



# ASTM International Subcommittee D19.04 on Methods of Radiochemical Analysis

## Development of Voluntary Consensus Standards and Measurement Support for NORM / TENORM Applications

**Evgeny Taskaev and Donivan Porterfield**

**Council on Ionizing Radiation Measurements &  
Standards**

**Rockville, MD – April 17, 2023**

- Over 30,000 of the world's leading technical experts
- More than 110 countries represented. More than 40% of ASTM standards sold outside the U.S.
- Has created 12,500+ standards that impact our daily lives
- ASTM International is celebrating its 125<sup>th</sup> anniversary in 2023

# ASTM Technical Committees

## ■ Over 150 technical committees

- Water
- Gaseous Fuels
- Petroleum
- Construction/Building Materials & Products
- Plastics
- Declarable Substances
- Bioenergy and Biomass
- Environmental
- Paint
- Many, many more



# ASTM International – Global impact

- ASTM International has Memorandum of Understanding (MOU) agreements with over 100 national and regional standards bodies worldwide. Launched in 2001, the MOU program gives partners free access to ASTM's committees, standards, process, training, and more. MOUs encourage technical experts worldwide to participate in ASTM activities to be sure that standards meet their countries' economic and trade needs and broaden the usefulness of ASTM standards.
- ASTM global offices: Peru (Lima), Canada (Ottawa), Belgium (Brussels), and China (Beijing)

# International Standards

■ World Trade Organization's Agreement on Technical Barriers to Trade agreement encourages the use of "international standards" that have the following principles

- Transparency - All essential information regarding current work programmes, as well as on proposals for standards, guides and recommendations under consideration and on the final results should be made easily accessible.
- Openness - Membership of an international standardizing body should be open on a non-discriminatory basis to relevant bodies of at least all WTO Members.
- Impartiality and Consensus - not give privilege to, or favor the interests of, a particular supplier/s, country/ies or region/s."
- Effectiveness and Relevance
- Coherence - avoid duplication of, or overlap with, the work of other international standardizing bodies.
- Development Dimension

# ASTM Standards

- ASTM has several standard document types:
  - Specification - an explicit set of requirements to be satisfied by a material, product, system, or service.
  - Classification - a systematic arrangement or division of materials, products, systems, or services into groups based on similar characteristics such as origin, composition, properties, or use.
  - Terminology standard - a document comprising definitions of terms; explanations of symbols, abbreviations, or acronyms.
  - Guide - a compendium of information or series of options that does not recommend a specific course of action.
  - Practice - a definitive set of instructions for performing one or more specific operations that does not produce a test result.
  - Test method - a definitive procedure that produces a test result.

# ASTM Balloting Process

**COMMITTEE ON  
STANDARDS**

**SOCIETY & MAIN  
COMMITTEE D19**  
60% Return  
90% Approval

**SUBCOMMITTEE**  
60% Return  
2/3 Approval

**SECTION  
/ TASK  
GROUP**

The ASTM standards development process is driven from the bottom up, by the technical experts.

In the balloting process extensive consideration is given to negative votes. Standards are not approved until all negatives are resolved.

# U.S. Federal Agency Use of Voluntary Consensus Standards

- National Technology Transfer and Advancement Act (P.L. 104-113) (NTTAA) - Requires Federal agencies to adopt private sector standards, wherever possible, in lieu of creating proprietary, non-consensus standards and directs NIST to bring together Federal agencies as well as state and local governments to achieve greater reliance on voluntary standards and decreased dependence on in-house standards.
- OMB Circular A-119 (revised January 27, 2016), Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities - Establishes policies on Federal use and development of voluntary consensus standards and on conformity assessment activities.



# ASTM D19.04 efforts for NORM / TENORM

## ■ NORM / TENORM standard development efforts

- Standard Method for the Determination of Radium-226 and Other Radionuclides in Soil Using High-Purity Germanium Gamma Spectrometry
  - An aliquot of the soil sample is dried, ground, and sieved before being sealed within a metal can.
  - 21-days to allow near-equilibrium in-growth of Pb-214 (352 keV) and Bi-214 (609 keV)
  - Measurement using HPGe
  - Some US states are allowing this method as a “modification” of EPA 901.1, “Gamma Emitting Radionuclides in Drinking Water”
  - Other practices skip the mentioned in-growth and either conservatively assume that all the 185 keV activity is Ra-226 (and doesn’t include U-235) or alternatively uses an estimated fraction of the 185 keV activity for Ra-226 determination.
- Standard Guide for the Radiochemical Characterization of Hydraulic Fracturing Flowback / Produced Waters
  - Develop guidance for the radionuclides that should be measured and analytical methodologies that should provide the necessary measurement quality objectives. And potentially address the reason for omitted radionuclides / analytical methodologies.

# ASTM D19.04 efforts for NORM / TENORM (continued)

## ■ NORM / TENORM standard development efforts

- Standard Practice for Radium-226 using “Triathler” ...
  - Could include the determination of Ra-226 in water using a immiscible liquid scintillation cocktail. Actually measures Rn-222 progeny that migrates from aqueous to organic phase.
  - The Hidex Triathler also has an optional external NaI(Tl) that can be used to measure gamma spectra of solids and solutions.
  - We are also interested in the advantages that the better energy resolution associated with lanthanum halide or CZT non-cryogenic gamma detectors can provide and could facilitate use to provide for better in-field measurements.
- Standard Practices for Radiochemical Separation for High Dissolved Solids Aqueous Matrices
  - The analysis of NORM / TENORM aqueous matrices can be challenging due to the potential for high dissolved solids. These high dissolved solids can significantly impact the decontamination and analyte recovery characteristics of usual radiochemical separations used for water samples. Some have developed radiochemical separations that can be used in combination with usual radiochemical separations to address such challenging matrices.

## **Other D19.04 Standards of potential CIRMS interest**

- D7282 - Standard Practice for Setup, Calibration, and Quality Control of Instruments Used for Radioactivity Measurements
- D7902 - Standard Terminology for Radiochemical Analyses
- D8293 - Standard Guide for Evaluating and Expressing the Uncertainty of Radiochemical Measurements

## **ANSI N42.22 & N42.23 revisions**

- ANSI / IEEE N42.22, American National Standard - Traceability of Radioactive Sources to the National Institute of Standards and Technology (NIST) and Associated Instrument Quality Control
- ANSI / IEEE N42.23, American National Standard Measurement and Associated Instrumentation Quality Assurance for Radioassay Laboratories