

# **Memorandum of Understanding**

**between**

**The National Institute of Standards and Technology,  
Chemical Science Division, Materials Measurement Laboratory,  
United States of America**

**and**

**The World Meteorological Organization, Global Atmosphere Watch Programme  
for Provision of a Central Calibration Laboratory (CCL)  
for Monoterpenes  
to the World Meteorological Organization, Global Atmosphere Watch Programme**

In consideration of the benefits anticipated from the entering into this Memorandum of Understanding (hereinafter MoU), the National Institute of Standards and Technology and the World Meteorological Organization (hereinafter jointly referred to as the 'Parties') agree as follows:

## **1. General**

1.1 The Global Atmosphere Watch (GAW) Programme of the World Meteorological Organization (WMO) is the only existing long-term international global programme that provides the technical basis for the assessment of the chemical composition of the atmosphere. The mission of GAW as described in the "WMO Global Atmosphere Watch (GAW) Strategic Plan: 2008-2015" (GAW report No. 172) is implemented through "maintaining and applying global, long-term observations of the chemical composition and selected physical characteristics of the atmosphere; emphasising quality assurance and quality control; delivering integrated products and services of relevance to users".

1.2. The WMO/GAW quality assurance system includes five types of central facilities dedicated to six groups of measurement variables, which are operated by WMO Members. A key role is played in this system by the Central Calibration Laboratories (CCLs) whose Terms of Reference are listed in the Annex 1.

1.3 The WMO/GAW Programme recognizes monoterpenes as one of the priority groups of Volatile Organic Compounds (VOCs) in the GAW Strategic Plan and in the GAW Report No.171 (Annex 2).

## **2. Purpose and Activities**

2.1 The purpose of this Memorandum of Understanding ("MoU") is to recognize the National Institute of Standards and Technology, Chemical Science Division, Materials Measurement Laboratory (NIST/MML) as a Central Calibration Laboratory for monoterpenes for the WMO/GAW Programme.

2.2 The NIST/MML will perform, within the framework of this MoU, the following activities:

- a) Support a set of stable and accurate gas standards for monoterpenes that define a scale. The intent is to maintain stable and accurate monoterpenes gas standards, such that WMO/GAW can detect and track trends in ambient concentration levels and quantify small differences in monoterpenes levels between regions.
- b) Perform a scale revision if necessary and inform all the partners on necessary scale corrections.
- c) Participate in international scale comparisons organized by the Bureau International des Poids et Mesures (BIPM) and involving National Metrology Institutes as appropriate.
- d) Provide stable and accurate transfer gas standards to the Central Facilities (World and Regional Calibration Centers) of the WMO/GAW Programme and to network members for calibration purposes. These standards will be used as primary standards for the assessment of global ambient levels of monoterpenes.
- e) NIST/MML will make public its involvement in the WMO/GAW Programme (e.g. on its website, newsletters, etc.) and report on their WMO/GAW related activities annually to WMO.

2.3 The WMO/GAW will perform, within the framework of this MoU, the following activities:

- a) Inform the WMO Members of the need to meet the requirements set by expert bodies and of the role of the CCL in assisting to meet these requirements.
- b) Periodically review its needs for Quality Assurance/Quality Control through the WMO Scientific Advisory Group for Reactive Gases and appropriate expert meetings and inform NIST/MML of the continued relevance of the monoterpenes gas standards.
- c) Ensure the publication of the Standard Operating Procedures and/or Measurement Guidelines prepared in collaboration with the CCL for monoterpenes.
- d) Acknowledge NIST/MML where appropriate for the support of the CCL for monoterpenes, including on its web pages.

### **3. General conditions**

3.1 This MoU is not intended to create any legally binding obligations.

3.2 This MoU will be carried out in accordance with the relevant laws and regulations and subject to the availability of appropriated funds and personnel of the Parties.

3.3 The Parties shall have the right to terminate this MoU, by written notice to this effect after the entry into force of the MoU, if it considers that completion of the MoU is impossible or impractical. The written notice should preferably be given two years prior to the termination of the MoU.

3.4 The Parties will not be held responsible vis-à-vis each other for any accident, illness, loss or damage to the other party which may occur in connection with the implementation of the activities covered by this MoU.

3.5 The Parties will inform each other regularly about planned and completed work and about the results generated under this MoU. To do this, the Parties will meet at regular intervals in order to exchange information and discuss their respective activities.

3.6 Any differences arising out of the interpretation or implementation of this MoU will be resolved in an amicable manner through consultations between the Parties.

3.7 Nothing in or relating to this MoU shall be deemed a waiver, express or implied, of any of the privileges and immunities of the WMO.

3.8 Should a provision of this MoU be or become invalid, this will not affect the validity of the rest of the provisions of this MoU or the MoU as a whole. The Parties will make a concerted effort to jointly decide upon a new valid provision, which will reflect as much as possible the invalid provision which it is replacing.

3.9 Any reference to this MoU will also include the Annexes.

3.10 Each Party will bear its own costs arising in the course of the implementation of this MoU.

#### **4. Reporting**

All matters regarding this MoU shall be addressed to the NIST/MML point of contact:

Dr Franklin R. Guenther  
Group Leader  
Chemical Sciences Division  
Materials Measurement Laboratory  
National Institute of Standards and Technology  
100 Bureau Drive  
GAITHERSBURG, MD, 20899  
USA

and to the WMO/GAW point of contact:

Dr Liisa Jalkanen  
Chief  
Atmospheric Environment Research Division (AER)  
Research Department (RES)  
World Meteorological Organization  
7bis, avenue de la Paix  
Case postale 2300  
CH-1211 GENEVA 2  
Switzerland

## 5. Settlement of Disputes

Any dispute between the Parties arising out of the interpretation or execution of this MoU shall be settled by mutual agreement. If both Parties are unable to reach agreement or any question in dispute or on a mode of settlement other than arbitration, the parties, upon mutual written agreement, may request arbitration in accordance with the Arbitration Rules of the United Nations Commission on International Trade Law (UNCITRAL), as at present in force. Each Party agrees to be bound by any arbitration award rendered in accordance with the above, as the final adjudication of any such dispute.

## 6. Amendments

Any amendment to this MoU shall be effected only on the basis of written mutual consent by the Parties.

## 7. Entry into Force

7.1 The present MoU will enter into force upon signature by both Parties and will remain in effect for a period of five years or until terminated by one or both of the Parties. Either Party may terminate this MoU in accordance with paragraph 3.3 above. This MoU may be extended in five year increments, upon written agreement of the parties prior to the expiration of the previous five year period.

7.2 The Parties shall sign two copies of this MoU. Each Party will have one original copy.

Signed in duplicate in the English language.

Signed on behalf of the World Meteorological Organization (WMO/GAW):

Dr Deon Terblanche  
Director  
Atmospheric Research and Environment Branch  
Research Department  
World Meteorological Organization

Signature:




Date:

25/4/2013

Signed on behalf of the National Institute of Standards and Technology, Materials Measurement Laboratory:

Dr Laurie E. Locascio  
Director  
Materials Measurement Laboratory  
National Institute of Standards and Technology

Signature:



Date:

5/24/13

## **ANNEX 1**

### **Terms of Reference for GAW Central Calibration Laboratories (CCLs)**

- (a) Host in the long term (many decades) the GAW primary standard and scale for a particular variable.
- (b) Serve the needs of the other quality assurance facilities and activities of GAW.
- (c) Prepare or commission laboratory standards required by the GAW network members for calibration purposes.
- (d) Supply well-calibrated air to GAW analytical laboratories as needed for conducting inter-comparisons (in collaboration with the World or Regional Calibration Centres).

Extracted from WMO Global Atmosphere Watch (GAW) Strategic Plan: 2008-2015 (GAW report No. 172, p. 16, Box 5).

## ANNEX 2

### Priority Volatile Organic Compounds (VOCs) specified by the GAW Programme and their Data Quality Objectives (DQOs)

Compound	Accuracy	Precision
Ethane	10%	5%
Propane	10%	5%
Acetylene	15%	5%
Isoprene	20%	15%
Formaldehyde	20%	15%
Monoterpenes	20%	15%
Acetonitrile	20%	15%
Methanol	20%	15%
Ethanol	20%	15%
Acetone	20%	15%
Dinethylsulphide (DMS)	20%	15%
Benzene	15%	10%
Toluene	15%	10%
Iso-/n-Butane	10%	5%
Iso-/n-Pentane	10%	5%
mole fraction <0.1 ppb	±20 ppt	±15 ppt

Extracted from "A WMO/GAW Expert Workshop on Global Long-Term Measurements of Volatile Organic Compounds (VOCs)" (GAW report No. 171, p.16). DQOs listed in the table are a subject of the revision by SAG Reactive Gases.



World Meteorological Organization  
Organisation météorologique mondiale

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Our ref.: 5528-13/RES/AER/CCLs

Annexes: 2

Dr Franklin R. Guenther  
Group Leader  
Chemical Sciences Division  
Materials Measurement Laboratory  
National Institute of Standards and  
Technology  
100 Bureau Drive  
GAITHERSBURG, MD 20809  
United States of America

GENEVA, 25 April 2013

**Subject: Letter of Agreement related to the Provision of a Central Calibration Laboratory (CCL) for Monoterpenes**

Dear Dr Guenther,

Please find attached herewith two originals of the above-mentioned Letter of Agreement between the National Institute of Standards and Technology (NIST) and the World Meteorological Organization/Global Atmosphere Watch Programme (WMO/GAW), for your signature.

Kindly return to us one original signed by both Parties.

Yours sincerely,

(L. Jalkanen)  
Chief

Atmospheric Environment Research Division  
Research Department

