



U.S. AND INTERNATIONAL STANDARDS ON AIR QUALITY

Martin Harper
Exposure Assessment Branch,
HELD, NIOSH

Kevin Ashley
Chemical Exposure and
Monitoring Branch,
DART, NIOSH

NIOSH

SAFER • HEALTHIER • PEOPLE™

Contents

- Focus on workplace air quality
- Standardization and the U.S. Government
- American Society for Testing and Materials
- Comité Européen de Normalisation
- International Organization for Standardisation
- Conclusions

6th IOHA Conference
Pilanesburg, South Africa
September 19-23, 2005

Standardization and the U.S. Government

- Public Law 104-113 (National Technology Transfer Advancement Act of 1995) encourages US government agencies to make use of consensus standards, where possible, in place of creating their own
- There are many US standards organizations, for example the American National Standards Institute (ANSI) is well known
- Consensus standards have a legitimacy conferred through the inclusive standards-setting process
- Many US government agencies participate (e.g. NIOSH, OSHA, EPA, DoE, etc.)

Overview of Committees

- American Society for Testing and Materials (ASTM) International Committee D22 (Air Quality)
- Comité Européen de Normalisation (CEN) Technical Committee 137 (Assessment of Workplace Exposure to Chemical and Biological Agents) and Technical Committee 264 (Assessment of Ambient and Indoor Exposure to Chemical and Biological Agents)
- International Organization for Standardization (ISO) Technical Committee 146 (Air Quality)

ASTM International

- Non-profit, non-government organization
- Over 30,000 members; >100 technical committees
- Standards for materials, products, systems, & services
- Test methods, specifications, guides, practices, terminology documents
- One member, one vote (unless "block voting" is identified and disallowed)

ASTM International Committee D22 (Air Quality)

- Sub-committee .01 (Quality Control)
- Sub-committee .03 (Ambient Atmospheres and Source Emissions)
- Sub-committee .04 (Workplace Air Quality)
- Sub-committee .05 (Indoor Air)
- Sub-committee .07 (Asbestos)
- Sub-committee .08 (Mold)
- Sub-committee .09 (ISO Technical Assistance Group)
- Sub-committee .11 (Meteorology)

ASTM Committee D22.04

- Kevin Ashley (Chair), Martin Harper (Secretary)
- 60 + members, many new European Union members
- Met in April in Reno, NV, in association with a symposium on beryllium sampling and analysis
- Currently 36 standards; new work items include surface micro-vacuuming for metals, portable fluorescence analysis of beryllium, and PCM/TEM analysis of asbestos fibers
- Will meet next in Dallas, TX in October, 2005
- A particle size-selective sampling symposium is planned for July 2007 in Burlington, VT
- A silica symposium (follow-up to Salt Lake City in 2004) is scheduled for Miami, FL in September 2008

Symposia organized by D22 - Examples

- Sampling and Calibration for Atmospheric Measurements (1985)
- Monitoring Methods for Toxics in the Atmosphere (1988)
- Biological Contaminants in Indoor Environments (1989)
- Modeling of Indoor Air Quality and Exposure (1992)
- Lead in Paint, Soil and Dust (1993)
- Sampling Environmental Media (1995)
- Advances in Environmental Measurement Methods for Asbestos (1997)
- Sampling and Analysis of Isocyanates (2000)
- Asbestos Monitoring at the World Trade Center Site (2002)
- Symposium on Silica Sampling and Analysis (2004)
- Symposium on Beryllium Sampling and Analysis (2005)

CEN Technical Committee 137 Active Working Groups

- WG 1 – General Requirements
- WG 3 – Particulate Matter
- WG 6 – Dermal
- Note - this committee has adopted dermal exposure issues as a part of its scope
- New Work Item: WI 00137028 "Workplace exposure – measurement of dermal exposure – Requirements and test methods"

CEN TC 137/WG 3

- Met in July 2005 in Loen, Norway, in association with the Airmon 2005 conference
- Discussed standard for assessment of "dustiness" of solid materials, and possible alterations to EN 482, the standard on size-selective particle sampling conventions (inhalable, thoracic and respirable), which is the equivalent of ISO 7708
- Technical report on recommending specific samplers was discussed
- Professor Jim Vincent presented at the Airmon conference his proposal to include probability of deposition in addition to probability of penetration to make the conventions even more health-relevant
- Next WG3 meeting is in Belgium or Netherlands in Dec, 2005
- ASTM and ISO representatives will follow progress

ISO Technical Committee 146 (Air Quality) Sub-committees

- Sub-committee 1 (Source Emissions)
- Sub-committee 2 (Workplace Atmospheres)
- Sub-committee 3 (Ambient Atmospheres)
- Sub-committee 4 (General Aspects)
- Sub-committee 5 (Meteorology)
- Sub-committee 6 (Indoor Air)

ISO Technical Committee 146, Sub- Committee 2 Working Groups

- WG 1 – Size-selective sampling
- WG 2 – Metals and inorganic acids
- WG 3 – Inorganic gases (inactive)
- WG 4 – Organic vapors
- WG 5 – Fibers
- WG 7 – Silica
- Note no "Mold" working group

International Participation in TC 146, SC 2 Working Groups

P-Members

- Australia
- Belgium
- Canada
- Italy
- Japan
- Korea (South)
- Netherlands
- Poland
- Spain
- Sweden
- Turkey
- United Kingdom

O-Members (regularly attending or commenting on standards)

- Denmark
- Finland
- France
- Germany
- Hungary
- Norway
- South Africa

U.S.A. holds the Secretariat

One P-member country, one vote

NIOSH Participation in ISO TC 146 SC 2 “Workplace Air Quality”

Martin Harper (HELD) SC2 Chair, Member of WG5

Paul Schlecht (DART) SC2 Secretary, Member of WG4

David Bartley, ex-NIOSH (DART) WG1 Convener, Member of WG4

Kevin Ashley (DART) WG Group 2 Member

Bob Streicher (DART) WG 4 Member

Rosa Key-Schwartz (DART) WG 7 Member

ISO TC 146/SC 2 Recent activities

- Met as full SC (Stockholm, Sweden) in September, 2004; next meeting is London, UK, September, 2005
 - ◆ individual working groups have met separately since then
- WG1 (size-selective particle sampling)
 - ◆ Has been working on a technical report for nanoaerosol sampling
 - ◆ Will meet at a nanoaerosol conference in Minneapolis, MN in Oct. 2005
- WG2 (inorganics)
 - ◆ met in Montreal, Canada in April, 2005
 - ◆ Standards for sampling and analysis of acid mists are in progress
- WG4 (organics) met in Pittsburgh, PA in May 2005
 - ◆ Isocyanate sampling and analysis was discussed
- WG5 (fibers) met in Burlington, VT in July 2005 after a long hiatus
 - ◆ Has a new convener (Dr Pang, Ryerson University, Canada)
 - ◆ Will be working on standards for the thoracic sampling of fibers and additional quality control through the use of re-locatable microscope fields
- WG7 (silica) met in Buxton, UK in April 2005 and is working on standards for the analysis of respirable silica

ISO TC 146/SC 2 Standards

- ISO 7708:1995 Particle size fraction definitions for health-related sampling
- ISO 8518:2001 Determination of particulate lead and lead compounds – Flame or electrothermal atomic absorption spectrometric method
- ISO 8672:1993 Determination of the number concentration of airborne inorganic fibres by phase contrast optical microscopy – Membrane filter method
- ISO 8760:1990 Determination of mass concentration of carbon monoxide – Method using detector tubes for short-term sampling with direct indication
- ISO 8761:1989 Determination of mass concentration of nitrogen dioxide – Method using detector tubes for short-term sampling with direct indication
- ISO 8762:1988 Determination of vinyl chloride – Charcoal tube/gas chromatographic method
- ISO 11041:1996 Determination of particulate arsenic and arsenic compounds and arsenic trioxide vapour – Method by hydride generation and atomic absorption spectrometry

ISO 11174:1996 Determination of particulate cadmium and cadmium compounds – Flame and electrothermal atomic absorption spectrometric method

ISO 15202-1:2000 Determination of metals and metalloids in airborne particulate matter by inductively coupled plasma atomic emission spectrometry – Part 1: Sampling

ISO 15202-2:2001 Determination of metals and metalloids in airborne particulate matter by inductively coupled plasma atomic emission spectrometry – Part 2: Sample preparation

ISO 15767:2003 Controlling and characterizing errors in weighing collected aerosols

ISO 16107:1999 Protocol for evaluating the performance of diffusive samplers

ISO 16200-1:2001 Sampling and analysis of volatile organic compounds by solvent desorption/gas chromatography – Part 1: Pumped sampling method

ISO 16200-2:2000 Sampling and analysis of volatile organic compounds by solvent desorption/gas chromatography – Part 2: Diffusive sampling method

ISO 16702:2001 Determination of total isocyanate groups in air using 2-(1-methoxyphenyl)piperazine and liquid chromatography

New ISO TC 146/SC2 Standards

ISO 15202-3:2004 Determination of metals and metalloids in airborne particulate matter by inductively coupled plasma atomic emission spectrometry – Part 3: Analysis

ISO 16740:2005 Determination of hexavalent chromium in airborne particulate matter – Method by ion chromatography and spectrophotometric measurement using diphenyl carbazide

ISO 17733:2004 Determination of mercury vapour – Method by cold-vapour atomic absorption spectrometry or atomic fluorescence spectrometry

ISO/DIS 20552 Determination of mercury vapour – Method using gold-amalgam collection and analysis by atomic absorption spectrometry or atomic fluorescence spectrometry

ISO/CD 21438 Determination of inorganic acids by ion chromatography – Part 1: Non volatile acids (sulphuric acid and phosphoric acid)

ISO 17734-1:2005 Determination of organonitrogen compounds in air using liquid chromatography and mass spectrometry – Part 1: Isocyanates using dibutylamine derivatives

ISO 17734-2:2005 Determination of organonitrogen compounds in air using liquid chromatography and mass spectrometry – Part 2: Amines and aminoisocyanates using dibutylamine and ethylchloroformate derivatives

Other ISO TC146 SC2 work-items

- Approved New Work Item: Guidelines for ensuring the quality of respirable crystalline silica measurements
- CD 17735 Determination of isocyanates using the MAP reagent and LC
- CD 17736 Determination of isocyanates using the "Isocheck" (double-filter) method
- New Work Item: Guide to the selection of sampling and analytical methods for airborne isocyanates

Also of interest from TC 146 SC 4:

- ISO/DIS 20988 Guidelines for estimating measurement uncertainty
- ISO/AWI 13752 Assessment of uncertainty of a measurement method under field conditions using a second method as reference

Acknowledgements: Paul Schlecht for acting as Secretary of ISO TC 146/SC2 and David Bartley for his past work as Secretary, and continued assistance.

Further Information: Ashley, K and Harper, M. ASTM Standards for Monitoring Chemical Hazards in the Workplace. Standardization News 32(4): 22-25, 2004. Ashley, K: Standards Activities of the ASTM International Committee on Atmospheric Sampling and Analysis. Journal of Occupational and Environmental Hygiene 1: D7-D9, 2004. Ashley, K and Harper, M: Analytical Performance Criteria: ASTM International Standards for Monitoring Chemical Hazards in Workplaces. Journal of Occupational and Environmental Hygiene 2: D44-D47, 2005.

www.astm.org

www.iso.org

Questions ?



Disclaimer



The findings and conclusions in this report are those of the author(s) and do not necessarily represent the views of the National Institute for Occupational Safety and Health.



SAFER • HEALTHIER • PEOPLE™