in Nitrogen	NO	10
2629a	Nitric Oxide in Nitrogen	NO	20
2630	Nitric Oxide in Nitrogen	NO	1500
2631	Nitric Oxide in Nitrogen	NO	3000
2735	Nitric Oxide in Nitrogen	NO	800
2736	Nitric Oxide in Nitrogen	NO	2000
2656	Oxides of Nitrogen in Air	NO_x	2500
2660	Oxides of Nitrogen in Air	NOx	100
2657a	Oxygen in Nitrogen	O_2	2 mol %
2658a	Oxygen in Nitrogen	O_2	10 mol %
2659a	Oxygen in Nitrogen	O_2	21 mol %
1665b	Propane in Air	C_3H_8	3
1666b	Propane in Air	C_3H_8	10
1667b	Propane in Air	C_3H_8	50
1668b	Propane in Air	C_3H_8	100
1669b	Propane in Air	C_3H_8	500
2764	Propane in Air	C_3H_8	0.25
1670a	Carbon Dioxide in Air	CO_2	330
1671a	Carbon Dioxide in Air	CO_2	340
1672a	Carbon Dioxide in Air	Co_2	350

107. Mixtures and Pollutants – Continued

SRM	Type	Certified Component	Nominal Concentration (in μmol/mol)
2643a	Propane in Nitrogen	C_3H_8	100
2644a	Propane in Nitrogen	C_3H_8	250
2645a	Propane in Nitrogen	C_3H_8	500
2646a	Propane in Nitrogen	C_3H_8	1000
2647a	Propane in Nitrogen	C_3H_8	2500
2648a	Propane in Nitrogen	C_3H_8	5000
2649a	Propane in Nitrogen	C_3H_8	1 mol %
2650	Propane in Nitrogen	C_3H_8	2 mol %
2651	Propane in Nitrogen and Oxygen	C_3H_8 O_2	0.01 mol % 5.0 mol %
2652	Propane in Nitrogen and Oxygen	C_3H_8 O_2	100 10.0 mol %
1661a	Sulfur Dioxide in Nitrogen	SO_2	500
1662a	Sulfur Dioxide in Nitrogen	SO_2	1000
1663a	Sulfur Dioxide in Nitrogen	SO_2	1500
1664a	Sulfur Dioxide in Nitrogen	SO_2	2500
1693a	Sulfur Dioxide in Nitrogen	SO_2	50
1694a	Sulfur Dioxide in Nitrogen	SO_2	100
1696a	Sulfur Dioxide in Nitrogen	SO_2	3500
1800	Ambient Non-methane Organics in Nitrogen	(Fifteen components)	5.0 nmol/mol
1804a	Ambient Toxic Organics in Nitrogen	(Nineteen components)	
2730	Hydrogen Sulfide in Nitrogen	H_2S	5
2731	Hydrogen Sulfide in Nitrogen	H_2S	20

107. Permeation Devices

These SRMs are primarily intended for use in calibrating air pollution monitoring apparatus and for calibrating air pollution analytical methods and procedures. Each tube is individually calibrated and certified according to NIST procedures and protocols.

SRM	Type	Tube Length (in cm)	Permeation Rate at 30 °C (in μg/min)	Concentration* (in μmol/mol) @ Flow Rate (L/min) of 1	5	10
1625	Sulfur Dioxide Permeation Tube	10	3.7		In Prep	
1626	Sulfur Dioxide Permeation Tube	5	2.1		In Prep	
1627	Sulfur Dioxide Permeation Tube	2	0.8	0.3	0.06	0.03
1629a	Nitrogen Dioxide Permeation Tube	1	2.1		In Prep	

* Nominal values

108. Fossil Fuels

Alcohols and Ethers [Oxygenates] in Reference Fuels (liquid form)

SRMs 1829, 1837, 1838, and 1839 are for calibrating instruments and validating methods used to determine various alcohols in gasoline. SRM 1829 is issued as a set of six (6) sealed 20-mL ampules; SRMs 1837, 1838 and 1839 are each issued as a set of five (5) sealed 20-mL ampules.

SRMs 2286 through 2293 are for determining the oxygen content of gasoline and were produced in response to the U.S. EPA Final Rule on Reformulated Gasoline aimed at reducing the volatile organic compounds emitted from gasoline. They consist of varying quantities of alcohol and ether (oxygenate) solutions in gasoline and are certified for constituent oxygenate concentration and resultant oxygen concentration in gasoline. Each SRM is issued as a set of three (3) sealed 20-mL ampules—two ampules contain oxygenate and one ampule contains base reference gasoline.

SRM	Type	Concentration (in Wt. %)				
		Methanol	Ethanol	Methanol and t-Butanol	Oxygenate	Oxygen
1829	Alcohols in Reference Fuels	0.335	11.39	10.33 + 6.63		
1837	Methanol and t-Butanol			10.33 + 6.63		
1838	Ethanol		11.39			
1839	Methanol	0.335				
2286	Ethanol in Gasoline				5.73	2.02
2287	Ethanol in Gasoline				10.07	3.53
2288	t-Amyl Methyl Ether in Gasoline				12.78	2.02
2289	t-Amyl Methyl Ether in Gasoline				17.30	2.73
2290	Ethyl t-Butyl Ether in Gasoline				12.78	2.01
2291	Ethyl t-Butyl Ether in Gasoline				17.18	2.70
2292	Methyl t-Butyl Ether in Gasoline				10.96	2.00
2293	Methyl t-Butyl Ether in Gasoline				14.86	2.71

108. Metal Constituents in Fossil Fuels (liquid and solid forms)

These SRMs are for analysis of metal trace elements in fuel oil, coal and reference fuels.

SRM/RM	Type	Unit Size	Elemental Composition			
			Pb	Ni	S	V
Nominal Composition [In Wt.% unless identified by an asterisk which indicates mg/kg.]						
1618	Vanadium and Nickel in Residual Fuel Oil	100 mL		75 *	(4.3)	423 *
2712	Lead in Reference Fuel	6 × 20 mL	11.4 *			
2713	Lead in Reference Fuel	6 × 20 mL	19.4 *			
2714	Lead in Reference Fuel	6 × 20 mL	28.1 *			
2715	Lead in Reference Fuel	6 × 20 mL	784 *			
8505	Vanadium in Crude Oil	250 mL				(390 *)

108. Sulfur in Fossil Fuels (liquid and solid forms)

SRM/RM	Type	Unit Size	Sulfur (in Wt. %)	Furnace Ash (in Wt. %)	HHV2 (in MJ/kg)
1616a	Sulfur in Kerosine	100 mL	In Prep		
1617a	Sulfur in Kerosine	100 mL	In Prep		
1619a	Sulfur in Residual Fuel Oil	100 mL	0.725		
1620b	Sulfur in Residual Fuel Oil	100 mL	4.22		
1621d	Sulfur in Residual Fuel Oil	100 mL	1.011		
1622d	Sulfur in Residual Fuel Oil	100 mL	2.031		
1623b	Sulfur in Residual Fuel Oil	100 mL	0.348		
1624b	Sulfur in Distillate Fuel Oil	100 mL	0.332		
2717	Sulfur in Residual Fuel Oil	100 mL	3.022		
2724	Sulfur in Diesel Fuel Oil	100 mL	0.0425		
8532	Diesel Fuel Oil	100 mL	(S = 276/294 g/kg)	Gravity * (36.9)	
2682a	Coal (Sub-bituminous)	50 g	0.486	6.3	25.48
2683a	Coal (Bituminous)	50 g	1.89	6.8	31.90
2684a	Coal (Bituminous)	50 g	3.06	11.0	28.50
2685a	Coal (Bituminous)	50 g	4.730	16.21	26.67
2692a	Sulfur in Coal, 1%	50 g	1.184	7.94	32.64
2775	Foundry Coke	In Prep			
2776	Furnace Coke	In Prep			

NOTE: The calorific values (MJ/kg) may decrease upon the aging or normal oxidation of the coals. NIST will continue to monitor these values and report any substantive change to purchasers.

* API Gravity at 15.6 °C. Total nitrogen aromatics and PAHs also available.

108. Moisture in Oils (liquid form)

These reference materials (RMs) are intended for use in developing and validating methods for the determination of moisture in oil and similar matrices. The water concentration values are shown in parentheses because they are not certified, but represent the "best estimate" of the moisture content based on interlaboratory round robin studies and confirmed by NIST.

RM	Type	Unit Size	Water Concentration (in mg/kg)
8506	Transformer Oil	Set of 5 ampules: (10 mL each)	(21)
8507	Mineral Oil	Set of 5 ampules: (10 mL each)	(47)

Values in parentheses are not certified and are given for information only.

108. Reference Liquids for Evaluating Fuels

SRMs 1815a and 1816a are high, purity liquids intended for use in maintaining the integrity of the octane rating of motor and aviation fuels as specified in the ASTM Manual for Rating Motor, Diesel, and Aviation Fuels.

SRM	Type	Purity (in Wt. %)	Unit Size
1815a	n-Heptane	99.987	100 mL
1816a	*Iso*octane (2,2,4-Trimethylpentane)	99.987	100 mL

108. Trace Elements (solid form)

SRM	1632b	1633b	1634c	1635	2689	2690	2691
Type	Coal (Bituminous)	Coal Fly Ash	Fuel Oil	Coal (Subbitum-inous)	Coal Fly Ash	Coal Fly Ash	Coal Fly Ash
Unit Size	50 g	75 g	100 mL	75 g	3×10 g	3×10 g	3×10 g
ELEMENT	Concentrations are in mg/kg, unless noted by a single asterisk, *, for Wt. %, or a double asterisk, **, for μg/kg.						
Aluminum	0.855 *	15.05 *	In Prep	(0.32 *)	12.94 *	12.35 *	9.81 *
Antimony	(0.24)	(6)		(0.14)	(9)	(6)	(3)
Arsenic	3.72	136.2		0.42	(200)	(26)	(30)
Barium	67.5	709			(800)	(5800)	(5900)
Beryllium					(21)	(8)	(8)
Bromine	(17)	(2.9)					
Cadmium	0.0573	0.784		0.03	(3)	(0.7)	(0.9)
Calcium	0.204 *	1.51 *			2.18 *	5.71 *	18.45 *
Carbon	78.11 *						
Cerium	(9)	(190)		(3.6)			
Cesium	(0.44)	(11)			(11)	(8)	(1)
Chlorine	(1260)						
Chromium	(11)	198.2		2.5	(170)	(67)	(68)
Cobalt	2.29	(50)		(0.65)	(48)	(19)	(26)
Copper	6.28	112.8		3.6			
Dysprosium		(17)					
Europium	(0.17)	(4.1)		(0.06)	(3)	(2)	(2)
Gadolinium		(13)					
Gallium				(1.05)			
Hafnium	(0.43)	(6.8)		(0.29)	(7)	(8)	(10)
Holmium		(3.5)					
Hydrogen	5.07 *						
Iron (Total)	0.759 *	7.78 *		0.239 *	9.32 *	3.57 *	4.42 *
Lanthanum	(5.1)	(94)					
Lead	3.67	68.2		1.9	(52)	(39)	(29)
Lithium	(10)						
Lutetium		(1.2)					
Magnesium	0.0383 *	0.482 *			0.61 *	1.53 *	3.12 *
Manganese	12.4	131.8		21.4	(300)	(300)	(200)
Mercury		0.141			(<0.003)	(<0.003)	(<0.003)
Molybdenum	(0.9)	(85)					
Neodymium		120.6					
Nickel	6.10	10.26		1.74	(122)	(46)	(53)
Nitrogen	1.56 *						
Phosphorus		(2300)			0.10 *	0.52 *	0.51 *
Potassium	0.0748 *	1.95 *			2.20 *	1.04 *	0.34 *
Rubidium	5.50	(140)					
Samarium	(0.87)	(20)					
Scandium	(1.9)	(41)		(0.63)	(32)	(17)	(24)
Selenium	1.29	10.26		0.9	(7)	(0.8)	(17)
Silicon	(1.4 *)	23.02 *			24.06 *	25.85 *	16.83 *
Sodium	0.0515 *	0.201 *		(0.24 *)	0.25 *	0.24 *	1.09 *
Strontium	(102)	1041			(700)	(2000)	(2700)
Sulfur	1.89 *	0.2075 *		0.33 *		0.15 *	0.83 *
Tantalum		(1.8)					
Terbium		(2.6)					
Thallium		(5.9)					
Thorium	1.342	25.7		0.62	(25)	(25)	(26)
Thulium		(2.1)					
Titanium	0.0454 *	0.791 *		(0.02 *)	0.75 *	0.52 *	0.90 *
Tungsten	(0.48)	(5.6)					
Uranium	0.436	8.79		0.24			
Vanadium	(14)	295.7		5.2			
Ytterbium		(7.6)					
Zinc	11.89	(210)		4.7	(240)	(120)	(120)

Values in parentheses are not certified and are given for information only.

109. Organics

109. GC/MS and LC System Performance (liquid form)

These SRMs and RMs are for evaluating the sensitivity of gas chromatography/mass spectrometry (GC/MS) instrumentation and for characterizing liquid chromatography (LC) column selectivity.

SRM/RM	Type	Unit Size	Selectivity (C18 phases)	Concentration (in mg/L) Low/High
869 8442	LC Selectivity	Set of 5, 1.1 mL Set of 50, 1.1 mL	BaP≤ PhPh < TBN	
1543 8443	GC/MS System Performance	Set of 4, 1 mL Set of 20, 1 mL		Methyl Stearate 0.99/4.98 Benzophenone 1.01/5.01

109. Organic Constituents (liquid and solid forms)

These SRMs and RMs are further described in the following five pages.

SRM/RM	Type	Unit of Issue
1491	Aromatic Hydrocarbons in Hexane/Toluene	Set: 5, 1.2 mL/ampule
1492	Chlorinated Pesticides in Hexane	Set: 5, 1.2 mL/ampule
1493	Polychlorinated Biphenyl Congeners in *Iso*octane	Set: 5, 1.2 mL/ampule
1580	Shale Oil	Set: 5, 1.2 mL/ampule
1581	Polychlorinated Biphenyls in Oil	Set: 8, 2.5 mL/ampule
1582	Petroleum Crude Oil	Set: 5, 1.2 mL/ampule
1583	Chlorinated Pesticides in *Iso*octane	Set: 6, 1.2 mL/ampule
1584	Phenols in Methanol	Set: 5, 1.2 mL/ampule
1585	Chlorinated Biphenyls	Set: 5, 1.2 mL/ampule
1586	Isotopically Labelled Priority Pollutants	Set: 6, 1.2 mL/ampule
1587	Nitro PAH in Methanol	Set: 4, 1 mL/ampule
1588	Organics in Cod Liver Oil	Set: 5, 1.2 mL/ampule
1589	Polychlorinated Biphenyls (as Aroclor 1260) in Human Serum	Set: 3, 2 g/ampule
1596	Dinitropyrene Isomers and 1-Nitropyrene in Methylene Chloride	Set: 5, 1.3 mL/ampule
1597	Complex Mixture of Polycyclic Aromatic Hydrocarbons	Set: 4, 1.2 mL/ampule
1614	Dioxin (2,3,7,8 TCDD) in *Iso*octane	Set: 6, 1.2 mL/ampule
1639	Halocarbons (in Methanol)	Set: 5, 1.5 mL/ampule
1647c	Priority Pollutant Polycyclic Aromatic Hydrocarbons (in Acetonitrile)	Set: 5, 1.2 mL/ampule
1649	Urban Dust/Organics	5 g, bottle
1650	Diesel Particulate Matter	0.5 g, bottle
1939	Polychlorinated Biphenyls in River Sediment A	50 g, bottle
1941a	Organics in Marine Sediment	50 g, bottle
1945	Organics in Whale Blubber	Set: 2, 15 g/bottle
1974a	Organics in Mussel Tissue	In Prep
2260	Aromatic Hydrocarbons in Toluene	Set: 5, 1.2 mL/ampule
2261	Chlorinated Pesticides in Hexane	Set: 5, 1.2 mL/ampule
2262	Chlorinated Biphenyl Congeners in *Iso*octane	Set: 5, 1.2 mL/ampule
8464	Aldrin (neat)	In Prep
8465	Dieldrin (neat)	In Prep
8466	γ-HCH (Lindane) (neat)	Vial, 100 mg
8467	4,4′-DDE (neat)	Vial, 100 mg
8468	Heptachlor (neat)	In Prep
8469	4,4′-DDT (neat)	Vial, 100 mg

109. Organic Constituents (liquid and solid forms) – Continued

SRM	1491	1580	1582	1597	1647c	1649	1650	2260
Component (in mg/kg* except for SRM 1597 which is in mg/L)								
Anthracene	11.69			87.4	1.02			57.54
Benz[*a*]anthracene	5.37		3.0	85.3	5.24	2.6	6.5	66.0
Benzo[*a*]pyrene	10.14	21	1.1	82.9	6.32	2.9	1.2	68.61
Benzo[*e*]pyrene	8.40	18					(9.6)	75.98
Fluoranthene	8.84	54	2.5	278	9.82	7.1	51	76.31
o-Cresol		385						
Phenol		407						
Perylene	10.65	3.4	31	22.6			(0.13)	57.48
Pyrene	8.81	104		204	10.94		48	76.20
2,6–Dimethylphenol		175						
Benzo[*f*]quinoline (5,6-Benzoquinoline)		16						
Naphthalene	10.30			1000	25.62			76.3
Acenaphthylene	10.40				19.81			73.09
Acenaphthene	10.89				26.38			78.9
1–Nitropyrene							19	
Fluorene	10.87				6.10			75.62
Phenanthrene	10.48		101	400	4.46		(71)	76.01
Chrysene	10.50			62.0	4.75		(22)	76.6
Benzo[*b*]fluoranthene	7.85				5.37			75.97
Benzo[*k*]fluoranthene	8.33				6.01		(2.1)	75.67
Benzo[*ghi*]perylene	7.90			46.5	4.73	4.5	2.4	67.9
Dibenz[*a*,*h*]anthracene	7.74				4.62			67.1
Indeno[1,2,3–*cd*]pyrene	9.40			52.1	5.53	3.3	(2.3)	67.4
Dibenzothiophene			33					
Triphenylene				10.5				
1-Methylnaphthalene	12.4							75.7
2-Methylnaphthalene	(11.8)							(73.2)
Biphenyl	10.46							76.14
2,6-Dimethylnaphthalene	10.8							75.9
2,3,5-Trimethylnaphthalene	9.9							67.5
1-Methylphenanthrene	10.4							75.2

SRM 1492 Chlorinated Pesticides in Hexane

Pesticide	Concentration (in µg/kg)
Hexachlorobenzene	308
γ-HCH (Lindane)	310
Heptachlor	299
Aldrin	304
Heptachlor Epoxide	307
cis-Chlordane	305
trans-Nonachlor	297
Dieldrin	307
Mirex	306
2,4′–DDE	303
4,4′–DDE	306
2,4′–DDD	299
4,4′–DDD	296
2,4′–DDT	307
4,4′–DDT	302

Values in parentheses are not certified and are given for information only.
* SI unit. Replaces "ppm" and "µg/g".

109. Organic Constituents (liquid and solid forms) – Continued

SRM 1493 Polychlorinated Biphenyl Congeners in 2,2,4-Trimethylpentane (*Iso* octane)

Selected Polychlorinated Biphenyls (PCBs) (18 certified)	Concentration (in μg/kg)
PCB 18	290.8
PCB 28	288.0
PCB 52	285.9
PCB 77	284.3
PCB 101	287.8
PCB 153	287.5
PCB 209	289.6

SRM 1581 Polychlorinated Biphenyls in Oils

Matrix	Aroclor Type	Concentration (in mg/kg)
Motor Oil	1242	100
Motor Oil	1260	100
Transformer Oil	1242	100
Transformer Oil	1260	100

SRM 1583 Chlorinated Pesticides in 2,2,4–Trimethylpentane (*Iso* octane)

Pesticide	Concentration (in mg/kg)
γ-BHC (Lindane)	1.11
δ-BHC	0.76
Aldrin	0.86
Heptachlor Epoxide	(0.997)
4,4′–DDE (p,p′–DDE)	1.23
4,4′–DDT (p,p′–DDT)	1.90

SRM 1584 Priority Pollutant Phenols in Methanol

Component	Concentration (in mg/L @ 25 °C)
2–Chlorophenol	64.4
Phenol	29.7
2–Nitrophenol	25.2
2,4–Dimethylphenol	51.6
2,4–Dichlorophenol	35.6
4–Chloro-m-cresol	27.4
2,4,6–Trichlorophenol	20.4
4–Nitrophenol	20.7
4,6–Dinitro-o-cresol	20.1
Pentachlorophenol	15.4
2,4–Dinitrophenol	(22.4)

SRM 1585 Chlorinated Biphenyls in 2,2,4-Trimethylpentane (*Iso* octane)

Polychlorinated Biphenyl (PCB)	Concentration (in mg/kg)
PCB 3	43.3
PCB 15	9.53
PCB 28	3.70
PCB 52	7.72
PCB 77	6.62
PCB 101	5.24
PCB 138	2.37
PCB 153	3.06

Values in parentheses are not certified and are given for information only.

109. Organic Constituents (liquid and solid forms) – Continued

SRM 1586 Isotopically Labeled and Unlabeled Priority Pollutants in Methanol

Component	Concentration (in mg/kg)	
	1586–1 (unlabeled)	1586–2 (labeled)
Carbon Tetrachloride	128.5	124.4
Benzene	101.1	99.0
Chlorobenzene	133.0	144.0
Phenol	117.0	116.0
Nitrobenzene	126.0	134.5
2–Nitrophenol	103.6	101.9
2,4–Dichlorophenol	102.5	82.2
Naphthalene	126.5	126.6
Bis(2–ethylhexyl)phthalate	63.9	60.4
Benzo[*a*]pyrene	49.2	44.1

SRM 1587 Nitrated Polycyclic Aromatic Hydrocarbons in Methanol

Component	Concentration (in mg/kg)
2–Nitrofluorene	9.67
9–Nitroanthracene	5.01
3–Nitrofluoranthene	9.24
1–Nitropyrene	8.95
7–Nitrobenz[*a*]anthracene	9.27
6–Nitrochrysene	8.13
6–Nitrobenzo[*a*]pyrene	(6.1)

SRM 1588 Organics in Cod Liver Oil

Component	Concentration (in µg/kg)
Hexachlorobenzene	148
α-HCH	86
trans-Chlordane	50
cis-Chlordane	158
trans-Nonachlor	209
Dieldrin	150
4,4′–DDD	277
4,4′–DDE	641
2,4′–DDT	156
4,4′–DDT	529
PCB 101	261
PCB 138	276
PCB 170	45
PCB 180	107

SRM 1589 Polychlorinated Biphenyls (as Aroclor 1260) in Human Serum

Component	Concentration * (in µg/kg)
Aroclor 1260	106.0
1, 2, 3, 4-TCDD	(0.153)
2, 3, 7, 8-TCDD	(0.081)

* when reconstituted

SRM 1596 Dinitropyrene Isomers and 1-Nitropyrene in Methylene Choride

Component	Concentration (in mg/kg)
1–Nitropyrene	4.38
1,3–Dinitropyrene	2.10
1,6–Dinitropyrene	4.82
1,8–Dinitropyrene	8.90

Values in parentheses are not certified and are given for information only.

109. Organic Constituents (liquid and solid forms) – Continued

SRM 1614 Dioxin (2,3,7,8-TCDD in *Iso*octane)

Component	Concentration (in µg/kg)
2,3,7,8-TCDD	98.3
2,3,7,8-TCDD-^{13}C	95.6

SRM 1639 Halocarbons (in methanol) for Water Analyses

Component	Concentration (in mg/L)
Chloroform	6235
Chlorodibromomethane	124.6
Bromodichloromethane	389.9
Bromoform	86.5
Carbon Tetrachloride	157.0
Trichloroethylene	85.8
Tetrachloroethylene	40.6

SRM 1939 Polychlorinated Biphenyls (Congeners) in River Sediment A

Component	Concentration (in mg/kg)
PCB 26	4.20
PCB 28	2.21
PCB 44	1.07

SRM 1941a Organics in Marine Sediment

Selected Components (53 certified)	Concentration (in µg/kg)
Phenanthrene	489
Anthracene	184
Fluoranthene	981
Pyrene	811
Benzo[*a*]anthracene	427
Benzo[*b*]fluoranthene	740
Benzo[*k*]fluoranthene	361
Benzo[*a*]pyrene	628
Perylene	452
Benzo[*ghi*]perylene	525
Indeno[1,2,3-*cd*]pyrene	501
2, 4′–DDE	0.73
4, 4′–DDE	6.59
4, 4′–DDD	5.06

SRM 1945 Organics in Whale Blubber

Selected Components (46 certified)	Concentration (in µg/kg)
Hexachlorobenzene	32.9
α–HCH	16.2
γ–HCH (Lindane)	3.30
Heptaclor Epoxide	10.8
Oxychlordane	19.8
Mirex	28.9
2, 4′–DDE	12.28
4, 4′–DDE	445
2, 4′–DDD	18.1
4, 4′–DDD	133
2, 4′–DDT	106
4, 4′–DDT	245
PCB 18	4.48
PCB 44	12.2
PCB 101	65.2
PCB 209	10.6

109. Organic Constituents (liquid and solid forms) – Continued

SRM 1974a Organics in Mussel Tissue (Mytilus Edulis)

Component	Concentration (in μg/kg)
Phenanthrene	In Prep
Anthracene	In Prep
Fluoranthene	In Prep
Pyrene	In Prep
Perylene	In Prep
Benzo[*b*]fluoranthene	In Prep
Benzo[*a*]pyrene	In Prep
Benzo[*ghi*]perylene	In Prep
Indenol[1,2,3-*cd*]pyrene	In Prep

SRM 2261 Chlorinated Pesticides in Hexane

Pesticide	Concentration (in mg/kg)
Hexachlorobenzene	3.005
γ-HCH (Lindane)	3.012
Heptachlor	3.020
Aldrin	3.029
Heptachlor Epoxide	3.020
cis-Chlordane	3.012
trans-Nonachlor	3.034
Dieldrin	3.012
Mirex	3.041
2,4′–DDE	3.019
4,4′–DDE	3.019
2,4′–DDD	3.013
4,4′–DDD	3.043
2,4′–DDT	2.993
4,4′–DDT	3.004

SRM 2262 Chlorinated Biphenyl Congeners in 2,2,4-Trimethylpentane (*Iso* octane)

Selected Chlorinated Biphenyls (CBs) (25 certified)	Concentration (in mg/kg)
CB 1	2.997
CB 18	2.983
CB 44	2.977
CB 66	2.973
CB 101	2.950
CB 118	2.992
CB 153	2.957
CB 170	2.964
CB 206	2.900

Primary Reference Compounds

RM	Type	Purity (in Wt.%)
8466	γ–Hexachlorocyclohexane	(99.9)
8467	4,4′–DDE	(99.8)
8469	4,4′–DDT	(99.8)

Values in parentheses are not certified and are given for information only.

110. Food and Agriculture

These SRMs are for use in the calibration of apparatus and methods used in the analysis of trace elements in foods and related products.

Foods and Beverages (liquid and powder forms)

SRM	1549	1566a	1567a	1568a	1577b
Type	Non-fat Milk Powder	Oyster Tissue	Wheat Flour	Rice Flour	Bovine Liver
Unit Size	100 g	25 g	80 g	80 g	50 g
ELEMENTS	**Nominal Composition in mg/kg*, unless otherwise noted.**				
Aluminum	(2)	202.5	5.7	4.4	(3)
Antimony	(0.00027)	(0.01)		(0.0005)	(0.003)
Arsenic	(0.0019)	14.0	(0.006)	0.29	(0.05)
Bromine	(12)		(6)	(8)	(9.7)
Cadmium	0.0005	4.15	0.026	0.022	0.50
Calcium	1.30 Wt. %	0.196 Wt. %	0.0191 Wt. %	0.011 Wt. %	116
Chlorine	1.09 Wt. %	0.829 Wt. %	(565)	(300)	0.278 Wt. %
Chromium	0.0026	1.43			
Cobalt	(0.0041)	0.57	(0.006)	(0.018)	(0.25)
Copper	0.7	66.3	2.1	2.4	160
Fluorine	(0.20)	(240)			
Iodine	3.38	4.46	(0.0009)	(0.009)	
Iron	1.78	539	14.1	7.4	184
Lead	0.019	0.371	(<0.020)	(<0.010)	0.129
Magnesium	0.120 Wt. %	0.118 Wt. %	0.040 Wt. %	0.056 Wt. %	601
Manganese	0.26	12.3	9.4	20.0	10.5
Mercury	0.0003	0.0642	(0.0005)	0.0058	(0.003)
Molybdenum	(0.34)		0.48	1.46	3.5
Nickel		2.25		(0.16)	
Nitrogen		(6.81 Wt. %)			
Phosphorus	1.06 Wt. %	0.623 Wt. %	0.134 Wt. %	0.153 Wt. %	1.10 Wt. %
Potassium	1.69 Wt. %	0.790 Wt. %	0.133 Wt. %	0.1280 Wt. %	0.994 Wt. %
Rubidium	(11)	(3)	0.68	6.14	13.7
Selenium	0.11	2.21	1.1	0.38	0.73
Silver	(<0.0003)	1.68			0.039
Sodium	0.497 Wt. %	0.417 Wt. %	6.1	6.6	0.242 Wt. %
Strontium		11.1			0.136
Sulfur	0.351 Wt. %	0.862 Wt. %	0.165 Wt. %	0.120 Wt. %	0.785 Wt. %
Tellurium				(<0.002)	
Thorium		(0.04)			
Tin	(<0.02)	(3)	(0.0033)	(0.0047)	
Uranium		0.132	(0.0003)	(0.0003)	
Vanadium		4.68	(0.011)	(0.007)	(0.123)
Zinc	46.1	830	11.6	19.4	127

Values in parentheses are not certified and are given for information only.
* SI unit. Replaces "ppm" and "μg/g".

110. Health Care and Nutrients (liquid and solid forms)

These SRMs are for use in determining the nutritional contents of foods. They are certified for such dietary constituents as proximates (solids, ash, protein, carbohydrate, fat and linoleate), vitamins, niacin, folic acid, pantothenic acid, biotin, choline, and selected minerals and trace elements.

SRM	Type	Certified Constituents		Unit Size
		Analytes	Values	
Nominal Composition [In Wt.% unless identified by an asterisk which indicates mg/kg.]				
1544	Diet Composite	Fatty Acids		In Prep
1548	Total Diet	14 elements		2 bottles:
		Fat	20.6	6.5 g each
		Ash	3.5	
		Kjeldahl Nitrogen	3.4	
		Dietary Fiber	3.7	
1548a	Typical Diet			In Prep
1563	Coconut Oil	Cholesterol	642 *	10 ampules
		Retinyl Acetate	12.2 *	(5 certified)
		Ergocalciferol	10.9 *	(5 uncertified)
		dl-α-Tocopherol Acetate	158.2 *	
1845	Whole Egg Powder	Cholesterol	19.0 *	35 g
1846	Infant Formula (milk-based)	Proximates, Vitamins, Minerals		In Prep
2383	Foods/Baby Foods	Carotenoids, Vitamins		In Prep
8435	Whole Milk	Proximates, Minerals, Vitamins		In Prep
8439	Dietary Fiber	Soluble/Insoluble Fiber		In Prep

110. USA/Canada Collaborative Materials (powder form)

These materials, developed by Agriculture Canada in collaboration with NIST, are for calibrating apparatus and validating analytical methods applied to food/agricultural commodities.

RM	Type	Elements Certified
8414	Bovine Muscle Powder (Beef)	Al, As, B, Ca, Cd, Cl, Co, Cr, Cu, Fe, Hg, I, K, Mg, Mn, Mo, N, Na, Ni, P, Rb, S, Se, Sr, Zn
8415	Whole Egg Powder	Al, B, Ca, Cl, Co, Cr, Cu, Fe, Hg, I, K, Mg, Mn, Mo, N, Na, P, Pb, S, Se, Sr, V, Zn
8416	Microcrystalline Cellulose	Al, Cl, Co, Cu, Mo, N, Ni, Se
8418	Wheat Gluten	Al, Ba, Ca, Cd, Cl, Co, Cr, Cu, Fe, Hg, I, K, Mg, Mn, Mo, N, Na, Ni, P, Pb, S, Se, Sr, Zn
8432	Corn Starch	Al, Ca, Cl, Cu, K, Mg, Mo, N, Na, Ni, P, Se
8433	Corn Bran	Al, As, B, Ba, Ca, Cd, Cl, Co, Cr, Cu, Fe, Hg, I, K, Mg, Mn, Mo, N, Na, Ni, P, Pb, S, Se, Sr, V, Zn
8435	Whole Milk Powder	Ba, Br, Ca, Cl, Cu, Fe, I, K, Mg, Mn, Mo, N, Na, P, Pb, Rb, S, Se, Sr, Zn
8436	Durum Wheat Flour	Al, Ba, Br, Ca, Cd, Cl, Cr, Cu, Fe, Hg, I, K, Mg, Mn, Mo, N, Na, Ni, P, Pb, S, Se, Sr, V, Zn
8437	Hard Red Spring Wheat Flour	Ca, Cl, Cr, Cu, Fe, K, Mg, Mn, Mo, N, Na, P, S, Se, Zn
8438	Soft Winter Wheat Flour	Ca, Cl, Cu, Fe, K, Mg, Mn, Mo, N, Na, P, S, Se, Zn

110. Agricultural Materials (powder form)

SRM	1515	1547	1573a	1575	2695	RM 8412	RM 8413	1570a
Type	Apple Leaves	Peach Leaves	Tomato Leaves	Pine Needles	Fluoride, in Vegetation	Corn Stalk (Zea Mays)	Corn Kernel (Zea Mays)	Spinach Leaves
Unit Size	50 g	50 g	50 g	70 g	2 × 25 g	34 g	47 g	60 g
ELEMENTS	**Concentrations are in mg/kg unless noted by a single asterisk *, for Wt.%.**							
Aluminum	286	249	598	545			(4)	310
Antimony	(0.013)	(0.02)	0.063	(0.2)				
Arsenic	0.038	0.060	0.112	0.21				0.068
Barium	49	124	(63)					
Boron	27	29	33.3					37.6
Bromine	(1.8)	(11)	(1300)	(9)				
Cadmium	(0.013)	(0.026)	1.52	(<0.5)				2.89
Calcium	1.526 *	1.56 *	5.05 *	0.41 *		(2160)	(42)	1.527 *
Cerium	(3)	(10)	(2)	(0.4)				
Cesium			(53)					
Chlorine	579	360	(6600)			(2440)	(450)	
Chromium	(0.3)	(1)	1.99	2.6				
Cobalt	(0.09)	(0.07)	0.57	(0.1)				0.39
Copper	5.64	3.7	4.70	3.0		(8)	(3.0)	12.2
Europium	(0.2)	(0.17)		(0.006)				(0.0054)
Fluorine					64/277	(0.65)	(0.24)	
Gadolinium	(3)	(1)	(0.17)					
Gold	(0.001)							
Hydrogen		5.2 *						
Iodine	(0.3)	(0.3)	(0.85)					
Iron	(83)	(218)	368	200		(139)	(23)	
Lanthanum	(20)	(9)	(2.3)	(0.2)				
Lead	0.470	0.87	10.8					(0.20)
Magnesium	0.271 *	0.432 *	(1.2 *)			(1600)	(990)	(0.89 *)
Manganese	54	98	246	675		(15)	(4.0)	75.9
Mercury	0.044	0.031	0.034	0.15				0.030
Molybdenum	0.094	0.060	(0.46)					
Neodymium	(17)	(7)						
Nickel	0.91	0.69	1.59	(3.5)				2.14
Nitrogen	2.25 *	2.94 *	3.03 *	(1.2 *)		(6970)	(13750)	5.90 *
Phosphorus	0.159 *	0.137 *	0.216 *	0.12 *				0.518 *
Potassium	1.61 *	2.43 *	2.70 *	0.37 *		(17350)	(3570)	2.903 *
Rubidium	10.2	19.7	14.89	11.7				(13)
Samarium	(3)	(1)	(0.19)					
Scandium	(0.03)	(0.04)	(0.1)	(0.03)				(0.055)
Selenium	0.050	0.120	0.054			(0.016)	(0.004)	0.117
Sodium	24.4	24	136			(28)		1.818 *
Strontium	25	53	(85)	4.8		(12)		55.6
Sulfur	(0.18 *)	(0.2 *)	(0.96 *)					(0.46 *)
Tellurium								
Terbium	(0.4)	(0.1)						
Thallium				(0.05)				
Thorium	(0.03)	(0.05)	(0.12)	0.037				0.48
Tin	(<0.2)	(<0.2)						
Tungsten	(0.007)							
Uranium	(0.006)	(0.015)	(35)	0.020				(0.15)
Vanadium	0.26	0.37	0.835					0.57
Ytterbium	(0.3)	(0.02)						
Zinc	12.5	17.9	30.9			(32)	(15.7)	82

Values in parentheses are not certified and are given for information only.

110. Fertilizers (powder form)

These SRMs are intended for use in the fertilizer industry as working standards for the determination of the certified constituents.

SRM	Type	Unit Size (in g)	Composition (in Wt. %)					
			N	P	K	P_2O_5	K_2O	CaO
120c	Phosphate Rock (Florida)	90				33.34	0.147	48.02
193	Potassium Nitrate	90	13.85		38.66			
194	Ammonium Dihydrogen Phosphate	90	12.15	26.92				
200	Potassium Dihydrogen Phosphate	90		22.74	28.76			
694	Phosphate Rock (Western)	90				30.2	0.51	43.6

SRM	SiO_2	F	Fe_2O_3	Al_2O_3	MgO	Na_2O	MnO	TiO_2	Cr_2O_3	CdO	U	V_2O_5
694	11.2	3.2	0.79	1.8	0.33	0.86	0.0116	(0.11)	(0.10)	0.015	0.01414	0.31

Values in parentheses are not certified and are given for information only.

110. Biomass Materials (powder form)

These Reference Materials, RMs 8491 Sugar Cane Bagasse (*Saccharum spp. hybrid*), 8492 Eastern Cottonwood (*P. deltoides*), 8493 Pinus Radiata, and 8494 Wheat Straw (*Triticum aestivum*) are intended primarily for use in fundamental studies on the chemical and physical properties of cellulose, hemi-cellulose and lignin and of their effects on various conversion processes. As part of the International Energy Agency (IEA) Voluntary Standards Activity Group's work, these materials were selected initially for use as research materials for a world-wide round robin analytical laboratory comparison using the Uppsala Method. They were supplied by various institutions and were prepared, packaged and are being distributed by NIST.

At this time, no extensive property measurements have been made on these materials beyond ensuring that the materials are homogeneous. A round robin is in progress with participation by international laboratories and as results become available, the Report of Investigation that accompanies each of these materials will be revised to reflect those changes.

All of the ground and homogenized materials were irradiated with Cobalt-60. The irradiation was required to meet customs regulations for shipment of biomass materials to international destinations.

RM	Type	Unit Size
8491	Sugar Cane Bagasse	In Prep
8492	Eastern Cottonwood	In Prep
8493	Pinus Radiata	In Prep
8494	Wheat Straw	In Prep

111. Geological Materials and Ores

111. Chinese Ores (powder form)

These RMs are a series of skarn deposit ores developed and certified by the Hubei Geological Research Laboratory, Hubei Province, China. Skarn ores are common in the Pacific area and other parts of the world. These RMs can be used as control samples in geochemical exploration and in environmental monitoring programs.

NOTE: In addition to the listed constituent elements, elemental concentrations are given for all major rock-forming oxides and many trace elements, including the rare earth elements and toxic trace elements important to environmental assessment programs.

RM	8600	8601	8602	8603	8604	8605	8606	8607	8608
Type	Copper	Copper	Lead	Lead	Zinc	Molybdenum	Molybdenum	Tungsten	Tungsten
Unit Size (in g)	100	100	100	100	100	100	100	100	100
Components [in Wt. %]									
Cu	1.15	0.19	0.20	0.035	0.71			0.079	0.096
Mo						1.51	0.11		
Pb			4.17	0.61	0.25				
S	0.72	0.14	0.86	0.38	2.87	1.64	0.48	3.12	1.90
W						0.36	0.10	0.015	0.22
Zn	0.059	0.013	0.062	0.092	2.75			0.29	0.010

111. Ores (powder form)

SRM/RM	79a	180	181	182	183	277	330	331	2430
Type	Fluorspar, Customs Grade	Fluorspar, High Grade	Lithium Ore (Spodumene)	Lithium Ore (Petalite)	Lithium Ore (Lepidolite)	Tungsten Concentrate	Copper Ore Mill Heads	Copper Ore Mill Tails	Scheelite Ore
Unit Size (in g)	120	120	45	45	45	100	100	100	100
Components [in Wt. % unless identified by an asterisk which indicates mg/kg]									
Ca						(0.37)			As 0.002
CaF_2	97.39	98.80							
Cu							0.84	0.091	(0.01)
Fe						(7.4)			(1.0)
Au							(0.093*)	(0.034*)	
Li_2O			6.39	4.34	4.12				
Mn						(10.0)			(0.12)
Mo						(0.06)	0.018	0.0022	0.22
Nb						(1.00)			
O_2						(21.4)			Al (0.4)
P						(0.03)			0.017
Pb						(0.07)			Bi 0.078
Re							0.30*	0.04*	
Si						(0.85)			Mg (0.5)
Ag							(1.51*)	(0.243*)	
S						(0.25)			0.26
Ta						(0.20)			(<0.01)
Sn						(0.54)			K (0.16)
Ti						(2.2)			Na (0.02)
WO_3						67.4			70.26

Values in parentheses are not certified and are given for information only.

111. Ores (powder form) – Continued

SRM	25d	27f	69b	120c	600	670	690	691	692	693
Type	Manganese Ore	Iron Ore, Sibley	Bauxite, Arkansas	Phosphate Rock, Florida	Bauxite, Australian	Rutile Ore	Iron Ore, Canada	Iron Oxide, Reduced	Iron Ore, Labrador	Iron Ore, Nimba
Unit Size (in g)	100	80	60	90	90	90	100	100	100	100
Components [in Wt. % unless identified by an asterisk which indicates mg/kg]										
Al_2O_3	5.32	0.82	48.8	1.30	40.0		0.18	1.22	1.41	1.02
BaO	(0.21)		(0.008)							
CdO				0.0010						
CaO	(0.052)	0.039	0.13	48.02	0.22		0.20	0.63	0.023	0.016
Co			(0.0001)					0.030		
Cu								0.032		
Cr_2O_3			0.011		0.024	0.23				
Total Fe		65.97					66.85	90.8	59.58	65.11
Fe_2O_3	3.92		7.14	1.08	17.0	0.86				
MgO		0.019	0.085	0.32	0.05		0.18	0.52	0.035	0.013
MnO	**Mn 51.78**	0.011	0.110	0.027	0.013		0.23	0.043	0.46	0.091
P		0.041					0.011	0.006	0.039	0.056
P_2O_5	0.25		0.118	33.34	0.039					
K_2O	0.93	0.008	0.068	0.147	0.23		0.0030		0.039	0.0028
SiO_2	2.52	4.17	13.43	5.5	20.3	0.51	3.71	3.7	10.14	3.87
Na_2O		0.012	(0.025)	0.52	0.022		0.003	0.186	0.008	0.0028
S		0.005					0.003	0.008	0.005	0.005
SO_3			0.551		0.155					
TiO_2	0.13	0.019	1.90	0.103	1.31	96.16	0.022	0.27	0.045	0.035
V_2O_5			0.028	0.016	0.060	0.66				
ZnO			0.0035	CO_2 **3.27**	0.003			**C 0.12**		
ZrO_2			0.29	**F 3.82**	0.060	0.84				
Oxygen, Available	14.28									
Moisture	(0.96)									
Loss on Ignition			27.2		20.5					

Values in parentheses are not certified and are given for information only.

111. Ores (powder form) – Continued

SRM	694	696	697	698	699	886	1835
Type	Phosphate Rock, Western	Bauxite, Surinam	Bauxite, Dominican	Bauxite, Jamaican	Alumina (reduction grade)	Gold Ore, Refractory	Borate Ore
Unit Size (in g)	90	60	60	60	60	200	60
Components [in Wt. % unless identified by an asterisk which indicates mg/kg]							
Al_2O_3	1.8	54.5	45.8	48.2		8.25 *	3.474
BaO		(0.004)	(0.015)	(0.008)			0.0497
C_{Total}						(5.7)	
CdO	0.015						
CaO	43.6	0.018	0.71	0.62	0.036		21.622
Co	**F 3.2**	(0.00009)	(0.0013)	(0.0045)			**F 0.348**
Cr_2O_3	(0.10)	0.047	0.100	0.080	0.0002		
Fe_2O_3	0.79	8.70	20.0	19.6	0.013		1.141
MgO	0.33	0.012	0.18	0.058	0.0006		3.411
MnO	0.0116	0.004	0.41	0.38	0.0005		0.0333
P_2O_5	30.2	0.050	0.97	0.37	0.0002		
K_2O	0.51	0.009	0.062	0.010			1.261
SiO_2	11.2	3.79	6.81	0.69	0.014		18.408
Na_2O	0.86	(0.007)	(0.036)	(0.015)	0.59		3.484
S_{Total}						1.466	
SO_3		0.15	0.077	0.143		(0.7)	1.477
TiO_2	(0.11)	2.64	2.52	2.38			0.1332
U	0.01414						
V_2O_5	0.31	0.072	0.063	0.064	0.0005		
ZnO	(0.19)	0.0014	0.037	0.029	0.013		
ZrO_2		0.14	0.065	0.061			**SrO 0.9418**
Ga_2O_3					0.010		**B_2O_3 18.739**
Li_2O					0.002		
Loss on Ignition – See certificate for conditions		29.9	22.1	27.3	0.69		25.72

Values in parentheses are not certified and are given for information only.

111. Ore Bioleaching Substrate (powder form)

This Reference Material (RM) is for use as a bioleaching substrate and for testing bioleaching rates. The material consists of pyrite from New Mexico. Thiobacillus ferrooxidans was used in the determinations.

RM	Type	Unit Size (in g)	Bioleaching Rate (in mg Fe/L/hr)
8455	Pyrite Ore	100	12.4

111. Clays (powder form)

SRM	97b	98b	679
Type	Flint Clay	Plastic Clay	Brick Clay
Unit Size (in g)	60	60	75
	Elemental Composition (in Wt. %) *		
Al	20.76	14.30	11.01
Ba	(0.018)	(0.07)	0.0432
Ca	0.0249	0.0759	0.1628
Ce			(105)*
Cs	(3.4)*	(16.5)*	(9.6)*
Cr	227*	119*	109.7*
Co	(3.8)*	(16.3)*	(26)*
Eu	(0.84)*	(1.3)*	(1.9)*
Hf	(13)*	(7.2)*	(4.6)*
Fe	0.831	1.18	9.05
Li	550*	215*	71.7*
Mg	0.113	0.358	0.7552
Mn	47*	116*	(1730)*
P	(0.02)	(0.03)	(0.075)
K	0.513	2.81	2.433
Rb	(33)*	(180)*	(190)*
Sc	(22)*	(22)*	(22.5)*
Si	19.81	26.65	24.34
Na	0.0492	0.1496	0.1304
Sr	84*	189*	73.4*
Th	(36)*	(21)*	(14)*
Ti	1.43	0.809	0.577
Zn	(87)*	(110)*	(150)*
Zr	(0.05)	(0.022)	
Sb	(2.2)*	(1.6)*	
Loss on Ignition**	(13.3)	(7.5)	

Values in parentheses are not certified and are given for information only.
* Value is in mg/kg (SI unit).
**At 1100 °C, 2 hours; sample previously dried.

111. Rocks and Minerals (powder form)

SRM	1c	70a	81a	88b	99a	165a	278	688	1413
Type	Lime-stone, Argilla-ceous	Feld-spar, Potash	Glass Sand	Limestone, Dolomite	Feld-spar, Soda	Glass Sand (low iron)	Obsidian Rock	Basalt Rock	Glass Sand (high alumina)
Unit Size (in g)	50	40	75	75	40	75	35	60	75
Components [in Wt. % unless identified by an asterisk which indicates mg/kg.]									
Al_2O_3	1.30	17.9	0.66	0.336	20.5	0.059	14.15	17.36	9.90
BaO		0.02		CO_2 46.37	0.26		Ba (1140 *)		0.12
CaO	50.3	0.11		29.95	2.14		0.983	(12.17)	0.74
Cr_2O_3			46 *			(1 *)	Cr (6.1 *)	Cr 332 *	
Fe_2O_3 †	0.55	0.075	0.082	0.277	0.065	0.012	2.04	10.35	0.24
FeO †							1.36	7.64	
MgO	0.42			21.03	0.02		(0.23)	(8.4)	0.06
MnO	0.025			0.0160			0.052	0.167	
P_2O_5	0.04			0.0044	0.02		0.036	0.134	
K_2O	0.28	11.8		0.1030	5.2		4.16	0.187	3.94
Rb_2O		0.06					Rb 127.5 *	Rb 1.91 *	
SiO_2	6.84	67.12		1.13	65.2		73.05	48.4	82.77
Na_2O	0.02	2.55		0.0290	6.2		4.84	2.15	1.75
SrO	0.030			0.0076			Sr 63.5 *	Sr 169.2 *	
TiO_2	0.07	0.01	0.12	(0.016)	0.007	0.011	0.245	1.17	0.11
ZrO_2			0.034			0.006			
Loss on Ignition – See certificate for conditions	39.9	0.40		(46.98)	0.26				

Values in parentheses are not certified and are given for information only.
† Refer to certificate to ascertain if the value reported represents total iron or species-specific iron.

111. Refractories (powder form)

SRM	76a	77a	78a	154b	198	199
Type	Burnt Refractory (Al_2O_3–40%)	Burnt Refractory (Al_2O_3–60%)	Burnt Refractory (Al_2O_3–70%)	Titanium Dioxide	Silica Brick	Silica Brick
Unit Size (in g)	75	75	75	90	45	45
Components (in Wt. %)						
Al_2O_3	38.7	60.2	71.7		0.16	0.48
CaO	0.22	0.05	0.11	(~0.01)	2.71	2.41
FeO *						
Fe_2O_3 *	1.60	1.00	1.2	(0.006)	0.66	0.74
Li_2O	0.042	0.025	0.12		0.001	0.002
MgO	0.52	0.38	0.70	(~0.01)	0.07	0.13
MnO					0.008	0.007
P_2O_5	0.120	0.092	1.3	(0.04)	0.022	0.015
K_2O	1.33	0.090	1.22		0.017	0.094
SiO_2	54.9	35.0	19.4	(0.01)		
Na_2O	0.07	0.037	0.078		0.012	0.015
SrO	0.037	0.009	0.25			
TiO_2	2.03	2.66	3.22	99.74	0.02	0.06
ZrO_2						
Loss on Ignition	(0.34)	(0.22)	(0.42)		0.21	0.17

Values in parentheses are not certified and are given for information only.
* Refer to certificate to ascertain if the value reported represents total iron or species-specific iron.

111. Soils and Sediments (powder form)

SRM/RM	1646a	2704	2709	2710	2711	8406	8407
Type	Estuarine Sediment	Buffalo River Sediment	San Joaquin Soil	Montana Soil Highly Elevated Traces	Montana Soil Moderately Elevated Traces	Tennessee River Sediment	Tennessee River Sediment
Unit Size	75 g	50 g	50 g	50 g	50 g	25 g	25 g
ELEMENT	Concentrations are in mg/kg, unless noted by a single asterisk, *, for Wt. %.						
Aluminum	2.297 *	6.11 *	7.50 *	6.44 *	6.53 *		
Antimony	(0.3)	3.79	7.9	38.4	19.4		
Arsenic	6.23	23.4	17.7	626	105		
Barium	(210)	414	968	707	726		
Beryllium	(<1)						
Bromine		(7)		(6)	(5)		
Cadmium	0.148	3.45	0.38	21.8	41.7		
Calcium	0.519 *	2.60 *	1.89 *	1.25 *	2.88 *		
Carbon		3.348 *	(1.2 *)	(3 *)	(2 *)		
Cerium	(34)	(72)	(42)	(57)	(69)		
Cesium		(6)	(5.3)	(107)	(6.1)		
Chlorine		(<0.01 *)					
Chromium	40.9	135	130	(39)	(47)		
Cobalt	(5)	14.0	13.4	(10)	(10)		
Copper	10.01	98.6	34.6	2950	114		
Dysprosium		(6)	(3.5)	(5.4)	(5.6)		
Europium		(1.3)	(0.9)	(1)	(1.1)		
Gallium	(5)	(15)	(14)	(34)	(15)		
Germanium							
Gold			(0.3)	(0.6)	(0.03)		
Hafnium		(8)	(3.7)	(3.2)	(7.3)		
Holmium			(0.54)	(0.6)	(1)		
Indium				(5.1)	(1.1)		
Iodine		(2)	(5)		(3)		
Iron (Total)	2.008 *	4.11 *	3.50 *	3.38 *	2.89 *		
Lanthanum	(17)	(29)	(23)	(34)	(40)		
Lead	11.7	161	18.9	5532	1162		
Lithium	(18)	47.5					
Magnesium	0.388 *	1.20 *	1.51 *	0.853 *	1.05 *		
Manganese	234.5	555	538	1.01 *	638		
Mercury	(0.04)	1.47	1.40	32.6	6.25	(0.06)	(50)
Molybdenum	(1.8)		(2.0)	(19)	(1.6)		
Neodymium	(15)		(19)	(23)	(31)		
Nickel	22.5	44.1	88	14.3	20.6		
Phosphorus	0.027 *	0.0998 *	0.062 *	0.106 *	0.086 *		
Potassium	0.864	2.00 *	2.03 *	2.11 *	2.45 *		
Rubidium	(38)	(100)	(96)	(120)	(110)		
Samarium		(6.7)	(3.8)	(7.8)	(5.9)		
Scandium	(5)	(12)	(12)	(8.7)	(9)		
Selenium	0.193	1.12	1.57		1.52		
Silicon	40.00 *	29.08 *	29.66 *	28.97 *	30.44 *		
Silver			0.41	35.3	4.63		
Sodium	0.741 *	0.547 *	1.16 *	1.14 *	1.14 *		
Strontium	(68)	(130)	231	(240)	245.3		
Sulfur	0.352 *	0.397 *	0.089 *	0.240 *	0.042 *		
Thallium	(<0.5)	1.06	0.74	(1.3)	2.47		
Thorium	(5.8)	(9.2)	(11)	(13)	(14)		
Titanium	0.456 *	0.457 *	0.342 *	0.283 *	0.306 *		
Tungsten			(2)	(93)	(3)		
Uranium	(2.0)	3.13	(3)	(25)	(2.6)		
Vanadium	44.84 *	95	112	76.6	81.6		
Ytterbium		(2.8)	(1.6)	(1.3)	(2.7)		
Yttrium			(18)	(23)	(25)		
Zinc	48.9	438	106	6952	350.4		
Zirconium		(300)	(160)		(230)		

Values in parentheses are not certified and are given for information only.

112. Ceramics and Glasses

Carbides (powder form)

SRM	Type	Unit Size (in g)	Composition (in Wt. %)							
			SiC	Total C	Free C	Fe	O	N	Al	Ca
112b	Silicon Carbide	80	97.37	29.43	0.26	0.13			0.44	0.04
276b	Tungsten Carbide	75		6.10	(0.04)		(0.08)	(0.01)		

Values in parentheses are not certified and are given for information only.

112. Cemented Carbides (powder form)

SRMs 887–9 are prepared from sintered tungsten carbide base materials.

SRM	887	888	889
Type	Cemented Carbide (W83-Co10)	Cemented Carbide (W64-Co25-Ta5)	Cemented Carbide (W75-Co9-Ta5-Ti4)
Unit Size (in g)	100	100	100
Elemental Composition (in Wt. %)			
Co	10.35	24.7	9.50
Ta		4.77	4.60
Ti			4.03
C	(5.5)	(4.6)	(6.0)

Values in parentheses are not certified and are given for information only.

112. Glasses (powder and solid forms)

SRM	81a	89	91	92	93a	165a	620	621	1411	1412	1413	1830	1831	1834
Type	Glass Sand	Lead-Barium	Opal Powder	Low-Boron Soda-Lime Powder	High-Boron Borosilicate	Glass Sand (low Iron)	Soda-Lime, Flat	Soda-Lime, Container	Soft Borosilicate	Multi Component	Glass Sand high) alumina)	Soda-Lime, Float	Soda-Lime, Sheet	Fused Ore Glass
Unit Size	75 g	45 g	45 g	45 g	wafer 32 mm D×6 mm	75 g	3 platelets 35×35×3 mm	3 disks 38 mm D×5 mm	10 platelets 32×32×3 mm	8 platelets 32×32×3 mm	75 g	3 platelets 38×38×6 mm	3 platelets 37×37×3 mm	disk 30 mm D×3 mm
Components [in Wt. % unless identified by an asterisk which indicates mg/kg.]														
SiO_2		65.35	67.5	(75.0)	80.8		72.08	71.13	58.04	42.38	82.77	73.07	73.08	Si 20.19
PbO		17.50	0.10							4.40				
Al_2O_3	0.66	0.18	6.01		2.28	0.059	1.80	2.76	5.68	7.52	9.90	0.12	1.21	Al 20.71
FeO					0.016							0.032	0.025	
Fe_2O_3	0.082	0.049	0.079		0.028	0.012	0.043	0.040	0.050	(0.031)	0.24	0.121	0.087	Fe 0.32
ZnO			0.08	(0.2)					3.85	4.48				
CdO										4.38				
MnO		0.088												
TiO_2	0.12	0.01	0.019		0.014	0.011	0.018	0.014	0.02			0.011	0.019	Ti 1.11
ZrO_2	0.034	0.005	0.009		0.042	0.006		0.007						Zr (0.047)
CaO		0.21	10.49	(8.3)	0.01		7.11	10.71	2.18	4.53	0.74	8.56	8.20	Ca 0.095
BaO		1.40						0.12	5.00	4.67	0.12			Ba 0.062
Li_2O										(4.50)				Li (4.6)
MgO		0.03		(0.1)	0.005		3.69	0.27	0.33	(4.69)	0.06	3.90	3.51	Mg 0.088
K_2O		8.40	3.24	(0.6)	0.014		0.41	2.01	2.97	4.14	3.94	0.04	0.33	K 0.42
Na_2O		5.70	8.47	(13.1)	3.98		14.39	12.74	10.14	4.69	1.75	13.75	13.32	Na (0.14)
B_2O_3				0.70	12.56				10.94	4.53				B (1.1)
P_2O_5		0.23	0.023											P 0.152
As_2O_5		0.36	0.10											
As_2O_3		0.03	0.09				0.056	0.030						
SO_3		0.03					0.28	0.13				0.26	0.25	
Cl		0.05	0.015		0.060									
Cr														(0.02)
SrO									0.09	4.55				Sr 0.153
F			5.73											
Cr_2O_3	46 *					(1 *)								
Loss on Ignition		0.32		(0.42)										

Values in parentheses are not certified and are given for information only.

112. Trace Elements (powder and wafer forms)

These SRMs are for calibrating instruments and evaluating analytical techniques used to determine trace elements in inorganic matrices.

SRM	607	610 and 611	612 and 613	614 and 615	616 and 617
Type	Trace Elements in Potassium Feldspar	Trace Elements in Glass	Trace Elements in Glass	Trace Elements in Glass	Trace Elements in Glass
Wafer Thickness (in mm)		1	3 and 1	3 and 1	3 and 1
Unit Size	5 g	6 wafers	6 wafers	6 wafers	6 wafers
Element			Composition (in mg/kg)		
Antimony				(1.06)	(0.078)
Barium			(41)		
Boron		(351)	(32)	(1.30)	(0.20)
Cadmium				(0.55)	
Cerium			(39)		
Cobalt		(390)	(35.5)	(0.73)	
Copper		(444)	(37.7)	1.37	(0.80)
Dysprosium			(35)		
Erbium			(39)		
Europium			(36)	(0.99)	
Gadolinium			(39)		
Gallium				(1.3)	(0.23)
Gold		(25)	(5)	(0.5)	(0.18)
Iron		458	51	(13.3)	(11)
Lanthanum			(36)	(0.83)	(0.034)
Lead		426	38.57	2.32	1.85
Manganese		485	(39.6)		
Neodymium			(36)		
Nickel		458.7	38.8	(0.95)	
Potassium		(461)	(64)	30	29
Rubidium	523.90	425.7	31.4	0.855	(0.100)
Samarium			(39)		
Scandium				(0.59)	(0.026)
Silver		(254)	22.0	0.42	
Strontium	65.485 *	515.5	78.4	45.8	41.72
Thallium		(61.8)	(15.7)	(0.269)	(0.0082)
Thorium		457.2	37.79	0.748	0.0252
Titanium		(437)	(50.1)	(3.1)	(2.5)
Uranium		461.5	37.38	0.823	0.0721
Ytterbium			(42)		
Zinc		(433)			

In addition to the elements listed above, the glass SRMs contain the following 25 elements: As, Be, Bi, Cs, Cl, F, Ge, Hf, Hg, Li, Lu, Mg, Nb, P, Pr, Se, S, Te, Tb, Tm, Sn, W, V, Y, and Zr.

NOTE: Glass—Nominal Composition; 72% SiO_2, 12% CaO, 14% Na_2O, and 2% Al_2O_3.

Values in parentheses are not certified and are given for information only.

* Also certified for isotopic ratio – $^{87}Sr/^{86}Sr = 1.20039$.

113. Cement

Portland Cements (powder form)

These SRMs are for X-ray spectroscopic and chemical analysis of portland cements and related materials. Each unit consists of three (3) sealed vials, each containing ~5 g of material.

SRM	1880	1881	1882	1883	1884
COLOR	BLACK	WHITE	ORANGE	SILVER	IVORY
Components (in Wt. %)					
CaO	63.14	58.67	37.6	27.8	64.01
SiO_2	19.82	22.25	3.40	0.35	23.19
Al_2O_3	5.03	4.16	38.6	71.2	3.31
Fe_2O_3	2.91	4.68	15.8	0.08	3.30
SO_3	3.37	3.65			1.67
MgO	2.69	2.63	1.25	0.29	2.32
K_2O	0.91	1.17	0.12	(0.01)	0.51
TiO_2	0.23	0.25	1.83	(0.01)	0.16
Na_2O	0.28	0.04	(0.06)	0.32	0.13
SrO	0.06	0.11			0.048
P_2O_5	0.29	0.09			0.12
Mn_2O_3	0.08	0.26			0.11
F	0.10	0.09			(0.03)
ZnO	0.01	0.01			(0.02)
Cr_2O_3					(<0.01)
Cl	0.02	0.01			(0)
Loss on Ignition at 1000 °C	1.38	2.01	1.58	0.42	1.17
Total	100.28	100.04			(100.05)

SRM	1885	1886	1887	1888	1889
COLOR	TURQUOISE	CRANBERRY	BROWN	PURPLE	GRAY
Components (in Wt. %)					
CaO	62.14	67.43	62.88	63.78	65.08
SiO_2	21.24	22.53	19.98	20.86	20.44
Al_2O_3	3.68	3.99	5.59	5.35	5.61
Fe_2O_3	4.40	0.31	2.16	3.18	2.67
SO_3	2.22	2.04	4.61	3.16	2.68
MgO	4.02	1.60	1.26	0.71	1.38
K_2O	0.83	0.16	1.27	0.56	0.32
TiO_2	0.20	0.19	0.27	0.29	0.21
Na_2O	0.38	0.02	0.10	0.14	0.11
SrO	0.037	0.11	0.07	0.07	0.20
P_2O_5	0.10	0.025	0.075	0.085	0.15
Mn_2O_3	0.12	0.013	0.072	0.025	0.24
F	(0.05)	(0.01)	(0.11)	(0.02)	(0.04)
ZnO	(0.03)	(<0.01)	(0.01)	(0.01)	(<0.01)
Cr_2O_3	(<0.01)	(<0.01)	(<0.01)	(0.01)	(0.01)
Cl	(0.02)	(0)	(0.007)	(0.015)	(0.002)
Loss on Ignition at 1000 °C	0.74	1.73	1.49	1.79	0.92
Total	(100.19)	(100.02)	(99.908)	(100.05)	(100.04)

Values in parentheses are not certified and are given for information only.

113. Portland Cement Clinkers

These RMs are intended primarily for use in the determination of the abundance of major phases in cement clinkers, i.e., the percentages of alite (C_3S), belite (C_2S), aluminate (C_3A), and ferrite (($C_2(A,F)$). **Note:** In cement chemist notation, C = CaO, S = SiO_2, A = Al_2O_3 and F = Fe_2O_3.

RM	8486	8487	8488
Type	Portland Cement Clinker	Portland Cement Clinker	Portland Cement Clinker
Unit Size (in g)	3×10	3×10	3×10
Components (in Wt. %)			
CaO	(63.36)	(67.20)	(66.50)
SiO_2	(22.48)	(21.43)	(22.68)
Al_2O_3	(4.70)	(5.53)	(4.90)
Fe_2O_3	(3.60)	(1.98)	(4.07)
SO_3	(0.27)	(0.83)	(0.31)
MgO	(4.73)	(1.48)	(0.98)
K_2O	(0.42)	(0.72)	(0.35)
TiO_2	(0.25)	(0.27)	(0.24)
Na_2O	(0.10)	(0.14)	(0.11)
SrO	(0.05)	(0.11)	(0.13)
P_2O_5	(0.06)	(0.29)	(0.08)
Mn_2O_3	(0.10)	(0.04)	(0.03)
Loss on Ignition	(0.16)	(0.17)	(0.21)
Total	(100.28)	(100.20)	(100.60)
Alite (C_3S)	(58.47)	(73.39)	(64.97)
Belite (C_2S)	(23.18)	(7.75)	(18.51)
Aluminate (C_3A)	(1.15)	(12.09)	(4.34)
Ferrite ($C_2(A,F)$)	(13.68)	(3.27)	(12.12)
Free CaO	(0.18)	(2.45)	(0.00)
Periclase	(3.21)	(0.09)	(0.05)
Alkali Sulfate	(0.14)	(0.98)	(0.03)
Total	(100.01)	(100.02)	(100.02)

Values in parentheses are not certified and are given for information only.

114. Engine Wear Materials

114. Metallo-Organic Compounds (liquid form)

These SRMs are for preparing solutions in oils of known and reproducible concentrations of metals. Each SRM unit consists of 5 g of material.

SRM	Type	Elemental Composition (in Wt. %)	
1051b	Barium cyclohexanebutyrate	Barium	28.7
1052b	Bis(1–phenyl–1,3-butanediono)oxovanadium (IV)	Vanadium	13.01
1053a	Cadmium cyclohexanebutyrate	Cadmium	24.8
1057b	Dibutyltin bis (2–ethylhexanoate)	Tin	22.95
1059c	Lead cyclohexanebutyrate	Lead	37.5
1060a	Lithium cyclohexanebutyrate	Lithium	4.1
1065b	Nickel cyclohexanebutyrate	Nickel	13.89
1066a	Octaphenylcyclotetrasiloxane	Silicon	14.14
1069b	Sodium cyclohexanebutyrate	Sodium	12.0
1070a	Strontium cyclohexanebutyrate	Strontium	20.7
1071b	Triphenyl phosphate	Phosphorus	9.48
1073b	Zinc cyclohexanebutyrate	Zinc	16.66
1075a	Aluminum 2–ethylhexanoate	Aluminum	8.07
1077a	Silver 2–ethylhexanoate	Silver	42.60
1078b	Tris (1–phenyl–1,3–butanediono)chromium (III)	Chromium	9.6
1079b	Tris (1-phenyl-1,3-butanediono)iron (III)	Iron	10.45
1080a	Bis(1–phenyl–1,3–butanediono)copper (II)	Copper	16.37

114. Lubricating Base Oils (liquid form)

These SRMs are for determining the concentrations of a single element in lubricating base oil. SRMs 1818a and 1819a consist of five (5) bottles, 20 g each; SRM 1836 consists of four (4) vials, ~4 g each.

SRM	Type	Elemental Composition (in mg/kg)				
		I	II	III	IV	V
1818a	Total Chlorine	31.6	60.0	78.2	154.4	234.0
1819a	Total Sulfur	423.5	741.1	4022	4689	6135
1836	Total Nitrogen	9.0	50.9	113.3	166.2	

114. Catalyst Characterization Material (liquid form)

This Reference Material (RM) is for determining the activity of FCC Catalysts by Microactivity Test. It is distributed by NIST in cooperation with the American Society for Testing and Materials (ASTM).

RM	Type	Unit Size
8590	High Sulfur Gas Oil Feed	946 mL

114. Catalyst Package for Lubricant Oxidation (liquid form)

These reference materials are for evaluating the oxidation stability of lubricating oils, i.e., automotive crankcase lubricants. SRM 1817c consists of a set of five (5) ampules of each of three (3) materials. The fuel fraction and the metal mixture are sealed under inert atmosphere. RM 8501 consists of a set of five (5) ampules of each of four (4) materials. The fuel fraction, model compound, and metal mixture are sealed under inert atmosphere.

SRM/RM	Type	Consisting of	Unit Size
1817c	Catalyst Package IIID	1) an Oxidized/Nitrated Fuel Fraction, 2) a Metal Naphthenate Mixture, and 3) Distilled Water	5×0.15 g 5×0.3 g 5×1.0 g
2567	Catalyst Package IIIE	1) an Oxidized/Nitrated Fuel Fraction, 2) a Nitro-Paraffin Model Compound, 3) a Nitro-Aromatic Model Compound, 4) a Metal Naphthenate Mixture, and 5) Distilled Water	In Prep
8501	Catalyst Package IIIE	1) an Oxidized/Nitrated Fuel Fraction, 2) a Nitro-Paraffin Model Compound, 3) a Metal Naphthenate Mixture, and 4) Distilled Water	5×0.15 g 5×0.15 g 5×0.3 g 5×1.0 g

114. Wear-Metals in Oil (liquid form)

SRM	Type	Unit Size	Elemental Composition (in mg/kg)				
			Al	Cr	Cu	Fe	Pb
1083	Wear-Metals (base oil)	150 mL	(<0.5)	(<0.02)	(<0.5)	(<1)	(<0.04)
1084a	Wear-Metals	Set of 5 ampules: 1.6 g each	(104)	98.3	100.0	98.9	101.1
1085a	Wear-Metals	Set of 5 ampules: 1.6 g each	(289)	296.3	295.1	296.8	297.4

SRM	Mg	Mn	Mo	Ni	Si	Ag
1083	(<0.1)	(<0.005)	(<0.01)	(<0.4)	(<1)	(<0.05)
1084a	99.5		100.3	99.7	(103)	101.4
1085a	296.0		302.9	302.9	(322)	305.7

SRM	Na	Sn	S	Ti	V	Zn
1083	(<0.06)	(<0.4)	(<1)	(<5)	(<0.3)	(<0.08)
1084a		97.2	(1700)	100.4	95.9	
1085a		296.0	(4500)	305.1	292.4	

Values in parentheses are not certified and are given for information only.

Physical Properties

Standard Reference Materials for Physical Properties

201. Ion Activity

pH Calibration (powder form)

These SRMs are used to prepare solutions of known hydrogen ion activity to calibrate commercial pH instruments. SRMs 186Ie and 186IIe, 191a and 192a are each certified for use as an admixture only. SRMs 186Ie and 186IIe may be used to prepare solutions with a pH of 6.863 at 25 °C, or physiological buffer solutions with a pH of 7.41 at 25 °C.

SRM	Type	pH(S) Values (at 25 °C)	Unit Size (in g)
185g	Potassium Hydrogen Phthalate	4.006	60
186Ie	Potassium Dihydrogen Phosphate	(see above)	30
186IIe	Disodium Hydrogen Phosphate		30
187c	Sodium Tetraborate Decahydrate (Borax)	9.180	30
188	Potassium Hydrogen Tartrate	3.557	60
189a	Potassium Tetroxalate	1.681	65
191a	Sodium Bicarbonate	10.011	25
192a	Sodium Carbonate		30
2193	Calcium Carbonate	12.46	30

201. Biological Buffer Systems (powder form)

These SRMs are used to calibrate clinical instruments (e.g., blood pH measurements), in the physiologically important range of pH 7 to 8. They are based on a biological buffer system for clinical pH measurements and are each certified for use as an admixture only. The pH(S) values for the buffer solutions are certified at 0.05 molal and 0.08 molal with respect to the free acid and the sodium salt admixture as a function of temperature. The certified temperature range is from 0 °C to 50 °C.

SRM	Type	pH(S) Values (at 37 °C)		Unit Size (in g)
		0.05 molal	0.08 molal	60
2181	HEPES Free Acid	7.364	7.373	60
2182	NaHEPESate			60
2183	MOPSO Free Acid	6.699	6.676	60
2184	NaMOPSOate			60

201. pD Calibration (powder form)

These SRMs are for the preparation of solutions of known deuterium ion activity to calibrate pH instruments to indicate pD data. SRMs 2186I and 2186II, and 2191a and 2192a are certified for use as admixtures only.

SRM	Type	pD(S) Values (at 25 °C)	Unit Size (in g)
2185	Potassium Hydrogen Phthalate	4.518	60
2186I	Potassium Dihydrogen Phosphate	7.428	30
2186II	Disodium Hydrogen Phosphate		30
2191a	Sodium Bicarbonate	10.732	30
2192a	Sodium Carbonate		30

201. Ion-Selective Electrode Calibration (powder form)

These SRMs are certified for the calibration of ion-selective electrodes and have conventional ionic activities based on the Stokes-Robinson hydration theory for ionic strengths greater than 0.1 mol/L.

SRM	Type	Certified Component	Unit Size (in g)
2201	Sodium Chloride	pNa, pCl	125
2202	Potassium Chloride	pK, pCl	160
2203	Potassium Fluoride	pF	125

201. Electrolytic Conductivity (liquid form)

These SRMs are for calibrating and standardizing conductivity cells and meters used in water purity determinations and in clinical applications. SRM 3190 is an aqueous solution of hydrochloric acid; SRMs 3191 through 3195 are solutions of high-purity potassium chloride in de-ionized water in equilibrium with atmospheric carbon dioxide. SRM 3196 is a solution of high purity sodium chloride in de-ionized water in equilibrium with atmospheric carbon dioxide. (NOTE: This SRM closely matches biological fluids for conductivity measurements in clinical materials. SRMs 3190–3195 are less suitable for such purposes.) SRMs 3198 and 3199 are solutions of potassium chloride in a mixture of n-propanol and de-ionized water.

SRM	Type	Nominal Conductivity (μS/cm)	Unit Size (in mL)
3190	HCl in de-ionized H_2O	25	500
3191	KCl in de-ionized H_2O	100	500
3192	KCl in de-ionized H_2O	500	500
3193	KCl in de-ionized H_2O	1000	500
3194	KCl in de-ionized H_2O	10000	500
3195	KCl in de-ionized H_2O	100000	500
3196	NaCl in de-ionized H_2O	20000	500
3198	KCl in n-propanol/de-ionized H_2O	5	500
3199	KCl in n-propanol/de-ionized H_2O	15	500

202. Polymeric Properties

Molecular Weight and Melt Flow (liquid, pellet and powder forms)

These SRMs are for the calibration of instrumentation used in polymer technology science for the determination of molecular weight and molecular weight distribution and as characterized samples for other physical properties of polymers.

SRM	Type	Unit Size (in g)
705a	Polystyrene, narrow molecular weight distribution, $M_w \approx 179{,}300$, $M_w/M_n \approx 1.07$	5
706	Polystyrene, broad molecular weight distribution, $M_w \approx 257{,}800$, $M_w/M_n \approx 2.1$	18
1473	Polyethylene Resin, low density, melt flow	60
1474	Polyethylene Resin, melt flow	60
1475a	Polyethylene, linear, $M_w \approx 52{,}000$ ($M_z:M_w:M_n \approx 7.54:2.90:1$)	50
1478	Polystyrene, narrow molecular weight distribution, $M_w \approx 37{,}400$ ($M_w/M_n \approx 1.04$)	2
1479	Polystyrene, narrow molecular weight distribution, $M_w \approx 1{,}050{,}000$	2
1480	Polyurethane ($M_w \approx 47{,}300$)	1
1482	Polyethylene, linear, $M_w \approx 13{,}600$ ($M_w/M_n \approx 1.19$)	1
1483	Polyethylene, linear, $M_w \approx 32{,}100$ ($M_w/M_n \approx 1.11$)	1
1484a	Polyethylene, linear, $M_w \approx 119{,}600$ ($M_w/M_n \approx 1.19$)	0.3
1487	Poly(methylmethacrylate), $M_n \approx 6{,}000$	2
1488	Poly(methylmethacrylate), $M_n \approx 29{,}000$	2
1489	Poly(methylmethacrylate), $M_n \approx 115{,}000$	2
1496	Polyethylene Gas Pipe Resin, melt flow (Unpigmented)	908
1497	Polyethylene Gas Pipe Resin, melt flow (Pigmented)	9080
1923	Poly(ethylene oxide), $M_w \approx 26{,}900$ ($M_w/M_n \approx 1.04$)	0.2
1924	Poly(ethylene oxide), $M_w \approx 120{,}900$ ($M_w/M_n \approx 1.06$)	0.2

Property	Method	705a	706	1473	1474	1475a	1478	1479	1480	1482	1483	1484a	1487	1488	1489	1496	1497	1923	1924
Molecular Weight:																			
Weight Average	(Light Scattering)	X	X			X		X	X	X	X	X						X	X
	(Sed. Equili.)	X	X				X						X	X					
	(Gel Permeation/Filtration Chromatography-GPC)																	X	X
Number Average	(Osmometry)	X					X			X	X	X			X				
	(Size Excl. Chromatography)					X			X										
MolecularWeight Distribution	(GPC)					X													
Limiting Viscosity No.	(Capillary Viscometry)																		
Benzene, 25 °C		X	X																
Benzene, 35 °C		X																	
Cyclohexane, 35 °C		X	X																
1-Chloronaphthalene, 130 °C						X				X	X	X							
1,2,4-Trichlorobenzene, 130 °C						X				X	X	X							
Decahydronaphthalene, 130 °C						X													
Tetrahydrofuran, 25 °C									X				X						
Toluene, 25 °C							X							X	X				
Melt Flow	(ASTM)			X	X	X										X	X		
Density	(ASTM)					X													
Heat Capacity	(Adiabatic)	X				X													

202. Polyethylene Pipe Products

These Reference Materials (RMs) are for the testing and characterization of polyethylene pipe products.

RM	Type	Tensile Properties* (in MPa)	Melt Flow (in g/10 min)	Density (in g/cm^3)
8450	Polyethylene Piping, 1.3 cm	16.40/0.125	0.851	0.938
8451	Polyethylene Piping, 4.8 cm	17.35/0.127		0.937
8452	Polyethylene Piping, 10.2 cm			0.938
8453	Polyethylene Socket T Joint		0.508	
8454	Polyethylene Butt T Joint		0.996	

* Expressed as Yield Stress/Strain at Yield (Strain Rate = 81% per minute).

202. Rubbers and Rubber Compounding Materials (powder and solid forms)

These SRMs have been prepared to provide the rubber industry with standard materials for rubber compounding. They are useful for the testing of rubber and rubber compounding materials in connection with quality control of raw materials and for the standardization of rubber testing.

Each material has been statistically evaluated for uniformity by mixing rubber and rubber compounds, vulcanizing them in accordance with ASTM Designation D–3182 and determining the stress-strain properties of the resulting vulcanizates. A certificate is issued for the rubber SRM 386k, because the properties of different lots are not the same. Replacement lots of rubber compounding SRMs 371h, 372i, and 383a, impart essentially the same characteristics to rubber vulcanizates so that certificates are not issued for these SRMs.

SRM/RM	Type	Unit Size (in kg)
371h	Sulfur	6
372i	Stearic Acid	3.2
383a	Mercaptobenzothiazole	3.2
386k	Styrene-Butadiene 1500	36
8384	N-tertiary-butyl-2-benzothiazole sulfenamide (TBBS), powder	3.2

203. Thermodynamic Properties

Combustion Calorimetry (powder form)

These SRMs are for use as standards for calibration of combustion bomb calorimeters used in checking the performance of apparatus and analytical procedures and for the characterization of high-purity compounds, fuels, and related fuel materials.

SRM	Type	Heat of Combustion (in MJ/kg)*	Unit Size (in g)
39i	Benzoic Acid	26.434	30
1656	Thianthrene	33.480	30
1657	Synthetic Refuse-Derived Fuel	13.87 **	100
2151	Nicotinic Acid	22.184	25
2152	Urea	10.536	25
2682a	Coal, Sub-bituminous: %S = 0.486; %Ash = 6.3	25.48 **	50
2683a	Coal, Bituminous: %S = 1.89; %Ash = 6.8	31.90 **	50
2684a	Coal, Bituminous: %S = 3.06; %Ash = 11.0	28.50 **	50
2685a	Coal, Bituminous: %S = 4.730; %Ash = 16.21	26.67 **	50
2692a	Coal, Bituminous: %S = 1.184; %Ash = 7.94	32.64 **	50

* The calorific values (MJ/kg) may decrease upon the aging or normal oxidation of the coals. NIST will continue to monitor these calorific values and report any substantive change to the purchaser.
** Gross calorific value or HHV (Higher Heating Value).

203. Solution Calorimetry

SRM	Type	Heat of Solution (in MJ/kg)	Unit Size (in g)
724a	Tris(hydroxymethyl)aminomethane	HCl Evolved - 0.24576 NaOH Absorbed - 0.1418	50
1655	Potassium Chloride (Water Solution Calorimetry)	Absorbed (0.235)	30

203. Enthalpy and Heat Capacity (solid forms)

SRM	Type	Unit Size	Temperature Range (in K)	Molecular Weight (in g/mol)
RM 5	Copper	0.19 D × 12 cm	25 to 300	
705a	Polystyrene	5 g	10 to 350	170,900
720	Synthetic Sapphire	15 g	10 to 2250	
781-D2	Molybdenum	0.64 D × 10 cm	273.15 to 2800	

203. Differential Scanning Calorimetry (solid forms)

These SRMs are for calibrating differential scanning calorimeters, differential thermal analyzers, and similar instruments. SRM 1514 is for evaluating methods of determining purity by differential scanning calorimetry. It consists of pure phenacetin and phenacetin doped with p-aminobenzoic acid.

SRM	Type	Unit Size	Melting Temperature (in K)	Enthalpy of Fusion (in J/g)
1514	Thermal Analysis Purity Set	Set of 4 vials: 0.5 g each		*
2220	Tin (99.9995%)	2.5 cm × 2.5 cm × 0.0127 cm	505.10	60.22
2221b	Zinc (99.999%)		In Prep	
2222	Biphenyl (99.984%)	1 g	342.41	120.41
2225	Mercury	2.5 g	234.30	11.469

* Certified for four levels of p–ABA (in mol %).

203. Differential Thermal Analysis (liquid and solid forms)

In cooperation with the International Confederation of Thermal Analysis and Calorimetry (ICTAC), NIST distributes transition point, melting point and magnetic transition measurement Reference Materials (RMs) 8754, 8757, 8758, 8759, 8760, and 8761 for use with differential thermal analyzers, differential scanning calorimeters, and thermogravimetry apparatus. These RMs (except for RM 8754) are configured in sets consisting of four or more materials in varying quantities per unit.

The ICTAC has recently undertaken a complete reevaluation of all the materials comprising these RMs and it is anticipated that the RMs will be redistributed in the future, as single material units rather than in sets. Therefore, only limited quantities of the current RMs are still available. Information about RM status can be obtained by contacting the SRMP Sales Office.

203. Superconductive Thermometric Fixed Point Device

This SRM is composed of six (6) small cylinders of high-purity materials mounted in a threaded copper stud and enclosed in a measuring coil pair. It is intended to provide superconductive fixed points, i.e., temperature of transitions from the normal to the superconductive state.

SRM	Type	Material	Temperature (in K)
767a	Superconductive Thermometric Fixed Point Device	Niobium	9.2
		Lead	7.2
		Indium	3.4
		Aluminum	1.2
		Zinc	0.9
		Cadmium	0.5

203. Defining Fixed Point, International Temperature Scale, ITS-90 (solid forms)

These SRMs are for use in preparing defining fixed points of the International Temperature Scale of 1990 (ITS-90).

SRM	Type	Temperature (in °C)	Unit Size (in g)
740a	Zinc (Freezing Point)	419.527	200, shot
741a	Tin (Freezing Point)		In Prep
743	Mercury (Triple Point)	−38.8344	680, ampule
1744	Aluminum (Freezing Point)	660.323	200, shot
1746	Silver (Freezing Point)	961.78	300, shot

203. Secondary Reference Points (solid forms)

These SRMs are for use in preparing secondary reference-point devices and for calibrating thermometers, thermocouples and other temperature-measuring devices.

SRM	Type	Temperature (in °C)	Unit Size (in g ingot)
45d	Copper (Freezing Point)	1084.8	450
49e	Lead (Freezing Point)	327.45	600
742	Alumina, 99.9+%	2052	10 (powder)

203. Melting Point and Triple Point (liquid and powder forms)

These SRM fixed point devices are for use in the realization of internationally accepted secondary reference points and/or triple points.

SRM	Type	Temperature (in °C)	Unit Size (in g)
1968	Gallium, 99.9999+%	29.7646	25, sealed cell
1969	Rubidium, 99.9+%	39.3	154, sealed cell
1970	Succinonitrile, 99.999+%	58.0642	60, sealed cell
1971	Indium, 99.9999+%	156.598	100, sealed cell
1972	1,3-Dioxolan-2-one (Ethylene Carbonate), 99.999+%	36.3143	60, sealed cell
1973	n-Docosane, 99.999+%	43.879	60, sealed cell

203. Laboratory Thermometer (mercury in glass)

This thermometer is for use in clinical laboratories. Its main scale extends from 24.00 °C to 38.00 °C, in 0.05 °C divisions. It has an auxiliary scale from −0.20 °C to +0.20 °C.

SRM	Type	Calibrated Points (in °C)	Unit Size
934	Clinical Laboratory Thermometer	0, 25, 30, 37	1 each

203. Thermocouple Material, Platinum (wire form)

SRM	Type	Temperature Range (in °C)	Unit Size
1967	Pt, High Purity (99.999+%)	197 to 1767	0.051D × 100 cm

203. Vapor Pressure of Metals (rod and wire forms)

SRM	Type	Pressure Range (in Pa)	Temperature Range (in K, ITS-90)	Unit Size (in cm)
745	Gold	10^{-4} to 10^{+2}	1300 to 2100	wire, 0.14 × 15.2
746	Cadmium	10^{-6} to 10^{+1}	350 to 594	rod, 0.64 × 6.4

203. Thermal Conductivity of Graphite and Metals (rod form)

SRM/RM	Type	Unit Size (in cm)	Temperature Range (in K)	Conductivity at 293 K (in W/m/K)
1461	Stainless Steel	1.27D × 5.0	2 to 1200	14.1
1462	Stainless Steel	3.4D × 5.0	2 to 1200	14.1
8420	Electrolytic Iron	0.64D × 5.0	2 to 1000	77.9
8421	Electrolytic Iron	3.17D × 5.0	2 to 1000	77.9
8423	Sintered Tungsten	0.64D × 5.0	2 to 3000	173
8424	Graphite	0.64D × 5.0	5 to 2500	90.9
8425	Graphite	1.27D × 5.0	5 to 2500	90.9
8426	Graphite	2.54D × 5.0	5 to 2500	90.9

203. Thermal Expansion of Glass and Silica (rod form)

SRM	Type	Temperature Range (in K)	Unit Size (in cm)
731	Borosilicate Glass	L1: 80 to 680	0.64 × 5.1
		L2: 80 to 680	0.64 × 10.2
		L3: 80 to 680	0.64 × 15.2
736	Copper	L1: 20 to 800	0.64 × 5.1
738	Stainless Steel (AISI 446)	293 to 780	0.64 × 5.1
739	Fused Silica	L1: 80 to 1000	0.64 × 5.1
		L2: 80 to 1000	0.64 × 10.2
		L3: 80 to 1000	0.64 × 15.2

203. Thermal Resistance of Glass and Silica (solid forms)

SRM	Type	Unit Size (in cm)	Temperature Range (in K)	Thermal Resistance (in m^2K/W)
1449	Fumed Silica Board	60 × 60 × 2.54	297.1	1.2
1450b	Fibrous Glass Board	60 × 60 × 2.54	100 to 330	0.75
1452	Fibrous Glass Blanket	60 × 60 × 2.54	297.1	0.60
1459	Fumed Silica Board	30 × 30 × 2.54	297.1	1.2

204. Optical Properties

Molecular Absorption and Molecular Luminescence (film, filter, solid, and solution forms)

The optical SRMs for spectrophotometry are certified transfer standards that fall into three (3) general categories—transmittance, wavelength, and stray radiant energy—each of which addresses a specific instrumental parameter of an ultraviolet/visible absorption spectrometer that must be in control for accurate optical transmittance measurements. To obtain optimum verification results, each SRM must be used within the specified range of conditions for which it is intended.

SRM 930e: This SRM is for the verification and calibration of the transmittance and absorbance scales of visible absorption spectrometers. It differs from the prior series, SRM 930d, only with respect to tightened optical polishing tolerances. SRM 930e has been polished to a parallelism of two arc seconds or better, in such a way so as to reduce the optical deviation (relative to SRM 930d) and improve performance in instruments for which wavelength dispersion occurs *after* the light has passed through the filter. SRM 930e consists of three (3) individual Schott NG-type glass filters in separate metal cuvette-style holders and an empty filter holder. The nominal percent transmittances of the three filters are 10 % T, 20 % T, and 30 % T. The three filters are individually certified for transmittance at five (5) wavelengths in the visible spectrum: 440.0 nm, 465.0 nm, 546.1 nm, 590.0 nm, and 635.0 nm. The optical transmittance neutrality of SRM 930e is sufficient for the filters to be used to accurately verify absorption spectrometers with maximum spectral bandpasses ranging from 2.2 nm to 6.5 nm for the five wavelengths at which the transmittances are certified. When SRM 930e is used in combination with SRM 1930, a 6-point stepwise verification of the transmittance scale is possible over the transmittance range from 1 % T to 50 % T. A detailed discussion of this SRM and SRM 1930 are given in Special Publication 260–116 which accompanies each unit.

SRM 931e: This SRM is for the verification and calibration of the absorbance scales of ultraviolet and visible absorption spectrometers having narrow spectral bandpasses. SRM 931e consists of three (3) sets of four (4) solutions in sealed 10-mL ampules. The four solutions include a blank solution and three concentrations of an empirical inorganic solution prepared from high-purity cobalt and nickel metals dissolved in a mixture of nitric and perchloric acids. The user must transfer the blank and standard solutions to cuvettes of known pathlength. The spectrum has absorption maxima at 302 nm, 395 nm, and 512 nm, and a plateau in the region of 678 nm at which the absorbances are certified. The nominal absorbances of the three empirical inorganic solution standards are 0.3, 0.6 and 0.9, respectively, at wavelengths 302 nm, 395 nm, and 512 nm. At wavelength 678 nm, the nominal absorbances of the three solutions are 0.1, 0.2, and 0.3, respectively. The liquid filters may be used to verify absorption spectrometers with maximum spectral bandpasses ranging from 1.5 nm to 8.5 nm for the four wavelengths at which the absorbances are certified.

SRM 935a: This SRM is for the verification and calibration of the absorbance scales of ultraviolet absorption spectrometers having spectral bandpasses not exceeding 2 nm. Issued in 15-g units, SRM 935a consists of crystalline potassium dichromate of established purity. Solutions of ten (10) known concentrations of this SRM in 0.001 N perchloric acid (between 20 mg/kg and 200 mg/kg) are certified for their specific absorbances under well-defined conditions. The user must prepare the liquid solutions from SRM 935a and then transfer them to cuvettes of known pathlength. The certified specific absorbances for the solutions prepared may be converted to their corresponding reference absorbance values using Beer's Law. Acidic SRM 935a solutions may be prepared anywhere within the concentration range of 20 mg/kg to 200 mg/kg to provide a standard with the desired absorbance at a specified wavelength. The spectrum has absorption maxima at 257 nm and 350 nm, and absorption minima at 235 nm and 313 nm at which the specific absorbance values are certified, and also at 345 nm, near one of the predicted isobestic points of the spectrum. A detailed discussion of this SRM is given in Special Publication 260–54 which accompanies each unit.

SRM 936a: This SRM is for use in the evaluation of methods and the calibration of fluorescence spectrometers. Issued in 1-g units, SRM 936 consists of solid quinine sulfate dihydrate. It is certified for the relative molecular emission spectrum, $E(\lambda)$, in radiometric units for a solution of 1.28×10^{-6} mol/L quinine sulfate dihydrate in 0.105 mol/L perchloric acid using an excitation wavelength of 347.5 nm. The values of the molecular emission spectrum are certified at 5-nm wavelength intervals from 375 nm to 675 nm. The user must prepare the solution and transfer it to a cuvette of known pathlength. A detailed discussion of this SRM is given in Special Publication 260–64.

SRM 1921: This SRM is for use in the calibration of the wavelength scale of spectrometers in the infrared (IR) spectral region from 3 μm to 18 μm (540 cm to 3200 cm^{-1}). SRM 1921 consists of five (5) cards made of a matte finish polystyrene film, approximately 38 μm thick with a 25-mm diameter clear aperture and centered 38 mm from the bottom of a cardboard holder 5 cm × 11 cm × 2 mm in size. The certified wavelength values, corresponding peak wavenumber values for thirteen (13) absorption peak positions in the 3 μm to 18 μm range and a spectrum marked with arrows identifying the certified peaks, are provided with each unit. A detailed discussion of this SRM is given in Special Publication 260-122.

SRM 1930: This SRM complements SRM 930e for the verification and calibration of the transmittance and absorbance scales of visible absorption spectrometers. SRM 1930 consists of three (3) individual Schott NG-type glass filters in separate metal cuvette-style holders and an empty filter holder. The nominal percent transmittances of the three filters are 1 % T, 3 % T, and 50 % T. The three filters are individually certified for transmittance at five (5) wavelengths in the visible spectrum: 440.0 nm, 465.0 nm, 546.1 nm, 590.0 nm, and 635.0 nm. The optical transmittance neutrality of SRM 1930 is sufficient for the filters to be used to accurately verify absorption spectrometers with maximum spectral bandpasses ranging from 2.2 nm to 6.5 nm for the five wavelengths at which the transmittances are certified. When SRM 1930 is used in combination with SRM 930d, a 6-point stepwise verification of the transmittance scale is possible over the transmittance range from 1 % T to 50 % T. A detailed discussion of this SRM and SRM 930 is given in Special Publication 260–116 which accompanies each unit.

SRM 1931: This SRM is for use in the evaluation and calibration of the relative spectral response of fluorescence spectrometers. It consists of four fluorescence standards and a "blank" specimen mounted in anodized aluminum cuvette-sized holders. The standards are composed of inorganic phosphors in a sintered polytetrafluoroethylene matrix. The fluorescence standards are certified for the relative corrected emission spectrum, $E(\lambda)$, in energy/wavelength units. The values of the blue (400 nm to 550 nm), green (490 nm to 600 nm), yellow (490 nm to 740 nm) and orange (530 nm to 740 nm) emission spectra are certified at 2-nm wavelength intervals. SRM 1931 L and R are oriented for left- and right-handed fluorescence spectrometers, respectively, as defined by viewing the fluorescent sample along the excitation beam. If the first emission optical component is located to the right of the sample then this orientation is designated R, and if it is to the left then it is designated L.

SRM 2030a: This SRM is for use in the one-point verification of the transmittance and absorbance scales of spectrophotometers at the given wavelength and measured transmittance. SRM 2030a consists of one (1) glass filter in its holder and one (1) empty holder. The exposed surface of the glass is approximately 29 mm × 8 mm, measured from a point 1.5 mm above the base of the filter holder. The filter bears an identification number. The certified transmittance value at a wavelength of 465.0 nm and for a maximum spectral bandpass of 2.7 nm is provided for each unit. The value and uncertainty are unique to each unit and cover a period of two (2) years from date of certification. The uncertainty estimation is described in Special Publication 260-116.

SRM 2031: This SRM is for the verification and calibration of the transmittance and absorbance scales of ultraviolet and visible absorption spectrometers. SRM 2031 consists of three (3) individual non-fluorescent, fused-silica filters in separate metal cuvette-style holders and an empty filter holder. The nominal percent transmittances of the three filters are 10 % T, 30 % T, and 90 % T. The quartz base plates of the 10 % T and 30 % T filters carry different thicknesses of semi-transparent chromium metal that are optically contacted to quartz cover plates. The nominal 90%T filter is a single clear quartz plate. The three filters are individually certified for transmittances at ten (10) wavelengths in the ultraviolet and visible spectral regions: 250.0 nm, 280.0 nm, 340 nm, 360.0 nm, 400.0 nm, 465.0 nm, 500.0 nm, 546.1 nm, 590.0 nm, and 635.0 nm. The optical transmittance neutrality of SRM 2031 is such that wider spectral bandpasses can be used. Consequently, SRM 2031 is the only transmittance SRM that is suitable for use with those absorption spectrometers with large spectral bandpasses, e.g., 8 nm to 20 nm. A detailed discussion of this SRM is given in Special Publication 260-68.

NOTE: Because the 10 % T and 30 % T chromium-coated filters attenuate incident radiation by reflection to a large extent, SRM 2031 may possibly generate interreflections between optical surfaces in the sample compartment of some absorption spectrometers. Such interreflections may result in isochromatic stray radiant energy that affects the accuracy of the transmittance measurement. Consequently, when contemplating the purchase of SRM 2031, the user should contact the instrument manufacturer to verify that metal-on-quartz filters are compatible with the spectrometer.

SRM 2032: This SRM is for use in the assessment of heterochromatic stray radiation energy (stray light) in ultraviolet absorption spectrometers in the spectral region below 260 nm. Issued in 25-g units, SRM 2032 consists of reagent-grade crystalline potassium iodide (KI). Solutions of this SRM in distilled water are certified for their specific absorbances under well-defined conditions at 240 nm, 245 nm, 250 nm, 255 nm, 260 nm, 265 nm, 270 nm, and 275 nm. The KI solutions exhibit sharp cutoffs in transmittances below about 260 nm. The user must prepare a liquid KI solution from SRM 2032 and then transfer it to a cuvette of known pathlength. The certified specific absorbance for the solution prepared is then converted to its corresponding reference transmittance or absorbance value using Beer's Law. The amount of heterochromatic stray light in the absorption spectrometer at a wavelength below 260 nm may be determined from the equations given in the certificate.

SRM 2034: This SRM is for use in the verification and calibration of the wavelength scale of ultraviolet and visible absorption spectrometers having nominal spectral bandwidths not exceeding 3 nm. SRM 2034, a liquid consisting of 4% (w/v) holmium oxide in an aqueous solution of 10% (v/v) perchloric acid, is sealed in a non-fluorescent, fused-silica cuvette of optical quality. SRM 2034 is batch-certified for wavelength location of minimum transmittance of 14 bands in the spectral range from 240 nm to 650 nm for six spectral bandwidths from 0.1 nm to 3 nm. A detailed discussion of this SRM is given in Special Publication 260–102 which accompanies each unit.

SRM	Type	Wavelength Range (in nm)	Unit Size
930e	Glass Filters, Transmittance	440 to 635	3 filters/4 holders
931e	Liquid Filters, Absorbance	302 to 678	Set of 12 ampules
935a	Potassium Dichromate, UV Absorbance	235 to 350	15 g
936a	Quinine Sulfate Dihydrate, Fluorescence	375 to 675	1 g
1921	Infrared Transmission Wavelength	3 μm to 18 μm	5 polystyrene cards
1930	Glass Filters, Transmittance	440 to 635	3 filters/4 holders
1931	Fluorescence Corrected Emission Spectra	400 to 760	Set of 4 holders
2030a	Glass Filter, Transmittance	465.0	1 filter/1 holder
2031	Metal-on-Quartz Filters, Transmittance	250 to 635	In Prep
2032	Potassium Iodide, Stray Light	240 to 280	25 g
2034	Holmium-oxide Solution, Wavelength	240 to 650	1 sealed cuvette

204. Specular Spectral Reflectance (plate form)

These SRMs are for calibrating the reflectance scale of integrating sphere reflectometers used to evaluate materials for solar energy collectors and to calibrate reflectometers used in evaluating the appearance of polished metals and metal-plated objects.

SRM	Type	Wavelength Range (in nm)	Unit Size (in cm)
2003	First Surface, Aluminum on Glass	250 to 2500	In Prep
2011	First Surface, Gold on Glass	600 to 2500	5.1D × 1.2
2023	Second Surface, Aluminum on Fused Quartz	250 to 2500	5.1D × 0.6
2026	First Surface, Black Glass	250 to 2500	5.1D × 0.6

204. Infrared Reflectance (solid form)

This SRM is for establishing the accuracy of the near infrared (IR) wavelength scale of reflectance spectrophotometers.

SRM	Type	Wavelength Range (in nm)	Unit Size (in cm)
1920	Rare Earth Oxide Mixture	740 to 2000	holder: 5.1D × 1.2

204. Directional Hemispherical Reflectance (wafer form)

SRM	Type	Wavelength Range (in nm)	Unit Size (in cm)
2015	Opal Glass	400 to 750	2.5 × 5.0 × 0.64

204. Optical Rotation (powder form)

These SRMs are for calibrating or checking polarimetric apparatus. In aqueous solution, the optical rotation of SRM 17d is certified at three (3) wavelengths, while that of SRM 41c is certified at two (2) wavelengths. SRM 41c is also certified at one (1) wavelength in a dimethyl sulfoxide solution.

SRM	Type	Optical Rotation (in mrad) – Aqueous Solution Wavelength (in nm)			Unit Size (in g)
		546	589	633	
17d	Sucrose	711.64	604.26	519.17	60
41c	Dextrose	1101.1	931.8	798.6	70

204. Photography (chart form)

SRM 1010a is used to test the resolving power of cameras or of whole microcopying systems. It consists of five (5) charts printed photographically on paper, which have 26 high-contrast, 5-line patterns ranging in spatial frequency from one cycle per mm to 18 cycles per mm. Instructions for the use of the charts are supplied with each unit.

SRM	Type	Unit Size
1010a	Microcopy Resolution Test Chart	Set of 5 charts

205. Radioactivity

Radiation Dosimetry (wire form)

This SRM is a cobalt-in-aluminum alloy wire 0.5 mm in diameter and 1 m in length for use as a neutron density monitor standard.

SRM	Type	Cobalt Composition (in Wt. %)
953	Neutron density monitor wire (Co in Al)	0.116

Fission Track Glass (wafer form)

This SRM, which contains uranium, will aid laboratories performing fission track analyses in interlaboratory comparisons of data and in monitoring neutron fluences. The material was irradiated in the NIST 10 Megawatt Research Reactor, at two different neutron energies. Each unit consists of four (4) unirradiated glass wafers and two (2) irradiated wafers.

SRM	Uranium Composition (in mg/kg)	Uranium-235 (in Atom %)	Reactor Position	Neutron Fluence Copper Foil	Neutron Fluence Gold Foil
963a	0.823	0.2792	RT-4: (10^{14} n/cm^2)	39.5	43.0
			RT-3: (10^{14} n/cm^2)	41.2	45.8

205. Special Nuclear Materials

The U.S. Department of Energy New Brunswick Laboratory issues special nuclear reference materials as NBL Certified Reference Materials (CRMs). These CRMs include the plutonium and uranium assay and isotopic materials previously issued by the National Institute of Standards and Technology. All orders or inquiries should be addressed to: U.S. Department of Energy, New Brunswick Laboratory, 9800 S. Cass Avenue, Bldg. 350, Argonne, IL 60439-4899. Attn: Reference Materials Sales; Phone – (708) 252-2767; Fax – (708) 252-6256; TWX/Telex – 681701DOEANL

The SRMs in the following five pages are certified and distributed for the SRM Program by the NIST Radioactivity Group. The radionuclide types represented by these SRMs are suitable for a variety of measurement and instrument calibration needs. Detailed information about the Radioactivity SRMs and a form for license certification can be found in a separate catalog issued periodically by the Radioactivity Group. Inquiries about NIST Radioactivity SRMs or requests for copies of the Radioactivity catalog should be directed to the **Radioactivity Group, Ionizing Radiation Division, Room C114, Radiation Physics Building, National Institute of Standards and Technology, Gaithersburg, MD 20899, Phone: (301) 975-5531; Fax: (301) 926-7416.**

Requests for new or renewal SRMs can be submitted to the Radioactivity Group. Upon receipt, these requests are evaluated and interested customers are notified whether or not the SRMs can be made available.

NOTE: Certain radionuclides are not economical to maintain as SRMs because of short half lives or low customer demand.

NIST Special Publication 250, *Calibration Services Users Guide,* describes the procedure for requesting calibration of radionuclides not provided as SRMs. Requests for such tests should also be submitted, with full source information for approval of suitability, to the Radioactivity Group at the above address.

205. Radioactive Solutions

These SRMs are intended for the calibration of radioactivity-measuring instruments and for the monitoring of chemical and geochemical processes. They are calibrated in terms of activity per gram of solution. Each SRM is contained in a flame-sealed glass ampule or bottle and, except as noted, consists of the radionuclide dissolved in an aqueous solution (usually acidic).

SRM	Radionuclide	Decay Modes	Activity per gram (in $Bq \cdot g^{-1}$)	Time of Calibration (month/year)	Volume of Solution (mL)
4322B*	Americium-241	α	40	09/91	5
4332D*	Americium-243	α	40	12/94	5
4251C*	Barium-133	EC, γ	500 000	09/93	5
4222C	Carbon-14 (as hexadene)	β^-	50 000	09/90	5
4233C*	Cesium-137 Burn-up Standard	β^-, γ	700 000	11/89	5
4943	Chlorine-36	β^-	10 000	12/84	3
4915E*	Cobalt-60	β^-, γ	80 000	12/94	5
4329*	Curium-243	α	60	04/89	5
4320*	Curium-244	α	60	04/89	5
4370C*	Europium-152	β^-, EC, γ	90 000	02/87	5
4361B	Hydrogen-3 (as water)	β^-	1	08/87	490
4926D	Hydrogen-3 (as water)	β^-	3 000	07/89	18
4927E	Hydrogen-3 (as water)	β^-	500 000	07/91	3
4947C	Hydrogen-3 (as toluene)	β^-	300 000	03/87	4
4949C*	Iodine-129	β^-, γ	3 000	03/93	5
4929D	Iron-55	EC	40 000	08/85	5
4341*	Neptunium-237	α	100	03/94	5
4226C*	Nickel-63	β^-	1 000 000	In Prep	5
4326	Polonium-209	α, EC	90	03/94	5
4323A*	Plutonium-238	α	30	02/94	5
4338*	Plutonium-240	α	20	04/80	5
4340*	Plutonium-241	β^-	150	07/86	5
4334E*	Plutonium-242	α	25	12/89	5
4952C	Radium-226 Blank	–	0.000 2	08/91	5
4950E	Radium-226	α, γ	3	04/84	5
4965	Radium-226	α, γ	30	09/91	5
4966	Radium-226	α, γ	300	09/91	5
4967	Radium-226	α, γ	3 000	09/91	5
4339A	Radium-228	β^-	200	04/94	5
4919G*	Strontium-90	β^-	4 000	08/90	5
4234A*	Strontium-90	β^-	2 000 000	10/94	5
4288A	Technetium-99	β^-	40 000	12/94	5
4328A	Thorium-229	α	30	01/94	5
4324A	Uranium-232	α	40	11/93	5
4321B	Uranium-238 "natural uranium"	α	250	01/92	5
4276C*	Long-Lived Mixed Radionuclide:			09/88	5
	Antimony-125	β^-, γ	10 000		
	Europium-154	β^-, γ	10 000		
	Europium-155	β^-, γ	7 000		

* License certification is required of purchaser by NIST before shipment.

205. Radiopharmaceuticals (solution and gaseous forms)

These SRMs are intended for the calibration of radioactivity-measuring instruments. They are calibrated in terms of activity per gram of solution (except SRM 4415, which is calibrated in terms of activity). Each SRM is contained in a 5 mL flame-sealed glass ampule and, except for SRM 4415, consists of the radio-nuclide dissolved in an aqueous solution (usually acidic).

These SRMs are produced in collaboration with the Nuclear Energy Institute and, because of the short half lives, are available only at specific times. For the current production schedule contact the Radioactivity Group at the address given on page 107.

SRM	Radionuclide	Half Life (days)	Activity per gram ($MBq \cdot g^{-1}$)
4400N*	Chromium-51	27.7	4
4408D*	Cobalt-57	271.7	2
4416O*	Gallium-67	3.3	4
4421L*	Gold-195	183	1
4405B*	Gold-198	2.7	4
4417N*	Indium-111	2.8	5
4414C*	Iodine-123	0.6	60
4407S*	Iodine-125	59.6	1
4401T*	Iodine-131	8.0	5
4411B*	Iron-59	44.5	1
4420B*	Lead-203	2.2	3
4418L*	Mercury-203	46.6	1
4412S*	Molybdenum-99/Technetium-99m	2.7	10
4406M*	Phosphorus-32	14.3	2
4425A*	Samarium-153	1.9	4
4409D*	Selenium-75	119.8	1
4403B*	Strontium-85	64.9	1
4426A*	Strontium-89	50.0	1
4424*	Sulfur-35	87.4	1
4410HT*	Technetium-99m	0.3	1 000
4404Q*	Thallium-201	3.0	4
4402C*	Tin-113/Indium-113	115.1	1
4415R*	Xenon-133	5.2	Total 500
4419C*	Ytterbium-169	32.0	2
4427A*	Yttrium-90	2.7	1

* License certification is required of purchaser by NIST before shipment.

205. Alpha Particle Point Sources

These SRMs are intended for the calibration of alpha-particle detectors. Each SRM consists of a practically weightless deposit of the radionuclide electroplated on a thin platinum foil cemented to a monel disk.

SRM	Radionuclide	Principal Alpha Energies (MeV)	Activity (Bq)	Time of Calibration (month/year)
4904NG*	Americium-241	5.443, 5.486	2 000 to 7 000	05/86
4904SG*	Americium-241	5.443, 5.486	2 000 to 3 000	05/86
4906C*	Plutonium-238	5.456, 5.499	10 to 300	09/87
4906HC*	Plutonium-238	5.456, 5.499	1 000 to 50 000	10/87

* License certification is required of purchaser by NIST before shipment.

205. Carbon-14 Dating (solid form)

This SRM is an international standard for contemporary carbon-14 against which world-wide measurements can be compared. Each SRM consists of approximately 225 grams of a 450-kg lot of oxalic acid prepared by fermentation of French beet molasses from the 1977 spring, summer, and autumn harvests.

SRM	Material	Description
4990C	Oxalic Acid	Set of 8: 28 g each

205. Accelerator Mass Spectrometry (solution form)

This SRM is intended for the calibration of accelerator mass spectrometers used to measure beryllium isotopic ratios. It is calibrated in terms of the isotopic ratio. The SRM is contained in a flame-sealed glass ampule and consists of the nuclides dissolved in an aqueous solution (acidic).

SRM	Nuclides	Isotopic Ratio	Total Nuclide Concentration ($mg \cdot g^{-1}$)	Time of Calibration (month/year)	Volume of Solution (mL)
4235	Beryllium-10/Beryllium-9	3×10^{-11}	5	08/86	50

* License certification is required by NIST.

205. Gamma Ray Point Sources

These SRMs are intended for the calibration of gamma-ray detectors. Each SRM consists of a small deposit of radioactive material sealed between two layers of polyester tape that are mounted on an aluminum annulus.

SRM	Radionuclide	Principal Photon Energies (keV)	Activity (Bq)	Time of Calibration (month/year)
4241B*	Barium-133	81 to 384	200 000	06/81
4200B	Cesium-137/Barium-137m	662	40 000	09/79
4207B	Cesium-137/Barium-137m	662	300 000	03/87
4203D*	Cobalt-60	1173, 1332	20 000 to 800 000	02/84
4201B	Niobium-94	702, 871	4 000	04/70
4275C	Long-Lived Mixed Radionuclide:	27 to 1596		09/88
	Antimony-125		50 000	
	Europium-154		60 000	
	Europium-155		30 000	

* License certification is required of purchaser by NIST before shipment.

205. Radon Emanation (encapsulated solution form)

This SRM is intended for the calibration of radon-222 measuring instruments. It consists of a small heat-sealed polyethylene cylinder containing approximately 0.35 grams of radium-226 solution. The SRM is calibrated in terms of the radium-226 activity and in terms of the emanation fraction of the radon-222 under specified conditions.

SRM	Radionuclide	Activity (Bq)	Time of Calibration (month/year)
4968	Radium-226	3 to 500	09/91

205. Natural Matrix Materials (powder form)

SRM 4350B—Columbia River Sediment
This material was collected from a river downstream from a nuclear reactor facility. Concentrations of fission and activation products are elevated over typical world-wide levels. $^{239/240}Pu$ and ^{241}Am are very homogeneously distributed through the sample and are in acid-leachable forms. Inhomogeneity is 3% or better for other radionuclides.

SRM 4351—Human Lung
This material contains radioactivity concentrations on the order of 10^{-4} Bq g^{-1}. It has been freeze-dried, cryogenically ground, homogenized, and packed in a glass bottle under vacuum. There is significant inhomogeneity in $^{239/240}Pu$ which is unavoidable because plutonium was taken into the lungs in particulate form. Assessments of accuracy of measurement techniques can be improved by averaging over several samples.

SRM 4352—Human Liver
This material contains radioactivity concentrations on the order of 10^{-4} Bq g^{-1}. It has been freeze-dried, cryogenically ground, homogenized, and packed in a glass bottle under vacuum.

SRM 4353—Rocky Flats Soil Number 1
This material was collected within 13 cm of the soil surface at Rocky Flats, CO. $^{239/240}Pu$ and ^{240}Am concentrations are about an order of magnitude higher than typical world-wide levels. Approximately 10% of the plutonium is in a acid-resistant form. The material also contains "hot" particles and a statistical method is provided for dealing with these. Inhomogeneities, excluding hot particles, are on the order of 3% or better.

SRM 4354—Freshwater Lake Sediment
This material (gyttja) contains approximately 25 g of freeze-dried, pulverized freshwater lake sediment (approximately 50% organic by weight) in a polyethylene bottle. The SRM is intended for use in tests of measurements of environmental radioactivity contained in matrices similar to the sample, for evaluating analytical methods, or as a generally available calibrated "real" sample matrix in interlaboratory comparisons.

SRM 4355—Peruvian Soil
This material, provided in 75 g units, has non-measurable radioactivity concentrations for many fallout radionuclides and can be used as a blank or for sensitive tests of radioanalytical procedures at low-radioactivity concentrations for other radionuclides. The results of a trace-element study are given for 57 elements.

SRM 4357—Ocean Sediment **In Prep**
This SRM, provided in 80-g units, consists of sediments collected in the Chesapeake Bay and in the sea off of the British Nuclear Fuels Sellafield facility in the United Kingdom. The material, which has been freeze-dried, pulverized, homogenized, and radiation-sterilized, is intended for use in tests of low-level radiochemical methods for measurement of such fission products as ^{90}Sr and ^{137}Cs and actinides such as ^{232}Th, ^{238}U, and $^{239/240}Pu$.

206. Electrical Properties

Electrical Resistivity and Conductivity of Metals (rod form)

These materials are for evaluating methods of measuring electrical resistivity over wide temperature ranges.

SRM/RM	Type	Temperature Range (in K)	Resistivity at 293 K (in μΩ · cm)	Unit Size (in cm)
1461	Stainless Steel	5 to 1200	80.5	rod: 1.27D × 5.0
1462	Stainless Steel	5 to 1200	80.5	rod: 3.40D × 5.0
8420	Electrolytic Iron	6 to 1000	10.1	rod: 0.64D × 5.0
8421	Electrolytic Iron	6 to 1000	10.1	rod: 3.17D × 5.0
8423	Sintered Tungsten	4 to 3000	5.4	rod: 0.64D × 5.0

206. Electrical Resistivity and Conductivity of Silicon (block and wafer forms)

SRMs 1521 and 1523 are sets of two wafers each, intended primarily for use as reference standards for measuring semiconductor resistivity and eddy current. SRMs 2526, 2527, 2528, and 2529 are sets of 16 silicon chips, each mounted on beveling blocks, intended to provide a number of resistivity-scale reference points for calibrating spreading resistance measurements of (111) p-type and n-type (SRMs 2526 and 2527) and (100) p-type and n-type (SRMs 2528 and 2529) silicon. SRMs 2541 through 2547 consist of single wafers, intended for use as reference standards for sheet resistance and resistivity measurements utilizing the four-point probe method. Each wafer is made of Czochralski-grown, boron-doped silicon with a (100) crystallographic orientation.

SRM	Type	Resistivity (in Ω · cm)	Unit Size (in mm)
1521	Silicon Resistivity	0.1 and 10	Set of 2: 51D × 0.63
1523	Silicon Resistivity	0.01 and 1.0	Set of 2: 51D × 0.63
2526	Spreading Resistance	0.001 to 200	Set of 16: 5 × 10 × 0.625
2527	Spreading Resistance	0.001 to 200	Set of 16: 5 × 10 × 0.625
2528	Spreading Resistance	0.001 to 200	Set of 16: 5 × 10 × 0.625
2529	Spreading Resistance	0.001 to 200	Set of 16: 5 × 10 × 0.625
2541	Silicon Resistivity	0.01	100D × 0.625
2542	Silicon Resistivity	0.1	100D × 0.625
2543	Silicon Resistivity	1	100D × 0.625
2544	Silicon Resistivity	10	100D × 0.625
2545	Silicon Resistivity	25	100D × 0.625
2546	Silicon Resistivity	100	100D × 0.625
2547	Silicon Resistivity	200	100D × 0.625

206. Residual Resistivity Ratio (rod form)

This SRM is a set of five (5) aluminum rods for use in checking four-terminal dc and eddy current decay techniques. The residual resistivity ratio (RRR), $\rho(273\ K)/\rho(4\ K)$, is a sensitive indicator of purity and of the mechanical state of a material.

SRM	Type	RRR Values	Unit Size (in cm)
769	Aluminum	130, 683, 1205, 2650, and 11,000	0.64D × 5.2

206. Superconducting Critical Current (wire form)

This SRM is for checking the performance of measurement systems used in superconductor technology. It consists of 2.2 m of a multifilamentary niobium titanium, copper-stabilized superconducting wire wound in a single layer onto a spool with a core diameter of 8.7 cm.

SRM	Type	Magnetic Field (in T)	Critical Current (in A)
1457	Nb–Ti Wire	2.000	293.30
		4.000	187.38
		6.000	124.72
		8.000	69.72

207. Metrology

Scanning Electron Microscope (SEM)

These SRMs are for calibrating the magnification scale and evaluating the performance of scanning electron microscopes. SRM 484g, on a 6.5-mm specimen mount, can be used to calibrate the magnification scale of an SEM from 1000 to 20,000 X. SRM 2069b consists of graphitized rayon fibers with smooth and uniform edges on a 3-mm SEM specimen mount. SRM 2090 will consist of a silicon chip on a silicon-wafer simulating mount and is being developed to meet the SEM needs of the semiconductor industry.

SRM	Type	Spacings	Size
484g	SEM Magnification Standard	0.5 to 5 μm	In Prep
2069b	SEM Performance Standard	2 to 4 mm	12 mm D
2090	SEM Magnification Standard	>0.5, >10 μm	In Prep

207. Optical Microscope Linewidth Measurement (wafer form)

These SRMs are for use in calibrating optical microscopes used to measure the widths of opaque lines and clear spaces on integrated-circuit photomasks. They can also be used to calibrate line spacings and line-to-space ratios. They are not for use with partially transmitting materials, in reflected light with opaque materials, or in a scanning electron microscope. SRMs 473 and 475 are patterned on antireflecting chromium; SRM 476 is patterned on bright chromium.

SRM	Type	Spacings (in μm)	Unit Size (in cm)
473	Linewidth Measurement Standard	2 to 70	12.7 × 12.7 × 0.23
475	Linewidth Measurement Standard	2 to 36	6.35 × 6.35 × 0.15
476	Linewidth Measurement Standard	0.5 to 12	6.35 × 6.35 × 0.15

207. Depth Profiling (wafer form)

SRMs 2135c and 2136 are for calibrating equipment used to measure sputtered depth and erosion rates in surface analysis. SRM 2135c will be certified for total chromium and total nickel thickness, for individual layer uniformity, for Ni/Cr bi-layer uniformity, and for individual layer thickness. SRM 2136 is certified for total Cr thickness of seven individual layer thicknesses. SRM 2137 is for calibrating the secondary ion response to minor and trace levels of boron in a silicon matrix.

SRM	Type	Value	Unit/Size (in cm)
2135c	Ni-Cr Thin-Film Depth Profile Standard	In Prep	1 × 2.54 × 0.04
2136	Cr/CrO Thin-Film Depth Profile Standard	175.3 μm/cm^2	1 × 2.54 × 0.04
2137	B Implant in Si Depth Profile Standard	$^{10}B - 1.018 \times 10^{15}$ atoms/cm^2	1 × 1

207. Optical Fiber Geometry (solid form)

SRM 2520 is intended for calibrating video microscopes or gray-scale systems used for fiber geometry measurements during fiber manufacture. It consists of a short length of bare fiber in an aluminum housing. The end of the fiber specimen has been carefully cleaved and is within approximately one-half wavelength of perpendicularity to the axis of the fiber. The diameter of each specimen is individually certified at 0, 45, 90, and 135 degree angles.

SRM	Type	Certified Diameter
2520	Optical Fiber Diameter	125 μm

207. Copper and Chromium Coating on Steel (plate form)

These SRMs are used to measure the thickness of nonmagnetic coatings on steel. The steel substrates have the properties of AISI 1010 steel and may be used to measure the thickness of paint and other organic coatings on steel, as well as zinc (galvanized) and other nonmagnetic metallic coatings.

SRM	Unit Size 30×30 mm	Coating Thickness, nominal (in mils)	(in μm)
1357	Set of 3	0.2, 0.8, 2.0	base, 6, 20, 48
1358	Set of 3	3.1, 9.8, 39	base, 80, 225, 1000
1359	Set of 4	2.0, 5.5, 20, 32	48, 140, 505, 800
1360	Set of 4	0.1, 0.2, 0.5, 0.8	2.5, 6, 12, 20
1361a	Set of 4	0.2, 0.5, 1.0, 2.0	6, 12, 25, 48
1362a	Set of 4	1.6, 3.1, 5.5, 7.9	40, 80, 140, 205
1363a	Set of 4	9.8, 16, 20, 26	255, 385, 505, 635
1364a	Set of 4	32, 39, 59, 79	800, 1000, 1525, 1935

207. Solder Thickness (plate form)

This SRM is for calibrating X-ray fluorescence equipment. Each unit, which consists of a 1.5 cm × 1.5 cm plate of an electroplated tin-lead alloy coating on a copper substrate, is individually certified for composition and mass per unit area.

SRM	Type	Composition	Coating Thickness, nominal (in μin)	(in μm)
2321	Sn-Pb Alloy	Sn: 40 Pb: 40	295	7.5

207. Gold Coating on Fe-Ni-Co Alloy (plate form)

SRM	Unit Size 15×15 mm	Coating Mass (in mg/cm^2)	Coating Thickness, nominal (in μin)	(in μm)
1371	1 each	1.5	30	0.8
1373	1 each	6.0	120	3
1374	1 each	14.0	280	7

207. Ellipsometry (wafer form)

These SRMs are issued primarily to evaluate the accuracy of ellipsometers and can also be used as an aid in the calibration of various other optical thickness-monitoring instruments. Each unit is certified for the ellipsometric parameters delta (Δ) and psi (Ψ) at the vacuum wavelength $\lambda = 633.0$ nm, and for the derived values of the thicknesses and indices of refraction of the SiO_2 and Si layers.

SRM	Type	Unit Size 76 mm D	Thickness (in nm)
2531	Thin Film Thickness	1 each	50
2532	Thin Film Thickness	1 each	100
2533	Thin Film Thickness	1 each	200
2534	Thin Film Thickness	1 each	25
2535	Thin Film Thickness	1 each	14
2536	Thin Film Thickness	1 each	10

207. Oxygen Concentration in Silicon (wafer form)

SRM 2551 is for the calibration of infrared spectrophotometers used to measure the 1107 cm^{-1} interstitial oxygen peak in silicon. Each unit is individually certified and consists of a set of three silicon wafers; one each of a low, medium and high oxygen level Czochralski specimen. A float zone specimen of minimum oxygen concentration is also included in each set. Certified values are provided in ppma, mg/kg and atoms/cm.

SRM	Type	Unit Size (in cm)	Concentration (in mg/kg, nominal)
2551	Oxygen in Silicon	Set: 4×2.5	L – 10 M – 13 H – 15 FZ – (<0.1)

207. NIST Time Software

The NIST Automated Time Service (ACTS) is a telephone time service designed to provide computers with telephone access to NIST time at occurrences approaching 1 millisecond (0.001 s). Features of the service include automated compensation for telephone-line delay, advanced alert for changes to and from daylight savings time and advanced notice of insertion of leap seconds. The ASCII-character time code should operate with standard modems and most computer systems. While the system can be used to set up computer time-of-day, simple hardware can be developed to set non-computer clock systems. **The telephone number for ACTS is (303) 494-4774.**

SRM	Type	Unit Size
8101a	Automated Computer Time Service (ACTS)	13.34 cm diskette

208. Ceramics and Glasses

Chemical Resistance [Durability] of Glass (solid form)

These SRMs are for checking test methods and calibrating equipment used to determine the resistance of glass containers to chemical attack. The values given represent the volume of 0.02 N sulfuric acid used to titrate to the methyl-red end point the alkaline extract from a crushed sample of glass after exposure to high-purity water at 121 °C.

SRM	Type	Unit Size	mL of N/50 H_2SO_4
622	Soda-Lime Silica	2.2 kg	7.67
623	Borosilicate	2.2 kg	0.34

208. Electrical Properties of Glass (bar and powder forms)

SRM 624 is for checking test methods and for calibrating equipment used to determine the dc volume resistivity of glass per ASTM C 657. SRM 774 is for checking methods used to determine dielectric constant and ac loss characteristics of insulating materials per ASTM D 150.

SRM	Type	Unit Size (in cm)	Value
624	Lead-Silica, for dc resistivity	5×5×0.5	$\log_{10}\rho \sim 9.9$ Ω-cm at 300 °C
774	Lead-Silica, for dielectric constant	5×5×2.5	K ~ 7.47 at 100 Hz
1414	Lead-Silica, for resistivity (molten range)	4×4×12	13.5 Ω-cm at 1300 °C

208. Viscosity of Glass (bar form)

SRMs 710a, 711, and 717a are for checking the performance of high-temperature viscosity equipment (rotating cylinders) and low-temperature viscosity equipment (fiber elongation, beam bending, parallel plates, etc.).

SRM	Type	Temperature (°C) at Log 10 Viscosity (in Pa · s*)										
		1	2	3	4	5	6	7	8	9	10	11
710a	Soda-Lime-Silica	1464	1205	1037	918							
711	Lead-Silica	1327.1	1072.8	909.0	794.7	710.4	645.6	594.3	552.7	518.2	489.2	464.5
717a	Borosilicate	1555.4	1256.5	1065.1	932.1							

* SI unit. Replaces term, "poise". ($Pa \cdot s = poise \times 10^{-1}$)

208. Viscosity Fixpoints (solid forms)

These SRMs are for the calibration of equipment for the determination of the softening, annealing, and strain points of glass.

SRM	Type	Unit Size	Softening Point, °C	Annealing Point, °C	Strain Point, °C
709	Extra Dense Lead	4 cm × 4 cm × 5 cm	384	328	311
710a	Soda-Lime-Silica	10 cm × 10 cm × 4 cm	730.6	(545)	(504)
711	Lead-Silica	4 cm × 4 cm × 12 cm	602	432	392
712	Mixed Alkali Lead Silicate	225 g	528	386	352
713	Dense Barium Crown 620/603	225 g	738	631	599
714	Alkaline Earth Alumina Silicate	225 g	908	710	662
716	Neutral	250 g	794	574	530
717	Borosilicate	4.2 cm × 4.2 cm × 12.5 cm	719	513	470

208. Relative Stress Optical Coefficient (bar form)

This glass is for calibrating instruments used to measure relative stress optical coefficient of glass.

SRM	Type	Unit Size	Relative Stress Optical Coefficient (C) at λ=546.1 nm (Value × 10^{-12} m^2/N)
709	Extra Dense Lead	4 cm × 4 cm × 5 cm	C = −1.359

208. Glass Liquidus Temperature (solid form)

These SRMs are for checking test methods and for calibrating equipment used to determine the liquidus temperature of glass by the gradient furnace methods per ASTM C 829.

SRM	Type	Unit Size	Method	Temperature, °C
773	Soda-Lime-Silica	2.5 cm × 2.5 cm × 0.6 cm	A (boat)	988
			B (perforated plate)	991
1416	Aluminosilicate	22 pieces tubing (250 g)	A (boat)	1147

209. Miscellaneous Properties

209. X-ray Diffraction (powder and solid forms)

SRMs 656, 676, 674a, 1878a, and 1879a consist of high phase purity materials for use in the quantitative analysis of samples by the internal standard method. SRM 656, a silicon nitride, is certified for both α and β polymorphs. SRMs 640b, 660, 675, and 1976 consist of materials with select crystallographic and microstructure properties used in the evaluation of diffraction equipment for the following variables; 1) d-spacing or line position, 2) line or instrument intensity, and 3) instrumental or sample contributions to the shape of reflection profiles. SRM 1976, a sintered alumina plate, is also certified with respect to lattice parameters as well as 12 relative intensity values from 25 to 145 degrees 2Θ (Cu K_α).

SRM	Type	XRD Application	Lattice Parameters (in nm)	Unit Size (in g)
640b	Silicon Powder 2Θ/d-Spacing	Line Position	0.5430940	7.5
656	Silicon Nitride	Quantitative Analysis	α-(0.7752630/0.5619372)	10
			β-(0.7602293/0.2906827)	10
660	LaB_6-2Θ	Line Profile	0.415695	3
674a	Powder Diffraction Intensity	Quantitative Analysis		
	α-Al_2O_3 (corundum)		(0.4759397/1.299237))	10
	CeO_2 (fluorite)		(0.5411102)	10
	Cr_2O_3 (corundum)		(0.4959610/1.358747)	10
	TiO_2 (rutile)		(0.4593939/0.2958862)	10
	ZnO (wurtzite)		(0.3249074/0.5206535)	10
675	Mica Low 2Θ	Line Position	0.998104	7.5
676	Alumina (corundum)	Quantitative Analysis	0.475919/1.299183	20
1976	Alumina Plate, Sintered	Instrument Sensitivity	0.4758846/1.299306	4.5 cm × 0.16 cm

Values in parentheses are not certified and are given for information only.

209. X-ray Diffraction of Ferrous Materials (disk and wafer forms)

SRMs 487 and 488 are for calibrating X-ray diffraction equipment used in determining the amount of retained austenite in ferrous materials. SRM 493 is for calibrating X-ray diffraction and Mössbauer equipment to determine the relative amounts of iron carbide in steel.

SRM	Type	Unit Size (in cm)
487	Austenite in Ferrite 30%	disk: 2.1D × 0.24
488	Austenite in Ferrite 2.5%	disk: 2.1D × 0.24

209. X-ray Stage Calibration (solid forms)

These SRMs are to be used to check the dimensional accuracy of x-ray inspection systems.

SRM	Type	Unit Size (in mm)
1842	Calibration Board (X and Y dimensions)	Board: 300 × 300 × 3
1843	Calibration Specimen (Z dimension)	Triangular Block: 37 × 20 × 12

209. Density and Refractive Index (liquid and solid forms)

These SRMs are for reference in the determination of the density of liquids and solids. The certified densities of SRM 211d was measured with a special-design picnometer; the certified refractive indexes were measured with a precision spectrometer. The certified densities of SRMs 1826 and 1827 were determined by means of hydrostatic weighing.

SRM	Type	Unit Size	Density* (in g/cm^3)	Refractive Index **
211d	Toluene	5-mL ampule	In Prep	
1820	Borosilicate Glass	slab – 3.8 cm × 3.8 cm × 0.6 cm	(2.292)	1.48669
1822	Soda-Lime Glass	slab – 3.8 cm × 3.8 cm × 0.6 cm		1.52876
1826	Soda-Lime Glass	button – 3.20 cm × 1.3 cm	2.549382	
1827	Lead Silica Glass	slab – 0.6 cm × 4.0 cm × 2.5 cm	3.04948	

* Values are at 25 °C.
** Values are at 20 °C and 435.83 nm (mercury spectral source).
Values in parentheses are not certified and are given for information only.

209. Bleached Kraft Pulps (sheet form)

These Reference Materials, RMs 8495 Northern Softwood Bleached Kraft Pulp and 8496 Eucalyptus Hardwood Bleached Kraft Pulp, are intended primarily for use in fundamental studies on the physical properties of fibers and paper sheets. The materials selected for these two RMs are bleached dried lap pulp, each from a single lot of a standard commercial production run. The materials were selected because of their differing fiber size, differing papermaking properties, and similarity to commercially available materials.

RMs 8495 and 8496 were developed and prepared with input and support from the Pulp Material Research Committee (PMRC), a sub-committee of the Fundamental Research Committee. These materials were donated by industry and are being distributed by the Standard Reference Materials Program. At this time, no extensive property measurements have been made on these materials beyond ensuring they were within the control limits of the normal production run. A measurement error study is in progress with participation by international paper technical laboratories. As results become available, they will be published and added to the Report of Investigation that accompanies each of these materials.

RM	Type	Unit Size
8495	Northern Softwood	10 standard lap sheets × 0.5 kg
8496	Eucalyptus Hardwood	10 standard lap sheets × 0.5 kg

Engineering Materials

Standard Reference Materials

for

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301. Sizing

Particle Size (powder and solid forms)

These SRMs are for evaluating and calibrating various type of particle size measuring instruments, including light and electrical zone flow-through counters, optical and electron microscopes, sedigraphs, and wire cloth sieving devices. SRM 659 consists of equiaxed silicon nitride primary particles with a minimal amount of large agglomerates; SRM 1978 consists of granular, irregular-shaped zirconium oxide primary particles with a minimal amount of large agglomerates. SRMs 1003b, 1004a, 1017b, 1018b and 1019a each consist of soda-lime glass beads covering a particular size distribution range. SRMs 1690, 1691, 1692 and 1963 are commercially-manufactured latex particles in a water suspension. SRMs 1960 and 1961 (also called 'space beads') are latex particles produced by the National Aeronautics and Space Administration (NASA) during the Challenger STS-6 and STS-11 missions, respectively. SRM 1965 consists of two different groupings of the SRM 1960 particles.

SRM	Type	Particle Size (in μm)	Unit Size
659	Silicon Nitride	0.2 to 10	5 vials: 2.5 g each
1003b	Glass	10 to 60	25 g
1004a	Glass	40 to 170	70 g
1017b	Glass	100 to 310 nominal	In Prep
1018b	Glass	225 to 780 nominal	In Prep
1019a	Glass	760 to 2160	200 g
1690	Polystyrene (0.5 Wt. % in H_2O)	0.895	5-mL vial
1691	Polystyrene (0.5 Wt. % in H_2O)	0.269	5-mL vial
1692	Polystyrene (0.25 Wt. % in H_2O)	2.982	5-mL vial
1960	Polystyrene (0.4 Wt. % in H_2O)	9.89	5-mL vial
1961	Polystyrene (0.5 Wt. % in H_2O)	29.64	5-mL vial
1963	Polystyrene (0.5 Wt. % in H_2O)	0.1007	5-mL vial
1965	Polystyrene	9.94	1 slide
1978	Zirconium Oxide	0.33 to 2.19	5 g

301. Cement Turbidimetry and Fineness

This SRM is for calibrating the Blaine fineness meter according to the latest issue of Federal Test Method Standard 158, Method 2101 or ASTM Designation C 204; to calibrate the Wagner turbidimeter according to ASTM Designation C 115; and to determine sieve residue according to ASTM Designation C 430. Each set consists of twenty (20) sealed vials, each containing approximately 10 g of cement.

SRM	Type	Properties Certified	Value
114p	Portland Cement	Residue on 45 μm (No. 325) sieve	8.24 %
		Specific Surface area (Wagner turbidimeter)	2086 $cm^2 \cdot g^{-1}$
		Specific Surface area (Air permeability)	3774 $cm^2 \cdot g^{-1}$

301. Electrophoretic Mobility, μ_E (suspension form)

SRMs 1980 and 1981 are intended for use in the calibration and evaluation of equipment used to measure electrophoretic mobility. Each consists of a goethite suspension saturated with phosphate in a sodium perchlorate electrolyte solution.

SRM	Type	Properties Certified	Unit Size
1980	Goethite (α–FeOOH)	$+\mu_E$, $-2.53\ \mu m \cdot cm/V \cdot s$	40 mL
1981	Goethite (α–FeOOH)	In Prep	

301. Surface Area of Powders

These materials are for calibrating and checking instruments used to determine the specific surface area of powders by the Brunauer, Emmett and Teller (BET) method. RMs 8570, 8571, and 8572 are issued by NIST in cooperation with ASTM. Their surface areas were determined by both the static (volumetric) and single-point methods.

RM	Type	Surface Area (in m^2/g)		Unit Size (in g)
		Static	Single Point	
8570	Calcined Kaolin	10.9	10.3	25
8571	Alumina	158.7	153.2	25
8572	Silica-Alumina	291.2	277.6	25

302. Surface Finish

Microhardness (block form)

These SRMs are for use in calibrating and checking the performance of microhardness testers. SRMs 1893 through 1907 are 1.25 cm × 1.25 cm (SRM 2798 is 1.35 cm × 1.35 cm) and was made by electroforming the test metal on AISI 1010 steel substrate. SRMs 2830 and 2831 are intended to meet the needs of the structural, electronic and biomedical ceramics communities.

SRM	Type	Load (in Newtons)	Hardness (in kg/mm^2)
1893	Bright Copper (Knoop)	0.245, 0.490, 0.981	125
1894	Bright Copper (Vickers)	0.245, 0.490, 0.981	125
1895	Bright Nickel (Knoop)	0.245, 0.490, 0.981	600
1896	Bright Nickel (Vickers)	0.245, 0.490, 0.981	600
1905	Bright Nickel (Knoop)	2.943	600
1906	Bright Nickel (Knoop)	4.905	600
1907	Bright Nickel (Knoop)	9.81	600
2798	Bright Nickel (Vickers)	4.905	600
2830	Ceramic, Silicon Nitride (Knoop)	In Prep	
2831	Ceramic, Tungsten Carbide (Vickers)	In Prep	

302. Abrasive Wear (block form)

This SRM is for use in the dry sand/rubber wheel abrasion test per ASTM G65, Procedure A.

SRM	Type	Unit Size (in cm)
1857	D–2 Tool Steel	2 blocks: 0.78 × 2.5 × 7.6

302. Corrosion (plate form)

This SRM is for determining the reliability of step test measurements of electrochemical potential and thickness of multilayered nickel deposits. It consists of a 5.0 × 5.0 cm plate of copper-plated steel over which a duplex nickel coating has been deposited.

SRM	Type	Step Test Potential (in mV)	Nickel Coating Thickness (in μm)	
			Bright	Semibright
2350	Nickel Step Test	110 to 150	7	20

302. Surface Roughness (block form)

These SRMs are for calibrating stylus instruments that measure surface roughness. These electroless-nickel coated steel blocks have a sinusoidal roughness profile machined on the top surface.

SRM	Type	Roughness, R_a (in μm)	Wavelength, D (in μm)	Unit Size (in cm)
2071a	Sinusoidal Roughness	0.3	100	block: 2.4 × 3.3
2072	Sinusoidal Roughness	1.0	100	block: 2.4 × 3.3
2073a	Sinusoidal Roughness	3.0	100	block: 2.4 × 3.3
2074	Sinusoidal Roughness	1.0	40	block: 2.4 × 3.3
2075	Sinusoidal Roughness	1.0	800	block: 2.4 × 3.3

303. Nondestructive Evaluation

303. Dye Penetrant Test Blocks

These SRMs are for checking the performance of liquid dye penetrants and dye penetrant crack detection systems and devices for surface defect detection. These test blocks, composed of a laminate cross section of electrodeposited nickel and copper, have four (4) synthetic cracks, approximately 0.2 μm, 0.5 μm, 1 μm, and 2 μm wide.

SRM	Type	Surface	Unit Size (in cm)
1850	Penetrant Test Block	Bright Finish	5D × 1
1851	NDE Penetrant Test Block	Matte Finish	5D × 1

303. Artificial Flaw for Eddy Current NDE

This Reference Material (RM) 8458 provides a flaw of known size and geometry that closely resembles an actual fatigue crack. It is intended to produce a response suitable for calibrating eddy current nondestructive evaluation (NDE) systems. The flaw size is 3.0 mm × 0.1 mm long by 1.0 mm deep in a 7 cm × 7 cm × 2 cm block of 7075–T651 aluminum alloy, heat treated to the T6 temper.

303. Magnetic Particle Inspection

SRM 1853 provides a means for obtaining a leakage field of known value. Such a field is useful for verifying the magnetic properties of particles used in Magnetic Particle Inspection (MPI). Each individually calibrated ring was machined from vacuum arc remelted 52100 steel and has a series of holes machined at various depths below the surface.

SRM	Type	Leakage Field Gradient (in Oe/cm)		Unit Size (in cm)
1853	Magnetic Particle Test Ring	min. A	50 to 2000	12.7D × 2.2
		max. A	100 to 2500	

304. Automatic Data Processing

304. Magnetic Computer Storage Media

These SRMs are for evaluating the performance of magnetic computer storage media and systems in accordance with relevant standards and for maintaining control over their production. Each SRM is individually calibrated and certified relative to NIST Master Standard Reference Tapes.

SRM	Type	Used by Standard(s)	Unit Size
3201	Secondary Standard Magnetic Tape—12.65 mm wide tape, certified for signal amplitude, typical field resolution, overwrite as peak shift at 262 and 394 flux transitions per mm.	ANSI X3.181 X3.197	cartridge
3202	Secondary Standard Magnetic Tape—12.65 mm wide tape certified for signal amplitude, typical field, resolution and overwrite at a data density of 1491 cycles per mm.	ANSI X3.180	cartridge
3203	Secondary Standard Magnetic Tape—6.30 mm wide, certified for signal amplitude, typical field and resolution at 394 flux transitions per mm.	ANSI X3.235	cartridge
3204	Secondary Standard Magnetic Tape—6.30 mm wide, certified for signal amplitude, typical field and resolution at 492 flux transitions per mm.	ANSI X3.325	cartridge
3217	Secondary Standard High Density Magnetic Tape Cartridge—6.30 mm wide tape, certified for signal amplitude outputs at 252 and 394 flux transitions per mm.	ANSI X3.116, X3.127, X3.136	cartridge

305. Fire Research

Surface Flammability (sheet form)

This SRM is for checking the operation of radiant panel test equipment in accordance with the procedures outlined in ASTM E162–78.

SRM	Type	Certification	Unit Size (in cm)
1002d	Hardboard Sheet	Flame Spread Index, I = 153 Heat Evolution Factor, Q = 36.5	Set of 4: 15.2 × 45.7 × 0.63

305. Smoke Density Chamber (sheet form)

These SRMs are certified for maximum specific optical density and are for performing operational checks of smoke density chambers.

SRM	Type	Maximum Specific Optical Density	Unit Size (in cm)
1006c	Non-flaming Exposure Condition (α-cellulose)	Dm (corr.) = 178	6 sheets: 0.05 (thickness)
1007b	Flaming Exposure Condition (plastic)	Dm (corr.) = 421 to 493	3 sheets: 25.4 × 25.4 × 0.076

305. Smoke Toxicity (granular and sheet forms)

SRM 1048 is for checking the operation of the Cup Furnace Smoke Toxicity Method under two (2) observation periods. It consists of eight (8) sheets, 16 cm × 16 cm × 0.76 cm each, of acrylonitrile-butadiene-styrene copolymer. SRM 1049 is for checking the operation of the University of Pittsburgh I Smoke Toxicity Method. It consists of 150 g of Nylon 6/6 granules which is enough to determine the LC_{50} value four (4) times.

SRM	Type	Combustion Mode	Observation Time	Values	
				LC_{50}	N-Gas
1048	Smoke Toxicity (ABS sheets)	Flaming	WE *	27	1.4
			WE & PE **	25	1.5
		Nonflaming	WE *	58	1.2
			WE & PE **	53	1.4
1049	Smoke Toxicity (Nylon 6/6)		30–Min. Exposure plus 10–Min. Post-Exposure	4.4	

* WE = within 30 min.
** WE & PE = 30 min + 14 d.

305. Flooring Radiant Panel (sheet form)

This SRM consists of three (3) sheets of kraft paperboard. It is for checking the operation of flooring radiant panel test apparatus used to measure critical radiant flux as per ASTM E648.

SRM	Type	Critical Radiant Flux	Unit Size (in cm)
1012	Flooring Radiant Panel	0.36 W/cm^2	104.1 × 25.4 × 0.305

309. Miscellaneous Performance Engineering Materials

309. Charpy V-Notch Test Blocks

These SRMs are test specimens intended for the certification of Charpy V-Notch testing machines in accordance with ASTM Standard E 23. Each SRM unit consists of five 10 mm × 10 mm × 54 mm steel bars. SRMs 2092 and 2096 are made from 4340 alloy steel; SRM 2098 is made from a high strength maraging steel. The bars are fabricated from vacuum melted, vacuum arc remelted steel, cut to finished lengths, stamped, heat-treated, and machined in SRM lots of ~1200 specimens each. Sample specimens taken at random from each lot, are then tested at the NIST Boulder Laboratory on Charpy V-Notch test reference machines and the data obtained, are statistically evaluated to assure the quality of the lot and to establish its certified energy value.

SRM	Type	Energy Range (in J)	Energy Range (in kgf · m)	Energy Range (in ft · lbf)
2092	Low Energy	12.2 to 20.3	1.2 to 2.1	9.0 to 15.0
2096	High Energy	88.1 to 115.2	9.0 to 11.7	65.0 to 85.0
2098	Super High Energy	210.0 to 230.0	21.4 to 23.5	155.0 to 170.0

309. Socketed Ball Bar

This SRM is for measuring the performance of coordinate measuring machines (CMMs) as per ASME Standard B89.1.12. It consists of a set of three (3) precision balls pinned and cemented onto threaded shafts, one (1) table-mount magnetic socket, one (1) ram-mount magnetic socket, and five (5) partially insulated extension tubes—50 mm, 100 mm, 200 mm, 400 mm, and 800 mm long.

SRM	Type	Measuring Lengths (in 50 mm steps)	Unit Size
2083	Socketed Ball Bar	100 to 1650	Set

309. Coordinate Measuring Machine (CMM) Probe Performance

These SRMs are designed to aid in assessing the point-to-point probing performance of a CMM in accordance with the American National Standard "Methods for Performance Evaluation of Coordinate Measuring Machines" ASME B89.1.12 m-1990. SRM 2084 consists of a calibrated 10-mm tungsten carbide sphere mounted on a tungsten carbide stem, and a stainless stand with provisions for mounting the sphere in either a horizontal, vertical or 45 degree inclination. SRMs 2084R and 2085 are separate 10-mm and 25-mm tungsten carbide spheres and stems designed to be used with SRM 2084.

SRM	Type	Unit Size
2084	CMM Probe Performance	Set: 1,10-mm sphere/stem 1, stand
2084R	CMM Probe Performance	10-mm sphere/stem only
2085	CMM Probe Performance	25-mm sphere/stem only

309. Tape Adhesion Testing (sheet form)

This SRM is intended as a uniform source of linerboard for use under ASTM Designation D2860, Procedure A: Adhesion of Pressure Sensitive Tape to Fiberboard at 90 Degree Angle and Constant Stress.

SRM	Type	Unit Size
1810a	Linerboard for Tape Adhesion Testing	50 sheets: 21.6 cm × 28 cm

NIST Special Publications in the 260 Series

Trahey, N. M., editor, **NIST Standard Reference Materials Catalog (1995–96 edition),** NIST Spec. Publ. 260 (January 1995).

Michaelis, R. E., and Wyman, L. L., **Standard Reference Materials: Preparation of White Cast Iron Spectrochemical Standards,** NBS Misc. Publ. 260–1 (June 1964). COM74–11061**

Michaelis, R. E., Wyman, L. L., and Flitsch, R., **Standard Reference Materials: Preparation of NBS Copper-Base Spectrochemical Standards,** NBS Misc. Publ. 260–2 (October 1964). COM74–11063**

Michaelis, R. E., Yakowitz, H., and Moore, G. A., **Standard Reference Materials: Metallographic Characterization of an NBS Spectrometric Low-Alloy Steel Standard,** NBS Misc. Publ. 260–3 (October 1964). COM74–11060**

Hague, J. L., Mears, T. W., and Michaelis, R. E., **Standard Reference Materials: Sources of Information,** Publ. 260–4 (February 1965). COM74–11059**

Alvarez, R., and Flitsch, R., **Standard Reference Materials: Accuracy of Solution X-Ray Spectrometric Analysis of Copper-Base Alloys,** NBS Misc. Publ. 260–5 (March 1965). PB168068**

Shultz, J. I., **Standard Reference Materials: Methods for the Chemical Analysis of White Cast Iron Standards,** NBS Misc. Publ. 260–6 (July 1965). COM74–11068**

Bell, R. K., **Standard Reference Materials: Methods for the Chemical Analysis of NBS Copper-Base Spectrochemical Standards,** NBS Misc. Publ. 260–7 (October 1965). COM74–11067**

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Richmond, M. S., **Standard Reference Materials: Analysis of Uranium Concentrates at the National Bureau of Standards,** NBS Misc. Publ. 260–8 (December 1965). COM74–11066**

Anspach, S. C., Cavallo, L. M., Garfinkel, S. B., Hutchinson, J. M. R., and Smith, C. N., **Standard Reference Materials: Half Lives of Materials Used in the Preparation of Standard Reference Materials of Nineteen Radioactive Nuclides Issued by the National Bureau of Standards,** NBS Misc. Publ. 260–9 (November 1965). COM74–11065**

Yakowitz, H., Vieth, D. L., Heinrich, K. F. J., and Michaelis, R. E., **Standard Reference Materials: Homogeneity Characterization of NBS Spectrometric Standards II: Cartridge Brass and Low-Alloy Steel,** NBS Misc. Publ. 260–10 (December 1965). COM74–11064**

Napolitano, A., and Hawkins, E. G., **Standard Reference Materials: Viscosity of Standard Lead-Silica Glass,** NBS Misc. Publ. 260–11** (November 1966).

Yakowitz, H., Vieth, D. L., and Michaelis, R. E., **Standard Reference Materials: Homogeneity Characterization of NBS Spectrometric Standards III: White Cast Iron and Stainless Steel Powder Compact,** NBS Misc. Publ. 260–12 (September 1966).

Spijkerman, J. J., Snediker, D. K., Ruegg, F. C., et al., **Standard Refereance Materials: Mossbauer Spectroscopy Standard for the Chemical Shift of Iron Compounds,** NBS Misc. Publ. 260–13** (July 1967).

Menis, O., and Sterling, J. T., **Standard Reference Materials: Determination of Oxygen in Ferrous Materials (SRMs 1090, 1091, 1092),** NBS Misc. Publ. 260–14** (September 1966).

Passagia, E. and Shouse, P. J., **Standard Reference Materials: Recommended Method of Use of Standard Light-Sensitive Paper for Calibrating Carbon Arcs Used in Testing Textiles for Colorfastness to Light,** NBS Spec. Publ. 260–15 (July 1967). Superseded by SP 260–41.

Yakowitz, H., Michaelis, R. E., and Vieth, D. L., **Standard Reference Materials: Homogeneity Characterization of NBS Spectrometric Standards IV: Preparation and Microprobe Characterization of W–20% Mo Alloy Fabricated by Powder Metallurgical Methods,** NBS Spec. Publ. 260–16 (January 1969). COM74–11062**

Catanzaro, E. J., Champion, C. E., Garner, E. L., et al., **Standard Reference Materials: Boric Acid; Isotopic, and Assay Standard Reference Materials,** NBS Spec. Publ. 260–17 (February 1970). PB189457**

Geller, S. B., Mantek, P. A., and Cleveland, N. G., **Calibration of NBS Secondary Standards Magnetic Tape Co;mputer Amplitude Reference Amplitude Measurement "Process A",** NBS Spec. Publ. 260–18 (November 1969). Superseded by SP 260–29.

Paule, R. C., and Mandel, J., **Standard Reference Materials: Analysis of Interlaboratory Measurements on the Vapor Pressure of Gold (Certification of Standard Reference Material 745),** NBS Spec. Publ. 260–19 (January 1970). PB190071**

260–20: Unassigned

Paule, R. C., and Mandel, J., **Standard Reference Materials: Analysis of Interlaboratory Measurements on the Vapor Pressures of Cadmium and Silver,** NBS Spec. Publ. 260–21 (January 1971). COM74–11359**

Yakowitz, H., Fiori, C. E., and Michaelis, R. E., **Standard Reference Materials: Homogeneity Characterization of Fe–3 Si Alloy,** NBS Spec. Publ. 260–22 (February 1971). COM74–11357**

Napolitano, A., and Hawkins, E. G., **Standard Reference Materials: Viscosity of a Standard Borosilicate Glass,** NBS Spec. Publ. 260–23 (December 1970). COM71–00157**

Sappenfield, K. M., Marinenko, G., and Hague, J. L., **Standard Reference Materials: Comparison of Redox Standards,** NBS Spec. Publ. 260–24 (January 1972). COM72–50058**

Hicho, G. E., Yakowitz, H., Rasberry, S. D., and Michaelis, R. E., **Standard Reference Materials: A Standard Reference Material Containing Nominally Four Percent Austenite,** NBS Spec. Publ. 260–25 (February 1971). COM74–11356**

Martin, J. F., **Standard Reference Materials: National Bureau of Standards-U.S. Steel Corporation Joint Program for Determining Oxygen and Nitrogen in Steel,** NBS Spec. Publ. 260–26 (February 1971). PB81-176620**

Garner, E. L., Machlan, L. A., and Shields, W. R., **Standard Reference Materials: Uranium Isotopic Standard Reference Materials,** NBS Spec. Publ. 260–27 (April 1971). COM74–11358**

Heinrich, K. F. J., Myklebust, R. L., Rasberry, S. D., and Michaelis, R. E., **Standard Reference Materials: Preparation and Evaluation of SRM's 481 and 482 Gold-Silver and Gold-Copper Alloys for Microanalysis,** NBS Spec. Publ. 260–28 (August 1971). COM71–50365**

Geller, S. B., **Standard Reference Materials: Calibration of NBS Secondary Standard Magnetic Tape (Computer Amplitude Reference) Using the Reference Tape Amplitude Measurement "Process A-Model 2,"** NBS Spec. Publ. 260–29 (June 1971). COM71–50282** Supersedes Measurement System in SP 260–18.

Gorozhanina, R. S., Freedman, A. Y., and Shaievitch, A. B. (translated by M. C. Selby), **Standard Reference Materials: Standard Samples Issued in the USSR (A Translation from the Russian),** NBS Spec. Publ. 260–30 (June 1971). COM71–50283**

Hust, J. G., and Sparks, L. L., **Standard Reference Materials: Thermal Conductivity of Electrolytic Iron SRM 734 from 4 to 300 K,** NBS Spec. Publ. 260–31 (November 1971). COM71–50563**

Mavrodineanu, R., and Lazar, J. W., **Standard Reference Materials: Standard Quartz Cuvettes for High Accuracy Spectrophotometry,** NBS Spec. Publ. 260–32 (December 1973). COM74–50018**

Wagner, H. L., **Standard Reference Materials: Comparison of Original and Supplemental SRM 705, Narrow Molecular Weight Distribution Polystyrene,** NBS Spec. Publ. 260–33 (May 1972). COM72–50526**

Sparks, L. L., and Hust, J. G., **Standard Reference Material: Thermoelectric Voltage of Silver-28 Atomic Percent Gold Thermocouple Wire, SRM 733, Verses Common Thermocouple Materials (Between Liquid Helium and Ice Fixed Points),** NBS Spec. Publ. 260–34 (April 1972). COM72–50371**

Sparks, L. L., and Hust, J. G., **Standard Reference Materials: Thermal Conductivity of Austenitic Stainless Steel, SRM 735 from 5 to 280 K,** NBS Spec. Publ. 260–35 (April 1972). COM72–50368**

Cali, J. P., Mandel, J., Moore, L. J., and Young, D. S., **Standard Reference Materials: A Referee Method for the Determination of Calcium in Serum, NBS SRM 915,** NBS Spec. Publ. 260–36 (May 1972). COM72–50527**

Shultz, J. I., Bell., R. K., Rains, T. C., and Menis, O., **Standard Reference Materials: Methods of Analysis of NBS Clay Standards,** NBS Spec. Publ. 260–37 (June 1972). COM72–50692**

Richmond, J. C., and Hsia, J. J., **Standard Reference Materials: Preparation and Calibration of Standards of Spectral Specular Reflectance,** NBS Spec. Publ. 260–38 (May 1972). COM72–50528**

Clark, A. F., Denson, V. A., Hust, J. G., and Powell, R. L., **Standard Reference Materials: The Eddy Current Decay Method for Resistivity Characterization of High-Purity Metals,** NBS Spec. Publ. 260–39 (May 1972). COM72–50529**

McAdie, H. G., Garn, P. D., and Menis, O., **Standard Reference Materials: Selection of Thermal Analysis Temperature Standards Through a Cooperative Study (SRM 758, 759, 760),** NBS Spec. Publ. 260–40 (August 1972). COM72–50776**

Wood, L. A., and Shouse, P. J., **Standard Reference Materials: Use of Standard Light-Sensitive Paper for Calibrating Carbon Arcs Used in Testing Textiles for Colorfastness to Light,** NBS Spec. Publ. 260–41 (August 1972). COM72–50775**

Wagner, H. L., and Verdier, P. H., eds., **Standard Reference Materials: The Characterization of Linear Polyethylene, SRM 1475,** NBS Spec. Publ. 260–42 (September 1972). COM72–50944**

Yakowitz, H., Ruff, A. W., and Michaelis, R. E., **Standard Reference Materials: Preparation and Homogeneity Characterization of an Austenitic Iron-Chromium-Nickel Alloy,** NBS Spec. Publ. 260–43 (November 1972). COM73–50760**

Schooley, J. F., Soulen, R. J., Jr., and Evans, G. A., Jr., **Standard Reference Materials: Preparation and Use of Superconductive Fixed Point Devices, SRM 767,** NBS Spec. Publ. 260–44 (December 1972). COM73–50037**

Greifer, B., Maienthal, E. J., Rains, T. C., and Rasberry, S. D., **Standard Reference Materials: Powdered Lead-Based Paint, SRM 1579,** NBS Spec. Publ. 260–45 (March 1973). COM73–50226**

Hust, J. G., and Giarratano, P. J., **Standard Reference Materials: Thermal Conductivity and Electrical Resistivity Standard Reference Materials: Austenitic Stainless Steel, SRM's 735 and 798, from 4 to 1200 K,** NBS Spec. Publ. 260–46 (March 1975). COM75–10339**

Hust, J. G., **Standard Reference Materials: Electrical Resistivity of Electrolytic Iron, SRM 797, and Austenitic Stainless Steel, SRM 798, from 5 to 280 K,** NBS Spec. Publ. 260–47 (February 1974). COM74–50176**

Mangum, B. W., and Wise, J. A., **Standard Reference Materials: Description and Use of Precision Thermometers for the Clinical Laboratory, SRM 933 and SRM 934,** NBS Spec. Publ. 260–48 (May 1974). Superseded by NIST Spec. Publ. 260–113. COM74–50533**

Carpenter, B. S., and Reimer, G. M., **Standard Reference Materials: Calibrated Glass Standards for Fission Track Use,** NBS Spec. Publ. 260–49 (November 1974). COM74–51185**

Hust, J. G., and Giarratano, P. J., **Standard Reference Materials: Thermal Conductivity and Electrical Resistivity Standard Reference Materials: Electrolytic Iron, SRM's 734 and 797 from 4 to 1000 K,** NBS Spec. Publ. 260–50 (June 1975). COM75–10698**

Mavrodineanu, R., and Baldwin, J. R., **Standard Reference Materials: Glass Filters as a Standard Reference Material for Spectrophotometry—Selection, Preparation, Certification, Use—SRM 930,** NBS Spec. Publ. 260–51 (November 1975). COM75–10339**

Hust, J. G., and Giarratano, P. J., **Standard Reference Materials: Thermal Conductivity and Electrical Resistivity Standard Reference Materials 730 and 799, from 4 to 3000 K,** NBS Spec. Publ. 260–52 (September 1975). COM75–11193**

Durst, R. A., **Standard Reference Materials: Standardization of pH Measurements,** NBS Spec. Publ. 260–53 (December 1978). Superseded by SP 260–53 Rev. 1988 Edition. PB88-217427**

Burke, R. W., and Mavrodineanu, R., **Standard Reference Materials: Certification and Use of Acidic Potassium Dichromate Solutions as an Ultraviolet Absorbance Standard–SRM 935,** NBS Spec. Publ. 260–54 (August 1977). PB272168**

Ditmars, D. A., Cezairliyan, A., Ishihara, S., and Douglas, T. B., **Standard Reference Materials: Enthalpy and Heat Capacity; Molybdenum SRM 781, from 273 to 2800 K,** NBS Spec. Publ. 260–55 (September 1977). PB272127**

Powell, R. L., Sparks, L. L., and Hust, J. G., **Standard Reference Materials: Standard Thermocouple Materials, Pt-67: SRM 1967,** NBS Spec. Publ. 260–56 (February 1978). PB277172**

Cali, J. P., and Plebanski, T., **Standard Reference Materials: Guide to United States Reference Materials,** NBS Spec. Publ. 260–57 (February 1978). PB277173

Barnes, J. D., and Martin, G. M., **Standard Reference Materials: Polyester Film for Oxygen Gas Transmission Measurements SRM 1470,** NBS Spec. Publ. 260–58 (June 1979). PB297098**

Chang, T., and Kahn, A. H., **Standard Reference Materials: Electron Paramagnetic Resonance Intensity Standard: SRM 2601; Description and Use,** NBS Spec. Publ. 260–59 (August 1978). PB292097**

Velapoldi, R. A., Paule, R. C., Schaffer, R., Mandel, J., and Moody, J. R., **Standard Reference Materials: A Reference Method for the Determination of Sodium in Serum,** NBS Spec. Publ. 260–60 (August 1978). PB286944**

Verdier, P. H., and Wagner, H. L., **Standard Reference Materials: The Characterization of Linear Polyethylene (SRM 1482, 1483, 1484),** NBS Spec. Publ. 260–61 (December 1978). PB289899**

Soulen, R. J., and Dove, R. B., **Standard Reference Materials: Temperature Reference Standard for Use Below 0.5 K (SRM 768),** NBS Spec. Publ. 260–62 (April 1979). PB294245**

Velapoldi, R. A., Paule, R. C., Schaffer, R., Mandel, J., Machlan, L. A., and Gramlich, J. W., **Standard Reference Materials: A Reference Method for the Determination of Potassium in Serum,** NBS Spec. Publ. 260–63 (May 1979). PB297207**

Velapoldi, R. A., and Mielenz, K. D., **Standard Reference Materials: A Fluorescence Standard Reference Material Quinine Sulfate Dihydrate (SRM 936),** NBS Spec. Publ. 260–64 (January 1980). PB80-132046**

Marinenko, R. B., Heinrich, K. F. J., and Ruegg, F. C., **Standard Reference Materials: Micro-Homogeneity Studies of NBS Standard Reference Materials, NBS Research Materials, and Other Related Samples,** NBS Spec. Publ. 260–65 (September 1979). PB300461**

Venable, W. H., Jr., and Eckerle, K. L., **Standard Reference Materials: Didymium Glass Filters for Calibrating the Wavelength Scale of Spectrophotometers—SRM 2009, 2010, 2013 and 2014,** NBS Spec. Publ. 260–66 (October 1979). PB80-104961**

Velapoldi, R. A., Paule, R. C., Schaffer, R., Mandel, J., Murphy, T. J., and Gramlich, J. W., **Standard Reference Materials: A Reference Method for the Determination of Chloride in Serum,** NBS Spec. Publ. 260–67 (November 1979). PB80-110117**

Mavrodineanu, R., and Baldwin, J. R., **Standard Reference Materials: Metal-On-Quartz Filters as a Standard Reference Material for Spectrophotometry—SRM 2031,** NBS Spec. Publ. 260–68 (April 1980). PB80-197486**

Velapoldi, R. A., Paule, R. C., Schaffer, R., Mandel, J., Machlan, L. A., Garner, E. L., and Rains, T. C., **Standard Reference Materials: A Reference Method for the Determination of Lithium in Serum,** NBS Spec. Publ. 260–69 (July 1980). PB80-20917**

Marinenko, R. B., Biancaniello, F., Boyer, P. A., et al., **Standard Reference Materials: Preparation and Characterization of an Iron-Chromium-Nickel Alloy for Microanalysis: SRM 479a,** NBS Spec. Publ. 260–70 (May 1981). SN003–003–02328–1**

Seward, R. W., and Mavrodincanu, R., **Standard Reference Materials: Summary of the Clinical Laboratory Standards Issued by the National Bureau of Standards,** NBS Spec. Publ. 260–71 (November 1981). PB82-135161**

Reeder, D. J., Coxon, B., Enagonio, D., Christensen, R. G., Schaffer, R., Howell, B. F., Paule, R. C., and Mandel, J., **Standard Reference Materials: SRM 900, Antiepilepsy Drug Level Assay Standard,** NBS Spec. Publ. 260–72 (June 1981). PB81-220758**

Interrante, C. G., and Hicho, G. E., **Standard Reference Materials: A Standard Reference Material Containing Nominally Fifteen Percent Austenite (SRM 486),** NBS Spec. Publ. 260–73 (January 1982). PB82-215559**

Marinenko, R. B., **Standard Reference Materials: Preparation and Characterization of K–411 and K–414 Mineral Glasses for Microanalysis: SRM 470,** NBS Spec. Publ. 260–74 (April 1982). PB82-221300**

Weidner, V. R., and Hsia, J. J., **Standard Reference Materials: Preparation and Calibration of First Surface Aluminum Mirror Specular Reflectance Standards (SRM 2003a),** NBS Spec. Publ. 260–75 (May 1982). PB82-221367**

Hicho, G. E., and Eaton, E. E., **Standard Reference Materials: A Standard Reference Material Containing Nominally Five Percent Austenite (SRM 485a),** NBS Spec. Publ. 260–76 (August 1982). PB83-115568**

Furukawa, G. T., Riddle, J. L., Bigge, W. G., and Pfieffer, E. R., **Standard Reference Materials: Application of Some Metal SRM's as Thermometric Fixed Points,** NBS Spec. Publ. 260–77 (August 1982). PB83-117325**

Hicho, G. E., and Eaton, E. E., **Standard Reference Materials: Standard Reference Material Containing Nominally Thirty Percent Austenite (SRM 487),** NBS Spec. Publ. 260–78 (September 1982). PB83-115576**

Richmond, J. C., Hsia, J. J., Weidner, V. R., and Wilmering, D. B., **Standard Reference Materials: Second Surface Mirror Standards of Specular Spectral Reflectance (SRM's 2023, 2024, 2025),** NBS Spec. Publ. 260–79 (October 1982). PB84-203447**

Schaffer, R., Mandel, J., Sun, T., Cohen, A., and Hertz, H. S., **Standard Reference Materials: Evaluation by an ID/MS Method of the AACC Reference Method for Serum Glucose,** NBS Spec. Publ. 260–80 (October 1982). PB84-216894**

Burke, R. W., and Mavrodineanu, R., **Standard Reference Materials: Accuracy in Analytical Spectrophotometry,** NBS Spec. Publ. 260–81 (April 1983). PB83-214536**

Weidner, V. R., **Standard Reference Materials: White Opal Glass Diffuse Spectral Reflectance Standards for the Visible Spectrum (SRM's 2015 and 2016),** NBS Spec. Publ. 260–82 (April 1983). PB83-220723**

Bowers, G. N., Jr., Alvarez, R., Cali, J. P., Eberhardt, K. R., Reeder, D. J., Schaffer, R., and Uriano, G. A., **Standard Reference Materials: The Measurement of the Catalytic (Activity) Concentration of Seven Enzymes in NBS Human Serum SRM 909,** NBS Spec. Publ. 260–83 (June 1983). PB83239509**

Gills, T. E., Seward, R. W., Collins, R. J., and Webster, W. C., **Standard Reference Materials: Sampling, Materials Handling, Processing, and Packaging of NBS Sulfur in Coal Standard Reference Materials 2682, 2683, 2684, and 2685,** NBS Spec. Publ. 260–84 (August 1983). PB84-109552**

Swyt, D. A., **Standard Reference Materials: A Look at Techniques for the Dimensional Calibration of Standard Microscopic Particles,** NBS Spec. Publ. 260–85 (September 1983). PB84-112648**

Hicho, G. E., and Eaton, E. E., **Standard Reference Materials: A Standard Reference Material Containing Two and One-Half Percent Austenite, SRM 488,** NBS Spec. Publ. 260–86 (December 1983). PB84-143296**

Mangum, B. W., **Standard Reference Materials: SRM 1969: Rubidium Triple-Point—A Temperature Reference Standard Near 39. 30 °C,** NBS Spec. Publ. 260–87 (December 1983). PB84-149996**

Gladney, E. S., Burns, C. E., Perrin, D. R., et al., **Standard Reference Materials: 1982 Compilation of Elemental Concentration Data for NBS Biological, Geological, and Environmental Standard Reference Materials,** NBS Spec. Publ. 260–88 (March 1984). PB84-218338**

Hust, J. G., **Standard Reference Materials: A Fine-Grained, Isotropic Graphite for Use as NBS Thermophysical Property RM's from 5 to 2500 K,** NBS Spec. Publ. 260–89 (September 1984). PB85-112886**

Hust, J. G., and Lankford, A. B., **Standard Reference Materials: Update of Thermal Conductivity and Electrical Resistivity of Electrolytic Iron, Tungsten, and Stainless Steel,** NBS Spec. Publ. 260–90 (September 1984). PB85-115814**

Goodrich, L. F., Vecchia D. F., Pittman, E. S., Ekin, J. W. and Clark, A. F., **Standard Reference Materials: Critical Current Measurements on an NbTi Superconducting Wire Standard Reference Material,** NBS Spec. Publ. 260–91 (September 1984). PB85-118594**

Carpenter, B. S., **Standard Reference Materials: Calibrated Glass Standards for Fission Track Use (Supplement to NBS Spec. Publ. 260–49).** NBS Spec. Publ. 260–92 (September 1984). PB85-113025**

Ehrstein, J., **Standard Reference Materials: Preparation and Certification of Standard Reference Materials for Calibration of Spreading Resistance Probes,** NBS Spec. Publ. 260–93 (January 1985). PB85-177921**

Gills, T. E., Koch, W. F., Stolz, J. W., Kelly, W. R., Paulsen, P. J., Colbert, J. C., Kirklin, D. R., Pei, P. T. S., Weeks, S., Lindstrom, R. M., Fleming, R. F., Greenberg, R. R., and Paule, R. C., **Standard Reference Materials: Methods and Procedures Used at the National Bureau of Standards to Certify Sulfur in Coal SRM's for Sulfur Content, Calorific Value, Ash Content,** NBS Spec. Publ. 260–94 (December 1984). PB85-165900**

Mulholland, G. W., Hartman, A. W., Hembree, G. G., Marx, E., and Lettieri, T. R., **Standard Reference Materials: Development of a 1 μm Diameter Particle Size Standard, SRM 1690,** NBS Spec. Publ. 260–95 (May 1985). PB86-113693**

Carpenter, B. S., Gramlich, J. W., Greenberg, R. R., Machlan, L. A., DeBievre, P., Eschbach, H. L., Meyer, H., Van Andenhove, J., Connelly, V. E., Trahey, N. M., and Zook, A. C., **Standard Reference Materials: Uranium–235 Isotopic Abundance Standard Reference Materials for Gamma Spectrometry Measurements,** NBS Spec. Publ. 260–96 (September 1986). PB87-108544**

Mavrodineanu, R., and Gills, T. E., **Standard Reference Materials: Summary of the Coal, Ore, Mineral, Rock, and Refractory Standards Issued by the National Bureau of Standards,** NBS Spec. Publ. 260–97 (September 1985). PB86-110830**

Hust, J. G., **Standard Reference Materials: Glass Fiberboard SRM for Thermal Resistance,** NBS Spec. Publ. 260–98 (August 1985). SN003–003–02674–3*

Callanan, J. E., Sullivan, S. A., and Vecchia, D. F., **Standard Reference Materials: Feasibility Study for the Development of Standards Using Differential Scanning Calorimetry,** NBS Spec. Publ. 260–99 (August 1985). PB86-106747**

Taylor, J. K., **Standard Reference Materials: Handbook for SRM Users,** NBS Spec. Publ. 260–100 (February 1993). PB93-183796**

Mangum, B. W., **Standard Reference Materials: SRM 1970, Succinonitrile Triple-Point Standard: A Temperature Reference Standard Near 58.08 °C,** NBS Spec. Publ. 260–101 (March 1986). PB86-197100**

Weidner, V. R., Mavrodineau, R., Mielenz, K. D., Velapoldi, R. A., Eckerle, K. L., and Adams, B., **Standard Reference Materials: Holmium Oxide Solution Wavelength Standard from 240–650 nm, SRM 2034,** NBS Spec. Publ. 260–102 (July 1986). PB86245727**

Hust, J. G., **Standard Reference Materials: Glass Fiberblanket SRM for Thermal Resistance,** NBS Spec. Publ. 260–103 (September 1985). PB86-109949**

Mavrodineanu, R., and Alvarez, R., **Standard Reference Materials: Summary of the Biological and Botanical Standards Issued by the National Bureau of Standards,** NBS Spec. Publ. 260–104 (November 1985). PB86-155561**

Mavrodineanu, R., and Rasberry, S. D., **Standard Reference Materials: Summary of the Environmental Research Analysis, and Control Standards Issued by the National Bureau of Standards,** NBS Spec. Publ. 260–105 (March 1986). PB86-204005**

Koch, W. F., ed., **Standard Reference Materials: Methods and Procedures Used at the National**

Bureau of Standards to Prepare, Analyze, and Certify SRM 2694, Simulated Rainwater, and Recommendations for Use, NBS Spec. Publ. 260–106 (July 1986). PB86247483**

Hartman, A. W., McKenzie, R. L., **Standard Reference Materials: SRM 1965, Microsphere Slide (10 μm Polystyrene Spheres),** NIST Spec. Publ. 260–107 (November 1988). PB89153704**

Mavrodineanu, R., and Gills, T. E., **Standard Reference Materials: Summary of Gas Cylinder and Permeation Tube Standard Reference Materials Issued by the National Bureau of Standards,** NBS Spec. Publ. 260–108 (May 1987). PB87209953**

Candela, G. A., Chandler-Horowitz, D., Novotny, D. B., Marchiando, J. F., and Belzer, B. J., **Standard Reference Materials: Preparation and Certification of an Ellipsometrically Derived Thickness and Refractive Index Standard of a Silicon Dioxide Film (SRM 2530),** NIST Spec. Publ. 260–109 (October 1988). PB89133573**

Kirby, R. K., and Kanare, H. M., **Standard Reference Materials: Portland Cement Chemical Composition Standards (Blending, Packaging, and Testing),** NBS Spec. Publ. 260–110 (February 1988). PB88193347**

Gladney, E. S., O'Malley, B. T., Roelandts, I., Gills, T. E., **Standard Reference Materials: Compilation of Elemental Concentration Data for NBS Clinical, Biological, Geological, and Environmental Standard Reference Materials,** NBS Spec. Publ. 260–111 (November 1987). PB88156708**

Marinenko, R. B., Blackburn, D. H., Bodkin, J. B., **Standard Reference Materials: Glasses for Microanalysis: SRMs 1871–1875,** NIST Spec. Publ. 260–112 (February 1990). PB90215807**

Mangum, B. W., Wise, J. A., **Standard Reference Materials: Description and Use of a Precision Thermometer for the Clinical Laboratory, SRM 934,** NIST Spec. Publ. 260–113 (June 1990). PB90257643*

Vezzetti, C. F., Varner, R. N., Potzick, J. E., **Standard Reference Materials: Bright-Chromium Standard Reference Material, SRM 476, for Calibration of Optical Microscope Linewidth Measuring Systems,** NIST Spec. Publ. 260–114 (January 1991). PB91167163**

Williamson, M. P., Willman, N. E., Grubb, D. S., **Standard Reference Materials: Calibration of NIST Standard Reference Material 3201 for 0.5 inch [12.65 mm] Serial Serpentine Magnetic Tape Cartridge,** NIST Spec. Publ. 260–115 (February 1991). PB91187542**

Mavrodineanu, R., Burke, R. W., Baldwin, J. R., et al., **Standard Reference Materials: Glass Filters as a Standard Reference Material for Spectrophotometry -Selection, Preparation, Certification and Use of SRM 930 and SRM 1930,** NIST Spec. Publ. 260–116 (March 1994). PB94-188844/AS**

Vezzetti, C. F., Varner, R. N., and Potzick, J. E., **Standard Reference Materials: Antireflecting-Chromium Linewidth Standard, SRM 475, for Calibration of Optical Microscope Linewdith Measuring Systems, NIST Spec. Publ. 260-117 (January 1992). PB92-149798****

Williamson, M. P., **Standard Reference Material 3202 for 18-Track, Parallel, and 36-Track, Parallel Serpentine, 12.65 mm (0.5 in), 1491 cpmm (37871 cpi), Magnetic Tape Cartrdige,** NIST Spec. Publ. 260–118 (July 1992). PB92-226281**

Vezzetti, C. F., Varner, R. N., and Potzick, **Standard Reference Materialls: Antireflecting-Chromium Linewidth Standard, SRM 473, for Calibration of Optical Microscope Linewidth Measuring System,** NIST Spec. Publ. 260119 (September 1992).

Caskey, G. W., Philips, S. D., Borchardt, et al., **Standard Reference Materials: A Users' Guide to NIST SRM 2084: CMM Probe Performance Standard,** NIST Spec. Publ. 260–120 (1994).

Rennex, B. G., **Standard Reference Materials: Certification of a Standard Reference Material for the Determination of Interstitial Oxygen Concentration in Semiconductor Silicon by Infrared Spectrophotometry,** NIST Spec. Publ. 260–121 (1994).

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963a	Fission Track Glass U-1 mg/g	Feb 84	205	108
965	Glucose in Frozen Human Serum	In Prep	105	57
968b	Fat-Sol. Vit. & Chol. in Serum	In Prep	105	56
975	Chlorine (Isotopic)	Mar 65	104	53
976	Copper (Isotopic)	Nov 93	104	53
977	Bromine (Isotopic)	Mar 65	104	53
978a	Silver (Isotopic)	Sep 84	104	53
979	Chromium (Isotopic)	May 66	104	53
980	Magnesium (Isotopic)	Jan 67	104	53
981	Natural Lead (Isotopic)	Mar 91	104	53
982	Equal Atom Lead (Isotopic)	Mar 91	104	53
983	Radiogenic Lead (Isotopic)	Mar 91	104	53
984	Rubidium Assay (Isotopic)	Jul 70	104	53
985	Potassium Assay (Isotopic)	Aug 79	104	53
986	Nickel (Isotopic)	May 90	104	53
987	Strontium Assay and Isotopic	Oct 82	104	49/53
989	Rhenium Assay (Isotopic)	Feb 74	104	53
990	Silicon Assay (Isotopic)	Aug 74	104	53
991	Lead-206 Spike Assay and Isotopic	Mar 76	104	53
994	Gallium (Isotopic)	Feb 86	104	53
997	Thallium (Isotopic)	Jul 86	104	53
998	Angiotensin I (Human)	Jan 83	105	56
999a	Potassium Chloride (Assay)	In Prep	104	49
1002d	Hard Board (Surface Flammability)	Aug 89	305	130
1003b	Glass (Particle Size)	Sep 93	301	125
1004a	Glass (Particle Size)	Dec 93	301	125
1006c	Alpha-Cellulose (Smoke Density)	Oct 88	305	130
1007b	Plastic, (Smoke Density)	Apr 91	305	130
1010a	Microcopy Test Chart	Jun 90	204	107
1012	Flooring Radiant Panel	Sep 84	305	130
1017b	Glass (Particle Size)	In Prep	301	125
1018b	Glass (Particle Size)	In Prep	301	125
1019a	Glass (Particle Size)	Oct 84	301	125
1034	Unalloyed Copper	Feb 82	102	40
1035	Leaded-Tin Bronze Alloy	Feb 82	102	40
1048	Smoke Toxicity (Cup Furnace)	Nov 91	305	130
1049	Smoke Toxicity (Univ. Pitts.)	Nov 92	305	130
1051b	Barium (Metallo-Organic)	Jun 91	114	90
1052b	Vanadium (Metallo-Organic)	Apr 93	114	90
1053a	Cadmium (Metallo-Organic)	Jan 70	114	90
1057b	Tin (Metallo-Organic)	Aug 68	114	90
1059c	Lead (Metallo-Organic)	Sep 87	114	90
1060a	Lithium (Metallo-Organic)	Apr 64	114	90
1065b	Nickel (Metallo-Organic)	Nov 93	114	90
1066a	Silicon (Metallo-Organic)	Jun 91	114	90
1069b	Sodium (Metallo-Organic)	Jun 91	114	90
1070a	Strontium (Metallo-Organic)	Apr 64	114	90
1071b	Phosphorus (Metallo-Organic)	Sep 91	114	90
1073b	Zinc (Metallo-Organic)	Sep 86	114	90
1075a	Aluminum (Metallo-Organic)	Oct 67	114	90
1077a	Silver (Metallo-Organic)	Feb 68	114	90
1078b	Chromium (Metallo-Organic)	Jul 72	114	90
1079b	Iron (Metallo-Organic)	Feb 69	114	90
1080a	Copper (Metallo-Organics)	Feb 69	114	90
1083	Wear Metals (Base Oil)	Jul 91	114	91
1084a	Wear Metals	Apr 91	114	91
1085a	Wear Metals	Apr 91	114	91
1089	Steels, Set (SRMs 1095-99)	Apr 86	101	28

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1090	Ingot Iron, Oxygen	Nov 85	101	28
1091a	Stainless Steel (A1S1 431)	Nov 85	101	28
1093	Valve Steel, Oxygen	Nov 84	101	28
1094	Maraging Steel	Nov 84	101	28
1095	Steel (A1SI 4340)	Apr 86	101	28
1096	Steel (AISI 94B17)	Apr 86	101	28
1097	Cr-V Steel (mod.)	Apr 86	101	28
1098	Steel (High Carbon)	Apr 86	101	28
1099	Electrolytic Iton	Apr 86	101	28
1104	Free-Cutting Brass	Aug 65	102	41
1107	Naval Brass B	Nov 81	102	41
1108	Naval Brass C	Nov 81	102	41
1110	Red Brass B	Oct 81	102	41
1111	Red Brass C	Oct 81	102	41
1112	Gilding Metal A (disk)	Oct 81	102	41
C1112	Gilding Metal A (block)	Oct 81	102	41
1113	Gilding Metal B (disk)	Oct 81	102	41
C1113	Gilding Metal B (block)	Oct 81	102	41
1114	Gilding Metal C (disk)	Oct 81	102	41
C1114	Gilding Metal C (block)	Oct 81	102	41
1115	Commercial Bronze A (disk)	Nov 81	102	41
C1115	Commercial Bronze A (block)	Nov 81	102	41
1116	Commercial Bronze B (disk)	Nov 81	102	41
C1116	Commercial Bronze B (block)	Nov 81	102	41
1117	Commercial Bronze C (disk)	Nov 81	102	41
C1117	Commercial Bronze C (block)	Nov 81	102	41
C1122	Beryllium-Copper (block)	Dec 81	102	41
C1123	Beryllium-Copper (block)	Dec 81	102	41
1128	Ti Alloy, V-Al-Cr-Sn	Jul 91	102	45
1129	Solder 63Sn-37Pb	May 89	102	43
1131	Solder 60Pb-40Sn	Oct 81	102	43
1132	Bearing Metal (Pb-Sn)	Nov 94	102	43
1134	LA Steel, High Silicon	Apr 70	101	30
1135	LA Steel, High Silicon	Jul 72	101	30
C1137a	White Cast Iron	Jan 84	101	38
1138a	Cast Steel (No. 1)	Jan 77	101	38
1139a	Cast Steel (No. 2)	Jan 77	101	38
C1145a	White Cast Iron	Jan 88	101	38
C1146a	White Cast Iron	Jan 88	101	38
C1151a	Stainless Steel 23Cr-7Ni	Dec 92	101	34
C1152a	Stainless Steel 18Cr-11Ni	Feb 90	101	34
C1153a	Stainless Steel 17Cr-9Ni	Sep 90	101	34
C1154a	Stainless Steel 19Cr-13Ni	Jun 92	101	34
1155	Stainless Steel Cr-Ni-Mo (AISI 316)	Aug 69	101	34
1157	Specialty Steel, Tool (AISI M2)	Aug 73	101	34
1158	Specialty Steel, High Nickel (Ni36)	Dec 77	101	34
1159	Elec/Mag Ni-Fe	Aug 81	102	44
1160	Elec/Mag Ni-Mo-Fe	Aug 81	102	44
1171	Stainless Steel Cr-Ni-Ti (AISI 321)	May 93	101	34
1172	Stainless Steel Cr-Ni-Nb (A1S1 348)	Jul 71	101	34
1173	Ni-Cr-Mo-V Steel	Jun 89	101	38
C1173	Cast Steel 3	Jan 89	101	38
1216	Carbon Modified Silicon	Nov 87	106	62
1218	LA Steel, High Silicon	Nov 84	101	30
1219	Stainless Steel Cr-Ni (AISI 431)	Sep 85	101	34
C1221	LA Carbon (A1S1 1211)	Apr 93	101	30
1222	LA Steel, Cr-Ni-Mo (A1SI 8640)	Sep 90	101	30
1223	Chromium Steel	May 93	101	34
1224	LA Steel, Carbon (A1SI 1078)	Feb 81	101	30
1225	LA Steel (A1S1 4130)	Mar 83	101	30
1226	LA Steel	Dec 82	101	30
1227	LA Steel, Basic Open Hearth, 1% C	Mar 83	101	30
1228	LA Steel, 0.1% C	Jun 93	101	30
1230	High Temp. Alloy, A286	Jun 87	101	35
1233	Specialty Steel, Valve Steel	Mar 92	101	34
1235	Zirconium B for Hf	Nov 80	102	46
1242	High Temp. Alloy L-605	Nov 91	102	39
1243	Waspaloy	Jan 89	102	44
1244	Inconel 600	May 84	101	35
1245a	Inconel 625	May 84	101	35
1246	Incoloy 800	May 84	101	35
1247	Incoloy 825	May 84	101	35
C1248	Nickel-Copper Alloy	Dec 86	102	44
1250	High Temp. Alloy Fe-Ni-Co	Jul 93	101	35
C1252	Phos. Copper 1X	Apr 86	102	42
C1253	Phos Copper X	Apr 86	102	42
1254	LA Steel (Ca only)	Apr 82	101	30
1258	Aluminum Alloy 6011	May 78	102	39
1259	Aluminum Alloy 7075	May 78	102	39
1261a	LA Steel (A1S1 4340)	May 93	101	30
1262b	LA Steel (A1S1 94B17)	Oct 92	101	30
1263a	LA Steel Cr-V (mod.)	Feb 81	101	30
1264a	LA Steel, 1ligh Carbon (mod.)	Jan 88	101	30
1265a	Electrolytic Iron	Jun 89	101	30
1269	Line Pipe (A1S1 1521 mod.)	Jun 81	101	30
1270	LA Steel, Cr-Mo (A336) (F-22)	Jun 81	101	30
1271	LA Steel (HSLA-100)	Oct 91	101	30
1276a	Cupro-Nickel (CDA 715)	Jun 89	102	41
C1285	LA Steel (A242) (mod.)	Jun 82	101	30
1286	LA Steel HY 80	Mar 92	101	30
C1287	Stainless Steel (A1SI 310 mod.)	Jun 81	101	34
C1288	Stainless Steel (A-743)	Aug 81	101	34
C1289	Stainless Steel (A1S1 414 mod.)	Jun 81	101	34
C1290	High Alloy (HC-250 + V)	Jan 85	101	38
C1291	High Alloy (Ni-Hard, Type 1)	Jan 85	101	38
C1292	High Alloy (Ni-Hard, Type 1V)	Jan 85	101	38
1295	Stainless Steel (SAE 405)	Mar 92	101	34
C1296	Stainless Steel 28Cr-3Mo (SAE 460)	Dec 91	101	34
1297	Stainless Steel Cr-Ni-Mn (SAE 201)	Dec 91	101	34
1357	Cu & Cr Coating on Steel	Jul 91	207	117
1358	Cu & Cr Coating on Steel	Jul 91	207	117
1359	Cu & Cr Coating on Steel	Jul 91	207	117
1360	Cu & Cr Coating on Steel	Jul 91	207	117
1361a	Cu & Cr Coating on Steel	Jul 91	207	117
1362a	Cu & Cr Coating on Steel	Jul 91	207	117
1363a	Cu & Cr Coating on Steel	Jul 91	207	117
1364a	Cu & Cr Coating on Steel	Jul 91	207	117
1371	Gold Coating on Fe-Ni-Co Alloy	Oct 90	207	117
1373	Gold Coating on Fe-Ni-Co Alloy	Oct 90	207	117
1374	Gold Coating on Fe-Ni-Co Alloy	Oct 90	207	117
1400	Bone Ash	Dec 92	105	56
1411	Soft Borosilicate Glass	Aug 85	112	86
1412	Multicomponent Glass	Aug 85	112	86
1413	Glass Sand (High Alumina)	Aug 85	111/112	83/86
1414	Lead-Silica (Resistivity)	Jul 91	208	119
1416	Glass Al-Silicate (Glass Liquidus)	May 94	208	120
1449	Fumed Silica Board	Jan 89	203	103
1450b	Fibrous Glass Board	May 85	203	103
1452	Fibrous Glass Blanket	Apr 86	203	103
1457	Superconducting Nb-Ti Wire	Jun 84	206	115
1459	Fumed Silica Board	Jan 89	203	103
1461	Stainless Steel (Therm./Elec. Resist.)	May 84	203/206	103/114
1462	Stainless Steel (Therm./Elect. Resist.)	May 84	203/206	103/114
1473	Polyethylene Resin	Oct 91	202	97
1474	Polyethylene Resin	Apr 90	202	97
1475a	Polyethylene, Linear	Dec 93	202	97
1478	Polystyrene, Narrow Mol. Wt.	Jul 92	202	97
1479	Polystyrene, Narrow Mol. Wt.	Mar 92	202	97
1480	Polyurethane	Aug 92	202	97
1482	Polyethylene, Linear	Oct 76	202	97
1483	Polyethylene, Linear	Mar 76	202	97
1484a	Polyethylene, Linear	Oct 92	202	97
1486	Bone Meal	Dec 92	105	56
1487	Poly (methylmethacrylate)	Jun 89	202	97

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1488	Poly (methylmethacrylate)	Feb 88	202	97
1489	Poly (methylmethacrylate)	Mar 86	202	97
1491	Arom. Hydro/Hexane Toluene	Aug 89	109	69
1492	Chlor. Pesticides/Hexane	Apr 92	109	69
1493	PCB Congeners	Feb 95	109	69
1496	Polyethylene Gas Pipe Resin	Sep 88	202	97
1497	Polyethylene Gas Pipe Resin	Jul 87	202	97
1507b	THC-COOH in Urine	Nov 94	105	58
1508	Cocaine & Metab. in Urine	Oct 90	105	58
1511	Multi Drugs of Abuse in Urine	Sep 94	105	58
1514	Thermal Analysis Purity Set (DSC)	Jul 84	203	100
1515	Apple Leaves	Jan 93	110	77
1521	Silicon Resistivity 0.1-10	Oct 91	206	114
1523	Silicon Resistivity 0.01-1	Oct 91	206	114
1543	GC/MS and LS System Performance	Aug 84	109	69
1544	Diet Composite	In Prep	110	76
1547	Peach Leaves	Jan 92	110	77
1548	Total Diet	Nov 91	110	76
1548a	Typical Diet	In Prep	110	76
1549	Non-Fat Milk Powder	Jul 85	110	75
1563	Coconut Oil	Jul 87	110	76
1566a	Oyster Tissue	Oct 89	110	75
1567a	Wheat Flour	Sep 88	110	75
1568a	Rice Flour	Jan 88	110	75
1570a	Trace Elements in Spinach Leaves	Oct 94	110	77
1573a	Tomato Leaves	Oct 93	110	77
1575	Pine Needles	Feb 93	110	77
1577b	Bovine Liver	Aug 91	110	75
1579a	Powdered Lead Base Paint	Feb 92	105	60
1580	Shale Oil	Nov 80	109	69
1581	PCBs in Oil	Jun 90	109	69
1582	Petroleum Crude Oil	Jan 84	109	69
1583	Chlor. Pesticide in Isooctane	Feb 85	109	69
1584	Phenols in Methanol	Apr 84	109	69
1585	Chlorinated Biphenyls	Jan 86	109	69
1586	Isotope Label Pollutants	Oct 84	109	69
1587	Nitro PAH in Methanol	Jun 85	109	69
1588	Organics in Cod Liver Oil	Jan 89	109	69
1589	PCBs (Aroclor 1260) in Human Serum	Nov 85	109	69
1595	Tripalmitin	Jul 83	105	56
1596	Nitropyrenes in Methylene Chloride	Jul 87	109	69
1597	Complex PAH Mix	May 92	109	69
1598	Inorg. Const. in Bovine Serum	Jan 90	105	56
1599	2 Anticonvulsant Drugs	Aug 82	105	56
1614	Dioxin in Isooctane	Jul 85	109	69
1616a	Sulfur in Kerosene	In Prep	108	67
1617a	Sulfur in Kerosene	In Prep	108	67
1618	Vanadium & Nickel in Fuel Oil	May 85	108	66
1619a	Sulfur in Residual Fuel Oil	Apr 91	108	67
1620b	Sulfur in Residual Fuel Oil	Jul 90	108	67
1621d	Sulfur in Residual Fuel Oil	Mar 91	108	67
1622d	Sulfur in Residual Fuel Oil	Mar 94	108	67
1623b	Sulfur in Residual Fuel Oil	Jul 90	108	67
1624b	Sulfur in Distillate Fuel Oil	Mar 94	108	67
1625	SO2 Permeation Tube-10 cm	In Prep	107	65
1626	SO2 Permeation Tube-5 cm	In Prep	107	65
1627	SO2 Permeation Tube-2 cm	Aug 92	107	65
1629a	NO2 Permeation Device 1cm	In Prep	107	65
1632b	Trace Elements in Coal (Bituminous)	Oct 93	108	68
1633b	Trace Elements in Coal Fly Ash	Jun 93	108	68
1634c	Trace Elements in Fuel Oil	In Prep	108	68
1635	Trace Elements in Coal (Subbituminous)	Aug 79	108	68
1639	Halocarbons (in methanol)	Apr 83	109	69
1640	Natural Water	In Prep	106	61
1641c	Mercury in Water	Jun 93	106	61
1643d	Trace Elements in Water	In Prep	106	61
1646a	Estuarine Sediment	Jan 95	106/111	61/84
1647c	Priority Pollutant PAHs	Apr 94	109	69
1648	Urban Particulate Matter	Aug 91	106	62
1649	Urban Dust/Organics	Jan 92	109	69
1650	Diesel Particulate Matter	Dec 91	109	69
1655	KCl Solution Calorimetry	Mar 81	203	99
1656	Thianthrene Combustion Calorimetry	Jan 85	203	99
1657	Synthetic Refuse-Derived Fuel	May 93	203	99
1658a	CH4/Air, 1 µmol/mol	Jun 93	107	64
1659a	CH4/Air, 10 µmol/mol	In Prep	107	64
1660a	CH4-C3H8/Air, 1 µmol/mol	In Prep	107	64
1661a	SO2/N2, 500 µmol/mol	In Prep	107	65
1662a	SO2/N2, 1000 µmol/mol	Aug 93	107	65
1663a	SO2/N2, 1500 µmol/mol	Jul 93	107	65
1664a	SO2/N2, 2500 µmol/mol	In Prep	107	65
1665b	C3H8/Air, 3 µmol/mol	In Prep	107	64
1666b	C3H8/Air, 10 µmol/mol	In Prep	107	64
1667b	C3H8/Air, 50 µmol/mol	In Prep	107	64
1668b	C3H8/Air, 100 µmol/mol	Jun 93	107	64
1669b	C3H8/Air, 500 µmol/mol	In Prep	107	64
1670a	CO2/Air, 300 µmol/mol	In Prep	107	64
1671a	CO2/Air, 340 µmol/mol	In Prep	107	64
1672a	CO2/Air, 350 µmol/mol	In Prep	107	64
1674b	CO2/N2, mol 7%	Aug 93	107	63
1675b	CO2/N2, mol 14%	Aug 93	107	63
1677c	CO/N2, 10 µmol/mol	Mar 94	107	64
1678c	CO/N2, 50 µmol/mol	In Prep	107	64
1679c	CO/N2, 100 µmol/mol	In Prep	107	64
1680b	CO/N2, 500 µmol/mol	In Prep	107	64
1681b	CO/N2, 1000 µmol/mol	In Prep	107	64
1683b	NO/N2, 50 µmol/mol	Mar 94	107	64
1684b	NO/N2, 100 µmol/mol	Oct 94	107	64
1685b	NO/N2, 250 µmol/mol	In Prep	107	64
1686b	NO/N2, 500 µmol/mol	In Prep	107	64
1687b	NO/N2, 1000 µmol/mol	In Prep	107	64
1690	Polystyrene (Particle Size)	Dec 82	301	125
1691	Polystyrene (Particle Size)	May 84	301	125
1692	Polystyrene (Particle Size)	May 91	301	125
1693a	SO2/N2, 50 µmol/mol	In Prep	107	65
1694a	SO2/N2, 100 µmol/mol	In Prep	107	65
1696a	SO2/N2, 3500 µmol/mol	Jul 93	107	65
1700a	CO2/N2, 10 mol (Blood Gas) %	Aug 88	107	63
1701a	CO2-5%, O2-12 mol (Blood Gas) %/N2	Aug 88	107	63
1702a	CO2-5%, O2-20 mol (Blood Gas) %/N2	Aug 88	107	63
1703a	CO2-10%, O2-7 mol (Blood Gas) %/N2	Aug 88	107	63
1710	Aluminum Alloy 3004	Jun 93	102	39
1711	Aluminum Alloy 3004	Jun 93	102	39
1712	Aluminum Alloy 3004	Jun 93	102	39
1713	Aluminum Alloy 5182	Jun 93	102	39
1714	Aluminum Alloy 5182	Jun 93	102	39
1715	Aluminum Alloy 5182	Jun 93	102	39
1744	Aluminum Freezing Point	Nov 94	203	101
1746	Silver (Freezing Point)	Jul 93	203	101
1754	Steel (AISI 4320)	Feb 89	101	28
1761	LA Steel	Apr 92	101	30
1762	LA Steel	Apr 92	101	30
1763	LA Steel	Apr 92	101	30
1764	LA Steel	Feb 93	101	30
1765	LA Steel	Feb 93	101	30
1766	LA Steel	Feb 93	101	30
1767	LA Steel	Jun 93	101	30
1768	High-Purity Iron	Dec 91	101	30
1776	Naval Brass WK1	In Prep	102	43
1777	Naval Brass WK2	In Prep	102	43
1778	Naval Brass WK3	In Prep	102	43
1779	Naval Brass WK4	In Prep	102	43
1780	Naval Brass WK5	In Prep	102	43
1800	Organic Compounds/N2	Dec 93	107	65
1804a	Tox. Organic Compounds/N2	Nov 92	107	65
1810a	Linerboard	Jun 90	309	131
1811	Aromatic Organics/N2	Apr 93	107	63
1812	Aromatic Organics/N2	Feb 93	107	63
1815a	n-Heptane (Fuel Rating)	Mar 85	108	67
1816a	Isooctane (Fuel Rating)	Mar 85	108	67
1817c	Catalyst Package IIID	Jun 92	114	91
1818a	Chlorine in Lub. Base Oil	Apr 94	114	90

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1819a	Sulfur in Lub. Base Oil	Apr 94	114	90
1820	Borosilicate Glass (Refractive Index)	Sep 74	209	122
1822	Soda-Lime Glass (Refractive Index)	Nov 84	209	122
1826	Soda-Lime Glass (Density)	Aug 90	209	122
1827	Lead Silica Glass (Density)	Aug 90	209	122
1828a	Ethanol-Water Soln.	In Prep	105	57
1829	Alcohols in Ref. Fuels	Mar 86	108	66
1830	Soda Lime Float (Glass)	Sep 91	112	86
1831	Soda Lime Sheet (Glass)	Sep 91	112	86
1832	Thin Glass Film (XRF)	May 84	106	61
1833	Thin Glass Film (XRF)	May 84	106	61
1834	Fused Ore (Glass)	Jul 90	112	86
1835	Borate Ore	Sep 87	111	81
1836	Nitrogen in Lub. Base Oil	Dec 89	114	90
1837	Methanol, Butanol (Fossil Fuel)	Mar 86	108	66
1838	Ethanol (Fossil Fuel)	Mar 86	108	66
1839	Methanol (Fossil Fuel)	Mar 86	108	66
1842	X-Ray Stage Calib., X and Y Dimen.	Nov 93	209	121
1843	X-Ray Stage Calib., Z Dimen.	Nov 93	209	121
1845	Cholesterol in Egg Powder	Apr 94	110	76
1846	Infant Formula (milk-based)	In Prep	110	76
1850	Penetrant Test Block	Dec 80	303	128
1851	NDE Penetrant Test Block	Apr 84	303	128
1853	Magnetic Particle Test Ring	Apr 92	303	128
1857	Tool Steel (Abrasive Wear)	Mar 83	302	127
1866a	Common Commercial Asbestos	Jun 91	105	60
1867	Uncommon Commercial Asbestos	Aug 93	105	60
1868	Asbestos in Building Materialsk	In Prep	105	60
1872	Synthetic Glass	May 84	103	47
1873	Synthetic Glass	May 84	103	47
1876b	Chrysotile Asbestos	Jan 92	105	60
1878a	Respirable α-Quartz	In Prep	105	60
1879	Respirable Cristobalite	Jan 88	105	60
1879a	Respirable Cristobalite	In Prep	105	60
1880	Portland Cement, Black	Jan 93	113	88
1881	Portland Cement, White	Jan 89	113	88
1882	Portland Cement, Orange	Jul 90	113	88
1883	Portland Cement, Silver	Jul 90	113	88
1884	Portland Cement, Ivory	Sep 89	113	88
1885	Portland Cement, Turquoise	Sep 89	113	88
1886	Portland Cement, Cranberry	Sep 89	113	88
1887	Portland Cement, Brown	Sep 89	113	88
1888	Portland Cement, Purple	Sep 89	113	88
1889	Portland Cement, Gray	Sep 89	113	88
1893	Microhardness, Cu-Knoop	Mar 95	302	127
1894	Microhardness, Cu-Vickers	Nov 94	302	127
1895	Microhardness, Ni-Knoop	Mar 95	302	127
1896	Microhardness, Ni-Vickers	Mar 95	302	127
1905	Microhardness, Ni-Knoop	Mar 92	302	127
1906	Microhardness, Ni-Knoop	Nov 94	302	127
1907	Microhardness, Ni-Knoop	Mar 95	302	127
1920	IR Reflectance	Jul 86	204	107
1921	IR Transmission Wavelength	Jan 94	204	104
1923	Poly(ethylene oxide)	Jun 94	202	97
1924	Poly(ethylene oxide)	Jun 94	202	97
1930	Glass Filters, Transmittance	Aug 94	204	105
1931	Fluorescence Spectra	Aug 89	204	105
1939	PCBs in River Sediment A	Oct 90	109	69
1941a	Organics in Marine Sediment	Mar 94	109	69
1945	Organics in Whale Blubber	Jun 94	109	69
1951a	Cholesterol in Human Serum	In Prep	105	56
1952a	Cholesterol in Human Serum	Jan 90	105	56
1960	Polystyrene (Particle Size)	Apr 85	301	125
1961	Polystyrene (Particle Size)	Jan 87	301	125
1963	Polystyrene (Particle Size)	Nov 93	301	125
1965	Polystyrene (on Slide)(Particle Size)	Jan 87	301	125
1967	Pt Thermocouple Wire	Jul 90	203	102
1968	Gallium (Fixed Point)	Mar 91	203	101
1969	Rubidium (Fixed Point)	Mar 91	203	101
1970	Succinonitrile (Fixed Point)	Apr 91	203	101
1971	Indium	Aug 90	203	101
1972	1,3-Dioxolan-2-one (Fixed Point)	May 94	203	101
1973	n-Docosane (Fixed Point)	May 93	203	101
1974a	Organics in Mussel Tissue	In Prep	109	69
1976	Instrument Intensity, Alumina (XRD)	Nov 91	209	121
1978	Zirconium Oxide (Particle Size)	Oct 93	301	125
1980	Electrophoretic Mobility (Positive)	Mar 94	301	126
1981	Electrophoretic Mobility (Negative)	In Prep	301	126
2003	First Surface Aluminum on Glass	In Prep	204	107
2011	First Surface, Gold on Glass	May 92	204	107
2015	Opal Glass (Reflectance)	May 82	204	107
2023	Second Surface, Aluminum on Quartz	Sep 92	204	107
2026	First Surface, Black Glass	Oct 92	204	107
2030a	Glass Filters, Transmittance	Oct 93	204	105
2031	Metal-on-Quartz Filters, Transmittance	In Prep	204	105
2032	Potassium Iodide,Stray Light	Oct 79	204	106
2034	Holmium Oxide Wavelength	In Prep	204	106
2063a	Mineral Glass (Thin Film)	Feb 93	103	47
2069b	SEM Performance	May 91	207	116
2071a	Sinusoidal Roughness	In Prep	302	127
2072	Sinusoidal Roughness	Dec 89	302	127
2073a	Sinusoidal Roughness	In Prep	302	127
2074	Sinusoidal Roughness	Jun 92	302	127
2075	Sinusoidal Roughness	Jan 94	302	127
2083	Socketed Ball Bar	Aug 85	309	131
2084	CMM Probe Performance	Apr 94	309	131
2085	CMM Probe (25-mm sphere)	In Prep	309	131
2090	SEM Magnification	In Prep	207	116
2092	Low-Energy Charpy	Nov 94	309	131
2096	High-Energy Charpy	Nov 94	309	131
2098	Super High-Energy Charpy	Nov 94	309	131
2108	Chromium (III) Speciation	Dec 92	104	53
2109	Chromium (VI) Speciation	Jul 92	104	53
2135c	Ni-Cr Depth profile	In Prep	207	116
2136	Cr/CrO2 Depth Profile	Mar 91	207	116
2137	B Implant in Si Depth Profile	Apr 93	207	116
2141	Urea	Aug 70	104	49
2142	0-Bromobenzoic Acid	Sep 70	104	49
2143	p-Fluorobenzoic Acid	Jan 82	104	49
2144	m-Chlorobenzoic Acid	Apr 73	104	49
2151	Nicotinic Acid (Comb. Calorimetry)	Jan 85	203	99
2152	Urea (Comb. Calorimetry)	Jan 85	203	99
2159	LA Steel, Carbon & Sulfur only	Mar 90	101	27
2160	LA Steel, Carbon & Sulfur only	Mar 90	101	27
2165	LA Steel, E	Jun 89	101	27
2166	LA Steel	Jun 89	101	27
2167	LA Steel, G	Jun 89	101	27
2168	High-Purity Iron	Dec 91	101	27
2171	LA Steel, (HSLA 100)	Oct 91	101	26
2181	HEPES Free Acid	Mar 92	201	95
2182	HEPES ate	Mar 92	201	95
2183	MOPSO Free Acid	Mar 92	201	95
2184	MOPSO Bte	Mar 92	201	95
2185	Pot. Hydrogen Phthalate	Nov 84	201	95
21861	Pot. Dihydro. Phosphate	May 68	201	95
21861l	Disod. Hydro. Phosphate	May 68	201	95
2191a	Sodium Bicarbonate	Feb 94	201	95
2192a	Sodium Carbonate	Feb 94	201	95
2193	Calcium Carbonate	Oct 91	201	95
2201	Sodium Chloride (Ion-Selective)	May 93	201	96
2202	Potassium Chloride (Ion-Selective)	Mar 84	201	96
2203	Potassium Fluoride (Ion-Selective)	May 73	201	96
2220	Tin (Dif. Scan. Calor.)	May 89	203	100
2221b	Zinc (Dif. Scan. Calor.)	In Prep	203	100
2222	Biphenyl (Dif. Scan. Calor.)	Jun 89	203	100
2225	Mercury (Dif. Scan Calor.)	Mar 89	203	100

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2260	Aromatic Hydrocarbons in Toluene	Jun 91	109	69
2261	Chlorinated Pesticides in Hexane	Jan 92	109	69
2262	Chlorinated Biphenyls in Isooctane	In Prep	109	69
2286	Ethanol in Gasoline	Feb 95	108	66
2287	Ethanol in Gasoline	Jan 95	108	66
2288	t-Amyl Methyl Ether in Gas.	Jan 95	108	66
2289	t-Amyl Methyl Ether in Gas.	Jan 95	108	66
2290	Ethyl t-Butyl Ether in Gas.	Jan 95	108	66
2291	Ethyl t-Butyl Ether in Gas.	Jan 95	108	66
2292	Methyl t-Butyl Ether in Gas.	Jan 95	108	66
2293	Methyl t-Butyl Ether in Gas.	Feb 95	108	66
2321	Sn-Pb Alloy Coating	Jun 91	207	117
2350	Nickel Step Test	Aug 85	302	127
2381	Morphine and Codeine in Urine	Jul 93	105	58
2382	Morphine Glucorinide in Urine	Jul 93	105	58
2383	Foods/Baby Foods	In Prep	110	76
2389	Amino Acids in Hydrochloric Acid	Dec 93	105	56
2390	DNA Profiling	Aug 92	105	59
2391	PCR-Based DNA Profiling	In Prep	105	59
2392	DNA Mituchondrial Sequencing	In Prep	105	59
C2400	HA Steel ACI (17/4 PH)	Feb 86	101	35
C2401	HA Steel (ACI-C-4M-Cu)	Feb 86	101	35
C2402	Hastelloy C	Feb 86	101	35
C2415	Battery Lead	Mar 91	102	43
C2416	Bullet Lead	Feb 88	102	43
C2417	Lead-Base Alloy	Feb 87	102	43
C2418	High-Purity Lead	Feb 87	102	43
C2423	Ductile Iron A	Nov 85	101	38
C2423a	Ductile Iron B	Nov 85	101	38
C2424a	Ductile Iron D	Jul 85	101	38
C2424	Ductile Iron C	Jul 85	101	38
2430	Scheelite Ore	Jan 87	111	79
2431	Titanium Base Alloy	Aug 93	102	45
2432	Titanium Base Alloy	Aug 93	102	45
2520	Optical Fiber Diameter	Jan 93	207	116
2526	111P-Type Si. Sprd. Resist.	Aug 83	206	114
2527	111N-Type Si. Sprd. Resist.	Aug 83	206	114
2528	100P-Type Si. Sprd. Resist.	Jan 84	206	114
2529	100N-Type Si. Sprd. Resist.	May 84	206	114
2531	Si/SiO2 Thickness-50 nm	Jul 92	207	118
2532	Si/SiO2 Thickness-100 nm	Jul 92	207	118
2533	Si/SiO2 Thickness-200 nm	Jul 92	207	118
2534	Si/SiO2 Thickness-25 nm	Jul 92	207	118
2535	Si/SiO2 Thickness-14 nm	Sep 94	207	118
2536	Si/SiO2 Thickness-76 mm	Sep 94	207	118
2541	Silicon Resistivity	In Prep	206	114
2542	Silicon Resistivity	In Prep	206	114
2543	Silicon Resistivity	In Prep	206	114
2544	Silicon Resistivity	In Prep	206	114
2545	Silicon Resistivity	In Prep	206	114
2546	Silicon Resistivity	In Prep	206	114
2547	Silicon Resistivity	In Prep	206	114
2551	Oxygen in Silicon	Mar 94	207	118
2556	Recycled Pellet (Autocatalyst)	Aug 93	106	62
2557	Recycled Monolith (Autocatalyst)	Aug 93	106	62
2567	Catalyst Package IIIE	In Prep	114	91
2579	Lead Paint Film	Mar 93	105	60
2580	Powdered Paint	In Prep	105	60
2581	Powdered Paint	In Prep	105	60
2582	Powdered Paint, (Low Lead)	Jun 94	105	60
2607	CO2/N2O/Air, 340/0.3 µmol/mol	Nov 88	107	63
2609	CO2/N2O/Air, 380/0.33 µmol/mol	Nov 88	107	63
2610	CO2/N2O/Air, 380/0.33 µmol/mol	Nov 88	107	63
2612a	CO/Air, 10 µmol/mol	Apr 91	107	63
2613a	CO/Air, 20 µmol/mol	Oct 94	107	63
2614a	CO/Air, 45 µmol/mol	In Prep	107	63
2619a	CO2/N2, 0.5 mol %	Jun 92	107	63
2620a	CO2/N2, 1.0 mol %	Jun 92	107	63
2621a	CO2/N2, 1.5 mol %	In Prep	107	63
2622a	CO2/N2, 2.0 mol %	In Prep	107	63
2623a	CO2/N2, 2.5 mol %	Jun 92	107	63
2624a	CO2/N2, 3.0 mol %	In Prep	107	63
2625a	CO2/N2, 3.5 mol %	Aug 94	107	63
2626a	CO2/N2, 4.0 mol %	In Prep	107	63
2627a	NO/N2, 5 µmol/mol	In Prep	107	64
2628a	NO/N2, 10 µmol/mol	In Prep	107	64
2629a	NO/N2, 20 µmol/mol	In Prep	107	64
2630	NO/N2, 1500 µmol/mol	In Prep	107	64
2631a	NO/N2, 3,000 µmol/mol	In Prep	107	64
2632a	CO2/N2, 300 µmol/mol	Sep 90	107	63
2635a	CO/N2, 25 µmol/mol	In Prep	107	64
2636a	CO/N2, 250 µmol/mol	In Prep	107	64
2637a	CO/N2, 2500 µmol/mol	In Prep	107	64
2638a	CO/N2, 5000 µmol/mol	In Prep	107	64
2639a	CO/N2, 1 mol %	May 92	107	64
2640a	CO/N2, 2 mol %	Nov 88	107	64
2641a	CO/N2, 4 mol %	Nov 88	107	64
2642a	CO/N2, 8 mol %	Sep 93	107	64
2643a	C3H8/N2, 100 µmol/mol	Sep 90	107	65
2644a	C3H8/N2, 250 µmol/mol	Sep 90	107	65
2645a	C3H8/N2, 500 µmol/mol	In Prep	107	65
2646a	C3H8/N2, 1000 µmol/mol	In Prep	107	65
2647a	C3H8/N2, 2500 µmol/mol	In Prep	107	65
2648a	C3H8/N2 5000 µmol/mol	Oct 93	107	65
2649a	C3H8/N2, 1 mol %	In Prep	107	65
2650	C3H8/N2, 2 mol %	Jan 93	107	65
2651	C3H8/N2 & O2, 0.01/5 mol %	Apr 93	107	65
2652	C3H8/N2 & O2, 0.01/10 mol %	Apr 93	107	65
2656	NOx/Air, 2500 µmol/mol	Apr 93	107	64
2657a	O2/N2, 2 mol %	Jun 93	107	64
2658a	O2/N2, 10 mol %	Jun 93	107	64
2659a	O2/N2, 21 mol %	Jun 93	107	64
2660	NOx/Air, 100 µmol/mol	Jul 93	107	64
2670	Toxic Metals in Urine	Aug 94	105	57
2671a	Fluorine in Urine	Dec 82	105	57
2672a	Mercury in Urine	May 83	105	57
2676d	Metals on Filter Media	Aug 92	105	59
2677a	Be and As on Filter Media	Feb 94	105	59
2678	Membrane Blank Filter	May 88	105	59
2679a	Quartz on Filter Media	May 84	105	59
2681	Ashless Blank Filter	May 88	105	59
2682a	Sulfur in Coal, 0.5%, (also Heat of Comb.)	May 94	108	67
2683a	Sulfur in Coal, 2%, (also Heat of Comb.)	Nov 92	108	67
2684a	Sulfur in Coal, 3%, (also Heat of Comb.)	Nov 92	108	67
2685a	Sulfur in Coal, 5%, (also Heat of Comb.)	May 94	108	67
2689	Coal Fly Ash	Dec 93	108	68
2690	Coal Fly Ash	Dec 93	108	68
2691	Coal Fly Ash	Dec 93	108	68
2692a	Sulfur in Coal, 1%	Sep 94	108	67
2694a	Simulated Rainwater	Feb 95	106	61
2695	Fluoride in Vegetation	Aug 91	110	77
2704	Buffalo River Sediment	Jul 90	106/111	61/84
2709	San Joaquin Soil	Aug 93	111	84
2710	Montana I Soil	Aug 93	111	84
2711	Montana II Soil	Aug 93	111	84
2712	Lead in Ref. Fuel	Sep 88	108	66
2713	Lead in Ref. Fuel	Sep 88	108	66
2714	Lead in Ref. Fuel	Sep 88	108	66
2715	Lead in Ref. Fuel	Sep 88	108	66
2717	Sulfur in Residual Fuel Oil	Oct 90	108	67
2724	Sulfur in Diesel Fuel Oil, 0.04%	Jul 93	108	67
2727	IM Gases, 3 Components	Apr 92	107	64
2728	IM Gases, 3 Components	Apr 92	107	64
2730	H2S/N2, 5 µmol/mol	In Prep	107	65
2731	H2S/N2, 20 µmol/mol	In Prep	107	65
2735	NO/N2, 800 µmol/mol	In Prep	107	64
2736	NO/N2, 2000 µmol/mol	Sep 90	107	64
2740	CO/N2, 10 mol %	Sep 90	107	64
2741	CO/N2, 13 mol %	Sep 90	107	64
2745	CO2/N2, 16 mole Percent	In Prep	107	64
2750	CH4/N2, 50 µmol/mol	Sep 90	107	64
2751	CH4/N2, 100 µmol/mol	In Prep	107	64

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2764	C3H8/Air, 0.25 µmol/mol	In Prep	107	64
2775	Foundry Coke	In Prep	108	67
2776	Foundry Coke	In Prep	108	67
2798	Microhardness, Ni Vickers	Aug 93	302	127
2830	Microhardness, Ceramic-Knoop	In Prep	302	127
2831	Microhardness, Ceramic-Vickers	In Prep	302	127
3087	Metals on Filter Media	Jun 90	105	59
3101a	Aluminum Spectro Soln.	Feb 94	104	50
3102a	Antimony Spectro Soln.	Nov 94	104	50
3103a	Arsenic Spectro Soln.	Jul 94	104	50
3104a	Barium Spectro Soln.	Nov 94	104	50
3105a	Beryllium Spectro Soln.	Mar 95	104	50
3106	Bismuth Spectro Soln.	Mar 95	104	50
3107	Boron Spectro Soln.	Aug 94	104	50
3108	Cadmium Spectro Soln.	Sep 93	104	50
3109a	Calcium Spectro Soln.	Jul 94	104	50
3110	Cerium Spectro Soln.	Feb 95	104	50
3111a	Cesium Spectro Soln.	May 93	104	50
3112a	Chromium Spectro Soln.	Apr 94	104	50
3113	Cobalt Spectro Soln.	Mar 95	104	50
3114	Copper Spectro Soln.	Mar 94	104	50
3115a	Dysprosium Spectro Soln.	Apr 92	104	50
3116a	Erbium Spectro Soln.	Dec 93	104	50
3117a	Europium Spectro Soln.	Jan 94	104	50
3118a	Gadolinium Spectro Soln.	Jan 95	104	50
3119a	Gallium Spectro Soln.	Oct 93	104	50
3120	Germanium Spectro Soln.	Nov 94	104	50
3121	Gold Spectro Soln.	Sep 93	104	50
3122	Hafnium Spectro Soln.	Feb 91	104	50
3123a	Holmium Spectro Soln.	Jan 94	104	50
3124a	Indium Spectro Soln.	Jan 94	104	50
3126a	Iron Spectro Soln.	Nov 94	104	50
3127a	Lanthanum Spectro Soln.	Jan 95	104	50
3128	Lead Spectro Soln.	Mar 94	104	50
3129a	Lithium Spectro Soln.	Mar 94	104	50
3130a	Lutetium Spectro Soln.	Jan 94	104	50
3131a	Magnesium Spectro Soln.	Apr 94	104	50
3132	Manganese Specto Soln.	Jun 94	104	50
3133	Mercury Spectro Soln.	Mar 94	104	50
3134	Molybdenum Spectro Soln.	Dec 94	104	50
3135a	Neodymium Spectro Soln.	Sep 94	104	50
3136	Nickel Spectro Soln.	Sep 94	104	50
3137	Niobium Spectro Soln.	Aug 94	104	50
3138	Palladium Spectro Soln.	Nov 94	104	50
3139a	Phosphorus Spectro Soln.	May 94	104	50
3140	Platinum Spectro Soln.	May 94	104	50
3141a	Potassium Spectro Soln.	Nov 94	104	50
3142a	Praseodymium Spectro Soln.	Sep 94	104	50
3143	Rhenium Spectro Soln.	Oct 93	104	50
3144	Rhodium Spectro Soln.	Jan 95	104	50
3145a	Rubidium Spectro Soln.	Dec 93	104	50
3147a	Samarium Spectro Soln.	Dec 93	104	51
3148a	Scandium Spectro Soln.	Aug 94	104	51
3149	Selenium Spectro Soln.	Aug 94	104	51
3150	Silicon Spectro Soln.	Jul 94	104	51
3151	Silver Spectro Soln.	Aug 94	104	51
3152a	Sodium Spectro Soln.	Dec 94	104	51
3153a	Strontium Spectro Soln.	Feb 94	104	51
3154	Sulfur Spectro Soln.	Mar 95	104	51
3155	Tantalum Spectro Soln.	Oct 93	104	51
3156	Tellurium Spectro Soln.	Feb 94	104	51
3157a	Terbium Spectro Soln.	Dec 93	104	51
3158	Thallium Spectro Soln.	Sep 93	104	51
3159	Thorium Spectro Soln.	Feb 94	104	51
3160a	Thulium Spectro Soln.	Jan 94	104	51
3161	Tin Spectro Soln.	May 94	104	51
3162a	Titanium Spectro Soln.	Jul 94	104	51
3163	Tungsten Spectro Soln.	Dec 93	104	51
3164	Uranium Spectro Soln.	Oct 93	104	51
3165	Vanadium Spectro Soln.	Jan 95	104	51
3166a	Ytterbium Spectro Soln.	Jan 94	104	51
3167a	Yttrium Spectro Soln.	Jul 93	104	51
3168a	Zinc Spectro Soln.	Dec 94	104	51
3169	Zirconium Spectro Soln.	Jan 95	104	51
3171a	Multielement Mix A1 Soln.	Nov 94	104	51
3172a	Multielement Mix B1 Soln.	Jan 95	104	52
3179	Multielement Mixes I, II, III	Jul 93	104	52
3181	Sulfate Anion Soln.	Jan 95	104	53
3182	Chloride Anion Soln.	Aug 94	104	53
3183	Fluoride Anion Soln.	Dec 94	104	53
3184	Bromide Anion Soln.	Sep 94	104	53
3185	Nitrate Anion Soln.	Aug 94	104	53
3186	Phosphate Anion Soln.	Nov 93	104	53
3190	Electro. Conductivity (25 µS/cm)	Feb 95	201	96
3191	Electro. Conductivity (100 µS/cm)	Jul 94	201	96
3192	Electro. Conductivity (500 µS/cm)	Jul 94	201	96
3193	Electro. Conductivity (1000 µS/cm)	Feb 95	201	96
3194	Electro. Conductivity (10,000 µS/cm)	Mar 94	201	96
3195	Electro. Conductivity (100,000 µS/cm)	Jun 93	201	96
3196	Electro. Conductivity (20,000 µS/cm)	Jan 93	201	96
3198	Electro. Conductivity (5 µS/cm)	In Prep	201	96
3199	Electro. Conductivity (15 µS/cm)	In Prep	201	96
3201	Sec. Std. Mag. Tape	Mar 94	304	129
3202	Sec. Std. Mag. Tape	Mar 94	304	129
3203	Sec. Std. Mag. Tape	Mar 94	304	129
3204	Sec. Std. Mag. Tape	Mar 94	304	129
3217	Sec. Std. Mag. Tape High Density	Jul 87	304	129
4200B	Cesium/Barium-137m	Dec 79	205	112
4201B	Niobium-94	Jun 70	205	112
4203D	Cobalt-60	Feb 84	205	112
4207B	Cesium-137/Barium-137m	Mar 87	205	112
4222C	Carbon-14 (as hexadene)	Jan 91	205	109
4226C	Nickel-63	In Prep	205	109
4233C	Cesium-137 Burn-up Std. (Soln.)	Dec 89	205	109
4234A	Strontium-90	Apr 95	205	109
4235	Beryllium-10/Beryllium-9	Nov 86	205	111
4241B	Barium-133	Apr 82	205	112
4251C	Barium-133 Soln.	Dec 81	205	109
4275C	Mixed Radionuclide	Sep 88	205	112
4276C	Mixed Radionuclide Soln.	Sep 88	205	109
4288A	Technetium-99 Soln.	Nov 82	205	109
4320	Curium-244 Soln.	Mar 89	205	109
4321B	Natural Uranium Soln.	Nov 86	205	109
4322B	Americium-241 Soln.	Oct 91	205	109
4323A	Plutonium-238 Soln.	Nov 86	205	109
4324A	Uranium-232	In Prep	205	109
4326	Polonium-209	Jan 95	205	109
4328A	Thorium-229 Soln.	May 85	205	109
4329	Curium-243 Soln.	Mar 85	205	109
4332D	Americium-243 Soln.	Aug 90	205	109
4334E	Plutonium-242 Soln.	Jan 93	205	109
4338	Plutonium-240 Soln.	Sep 80	205	109
4339A	Radium-228 Soln	Jul 88	205	109
4340	Plutonium-241 Soln.	May 86	205	109
4341	Neptunium-237	Jan 93	205	109
4350B	River Sediment (Radioactivity)	Sep 81	205	113
4351	Human Lung	Oct 82	205	113
4352	Human Liver	Jun 82	205	113
4353	Rocky Flats Soil #1	Dec 80	205	113
4354	Lake Sediment (Radioactivity)	Feb 86	205	113
4355	Peruvian Soil	Jun 82	205	113
4357	Ocean Sediment (Radioactivity)	In Prep	205	113
4361B	Hydrogen-3 Soln.	Jan 81	205	109
4370C	Europium-152 Soln.	Mar 87	205	109
4400N	Chromium-51 Soln.	FC	205	110
4401T	Iodine-131 Soln.	FC	205	110
4402C	Tin-113/Indium-113m Soln.	FC	205	110
4403B	Strontium-85 Soln.	FC	205	110
4404Q	Thallium-201 Soln.	FC	205	110
4405B	Gold-198 Soln.	FC	205	110

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4406M	Phosphorus-32 Soln.	FC	205	110
4407S	Iodine-125 Soln.	FC	205	110
4408D	Cobalt-57 Soln.	FC	205	110
4409D	Cobalt-57 Soln.	FC	205	110
4410HT	Technetium-99M Soln.	FC	205	110
4411B	Iron-59 Soln.	FC	205	110
4412S	Molybdenum-99/Technetium-99 Soln.	FC	205	110
4414C	Iodine-123 Soln.	FC	205	110
4415R	Xenon-133 Gas	FC	205	110
4416O	Gallium-67 Soln.	FC	205	110
4417N	Indium-111 Soln.	FC	205	110
4418L	Mercury-203 Soln.	FC	205	110
4419C	Ytterbium-169 Soln.	FC	205	110
4420B	Lead-203 Soln.	FC	205	110
4421L	Gold-195 Soln.	FC	205	110
4424	Sulfur-35 Soln.	FC	205	110
4425A	Samarium-153 Soln.	FC	205	110
4426A	Strontium-89 Soln.	FC	205	110
4427A	Yttrium-90 Soln.	FC	205	110
4904NG	Americium-241	Apr 87	205	111
4904SG	Americium-241	Apr 87	205	111
4906C	Plutonium-238	Nov 87	205	111
4906HC	Plutonium-238	Nov 87	205	111
4915E	Cobalt-60 Soln.	Feb 84	205	109
4919G	Strontium-90 Soln.	May 88	205	109
4926D	Hydrogen-3 Water Soln.	Aug 89	205	109
4927E	Hydrogen-3 Soln.	Jan 89	205	109
4929D	Iron-55 Soln.	Feb 86	205	109
4943	Chlorine-36 (Beta) Soln.	Dec 84	205	109
4947C	Hydrogen-3 Toluene Soln.	May 87	205	109
4949C	Iodine-129 Soln.	Feb 82	205	109
4950E	Radium-226 Soln.	May 84	205	109
4952C	Radium-226 Blank Soln.	Jan 92	205	109
4965	Radium-226 Soln.	Jan 92	205	109
4966	Radium-226 Soln.	Jan 92	205	109
4967	Radium-226 Soln.	Jan 92	205	109
4968	Radium-226	Aug 94	205	112
4990C	Oxalic Acid (C-14 Dating)	Jul 83	205	111
8050-8067	RCM Fine Gold	In Prep	104	55
8068-8082	RCM Gold Bullion	In Prep	104	54
8101a	Auto. Computer Time Svc.	Aug 93	207	118
8153-8173	RCM Fine Silver	In Prep	104	54
8384	TBBS (powder)	Oct 92	202	98
8406	Tennessee River Sediment	Jun 90	111	84
8407	Tennessee River Sediment	Jun 90	106	84
8411	Mixed Asbestos Research Filter	Nov 88	105	60
8412	Corn Stalk (Zea Mays)	Sep 93	110	77
8413	Corn Kernel (Zea Mays)	Sep 93	110	77
8414	Bovine Muscle Powder (Beef)	Sep 93	110	76
8415	Whole Egg Powder	Sep 93	110	76
8416	Micro. Cellulose	Sep 93	110	76
8418	Wheat Gluten	Sep 93	110	76
8420	Iron Electrolytic	May 84	203/206	103/114
8421	Iron Electrolytic	May 84	203/206	103/114
8423	Sintered Tungsten	May 84	203/206	103/114
8424	Graphite	May 84	203	103
8425	Graphite	May 84	203	103
8426	Graphite	May 84	203	103
8432	Corn Starch	Sep 93	110	76
8433	Corn Bran	Sep 93	110	76
8435	Whole Milk Powder	Sep 93	110	76
8436	Durum Wheat Flour	Sep 93	110	76
8437	Hard Red Spring Wheat Flour	Sep 93	110	76
8438	Soft Winter Wheat Flour	Sep 93	110	76
8439	Dietary Fiber	In Prep	110	76
8442	LC Selectivity	Mar 90	109	69
8443	GC/MS System Performance	Aug 84	109	69
8444	Cotinine	Feb 89	105	58
8448	Drugs of Abuse in Hair	Mar 92	105	58
8449	Drugs of Abuse in Hair	Feb 92	105	58
8450	Polyethylene Piping, 1.3 cm	Jan 88	202	98
8451	Polyethylene Piping, 4.8 cm	Jan 88	202	98
8452	Polyethylene Piping, 10.2 cm	Jan 88	202	98
8453	Poly Socket T Joint	Jan 88	202	98
8454	Poly Butt T Joint	Jan 88	202	98
8455	Pyrite Ore	Apr 91	111	81
8458	Artificial Flaw for Eddy Current NDF	Aug 91	303	128
8464	Aldrin (neat)	In Prep	109	69
8465	Dieldrin (neat)	In Prep	109	69
8466	Y-HCH (Lindane) (neat)	Apr 92	109	69
8467	4,4'-DDE (neat)	Apr 92	109	69
8468	Heptachlor (neat)	In Prep	109	69
8469	Pesticide, 4,4'-DDT (neat)	Apr 92	109	69
8486	Portland Cement Clinker	May 89	113	89
8487	Portland Cement Clinker	May 89	113	89
8488	Portland Cement Clinker	May 89	113	89
8491	Sugar Cane Bagasse	In Prep	110	78
8492	Eastern Cottonwood	In Prep	110	78
8493	Pinus Radiata	In Prep	110	78
8494	Wheat Straw	In Prep	110	78
8495	Northern Softwood	N/A	209	122
8496	Eucalyptus Hardwood	N/A	209	122
8501	Catalyst Package IIIE	Jul 91	114	91
8505	Vanadium in Crude Oil	Oct 83	108	66
8506	Transformer Oil	Mar 92	108	67
8507	Mineral Oil	Mar 92	108	67
8532	Diesel Fuel Oil	N/A	108	67
8535	VSMOW-Water	Oct 92	104	55
8536	GISP-Water	Oct 92	104	55
8537	SLAP-Water	Oct 92	104	55
8538	NBS30-Biotite	Jun 92	104	55
8539	NBS22-Oil	Jun 92	104	55
8540	PEFI-Polyethylene Foil	Jun 92	104	55
8541	USGS24-Graphite	Jun 92	104	55
8542	Sucrose ANU-Sucrose	Jun 92	104	55
8543	NBS18-Carbonatite	Jun 92	104	55
8544	NBS19-Limestone	Jun 92	104	55
8545	LSVEC-Li Carbonate	Jun 92	104	55
8546	NBS28-Silica Sand	Jun 92	104	55
8547	IAEAN1-Ammonium Sulfate	Feb 93	104	55
8548	IAEAN2-Ammonium Sulfate	Feb 93	104	55
8549	IAEAN3-Potassium Nitrate	Feb 93	104	55
8550	USGS 25-Ammonium Sulfate	Feb 93	104	55
8551	USGS 26-Ammonium Sulfate	Feb 93	104	55
8552	NSVEC-Gaseous Nitrogen	Feb 93	104	55
8553	Soufre De Lacq-Elemen.-Sulf.	Jun 92	104	55
8554	NZ1-Silver Sulfide	Jun 92	104	55
8555	NZ2-Silver Sulfide	Jun 92	104	55
8556	NBS123-Sphalerite	Jun 92	104	55
8557	NBS127-Barium Sulfate	Jun 92	104	55
8558	USGS32-Potassium Nitrate	Feb 93	104	55
8570	LGCGM Calcined Kaolin (Sur. Area)	Sep 94	301	126
8571	LGCGM Alumina (Sur. Area)	Sep 94	301	126
8572	LGCGM Silica (Sur. Area)	Sep 94	301	126
8590	High Sulfur Gas Oil Feed	N/A	114	90
8600	Chinese Copper Ore	Jun 92	111	79
8601	Chinese Copper Ore	Jun 92	111	79
8602	Chinese Lead Ore	Jun 92	111	79
8603	Chinese Lead Ore	Jun 92	111	79
8604	Chinese Zinc Ore	Jun 92	111	79
8605	Chinese Molyb. Ore	Jun 92	111	79
8606	Chinese Molyb. Ore	Jun 92	111	79
8607	Chinese Tungsten Ore	Jun 92	111	79
8608	Chinese Tungsten Ore	Jun 92	111	79
8754	ICTAC Polystyrene DTA	N/A	203	100
8757	ICTAC Set DTA	In Prep	203	100
8758	ICTAC Set DTA	In Prep	203	100
8759	ICTAC Set DTA	N/A	203	100
8760	ICTAC Set DTA	N/A	203	100
8761	ICTAC Thermogravimetry	In Prep	203	100

N/A-Certificate does not exist.

FC-New certificate is issued with each new batch prepared.

In Prep-New or Renewal SRM being prepared.

Numerical MSDS Index

The following is a listing of Material Safety Data Sheets (MSDSs) for compounds that have been determined to be hazardous by the National Institute of Standards and Technology. Under current OSHA regulations, there is no expiration date associated with a MSDS. Materials not considered to require an MSDS, fall into one of the following categories:

1. The SRM is an article, as the word is defined in paragraph (c) of section 19.10.1200 of the title 29 of the Code of Federal Regulations, which does not release or otherwise result in exposure to a hazardous chemical, under normal conditions and use.
2. The SRM has been determined to be non-hazardous by the National Institute of Standards and Technology under paragraph (d) of section 1910.1200 title 29 of the Code of Federal Regulations. The SRM will not release or otherwise result in exposure to a hazardous chemical under normal conditions of use.
3. The SRM is a pesticide or hazardous waste labeled according to regulations issued by the Environmental Protection Agency.
4. The SRM is a food, food additive, drug or clinical material labeled according to regulations issued by the Food and Drug Administration.
5. The SRM is a wine labeled according to regulations issued by the Bureau of Alcohol, Tobacco and Firearms.
6. The SRM is a tobacco product, wood or wood product which is exempted by paragraph (b)(5)(ii) and (iii) of section 1910.1200 of title 29 of the Code of Federal Regulations from the provisions of that section.
7. The SRM was obsoleted before MSDS regulations came into effect.

Additional information about MSDSs can be obtained by contacting the SRM MSDS Coordinator at:

Telephone: (301) 975-6439
Fax: (301) 926-4751
E-Mail: SRMMSDS@enh.nist.gov

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27f	Iron Ore, Sibley	Sep 94	80
39i	Benzoic Acid (Combustion Cal.)	Mar 92	99
40h	Sodium Oxalate (Reductometric)	May 90	49
58a	Ferrosilicon (73% Si)	Nov 93	36
59a	Ferrosilicon	Nov 93	36
76a	Burnt Refractory (Al203-40%)	Sep 94	83
77a	Burnt Refractory (Al203-60%)	Sep 94	83
78a	Burnt Refractory (Al203-70%)	Sep 94	83
81a	Glass Sand	Feb 88	83/86
83d	Arsenic Trioxide (Reductometric)	Dec 91	49
84j	Potassium Hydrogen Phthalate	Mar 92	49
114p	Portland Cement	Apr 94	125
127b	Solder, 40Sn-60Pb	Feb 94	43
136e	Potassium Dichromate (oxidimetric)	May 93	49
141c	Acetanilide	Sep 91	49
142	Anisic Acid	May 80	49
148	Nicotine Acid	Jan 87	49
165a	Glass Sand (Low Iron)	Sep 94	83/86
181	Lithium Ore (Spodumene)	Feb 93	79
182	Lithium Ore (Petalite)	Feb 93	79
183	Lithium Ore (Lepidolite)	Feb 93	79
185g	Potassium Hydrogen Phthalate, pH	Mar 92	95
187c	Sodium Tetraborate (Borax), pH	Oct 88	95
193	Potassium Nitrate	Sep 85	78
194	Ammonium Dihydrogen Phosphate	Sep 86	78
198	Silica Brick	May 94	83
199	Silica Brick	May 94	83
276b	Tungsten Carbide	Oct 83	85
350a	Benzoic Acid	Mar 92	49
371h	Sulfur (Rubber Compound)	Feb 93	98
372i	Stearic Acid (Rubber Compound)	Nov 93	98
383a	Mercaptobenzothiazole	Dec 78	98
640b	Line Position, Silicon (XRD)	May 92	121
659	Silicon Nitride, Particle Size	Apr 92	125
660	Line Profile, Lab6 (XRD)	Nov 92	121
671	Nickel Oxide 1	Dec 91	45
672	Nickel Oxide 2	Dec 91	45
673	Nickel Oxide 3	Dec 91	45
674a	Quant. Analysis, Set (XRD)	Oct 93	121
675	Line Position, Mica (XRD)	Jan 93	121
676	Quantitative Analysis, Alumina (XRD)	Nov 92	121
699	Alumina (Reduction Grade)	Nov 93	81
742	Alumina (Reference Point)	Jul 92	101
869	LC Column Selectivity	May 90	69
915a	Calcium Carbonate (Clinical)	Dec 91	56
928	Lead Nitrate (Clinical)	Mar 89	56
934	Clinical Thermometer	Mar 93	102
935a	Potassium Dichromate, UV Absorbance	Sep 94	104
951	Boric Acid, Assay and Isotopic	Apr 92	49/53
952	Boric Acid 95% enr. 10B	Apr 92	53
977	Bromine (Isotopic)	Oct 94	53
979	Chromium (Isotopic)	Dec 85	53
980	Magnesium (Isotopic)	Dec 85	53
981	Natural Lead (Isotopic)	Jan 92	53
982	Equal Atom Lead (Isotopic)	Jan 92	53
983	Radiogenic Lead (Isotopic)	Jan 92	53
984	Rubidium Assay (Isotopic)	Dec 85	53
986	Nickel (Isotopic)	Oct 94	53
987	Strontium Assay and Isotopic	Aug 94	49/53
989	Rhenium Assay (Isotopic)	Apr 94	53
991	Lead-206 Spike Assay and Isotopic	Oct 94	53
994	Gallium (Isotopic)	Sep 79	53
997	Thallium (Isotopic)	Oct 94	53
1007b	Plastic, (Smoke Density)	Sep 94	130
1051b	Barium (Metallo-Organic)	Feb 81	90
1052b	Vanadium (Metallo-Organic)	Jul 80	90

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1053a	Cadmium (Metallo-Organic)	May 81	90
1057b	Tin (Metallo-Organic)	May 81	90
1059c	Lead (Metallo-Organic)	Jun 84	90
1060a	Lithium (Metallo-Organic)	Sep 86	90
1065b	Nickel (Metallo-Organic)	Feb 83	90
1066a	Silicon (Metallo-Organic)	May 81	90
1069b	Sodium (Metallo-Organic)	Aug 85	90
1073b	Zinc (Metallo-Organic)	Jun 84	90
1075a	Aluminum (Metallo-Organic)	Feb 81	90
1077a	Silver (Metallo-Organic)	Feb 83	90
1079b	Iron (Metallo-Organic)	Apr 85	90
1080a	Copper (Metallo-Organics)	Feb 83	90
1083	Wear Metals (Base Oil)	Mar 92	91
1084a	Wear Metals	Mar 92	91
1085a	Wear Metals	Mar 92	91
1129	Solder 63Sn-37Pb	Dec 93	43
1131	Solder 60Pb-40Sn	Feb 94	43
1450b	Fibrous Glass Board	Apr 92	103
1491	Arom. Hydro/Hexane Toluene	Aug 89	69
1492	Chlor. Pesticides/Hexane	Sep 89	69
1493	PCB Congeners	Dec 94	69
1514	Thermal Analysis Purity Set (DSC)	May 92	100
1543	GC/MS and LS System Performance	Mar 92	69
1579	Powdered Lead Base Paint	Jan 92	60
1581	PCBs in Oil	Dec 91	69
1583	Chlor. Pesticide in Isooctane	Feb 93	69
1584	Phenols in Methanol	Mar 91	69
1585	Chlorinated Biphenyls	Feb 93	69
1586	Isotope Label Pollutants	Jun 93	69
1587	Nitro PAH in Methanol	Sep 93	69
1597	Complex PAH Mix	Feb 94	69
1614	Dioxin in Isooctane	Aug 93	69
1616a	Sulfur in Kerosene	Mar 88	67
1617a	Sulfur in Kerosene	Mar 88	67
1618	Vanadium & Nickel in Fuel Oil	Apr 91	66
1619a	Sulfur in Residual Fuel Oil	Apr 91	67
1620b	Sulfur in Residual Fuel Oil	Sep 90	67
1621d	Sulfur in Residual Fuel Oil	Aug 93	67
1622d	Sulfur in Residual Fuel Oil	Nov 93	67
1623b	Sulfur in Residual Fuel Oil	Sep 94	67
1624b	Sulfur in Distillate Fuel Oil	May 90	67
1625	SO2 Permeation Tube-10 cm	Dec 91	65
1626	SO2 Permeation Tube-5 cm	Dec 91	65
1629a	NO2 Permeation Device 1cm	May 94	65
1632b	Trace Elements in Coal (Bituminous)	Feb 93	68
1633b	Trace Elements in Coal Fly Ash	Nov 85	68
1634c	Trace Elements in Fuel Oil	Jun 92	68
1635	Trace Elements in Coal (Subbituminous)	Sep 94	68
1639	Halocarbons (in methanol)	May 93	69
1641c	Mercury in Water	Dec 89	61
1643d	Trace Elements in Water	In Prep	61
1647c	Priority Pollutant PAHs	Apr 93	69
1658a	CH4/Air, 1 µmol/mol	Jan 91	64
1659a	CH4/Air, 10 µmol/mol	Jan 91	64
1660a	CH4-C3H8/Air, 1 µmol/mol	Oct 93	64
1661a	SO2/N2, 500 µmol/mol	Aug 89	65
1662a	SO2/N2, 1000 µmol/mol	Aug 89	65
1663a	SO2/N2, 1500 µmol/mol	Aug 89	65
1664a	SO2/N2, 2500 µmol/mol	Aug 89	65
1665b	C3H8/Air, 3 µmol/mol	Sep 89	64
1666b	C3H8/Air, 10 µmol/mol	Sep 89	64
1667b	C3H8/Air, 50 µmol/mol	Sep 89	64
1668b	C3H8/Air, 100 µmol/mol	Sep 89	64
1669b	C3H8/Air, 500 µmol/mol	Sep 89	64
1674b	CO2/N2, mol 7%	Sep 94	63
1675b	CO2/N2, mol 14%	Sep 94	63
1677c	CO/N2, 10 µmol/mol	Jan 91	64
1678c	CO/N2, 50 µmol/mol	Jan 91	64
1679c	CO/N2, 100 µmol/mol	Jan 91	64
1680b	CO/N2, 500 µmol/mol	Jan 91	64
1681b	CO/N2, 1000 µmol/mol	Jan 91	64
1683b	NO/N2, 50 µmol/mol	Dec 90	64
1684b	NO/N2, 100 µmol/mol	Sep 94	64
1685b	NO/N2, 250 µmol/mol	Dec 90	64
1686b	NO/N2, 500 µmol/mol	Dec 90	64
1687b	NO/N2, 1000 µmol/mol	Dec 90	64
1693a	SO2/N2, 50 µmol/mol	Sep 94	65
1694a	SO2/N2, 100 µmol/mol	Sep 94	65
1696a	SO2/N2, 3500 µmol/mol	Sep 94	65
1700a	CO2/N2, 10 mol (Blood Gas) %	Sep 94	63
1701a	CO2-5%, O2-12 mol (Blood Gas) %/N2	Sep 94	63
1702a	CO2-5%, O2-20 mol (Blood Gas) %/N2	Sep 94	63
1703a	CO2-10%, O2-7 mol (Blood Gas) %/N2	Sep 94	63
1800	Organic Compounds/N2	Feb 94	65
1804a	Tox. Organic Compounds/N2	Oct 92	65
1811	Aromatic Organics/N2	Apr 93	63
1812	Aromatic Organics/N2	Apr 93	63
1815a	n-Heptane (Fuel Rating)	May 93	67
1816a	Isooctane (Fuel Rating)	Jan 93	67
1817c	Catalyst Package IIID	Mar 90	91
1818a	Chlorine in Lub. Base Oil	Apr 94	90
1819a	Sulfur in Lub. Base Oil	Apr 94	90
1828a	Ethanol-Water Soln.	Aug 93	57
1829	Alcohols in Ref. Fuels	Aug 93	66
1837	Methanol, Butanol (Fossil Fuel)	Jun 93	66
1838	Ethanol (Fossil Fuel)	May 93	66
1839	Methanol (Fossil Fuel)	Jun 93	66
1866a	Common Commercial Asbestos	Jan 94	60
1867	Uncommon Commercial Asbestos	Aug 93	60
1879	Respirable Cristobalite	Mar 91	60
1880	Portland Cement, Black	Jan 92	88
1881	Portland Cement, White	Apr 91	88
1882	Portland Cement, Orange	Jan 91	88
1883	Portland Cement, Silver	Apr 91	88
1884	Portland Cement, Ivory	Apr 91	88
1885	Portland Cement, Turquoise	Apr 91	88
1886	Portland Cement, Cranberry	Apr 91	88
1887	Portland Cement, Brown	Apr 91	88
1888	Portland Cement, Purple	Apr 91	88
1889	Portland Cement, Gray	Apr 91	88
1920	IR Reflectance	Jun 92	107
1941a	Organics in Marine Sediment	Aug 92	69
1970	Succinonitrile (Fixed Point)	Nov 92	101
1978	Zirconium Oxide (Particle Size)	Oct 93	125
2034	Holmium Oxide Wavelength	Feb 92	106
2108	Chromium (III) Speciation	Jun 93	53
2109	Chromium (VI) Speciation	Aug 92	53
2141	Urea	Oct 94	49
2142	0-Bromobenzoic Acid	Aug 85	49
2143	p-Fluorobenzoic Acid	Mar 88	49
2144	m-Chlorobenzoic Acid	May 91	49
2185	Pot. Hydrogen Phthalate	Mar 92	95
2193	Calcium Carbonate	Dec 91	95
2203	Potassium Fluoride (Ion-Selective)	May 82	96
2220	Tin (Dif. Scan. Calor.)	Sep 94	100
2222	Biphenyl (Dif. Scan. Calor.)	Mar 93	100
2225	Mercury (Dif. Scan Calor.)	Mar 93	100
2260	Aromatic Hydrocarbons in Toluene	Dec 91	69
2261	Chlorinated Pesticides in Hexane	Feb 92	69
2286	Ethanol in Gasoline	Jan 95	66
2287	Ethanol in Gasoline	Jan 95	66
2288	t-Amyl Methyl Ether in Gas.	Jan 95	66
2289	t-Amyl Methyl Ether in Gas.	Jan 95	66
2290	Ethyl t-Butyl Ether in Gas.	Jan 95	66
2291	Ethyl t-Butyl Ether in Gas.	Jan 95	66
2292	Methyl t-Butyl Ether in Gas.	Jan 95	66
2293	Methyl t-Butyl Ether in Gas.	Jan 95	66
2389	Amino Acids in Hydrochloric Acid	Jan 94	56
2579	Lead Paint Film	Oct 92	60
2582	Powdered Paint, (Low Lead)	Jul 94	60
2607	CO2/N2O/Air, 340/0.3 µmol/mol	Nov 88	63
2609	CO2/N2O/Air, 380/0.33 µmol/mol	Nov 88	63

SRM	Descriptor	MSDS Date	Page
2610	CO2/N2O/Air, 380/0.33 µmol/mol	Nov 88	63
2612a	CO/Air, 10 µmol/mol	Jun 91	63
2613a	CO/Air, 20 µmol/mol	Jun 91	63
2614a	CO/Air, 45 µmol/mol	Jun 91	63
2619a	CO2/N2, 0.5 mol %	Jun 92	63
2620a	CO2/N2, 1.0 mol %	Jun 92	63
2621a	CO2/N2, 1.5 mol %	Jun 92	63
2622a	CO2/N2, 2.0 mol %	Jun 92	63
2623a	CO2/N2, 2.5 mol %	Jun 92	63
2624a	CO2/N2, 3.0 mol %	Jan 93	63
2625a	CO2/N2, 3.5 mol %	Jan 93	63
2626a	CO2/N2, 4.0 mol %	Jan 93	63
2627a	NO/N2, 5 µmol/mol	Jan 91	64
2628a	NO/N2, 10 µmol/mol	Jun 91	64
2629a	NO/N2, 20 µmol/mol	Jun 91	64
2630	NO/N2, 1500 µmol/mol	Jun 91	64
2631a	NO/N2, 3,000 µmol/mol	Jun 91	64
2632a	CO2/N2, 300 µmol/mol	Jun 91	63
2635a	CO/N2, 25 µmol/mol	Jan 89	64
2636a	CO/N2, 250 µmol/mol	Jun 92	64
2637a	CO/N2, 2500 µmol/mol	Jun 92	64
2638a	CO/N2, 5000 µmol/mol	Jun 92	64
2639a	CO/N2, 1 mol %	Jun 92	64
2640a	CO/N2, 2 mol %	Dec 88	64
2641a	CO/N2, 4 mol %	Dec 88	64
2642a	CO/N2, 8 mol %	Sep 92	64
2643a	C3H8/N2, 100 µmol/mol	Dec 90	65
2644a	C3H8/N2, 250 µmol/mol	Dec 90	65
2645a	C3H8/N2, 500 µmol/mol	Dec 90	65
2647a	C3H8/N2, 2500 µmol/mol	Dec 90	65
2648a	C3H8/N2 5000 µmol/mol	Nov 93	65
2649a	C3H8/N2, 1 mol %	Dec 90	65
2650	C3H8/N2, 2 mol %	Feb 93	65
2651	C3H8/N2 & O2, 0.01/5 mol %	Aug 93	65
2652	C3H8/N2 & O2, 0.01/10 mol %	Aug 93	65
2656	NOx/Air, 2500 µmol/mol	Aug 93	64
2657a	O2/N2, 2 mol %	Jul 93	64
2658a	O2/N2, 10 mol %	Jul 93	64
2659a	O2/N2, 21 mol %	Jul 93	64
2660	NOx/Air, 100 µmol/mol	Jul 93	64
2682a	Sulfur in Coal, 0.5%, (also Heat of Comb.)	Apr 91	67
2683a	Sulfur in Coal, 2%, (also Heat of Comb.)	Apr 91	67
2684a	Sulfur in Coal, 3%, (also Heat of Comb.)	Apr 91	67
2685a	Sulfur in Coal, 5%, (also Heat of Comb.)	Apr 91	67
2689	Coal Fly Ash	Nov 85	68
2690	Coal Fly Ash	Nov 85	68
2691	Coal Fly Ash	Nov 85	68
2692a	Sulfur in Coal, 1%	Jul 94	67
2712	Lead in Ref. Fuel	Nov 88	66
2713	Lead in Ref. Fuel	Nov 88	66
2714	Lead in Ref. Fuel	Nov 88	66
2715	Lead in Ref. Fuel	Nov 88	66
2717	Sulfur in Residual Fuel Oil	Feb 93	67
2724	Sulfur in Diesel Fuel Oil, 0.04%	Jun 93	67
2727	IM Gases, 3 Components	Feb 89	64
2728	IM Gases, 3 Components	Feb 89	64
2735	NO/N2, 800 µmol/mol	Dec 90	64
2736	NO/N2, 2000 µmol/mol	Dec 90	64
2740	CO/N2, 10 mol %	Jan 91	64
2741	CO/N2, 13 mol %	Jan 91	64
2764	C3H8/Air, 0.25 µmol/mol	Jan 94	64
3101a	Aluminum Spectro Soln.	May 93	50
3102a	Antimony Spectro Soln.	Jun 93	50
3103a	Arsenic Spectro Soln.	Jul 93	50
3104a	Barium Spectro Soln.	Sep 93	50
3105a	Beryllium Spectro Soln.	Jan 94	50
3106	Bismuth Spectro Soln.	May 88	50
3108	Cadmium Spectro Soln.	May 90	50
3109a	Calcium Spectro Soln.	May 93	50
3110	Cerium Spectro Soln.	Apr 89	50
3111a	Cesium Spectro Soln.	Jul 93	50
3112a	Chromium Spectro Soln.	May 93	50
3113	Cobalt Spectro Soln.	Mar 89	50
3114	Copper Spectro Soln.	May 90	50
3115a	Dysprosium Spectro Soln.	Mar 94	50
3116a	Erbium Spectro Soln.	Jan 94	50
3117a	Europium Spectro Soln.	Jan 93	50
3118a	Gadolinium Spectro Soln.	Jan 93	50
3119a	Gallium Spectro Soln.	Oct 93	50
3120	Germanium Spectro Soln.	Apr 89	50
3121	Gold Spectro Soln.	Sep 88	50
3122	Hafnium Spectro Soln.	Jan 94	50
3123a	Holmium Spectro Soln.	Feb 94	50
3124a	Indium Spectro Soln.	May 93	50
3126a	Iron Spectro Soln.	Feb 94	50
3127a	Lanthanum Spectro Soln.	May 93	50
3128	Lead Spectro Soln.	Sep 88	50
3129a	Lithium Spectro Soln.	May 93	50
3130a	Lutetium Spectro Soln.	Feb 94	50
3131a	Magnesium Spectro Soln.	May 93	50
3132	Manganese Specto Soln.	Apr 89	50
3133	Mercury Spectro Soln.	Apr 89	50
3134	Molybdenum Spectro Soln.	May 90	50
3135a	Neodymium Spectro Soln.	May 93	50
3136	Nickel Spectro Soln.	Sep 88	50
3138	Palladium Spectro Soln.	Apr 89	50
3139a	Phosphorus Spectro Soln.	Jul 94	50
3140	Platinum Spectro Soln.	Apr 89	50
3141a	Potassium Spectro Soln.	May 93	50
3142a	Praseodymium Spectro Soln.	May 93	50
3143	Rhenium Spectro Soln.	Jul 88	50
3144	Rhodium Spectro Soln.	Jan 93	50
3145a	Rubidium Spectro Soln.	Jan 94	50
3147a	Samarium Spectro Soln.	Jan 94	51
3148a	Scandium Spectro Soln.	May 93	51
3149	Selenium Spectro Soln.	Apr 89	51
3151	Silver Spectro Soln.	Apr 89	51
3152a	Sodium Spectro Soln.	Sep 94	51
3153a	Strontium Spectro Soln.	May 93	51
3154	Sulfur Spectro Soln.	Feb 93	51
3155	Tantalum Spectro Soln.	Mar 89	51
3156	Tellurium Spectro Soln.	Mar 90	51
3157a	Terbium Spectro Soln.	Feb 94	51
3158	Thallium Spectro Soln.	Feb 89	51
3159	Thorium Spectro Soln.	Jan 89	51
3160a	Thulium Spectro Soln.	Mar 94	51
3161	Tin Spectro Soln.	May 88	51
3162a	Titanium Spectro Soln.	Jan 93	51
3163	Tungsten Spectro Soln.	Nov 88	51
3164	Uranium Spectro Soln.	Feb 90	51
3165	Vanadium Spectro Soln.	Feb 90	51
3166a	Ytterbium Spectro Soln.	Feb 94	51
3167a	Yttrium Spectro Soln.	Jul 93	51
3168a	Zinc Spectro Soln.	Oct 93	51
3169	Zirconium Spectro Soln.	Oct 88	51
3171a	Multielement Mix A1 Soln.	May 93	51
3172a	Multielement Mix B1 Soln.	Jan 93	52
3179	Multielement Mixes I, II, III	Nov 93	52
3183	Fluoride Anion Soln.	Feb 93	53
8443	GC/MS System Performance	Mar 92	69
8466	Y-HCH (Lindane) (neat)	May 92	69
8467	4,4'-DDE (neat)	May 92	69
8469	Pesticide, 4,4'-DDT (neat)	May 92	69
8505	Vanadium in Crude Oil	Jan 93	66
8506	Transformer Oil	Mar 92	67
8507	Mineral Oil	Mar 92	67
8570	LGCGM Calcined Kaolin (Sur. Area)	Apr 85	126
8571	LGCGM Alumina (Sur. Area)	May 92	126
8572	LGCGM Silica (Sur. Area)	May 85	126
8590	High Sulfur Gas Oil Feed	Dec 91	90
8759	ICTAC Set DTA	Aug 93	100
8760	ICTAC Set DTA	Aug 93	100

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