DAILY INTAKE OF STABLE IODINE

Dear Editors:
In the paper "Age-specific uncertainty of the ^{131}I ingestion dose conversion factor," the authors state that "The amount of iodine consumed in an individual's diet has a significant influence on thyroid function and metabolism" (Harvey et al. 2003).

The usefulness of this article would be enhanced if the author provided the dietary intake of stable iodine assumed in their calculations. The ICRP assumes an adult daily intake of 200 μg d^{-1}.

It should be noted that there is great variability in the value of this parameter. An iodine-deficient diet would correspond to a daily intake of 75 μg d^{-1}. In contrast, Health Canada estimates that the mandatory use of iodized salt in Canada leads to a daily intake of 1,000 μg d^{-1}. In practice, this parameter may therefore have the greatest influence on the dose conversion factors and should be considered in any evaluation of the thyroid dose.

Francois Lemay

International Safety Research
457*a Sussex Drive*, 2*nd floor*
Ottawa, Ontario
*K*1*N* 6*V*4
Canada

Reference

Harvey RP, Hamby DM, Benke RR. Age-Specific uncertainty of the 131I ingestion dose conversion factor. Health Phys 84:334–343; 2003.

RESPONSE TO LEMAY

In response to Francois Lemay's letter regarding our article, "Age-specific Uncertainty of the ^{131}I Ingestion Dose Conversion Factor," our work is for normal individuals with typical iodine diets (200 μg d^{-1}, ICRP assumption). We are aware that the iodine intake can play a significant role in thyroid dose estimation.

Richard P. Harvey

Nuclear Medicine Department
University of Buffalo
Buffalo, NY 14214

STANDARDS FOR MEASURING AIRBORNE RADIOACTIVITY

Dear Editors:
Numerous standards at the international, regional, national, and local levels pertain to monitoring and measuring radioactive aerosols. There are also a myriad of regulations, recommendations, requirements, and scientific resources. Recognizing their origins, content, and applicability can be daunting. The following sections summarize the findings of our recent *International Review of Currently Applicable Standards for Measuring Airborne Radioactivity*. The purpose of the review was to describe the standards organizations for airborne radioactivity and provide a snapshot of standards in common usage or development. The complete review report, including appendices with annotated lists of the standards, can be found at *http://www.iec.ch/support/tcnews/*.

INTERNATIONAL STANDARDS

The overarching bodies for global standardization are the International Electrotechnical Commission (IEC) and the International Organization for Standardization (ISO). The national committees of the member nations who participate in the development of international standards work together to produce what are termed *industry-wide*, *voluntary consensus* standards. Taking into account the views of interests worldwide, they represent the negotiated agreements of the participants, but not necessarily the specific wishes of all participants. Depending on the needs of the regulator, manufacturer, or user, standards can be categorized in several ways including (1) committee of origin at the international, regional, or national level; (2) nature of the standard as either procedural or technical; (3) type or form of radioactive aerosol; (4) relevance to a particular instrument design or hardware; and (5) applicability for monitoring workplaces, effluent stacks, or the environment.

The International Electrotechnical Commission (IEC) (*www.iec.ch*) is the global organization that prepares and publishes international standards for electrical, electronic, and related technologies. It was founded in 1906 following passage of a resolution at the 1904 meeting of the International Electrical Congress in St. Louis, Missouri, USA. The IEC currently has 61 participating countries, including all the world's major trading nations and a growing number of industrializing countries.

As noted on the IEC website, the IEC charter embraces all electrotechnologies including electronics, magnetics and electromagnetics, electroacoustics, multimedia, telecommunication, and energy production and distribution, as well as

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associated general disciplines such as terminology and symbols, electromagnetic compatibility, measurement and performance, dependability, design and development, and safety and the environment. IEC Technical Committee TC45 was formed around 1960 to develop international standards covering nuclear-related instrumentation. TC45 evolved to comprise two subcommittees: SC45A (Nuclear Reactor Instrumentation) and SC45B (Radiation Protection Instrumentation). Working Group 13 of SC45B has the primary responsibilities for Measurements of Airborne Radioactivity.

IEC air monitoring standards include IEC 60579 (1977-01) on *Radioactive Aerosol Contamination Meters and Monitors*; IEC 60710 (1981-01) on *Radiation Protection Equipment for the Measuring and Monitoring of Airborne Tritium*; IEC 60761 (2002-01) on *Equipment for Continuously Monitoring Radioactivity in Gaseous Effluents*, comprising *Part 1: General Requirements, Part 2: Specific Requirements for Radioactive Aerosol Monitors Including Transuranics, Part 3: Specific Requirements for Radioactive Noble Gas Monitors, Part 4: Specific Requirements for Radioactive Iodine Monitors, and Part 5: Specific Requirements for Tritium Monitors*; IEC 60951 (1988-08) on *Radiation Monitoring Equipment for Accident and Post-Accident Conditions in Nuclear Power Plants* comprising *Part 1: General Requirements, Part 2: Equipment for Continuously Monitoring Radioactive Noble Gases in Gaseous Effluents, Part 3: High Range Area Gamma Radiation Dose Rate Monitoring Equipment, Part 4: Process Stream in Light Water Nuclear Power Plants, and Part 5: Radioactivity of Air in Light Water Nuclear Power Plants*; IEC 61171 (1992-09) on *Atmospheric Radioactive Iodines in the Environment*; IEC 61172 (1992-09) on *Radioactive Aerosols in the Environment*; and IEC 61578 (1997-08) on *Test Methods for the Calibration and Verification of the Effectiveness of Radon Compensation for Alpha and/or Beta Aerosol Measuring Instruments*. IEC 62302 (in preparation) will cover *Equipment for Noble Gas Monitoring in the Workplace, Effluents, and the Environment*, and IEC 62303 (in preparation) will cover *Equipment for Monitoring Airborne Tritium in the Workplace, Effluents, and the Environment.*

The International Organization for Standardization (ISO) (*www.iso.org*) was formed in 1947 to fill the need for an international organization for standards outside of the electrical and electronic disciplines. ISO characterizes itself as "a network of national standards institutes from 140 countries working in partnership with international organizations, governments, industry, business and consumer representatives; a bridge between public and private sectors." As is the case with the IEC, the ISO has numerous Technical Committees covering many disciplines. ISO air monitoring standards for radioactive materials are developed by ISO Technical Committee 85 (Nuclear Energy), Scientific Committee 2 (Radiation Protection), Working Group 14 (Air Control and Monitoring). There are common interests and collaborations between the IEC TC45/SC45B/WG13 and the ISO TC85/SC2/WG14 in terms of leadership and personnel volunteering to develop and maintain related standards.

ISO 2889 (1975) covers *General Principles for Sampling Airborne Radioactive Materials.* The standard may be revised to address Part 1 (general requirements), Part 2 (stacks and ducts), Part 3 (workplace), and Part 4 (outdoors or in the environment).

REGIONAL STANDARDS

The Comité Européen de Normalisation (CEN) (*www.cenorm.be*) was established in 1961 and is responsible for harmonization of national standards issued from the various countries of the European Union. Standards in the electrotechnical sector are developed by the Comité Européen de Normalisation Electrotechnique (CENELEC) (*www.cenelec.org*), which was established in 1973 and comprises the electrotechnical committees of some 19 European countries. CENELEC works closely with the CEN, IEC, and other similar organizations. More than 80% of the European standards adopted by CEN and CENELEC are identical to or based upon corresponding international standards. EN 481 (1993) covers *Workplace Atmospheres—Size Fraction Definitions for Measurement of Airborne Particles.*

There are other regional organizations such as the Pacific Area Standards Congress (PASC) (*www.pascnet.org*) that are not engaged in development of air monitoring standards.

NATIONAL STANDARDS

Most nations are represented in the international standards process by a national organization. These national organizations can (1) adopt and follow international standards, (2) adopt and follow standards provided by their regional standards bodies, and/or (3) prepare standards (or accredit qualified organizations to prepare them) as needed within their own country. Some organizations, such as the British Standards Institution (BSI) (*www.bsi-global.com*), have chosen not to develop their own set of standards for air monitoring and measuring, but instead contribute to and use the international standards of the ISO and IEC. In the member nations of the European Union, the various national standards are gradually being replaced by European standards. For example, standards developed by CEN and CENELEC are automatically adopted as national standards by the member countries. Other nations, including the United States, develop their own national standards, in addition to participating in the development of international standards.

The government of the United States is committed to using and participating in the development of voluntary consensus standards. This policy was affirmed on 20 October 1993 when the Office of Management and Budget (OMB) (*www.omb.gov*) issued OMB Circular No. A-119 on *Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment*. The commitment was codified in the *National Technology Transfer and Advancement Act of 1995* (Public Law 104-113). OMB issued a revision of Circular No. A-119 on 10 February 1998 "in order to make the terminology of the Circular consistent with the National Technology Transfer and Advancement Act of 1995, to issue guidance to the agencies on making their reports to OMB, to direct the Secretary of Commerce to issue policy guidance for conformity assessment, and to make changes for clarity." The revised circular states the purpose of federal agency participation in voluntary consensus standards bodies as follows: "Many voluntary consensus standards are appropriate or adaptable for the Government's purposes. The use of such standards, whenever practicable and appropriate, is intended to achieve the following goals: (a) Eliminate the cost to the Government of developing its own standards and decrease the cost of goods procured and the burden of complying with agency regulation. (b) Provide incentives and opportunities to establish standards that serve national needs. (c) Encourage long-term growth for U.S. enterprises and promote efficiency and economic competition through harmonization of standards. [and] (d) Further the policy of reliance upon the private sector to supply Government needs for goods and services."

The American National Standards Institute (ANSI) (*www.ansi.org*) is the national standardizing body in the United States. Its staff serve as the Secretariat for the U.S. National Committee (USNC) for ISO and the USNC for the IEC. The USNCs appoint the U.S. delegates and working group experts, all volunteers, who represent the USA in meetings of the IEC and ISO and participate as working group experts in the development of standards.

ANSI has accredited more than 250 professional societies or industrial firms to serve as the Secretariats for the committees that develop standards in specific topical areas and maintain them in contemporary form. ANSI then processes, adopts, and publishes national standards. In the areas of nuclear and health physics instrumentation and radiation safety, ANSI has accredited the Institute for Electrical and Electronic Engineers (IEEE) and the Health Physics Society (HPS).

The Institute of Electrical and Electronic Engineers (IEEE) (*www.ieee.org*) was formed in the late 1950's by a merger of the Institute of Electrical Engineers and the Institute of Radio Engineers. It is an international organization with most of its membership in the U.S. and a continually growing number of members from outside the U.S. The IEEE is accredited by ANSI to serve as the sponsor and Secretariat of ANSI Committee N42, which is responsible for developing American National Standards in nuclear and health physics instrumentation including radiological safety instrumentation such as dosimeters, portable survey meters and contamination monitors. Although the IEEE is an international organization, its standards in this area are generated to a great extent nationally and are processed as American National Standards through ANSI.

ANSI/IEEE air monitoring standards include ANSI N42.17B (1989) on *Performance Specification for Health Physics Instrumentation—Occupational Airborne Radioactivity Monitoring Instrumentation*; ANSI N42.18 (1980, reaffirmed 1991) on *Specification and Performance of On-site Instrumentation for Continuously Monitoring Radioactivity in Effluents*; ANSI N42.30 (2002) on *Performance Specification for Tritium Monitors*; ANSI N317 (1980) on *Performance Criteria for Instrumentation Used for In-Plant Plutonium Monitoring*; and ANSI N320 (1979, Reaffirmed 1985) on *Performance Specifications for Reactor Emergency Radiological Monitoring Instrumentation*. ANSI N323C (in preparation) will cover *Radiation Protection Instrumentation Test and Calibration—Air Monitoring Instruments*.

The Health Physics Society (HPS) (*www.hps.org*) was founded in 1956 and is a society of occupational and environmental radiation safety professionals. ANSI has accredited HPS to serve as the sponsor and secretariat for ANSI Committee N13. ANSI N13 is responsible for the development of standards concerned with radiation safety and health physics activities, such as air sampling, whole body counting, external and internal dosimetry, and bioassay. Because the radiological safety instrumentation standards developed by the IEEE-sponsored ANSI Committee N42 are of considerable utility to the HPS, close communication is maintained between N42 and the HPS-sponsored ANSI Committee N13. Many members of N42 are health physicists who are also members of the HPS.

ANSI/HPS standards include ANSI N13.1 (1969, revised 1999) on *Sampling and Monitoring Releases of Airborne Radioactive Substances from the Stacks and Ducts of Nuclear Facilities* and ANSI N13.2 (1969, reaffirmed 1982) on *Administrative Practices in Radiation Monitoring*. ANSI N13.9 (in preparation) will be a *Guide to Environmental Surveillance around Nuclear Facilities*. Table 1 illustrates how the various national and international standards can be grouped according to type of radionuclide and location of measurement.

Standards of Interest from Other ANSI-Accredited Organizations. The American Nuclear Society (ANS) (*www.ans.org*) is responsible for the development and maintenance of standards that address the design, analysis, and operation of components, systems, and facilities involved in or utilizing nuclear technology. These standards reference the ANSI/IEEE and ANSI/HPS standards for radiological safety instrumentation. The American Industrial Hygiene Association (AIHA) (*www.aiha.org*) covers the non-radioisotope aspects of topics of interest to the users of ANSI/IEEE and ANSI/HPS standards. For example, the *American National Standard for Laboratory Ventilation* (ANSI/AIHA Z9.5-1992) provides guidance for controlling, monitoring, and measuring air contamination for laboratories or hoods other than those used for radioisotopes, and the *American National Standard Practices for Respiratory Protection* (ANSI/AIHA Z88.2-1980) provides guidance for the selection and use of respirators. Similarly, the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (*www.ashrae.org*) has a *Method for Testing Air Cleaning Devices Used in General Ventilation for Removing Particulate Matter* (ANSI/ASHRAE 52-1968). The American Society for Testing and Materials

Table 1. Matrix showing various air monitoring standards according to the location of application and the type of airborne radioactivity.

	General	Particles	Noble Gases	Iodine	Tritium
General	ANSI N42.17B ANSI N323 ANSI N13.2	IEC 61578			ANSI N42.30
Effluent	IEC 60761-1 ISO 2889 ANSI N13.1	IEC 60761-2	IEC 60761-3	IEC 60761-4	IEC 60761-5
Workplace	ANSI N42.18 ANSI N317	IEC 579 EN 481			IEC 60710
Environment	ANSI N13.9	IEC 1172		IEC 1171	
Emergency	IEC 60951-1 ANSI N320	IEC 951-5	IEC 60951-2		

(ASTM) develops standards on the characteristics and performance of materials, products, systems, and services. Examples include *Standard Test Methods for Determining Air Change in a Single Zone by means of a Tracer Gas Dilution* (ANSI/ASTM E 741-93), a *Standard Guide for Qualification of Measurement Methods by a Laboratory within the Nuclear Industry* (ANSI/ASTM C 1086-95), and a standard for *Selection and Use of Portable Radiological Survey Instruments for Performing In Situ Radiological Assessments in Support of Decommissioning* (ANSI/ASTM E 1893-97). ASTM also has *Standard Terminology Relating to Sampling and Analysis of Atmospheres* (ANSI/ASTM D 1356-00), a *Standard Test Method for Respirable Dust in Workplace Atmospheres* (ANSI/ASTM D 4532-97), a *Standard Practice for Evaluating the Performance of Respirable Aerosol Samplers* (ANSI/ASTM D 6061-96), a *Standard Guide for Personal Samplers of Health-Related Aerosol Fractions* (ANSI/ASTM D 6062M-96), and a *Standard Guide for Air Sampling Strategies for Worker and Workplace Protection* (ANSI/ASTM E 1370-96).

The National Institute of Standards and Technology (*www.nist.gov*) is a key technical contributor to the U.S. standards infrastructure. The Standards Engineering Society (*www.ses-standards.org*) provides links to a number of standards organizations and information on the standards process. NSSN (*www.nssn.org*) serves as "a national resource for global standards" and provides information from more than 600 national, foreign, regional, and international bodies.

The national standards organizations in France provide another example of a strong national standards effort that contributes significantly to international standards developments in both the procedural and electrotechnical arenas.

Association Française de Normalisation (AFNOR) (*www.afnor.fr*) is the French member of ISO and CEN, and appoints experts to working groups of both. AFNOR was organized in 1926 and is controlled by the Ministry for Industry. It has a three-tier structure:

- *Experts* who comprise some 30,000 people from all walks of life, including companies, government, professional organizations, and trade unions. Some of these experts also work at the European (CEN) and international (ISO) levels;
- *Bureaux de Normalisation-BN*, which prepare the AFNOR standards. AFNOR has 31 BN. One of them is the Bureau de Normalisation des Equipements Nucléaires (BNEN), which was established in 1990 to develop relevant nuclear standards. One of the three commissions in BNEN is M60.1, which is responsible for monitoring the work of ISO/TC85/SC2 on "Nuclear Energy-Health Physics"; and
- *AFNOR*, which manages and coordinates the entire system.

France has generic standards in the *Air Quality* category with requirements comparable to the U.S. Clean Air Act of 1990, including NF X 43-021 (December 1984) on *Filter Sampling of Particulate Material Suspended in Ambient Air—Automatic Sequential Equipment*; NF X 43-022 (May 1985) on *Ambient Air—Concepts Relating to the Sampling of Particulate Matter*; and NF X 43-257 (August 1988) on *Air in Workplaces—Individual Sampling of Inspirable Fraction of Particulate Pollution*. Other generic standards include NF X 44-051 (July 1978) on *Sampling of Dust in a Stream of Gas (general case)* and NF X 44-052 (May 2002) on *Stationary Source Emissions—Determination of High Range Mass Concentration of Dust—Manual Gravimetric Method*. There are also specific air monitoring standards in the category of *Nuclear Energy—Measurement of Radioactivity in the Environment*, including NF M 60-312 (October 1999) on *Determination by Liquid Scintillation of the Activity Concentration of Atmospheric Tritium Sampled by the Sparging Technique (air through water)*; NF M 60-760 (October 2001) on *Sampling of Aerosols for Measurement of Radioactivity in the Environment*; NF M 60-763 (March 1998) on *Radon and Its Short-Lived Decay Products in the Atmospheric Environment: Origins and Measuring Methods*; NF M 60-764 (December 1997) on *Radon 222: Integrated Methods for Measurement of Alpha Potential Energy of Short Life Decay Products in the Atmospheric Environment*; NF M 60-765 (December 1997) on *Radon 222: Methods for Spot Measurement of Alpha Potential Energy of Radon Daughters in the Atmospheric Environment*; NF M 60-766 (December 1999) on *Radon 222: Integrated Methods for Measurement of the Average Volumic Activity of Radon in the Atmospheric Environment, with Passive Collection and a Deferred Analysis*; NF M 60-767 (August 1999) on *Radon 222: Continuous Measurement Methods of the Volumic Activity of Radon in the Atmospheric Environment*; NF M 60-768 (October 2002) on *Radon 222: Methods for the Estimation of the Surface Activity of Exhalation by Accumulation Methods*; NF M 60-769 (November 2000) on *Radon 222: Methods for Spot Measurement of the Volumic Activity of Radon in the Atmospheric Environment*; NF M 60-770 (October 2000) on *Determination of the Activity Concentration for Atmospheric Deposits on the Soil*; and NF M 60-771 (July 2001) on *Radon 222 in Buildings—Methodologies for Screening and Complementary Investigations*.

OTHER SOURCES OF INFORMATION

There are a number of government regulations and guidance documents. The U.S. Nuclear Regulatory Commission (NRC) (*www.nrc.gov*) provided updated *Standards for Protection against Radiation* (10CFR20) in 1991, issued regulatory guidance on *Calibration and Error Limits of Air Sampling Instruments for Total Volume of Air Sampled* (Regulatory Guide 8.25) in 1992, and published an associated document on *Air Sampling in the Workplace* (NUREG-1400) in 1993.

The U.S. Department of Energy (DOE) (*www.doe.gov*) published an *Operational Health Physics Training Manual* (ANL-88-26) in 1988; promulgated *Standards for Protection Against Radiation* (10CFR835) in 1993; summarized the characteristics of aerosols from a wide range of activities such as powder handling, spills, and fires in a 1994 handbook on *Airborne Release Fractions/Rates and Respirable Fractions for Nonreactor Nuclear Facilities* (DOE-HDBK-3010-94, Vol. 1 and 2); and provided an updated *Implementation Guide for Air Monitoring for use with Title 10 Code of Federal Regulations Part 835 Occupational Radiation Protection* (DOE G 441.1-8) in 1999.

The U.S. Environmental Protection Agency (EPA) (*www.epa.gov*) issued *National Emission Standards for Hazardous Air Pollutants* (40CFR61) in 1991. The Occupational Safety and Health Administration (OSHA) (*www.osha.gov*) has promulgated an *Occupational Safety and Health Standard for Ionizing Radiation* (29CFR1910.1096).

The recommendations of the International Commission on Radiological Protection (ICRP) (*www.icrp.org*) are internationally accepted as a coherent and consistent approach to radiation protection. Of particular interest are *Principles of Environmental Monitoring Related to the Handling of Radioactive Materials* (ICRP Publication 7) issued in 1965; *General Principles of Monitoring for Radiation Protection of Workers* (ICRP Publications 12 and 35) issued in 1968 and 1982; *Implications of Commission Recommendations that Doses be Kept As Low As Reasonably Achievable* (ICRP Publication 22) issued in 1973; *Reference Man: Anatomical, Physiological and Metabolic Characteristics* (ICRP Publication 23) issued in 1975;

Limits on Intakes of Radionuclides by Workers (ICRP Publication 30 and addendums) issued beginning in 1979; *Principles of Monitoring for the Radiation Protection of the Population* (ICRP Publication 43) issued in 1985; and several reports issued in 1994 on *1990 Recommendations of the International Commission on Radiation Protection* (Publication 60), *Human Respiratory Tract Model for Radiological Protection* (ICRP Publication 66), and *Dose Coefficients for Intakes of Radionuclides by Workers* (ICRP Publication 68).

Dorrian and Bailey (1995) summarized the particle size distribution of radioactive aerosols measured in a wide range of industrial operations. The typical particle size distribution had an activity median aerodynamic diameter (AMAD) of 5 μm with a geometric standard deviation of 2, although smaller size distributions were observed in operations involving high temperatures or fumes, and larger particle size distributions were observed in operations such as coarse powder handling. The typical size distribution values reported by Dorrian and Bailey are the accepted default values for use in ICRP Report 66 on the new *Human Respiratory Tract Model* for *Radiological Protection*. The previous default assumption in ICRP Report 30 for aerosol particle size in the work place had been an AMAD of 1 μm, which remains the default value for the particle size of radioactive aerosols in the environment.

The National Council on Radiation Protection and Measurements (NCRP) (*www.ncrp.com*) focused on fundamental considerations of human respiratory tract structure and function in deriving an alternate mathematical model on *Deposition, Retention and Dosimetry of Inhaled Radioactive Substances* (NCRP Report 125) in 1997. The NCRP also has a 1978 report on *Instrumentation and Monitoring Methods for Radiation Protection* (NCRP Report 57) and a 1978 *Handbook of Radiation Protection Measurements Procedures* (NCRP Report 58).

The International Commission on Radiation Units and Measurements (ICRU) (*www.icru.org*) issued a document on *Radiation Protection Instrumentation and its Application* (ICRU Report 20) in 1971. The International Atomic Energy Agency (IAEA) (*www.iaea.org*) has a 1978 report on *Particle Size Analysis in Estimating the Significance of Airborne Contamination* (IAEA Technical Report Series No. 179). The American Conference of Governmental Industrial Hygienists (ACGIH) (*www.acgih.org*) periodically updates its book series on *Air Sampling Instruments for Evaluation of Atmospheric Contaminants* that includes information on sampling radioactive aerosols (see, for example, Cohen 1995).

Measurement of radioactive aerosols involves most of the standard tools of aerosol science and technology, as well as a number of specialized techniques that take advantage of the unique physical properties of radioactive materials. In addition to the guidance and standards noted above, instruments and techniques for characterizing radioactive aerosols have been described extensively in numerous manuscripts, books, and reports (see, for example, Price 1965; Raabe 1972; Turner 1996; Cember 1996; Schleien et al. 1998; or Hoover and Newton 2001). Published software and computational programs, such as Anand et al. (1996) and Riehl et al. (1996), are available for calculating aerosol losses in transport lines. Detailed review and application of this information, as well as the development of new techniques and applications, continue to occupy the careers of many aerosol scientists and health protection professionals.

CONCLUSION

Manufacturers and users work together and in concert with regulatory bodies and corporate entities to identify, interpret, and comply with the appropriate standards. In some cases, new standards must be developed or existing standards must be revised to accommodate new industries, technologies, or expectations.

The development and maintenance of credible technical standards is a living process and the content, status, and applicability of the dozens of standards described in the current review comprise a snapshot in time. A similar review would be useful for industrial hygiene instrumentation and procedures.

Acknowledgments—The authors thank many colleagues nationally and internationally who assisted in the air monitoring standards review initiative. Notably, Louis Costrell of NIST has been a leading contributor to the standards community for more than forty years, serving in a significant capacity for both ANSI and IEC activities, and as a source of history and perspective for this review. Likewise, Jack Selby of Richland, WA, has served with distinction for decades as a mentor, contributor, and leader for standards activities for ANSI, IEC, and ISO. Nancy Johnson of Burke and Associates has been the standards coordinator for HPS/N13 and has been a continuing source of encouragement, information, and coordination. Alain Bourgerette of the French CEA (Atomic Energy Commission) has contributed significantly to the standards activities of the IEC and AFNOR and has assisted with this review. Ian Thompson has helped develop many nuclear-related standards in the UK, for the IEC, ISO, and for the IAEA, has also contributed substantively to this review. Jean-Claude Thevenin serves as secretary of IEC TC45/SC45B and provided useful review and comments. Charles Jacquemart provides IEC Central Office coordination for IEC TC45 and provided significant input to the review. We thank Laila Briquet-Mosig and Dennis Brougham of the IEC Central Office for website support to post the complete review report.

MORGAN COX

2501 *West Zia Road* 3102
Santa Fe, NM 87505

MARK D. HOOVER

Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health
1095 *Willowdale Road*
Morgantown, WV 26505

LILIANE GRIVAUD

Institut de Radioprotection et Surete Nucleaire
IRSN/DPEA/SERAC
BP n° 68
91192 *GIF-SUR-YVETTE CEDEX*
France

MICHELLE JOHNSON

Pacific Northwest National Laboratory
Battelle Boulevard
Richland, WA 99352

GEORGE J. NEWTON

449 *Graceland SE*
Albuquerque, NM 87108

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