DHS/NIST Virtual Workshop: Standards to Support an Enduring Capability in Wastewater Surveillance for Public Health

Overview and Goals for the 2021 SWWS Workshop

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June 14, 2021
Topics

• Background
• Goal and Expected Outcome
• Agenda Overview
• Introduction to Standards and Measurement Assurance Concepts
• Guiding Questions
The myriad ways sewage surveillance is helping fight COVID around the world

Wastewater tracking was used before the pandemic to monitor for polio and illicit drug use, but interest in the field and its applications has now ballooned.

Freda Kreier
Part of the U.S. Department of Commerce

Developing standards to support international trade and commerce

The U.S. National Metrology Institute (NMI)

NIST MISSION: To promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life
## NIST AT A GLANCE

**Industry’s National Laboratory**

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Number</th>
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</thead>
<tbody>
<tr>
<td>Federal Employees</td>
<td>3,400+</td>
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<tr>
<td>Associates</td>
<td>3,500+</td>
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<tr>
<td>Nobel Prizes</td>
<td>5</td>
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<td>Collaborative Institutes</td>
<td>10</td>
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<td>Manufacturing Offices of Manufacturing USA</td>
<td>14</td>
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<td>Manufacturing Extension Partnership Centers</td>
<td>51</td>
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<tr>
<td>Businesses Using NIST Facilities</td>
<td>400+</td>
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<td>U.S. Baldrige Performance Excellence Program</td>
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2 CAMPUS
- **GAITHERSBURG**, MD [HQ]
- **BOULDER**, CO

3,400+ FEDERAL EMPLOYEES
3,500+ ASSOCIATES
10 COLLABORATIVE INSTITUTES
14 NATL OFFICE FOR MANUFACTURING INSTITUTES
51 MANUFACTURING EXTENSION PARTNERSHIP CENTERS
Unique NIST Products and Services

Every year:
- **1,200** Standard Reference Material (SRM) products
- **100** Standard Reference Data (SRD) products
- **600** measurement services

**Every year:**
- **32,000** SRM units sold
- **13,000** calibrations and tests
- **800** accreditations of testing and calibrations laboratories

Million-Pound Deadweight Machine

Credit: NIST
NIST Laboratory Programs

- Material Measurement Laboratory
- Physical Measurement Laboratory
- Engineering Laboratory
- Information Technology Laboratory
- Communication Technology Laboratory
- Center for Nanoscale Science and Technology
- NIST Center for Neutron Research
June 2020 Webinar

- Explored challenges associated with measurement of SARS-CoV-2 in human stool and wastewater
- Launched exchange of knowledge between NIST and stakeholders on standards needs to support detection and quantification of SARS-CoV-2 in fecal microbiome and wastewater matrices
- Highlighted the need for tools/approaches including:
  - Protocol harmonization to improve data comparability
  - Guidelines for establishing sampling plans to decrease technical variability
  - Reference materials that account for the heterogeneity of the wastewater matrix
  - Data sharing and use of metadata to improve robustness of statistical data
- Proposed that NIST could develop RMs and/or guidance documents on the use of control materials to support confidence in test results
DHS-NIST Collaboration

- Develop standards that support development of an enduring capability in wastewater surveillance
- Stakeholder input is critical

SWWS Workshop!!
Workshop Goal

To identify and prioritize standards needs and technology/measurement gaps and propose a path forward to develop standards that enable an enduring capability in wastewater surveillance (beyond COVID-19) that provides high confidence, representative, comparable results to inform public health and safety decisions across the nation.
Workshop Expected Outcome

Stakeholder input from the workshop will

- **inform standards development activities**, potentially including consensus-based documentary standards and reference materials

- **ensure that efforts are fit for purpose** and aligned with the needs of the community

Workshop output will include a **publication describing the workshop findings** (workshop report and/or peer-reviewed article)
Wastewater Surveillance (WWS)

- SAMPLING
- TEST METHODS
- DATA REPORTING AND ANALYTICS
- USE OF DATA
Technical Program

Days 1 & 2

Day 1: Monday, June 14, 10 AM to 3 PM (EDT)
Day 2: Tuesday, June 15, 10 AM to 3 PM (EDT)

Wastewater Surveillance - Lessons Learned, Challenges Remaining, Potential Roles for Standards

Learning Objectives:
At the conclusion of Days 1 and 2, participants will be able to:

• Give examples of the benefits of wastewater surveillance based on experiences from the current pandemic
• Recall critical challenges that hinder comparable, high quality data for the various steps in wastewater surveillance
• Summarize potential roles for standards in wastewater surveillance
Day 3: Friday, June 18, 10 AM to 3 PM (EDT)
Next Steps Toward Standards to Help Build and Sustain an Enduring Wastewater Surveillance Capability

Learning Objectives:
At the conclusion of Day 3, participants will be able to:
• Describe key characteristics of an enduring capability from various perspectives
• List potential next steps toward standards to support this capability
• Determine where they would like to participate in future standards development activities
Agenda Overview

**DAY 1: Mon, June 14**
- **SWWS 101**: Introduction to WWS
- **SWWS 201**: Sampling

**DAY 2: Tues, June 15**
- **SWWS 202**: Testing Methods
- **SWWS 203**: Data Reporting and Analytics
- **SWWS 204**: Role of Standards in Supporting the Use of WWS Data

3-4 PM: Virtual Poster Session

**DAY 3: Fri, June 18**
- **SWWS 301**: Building an Enduring Capability

*Concurrent Breakout Sessions:*
- **SWWS 302**: Methods and Data Comparability
- **SWWS 303**: Reference Materials
- **SWWS 304**: Documentary Standards

- **SWWS 401**: Breakout Summaries, Closing Remarks
The Many Forms of Standards

There is no pre-conceived notion of what is the “right standard” to address the needs of the WWS community.

- **Reference Materials (RMs)** are homogeneous, stable materials well-characterized for one or more chemical and/or physical properties.
- **Documentary Standards** routinely specify definitions, classifications, delineation of procedures and processes, material and product specifications, test methods and sampling procedures.

**Wastewater RMs?**

**Target RMs?**

**Standard guidance documents?**
Measurement Assurance

- Provides a known level of confidence to inform decision making
- Is based on supporting data and metadata to provide credibility
- Leads to accelerated technology development and translation

Industry needs

R&D

Documentary Standards
- Guides/Methods

Metrology Toolkit
- Interlab comparisons
- Design of Experiments
- Validated protocols
- Reference Materials

Measurements/Data
- Methods, protocols, technologies, data

R&D

Industry needs
The Trade-Off

Low stakes decisions | High stakes decisions

Measurement assurance

Tolerance for uncertainty

General Workflow for Wastewater Surveillance

Sampling → Test Methods → Data Analytics & Reporting → Use of Data

Incorporating measurement assurance strategies into each step will increase confidence in results
Workshop Registrants

Nearly 500 registrants from 28 countries

LEVEL OF EXPERTISE IN WWS
- None: 14%
- Beginner: 28%
- Intermediate: 30%
- Advanced: 16%
- Beyond Expert: 9%

Organizations
- Industry
- Federal Government
- Academia
- Contract Laboratories
- Non-Profit
- Other
- Public Health
- Government (non-federal)
- Utilities

Focus Areas
- Data Reporting and Analytics
- Interpretation and Use of Data
- More Than One of the Above
- Sampling
- Sample Processing and Testing...
- Wastewater Treatment Plant
- Other
Guiding Questions

• What methods/techniques/measurement technologies are currently being used in your area of WWS?
  • How do they successfully contribute toward comparable, high quality data, results, and/or decisions?
  • How do they compromise efficiency and reduce confidence in data, results, and/or decisions?

• What is needed to improve comparability and confidence in data and results?

• What are the barriers to filling these needs?

• How could standards help address the needs and overcome the barriers? What standards would you recommend?