IEEE P2520.2.1
Machine Olfaction Devices and Systems used for General Outdoor Odor Monitoring
(SEN/SC/TMODS/OOM/2520.2.1)

Working Group Meeting Minutes
12 APRIL 2021 / 10:00 AM – 12:00 PM (ET)
WG Chair: Ehsan Danesh
Interim WG Secretary: H. Troy Nagle

1. **Call to Order**
   Chair called meeting to order at 10:03 AM EST. He also announced that the meeting is being recorded for the purpose of preparing minutes.

2. **Roll Call and Disclosure of Affiliation**
   Affiliation FAQs: http://standards.ieee.org/faqs/affiliation.html
   The Chair directed participants to a Google Docs link in the Chat window. All participants were asked to register into a Google form their names, email, affiliation, and WG membership request. A few minutes were allowed for participants to access and complete the registration process. Those participating in the meeting were displayed at this link (https://docs.google.com/spreadsheets/d/1OHpKudLIzxhX26ZqJH6w7cesHo1w1nKBci4Vi9tuuAo/edit#gid=1737656403) and are listed in Attachment A.

3. **Approval of Agenda**
   The Chair displayed the announced agenda and delayed approval until later in the meeting once a quorum was confirmed.

4. **IEEE Patent & Copyright Policies**
   a. **Call for Patents**
      https://development.standards.ieee.org/myproject/Public/mytools/mob/slideset.pdf
      Per standard IEEE-SA WG meeting practice, the Chair reviewed the required policy regarding potentially essential patents. No one raised concerns for consideration.

   b. Copyright Policy
      https://standards.ieee.org/ipr/copyright-materials.html
      Per standard IEEE-SA WG meeting practice, the Chair reviewed the required policy regarding copyrights. There were no questions or concerns.

5. Technical Presentation(s) and Discussion

a. *Presentation by Domenico Cipriano:*

Domenico Cipriano is Convenor of Italian Standard UNI 11761:2019 on Odour Determination using Instrumental Odour Monitoring Systems (IOMS). His contact information is Domenico.Cipriano@res-web.it. This standard gives a guarantee that values given by the IOMS are traceable and respect a required uncertainty level. They define three types of IOMS. The first determines the presence or absence of an odour. The second assigns an odour to a class (i.e., no odour, waste fill, petrochemical). The third provides an odorimetric value as described in EN 13725:2004. The standard offers four levels of IOMS performance, each to be passed in succession. The first level asks the manufacturer to give a minimal list of performance parameters being addressed (i.e., gas analyzed, full scales, linearity, etc.). The second level uses standard gas mixtures to "pre characterize" the IOMS operation in the laboratory. This is not a field calibration. The third level takes place in the field. Here the manufacturer verifies the performance defined in Level 1 and performs a full calibration to enable "valid" field measurements. Here chemical measurements are transformed into odour measurements. The fourth level is conducted in a user application in the field. Here, IOMS responses are verified using traceable materials to demonstrate that the IOMS is operating properly and remaining calibrated over time. The standard is currently being revised to include these four testing levels.

During the Q&A, Domenico was asked how he chooses the test gases for his IOMSs. He stated that permeation tubes are no longer being used in Italy. They use pressurized mixtures of traceable gases. Finding the right mixtures for an application is always problem. They are looking forward to working with us to address this common challenge. Can we find a simple and stable mixture that will guarantee that the IOMS continues to work properly? Some IOMS manufacturers do now offer cylinders of gas mixtures for periodic calibration purposes.

b. *General discussion:*

After the presentation, the group entered into a general discussion period. The topic of calibration methods continued. It was recommended that we avoid trying to create synthetic odors, but rather focus on mixtures of individual compounds that are relevant to the specific targeted application.

In our current discussions regarding P2520.1 Baseline Performance, we have listed ISB and EtoH. Several questions arose from the discussion.

Can we relax that specification to allow the equipment under test (EUT) testers to substitute other chemicals that are chosen for the specific field application of the device?

Can we allow the testing entity to choose alternative gases for P2520.1?

Can we provide such a list of specific alternatives listed by application area (i.e., P2520.2.1, P2520.3.1, P2520.4.1, etc.)?

Within each application area, can we further refine specific test chemicals and mixtures for application subclasses (i.e., P2520.2.2, P2520.2.3, P2520.2.4, P2520.2.5, etc.)?

The set of general procedures can be specified in the standard. This is the format that WG41 has taken. Lists of specific test chemicals can be included in Appendices and Conformity testing protocols.

At this point in the meeting the Chair reviewed the disposition of the Tasks presented at the last meeting. He shared this status update.

Task 0 – Equipment Under Test: Assigned to the P2520.1 WG.
Task 1 – Odors and concentrations: Establish quantitative and qualitative information about odour chemicals in outdoor environments to be included in this standard.
Task 2 – Performance validation: Define stepwise test methodologies for performance measurement in lab and field, and assess correlation with human perception.
Task 3 – Data manipulation: Assigned to the P2520.1 WG.

He asked if anyone wants to discuss Task 1. Laura Capelli volunteered to bring extensive data to our next meeting regarding landfills, foundries, and refineries. She is just completing a large European project under Horizon 2020. They have done a comprehensive literature survey and are including the published data analyzing emissions from those three types of odour sources. The focus on the studies was toxic chemical safety. However, the data could also serve our odour-monitor testing purpose. The data reported include emission composition, chemical concentrations, and odor thresholds. The study was done over the last two years and will be published (open access) in the next few weeks. In 2017, a similar study was published (open access) for waste-water treatment plants that will also be an important source for Task 1. Hopefully, these studies will provide insights into potential test chemicals and mixtures for baseline performance in all P2520.2.x applications. Perhaps that can give a starting point. The data tables may need some extra columns for boiling point, vapor pressure, and the like.

Perhaps we can employ the ratio between the emitted concentration and its odor threshold as a first estimate of a specific compound's contribution to the final odour emissions of a certain plant. Such a comparison my help us determine good candidates for calibration odorant mixtures for specific applications (e.g., P2520.2.2 Landfills). From these candidates, those with low toxicity and wide availability would emerge as winners.

The Chair then directed the discussion to Task 2 (Performance validation). In this task, he reviewed a testing procedure based on prior work by P2520.1. He changed the P2520.1 test gases from ISB and EtoH to H2S and ammonia (as place holders pending better choices from Task 1).

Level 1 (Detection in a fixed environment): The test demonstrates that the equipment under test (EUT) can differentiate each two test gases from background at a specified temperature and humidity.

Level 2 (Detection in a changing environment): In this test, the EUT must detect the each of the two chemicals in nine combinations of temperature and humidity.

Level 3 (Identification/classification in a fixed environment): In this test, both of the test chemical gases are employed at three non-zero concentrations. The EUT shall detect the test gases over a third interfering gas such as n-butanol. All three gases are employed at three non-zero concentrations.

Level 4 (Quantification): At this level, the EUT shall classify the concentrations of the two test gases under the testing parameters of Level 3.

For Level 4, quantification will include some uncertainty parameters that are appropriate for specific applications.

Should an instrument that can quantify a known odor emission source at high concentrations be eliminated from P2520.2.1 because it can't detect or identify low concentrations of a test gas? In many applications, the offending odor source in known and monitoring its concentration levels at or near the point of origin is very important.

Will passing Level 4 using only specific test and interfering gases be comprehensive enough for applications like wastewater treatment? In many applications test and interfering gas mixtures will be needed. The data from the 2017 and 2020 studies that were suggested by Laura will be very informative as we make these decisions in future meetings.

The Chair asked the following question: Can only portions of our standard be adopted? We can request a presentation by the IEEE-SA Conformity Assessment Program. Our standard can be included in their portfolio and they have examples that we can consider. Laboratories around the world can become certification sites for our P2520 series of odor monitoring equipment standards. A request was made for an overarching map of the various options being considered in the P2520 series. Access to iMeet Central needs to be provided to new members who missed the kickoff session. Everyone agreed that Google Docs will be a good mechanism for working on new draft documents.

The Chair reminded us that our upcoming milestone is August 7, which is to create a draft outline (table of contents) for our standard. We will be able to use a standard template to insert our planned procedures. Our WG website is now online. There we try to include relevant information and especially the meeting information. Please volunteer if anybody wants to contribute to the website.

At this point, the Secretary announced that we had 27 voting members in attendance and thus a quorum was achieved.

6. **Approval of Previous Meeting Minutes**
   The Chair received a motion to approve the Minutes of the first two WG Meetings from Troy Nagle and a second from Susan Schiffman. The motion passed without objection.

7. **Unfinished Business/Action Item Review**
   The Chair announced that we are still soliciting a volunteer WG Secretary. Please contact the chair is you are interested in the officer position. The discussion of the formation of Subgroups will continue at the next meeting.

8. **New Business**
   The chair announced that the Call for Participation in P2520.3.1 (General Indoor Odor Monitoring) is ready for distribution. The Chair is very pleased with the progress of this WG. That forms a basis to launch the new P2520.3.1 (Odor in Indoor Environments) WG. Ehsan is also chairing that new WG. The new WG will have many common interests with P2520.2.1. Many of the members of this WG will also want to join that one.

   Our regular meeting time on June 14 will be preempted by the P2520.3.1 kickoff meeting. Everyone will soon receive the Call for Participation in that session. It will require a separate registration (as did our P2520.2.1 kickoff in February). The Chair is planning some joint Subgroups between P2520.2.1 and P2520.3.1. Subgroup planning will be taking place and can be adopted at our next meeting and at the P2520.3.1 kickoff (at which a quorum will be achieved automatically).

9. **Future Meetings**
   The next meeting of the WG will take place at 10 AM EDT on May 10.

10. **Adjourn**
    The WG Chair asked for a motion to adjourn. Susan Schiffman made the motion, Susana Palma seconded. Without objection, the Chair adjourned the meeting at 11:47 AM.

Attachment A: Meeting Participants

First Name	Last Name	Affiliation	Country
Ehsan	Danesh	Alphasense Ltd	UK
Anna	Staerz	MIT	United States
Susana	Palma	FCT-NOVA	Portugal
Etienne	Bultel	Aryballe	France
DOMENICO	CIPRIANO	RSE	Italy
Wolfhard	Reimringer	3S - Sensors, Systems Processing, Systems GmbH	Deutschland
Fabio	Leccese	Dipartimento di Scienze - Università degli Studi "Roma Tre"	Italia
James	Covington	University of Warwick	UK
Hirenkumar	Gami	Miami University - OH	United States
Abhinav	Chopra	UoA	New Zealand
EDGAR	SOTTER	The CSA Group	Canada
Ko Chung	Wong	Oxford Technology	Japan
Anne-Claude	Romain	University of Liege	Belgium
Saverio	De Vito	ENEA - Agency for New Tech., Energy & Sustainable Economic Environment	Italia
Troy	Nagle	NC Statte University	USA
John	Saffell	Alphasense Ltd.	UK
Leszek	Majewski	University of Manchester	United Kingdom
Radislav	Potyrailo	GE Research	United States
Jesus	Lozano	Universidad de Extremadura	Spain
Susan	Schiffman	North Carolina State University	United States
Kishore	Kuna	Honeywell Technology Solutions	India
Cyntia	Izquierdo	Olores.org	España
Avid	Roman-Gonzalez	BE Tech	Peru
Susan	Schifffman	North Carolina State University	United States
Félix	Borner	Aryballe	France
laura	capelli	Politecnico di Milano	Italy
David	Peaslee	SPEC Sensors, LLC	United States
Hua-Yao	Li	Huazhong University of Science and technology	China
GUILLOT	Jean-Michel	IMT Mines Ales	FRANCE
Fabio	Leccese	Dipartimento di Scienze - Università degli Studi "Roma Tre"	Italia
Cyril	Herrier	Aryballe	france
Christian	Mantey	3S - Sensors, Systems Processing, Systems GmbH	Germany
Abhirupa	Saha	IIT Bombay	India
Louis-Ray	Harri	University of the West Indies	Jamaica
Magnovaldo	Carneiro	Univesp	Brazil