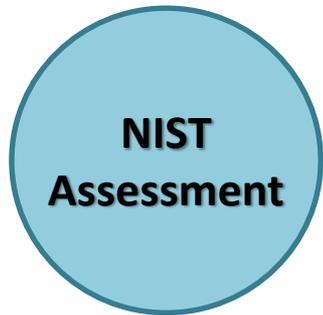


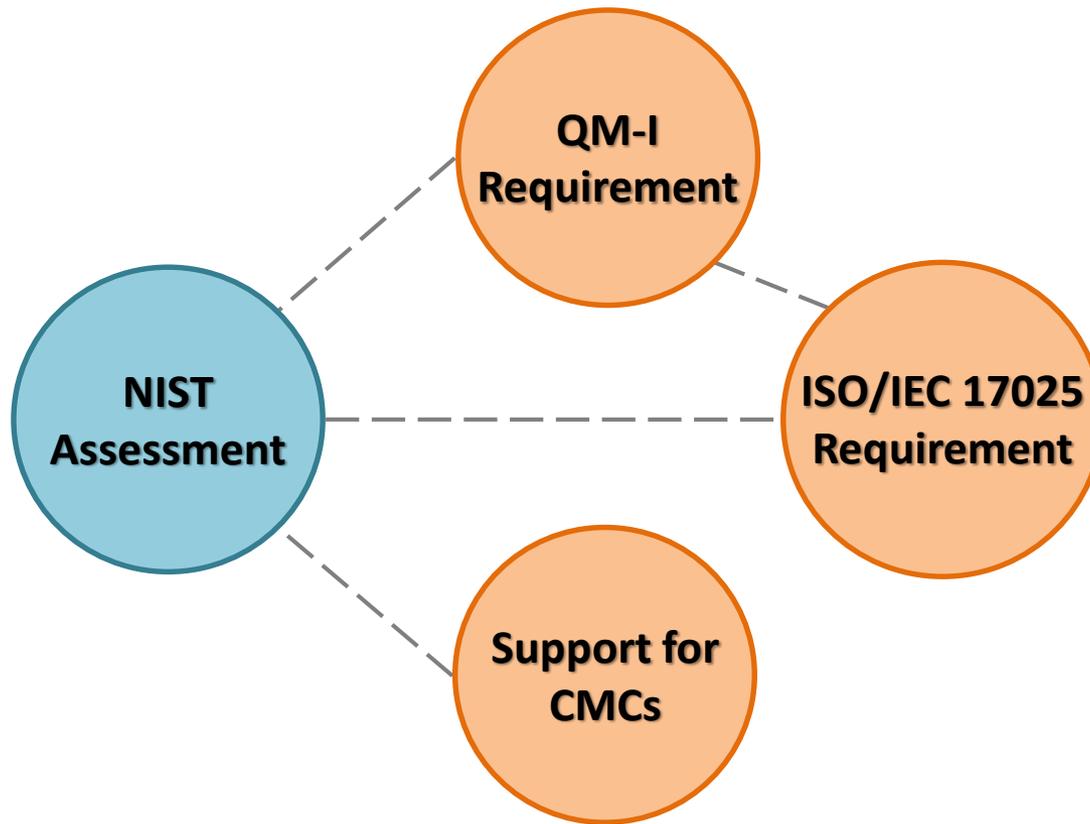
# **NIST Assessments**

**Catherine Cooksey  
Quality Manager  
Sensor Science Division, PML**

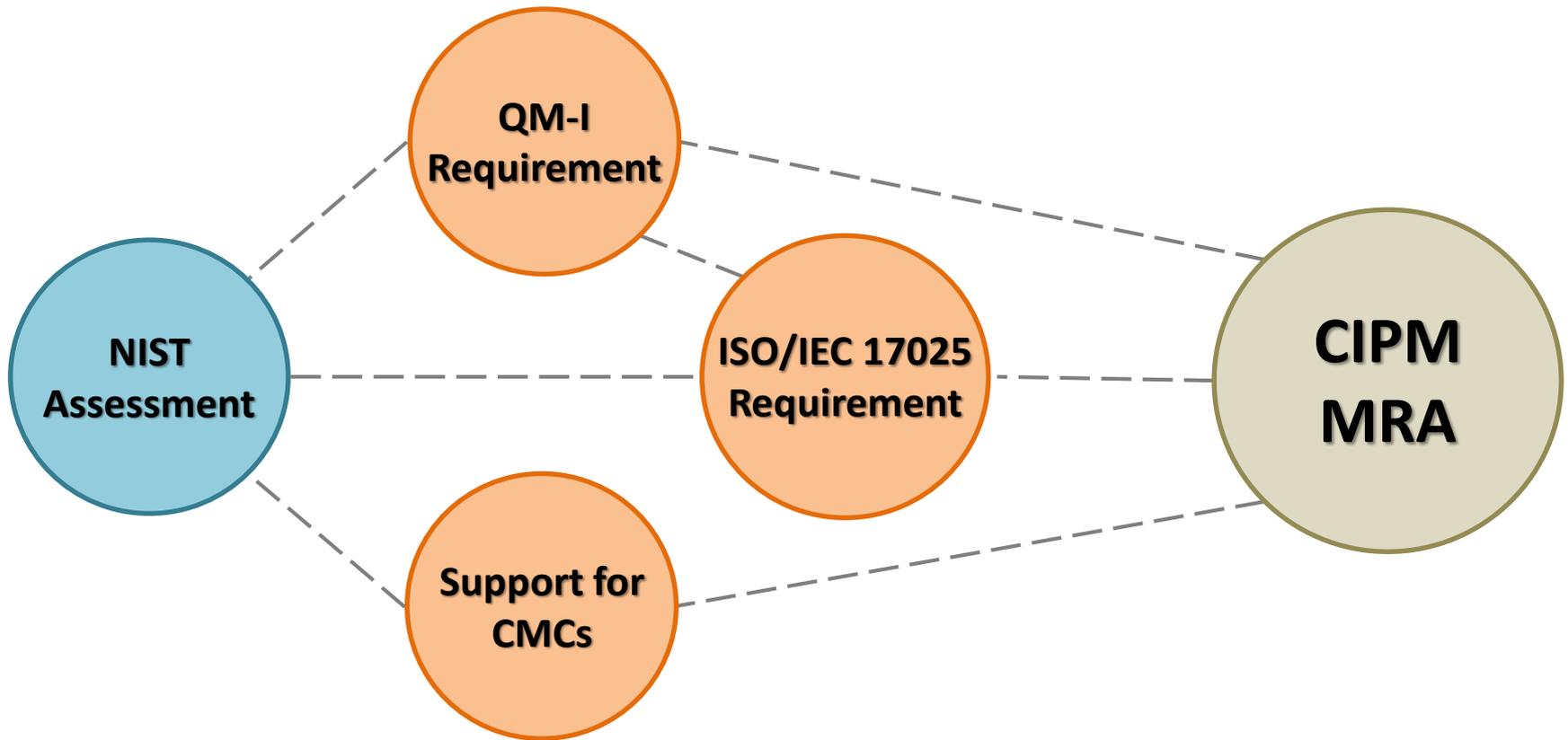
# Why Do NIST Assessments?



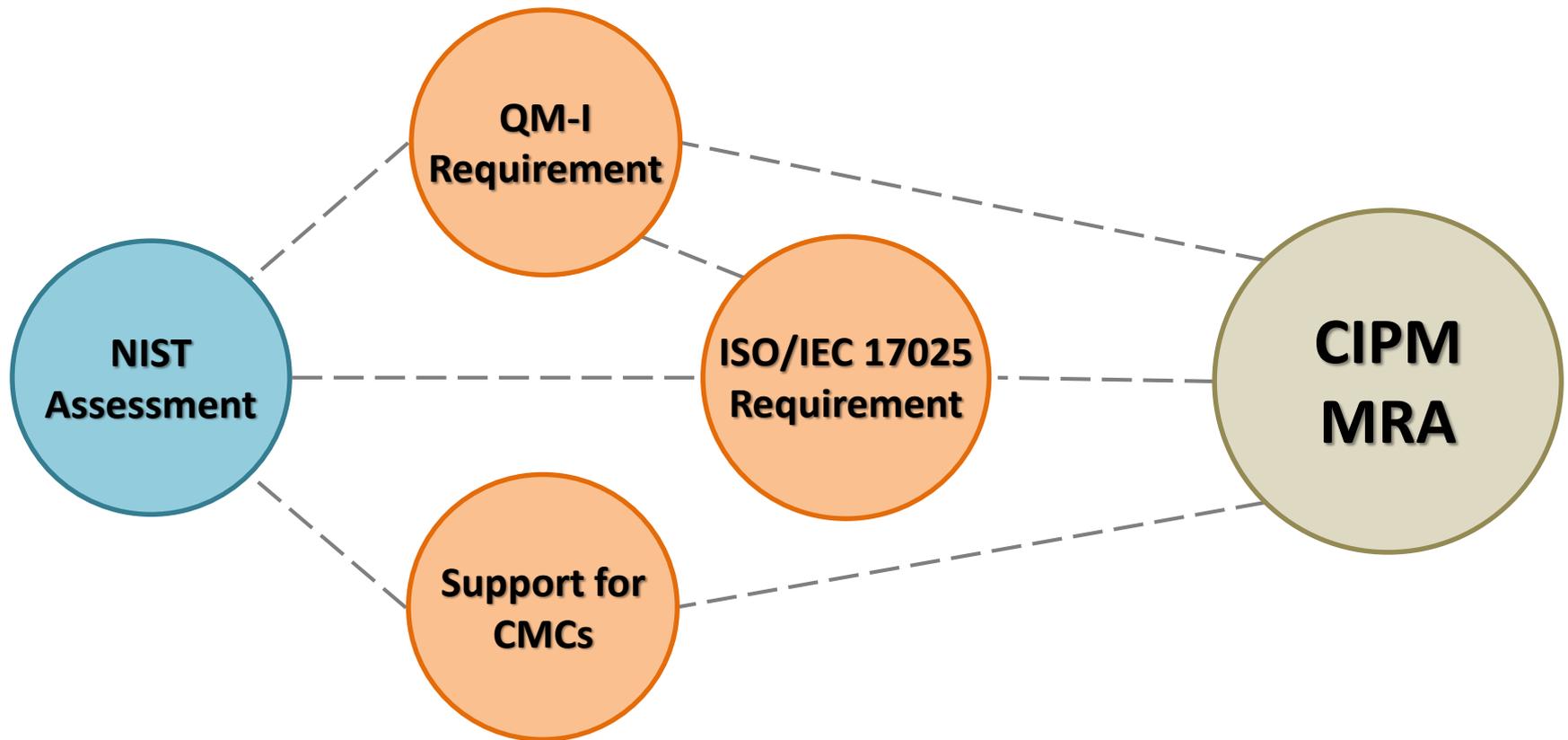
# Why Do NIST Assessments?



# Why Do NIST Assessments?

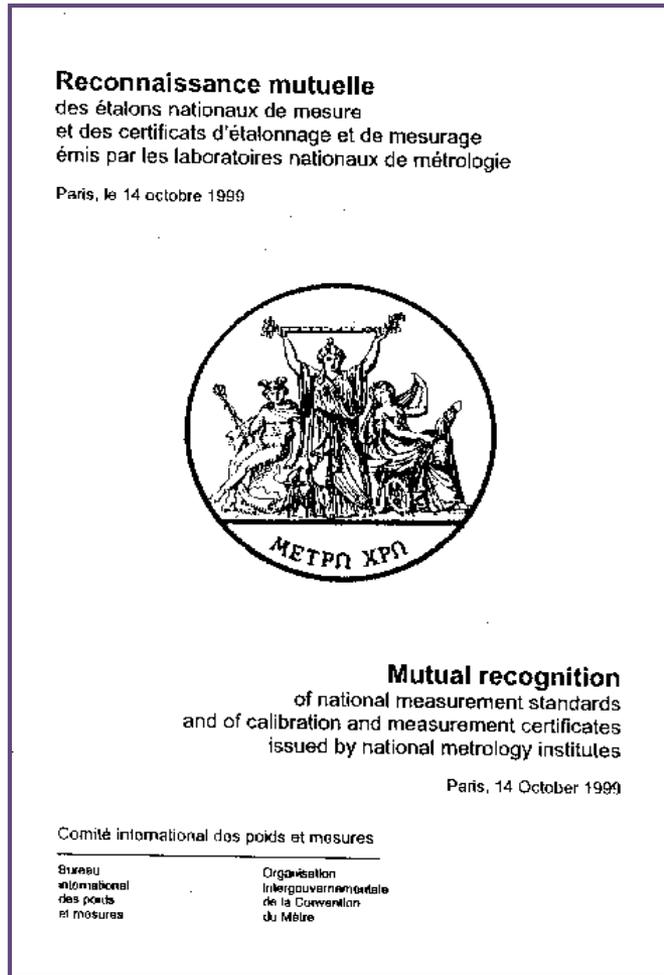


# Why Do NIST Assessments?



- ✓ Evidence of health of QMS
- ✓ Confidence in CMCs
- ✓ Technical basis for mutual recognition of measurement capabilities

# CIPM Mutual Recognition Arrangement (MRA)



Provides open, transparent, and comprehensive scheme to assess:

- Comparability of national metrology services
- Technical basis for wider agreements for international trade, commerce, and regulatory affairs

# CIPM Mutual Recognition Arrangement (MRA)

## Calibration and Measurement Capabilities (CMCs):

Calibration and Measurement Capabilities  
Photometry and Radiometry, United States, NIST (National Institute of Standards and Technology)



Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty					Comments	NMI Internal Service Identifier
Quantity	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage factor	Level of Confidence	Is the expanded uncertainty a relative one?		
Luminous intensity	Tungsten lamp	Photometric bench	0.001	1	cd	Color temperature	2000 K to 3200 K	1.5 to 0.5, varies with measurand	%	2	95%	Yes	Services also available for sources other than tungsten lamps, with uncertainty evaluated for specific sources.	37010C and 37020S
Luminous intensity	Tungsten lamp	Photometric bench	1	10000	cd	Color temperature	2000 K to 3200 K	0.5	%	2	95%	Yes	Services also available for sources other than tungsten lamps, with uncertainty evaluated for specific sources.	37010C and 37020S
Illuminance responsivity, tungsten source	Illuminance meter	Photometric bench			A/lx or V/lx	Illuminance	0.001 lx to 0.1 lx	1.5 to 0.5 varies with illuminance	%	2	95%	Yes	Services also available for sources other than Illuminant A (e.g., LEDs of various colors), with uncertainty evaluated for specific sources.	37090S
						Color temperature	2856 K							
Illuminance responsivity, tungsten source	Illuminance meter	Photometric bench			A/lx or V/lx	Illuminance	0.1 lx to 1000 lx	0.5	%	2	95%	Yes	Services also available for sources other than Illuminant A (e.g., LEDs of various colors), with uncertainty evaluated for specific sources.	37090S
						Color temperature	2856 K							

Intercomparisons

Quality Management Systems

International Peer Reviews

# SIM Quality System Task Force (QSTF)

SIM 09: SIM Procedure for Review of the Quality Management System of National Metrology Institutes and Designated Institutes

## ***QMS Requirements***

- Must be reviewed at least every 5 years
- Must have a Quality Manual
- Should be accredited or self declared to either ISO/IEC 17025 or Guide 34
- Must cover all declared CMCs

## ***QSTF Considerations***

- Is the QMS effective and compliant with ISO/IEC 17025 or Guide 34?
- Is there confidence in the NMI's ability to deliver their declared CMCs?

# SIM Quality System Task Force (QSTF)

## *Submission Requirements*

### **Status of CMCs**

- Updates
- Comparison results
- Staffing/management changes
- Customer feedback

### **Peer reviews**

- Scope and dates
- Reviewer names + bios
- Findings
- Corrective actions

### **Quality Manual**

- Organization structure
- Scope + objectives
- Policies + procedures
- Responsibilities

### **Evidence of implementation**

- Internal audits
- Management reviews

### **Vitality**

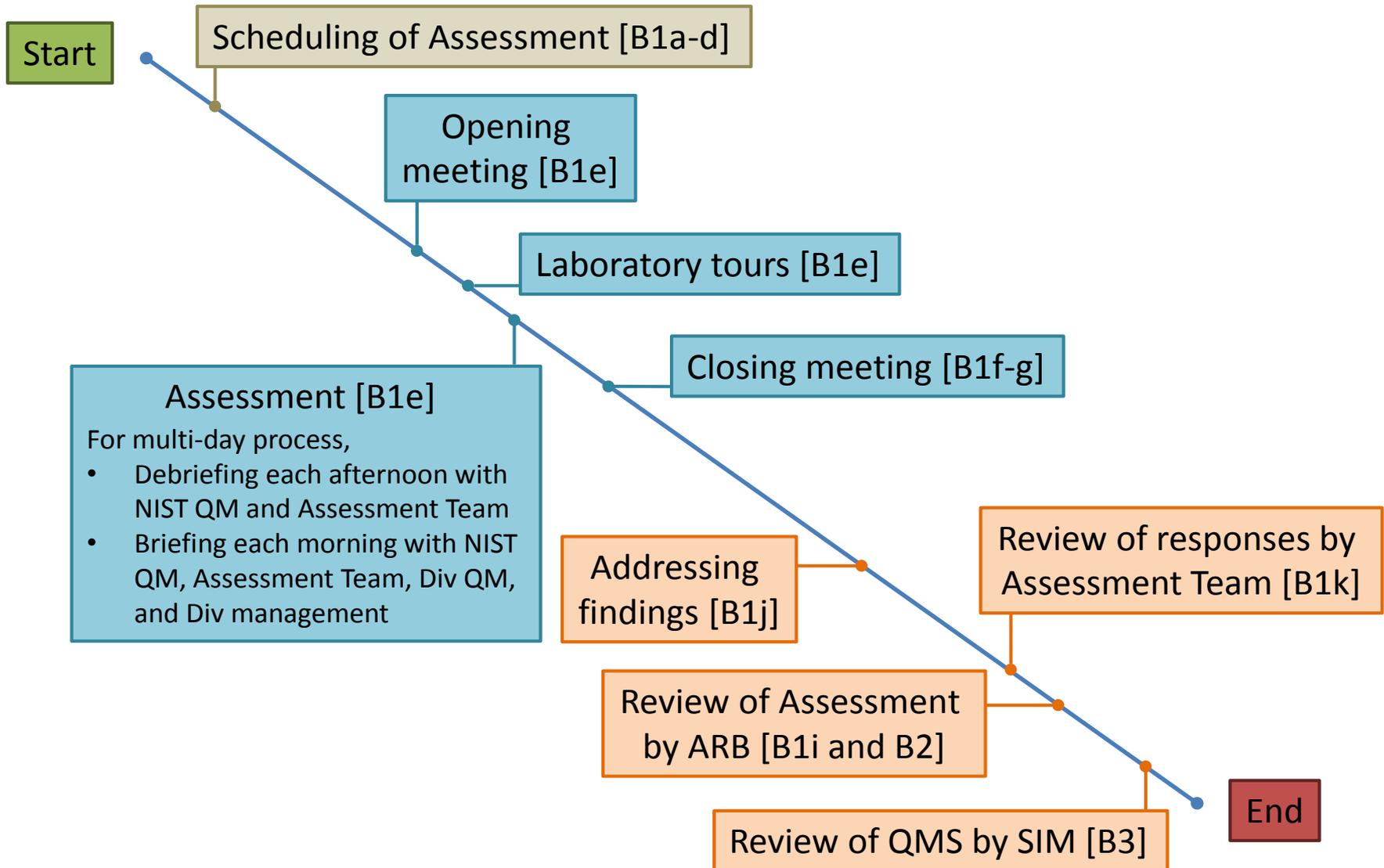
- Participation in comparisons
- Publications + presentations
- Staffing
- Equipment/facility upgrades
- Scale realizations
- Collaborations
- International representation
- Assessor activity
- Non-conformity + corrective actions log

# NIST Assessment Schedule for QMS Review

<b>CMCs</b>	<b>Division</b>	<b>SIM Approval Date</b>	<b>Deadline for Re-approval</b>
<b>Hardness</b>	655	April 2012	May 2017
<b>Photometry and Radiometry</b>	685	October 2012	November 2017
<b>Laser, Fiber, and Wavelength</b>	686	April 2014	May 2019
<b>LF Electrical</b>	684	April 2014	May 2019
<b>Temp, Pressure, Vacuum, Flow</b>	685	April 2014	May 2019
<b>Density and Volume</b>	685	April 2014	May 2019
<b>Mass and related quantities</b>	684	November 2014	November 2019
<b>Acoustics</b>	683	November 2014	November 2019
<b>Length</b>	683	November 2014	November 2019
<b>Biosystems and Biomaterials (Photometric Optical Properties)</b>	644	November 2014	November 2019
<b>EM: RF Technology Division</b>	672	November 2015	November 2020
<b>Ionizing Radiation</b>	682	November 2015	November 2020
<b>Time and Frequency</b>	688	November 2015	November 2020
<b>Chemistry</b>	646	May 2016	May 2021

# Timeline of Assessment Events

NIST-QM-I Appendix B



# Scheduling of Assessment

Calibration Service	NIST Service IDs	Calibration Staff	Group Leader	Lab locations
Laboratory Thermometers	31010C to 31260S and 32110C to 32150S	Dawn Cross, Wyatt Miller, Wes Tew, Karen Garrity, and Greg Strouse	Greg Strouse	221/A242, 221/B239, 221/B241
Thermocouples	321010C to 321010C and 32150C	Chris Meyer and Karen Garrity	Greg Strouse	221/B225 and 221/B229
Platinum and Cryogenic Resistance Thermometers	33010C to 33380M	Michal Chojnacky, Wes Tew, and Greg Strouse	Greg Strouse	221/B05 and 221/B217
Medium and High Pressure Piston Gauges	29010C to 29040S	Greg Driver and Doug Olson	Greg Strouse	220/B39
Low Pressure Transducers & Piston Gauge	30005C to 30025C and 30040S	Jay Hendricks and Jacob Ricker	Greg Strouse	218/C019 and 220/A48
Spinning Rotor Gauges, Ionization Gauges, and Leaks	30029C to 30032S, 30034C to 30038C, 30050S to 30062C	James Fedchak	Greg Strouse	218/C011
Humidity	36010C to 36070S	Peter Huang, Greg Scace, Chris Meyer, and Wyatt Miller	Greg Strouse	221/B131

Assessor Team: Dana Leaman, lead  
 Bob Zarr, technical  
 Pat Abbott, technical

James Whetstone, technical  
 Sally Bruce, observer

# Assessment Schedule

Time	Tues., 6/18	Wed., 6/19	Thurs., 6/20
8:30 am	Opening Mtg	Briefing	Briefing
9:00 am		Lab and QMS assessment: 3 simultaneous groups	Lab and QMS assessment follow-ups: 4 simultaneous groups
9:30 am			
10:00 am			
10:30 am			
11:00 am			
11:30 am			
12:00 pm			
12:30 pm			
1:00 pm	Lab and QMS assessments: 4 simultaneous groups	Lab and QMS assessment: 3 simultaneous groups	Assessment report writing
1:30 pm			
2:00 pm			
2:30 pm			
3:00 pm			
3:30 pm			
4:00 pm			Closing Mtg
4:30 pm	Debriefing	Debriefing	

# Assessment Documentation

Enter Date:

## NIST Quality Manual for Measurement services (NIST-QM-I, Version 8) Checklist

**Instructions to the Assessor:** This checklist addresses specific requirements for NIST Divisions prescribed in the NIST Quality Manual for Measurement Services, NIST-QM-I.

- All items on this checklist shall be addressed.
- Select "X" for each item that represents a nonconformity.
- Select "C" for each item on which you are commenting for other reasons.
- Select "OK" for each item you observed or verified as compliant.
- Record the item number and the nonconformity explanation and/or comment on the appropriate comment sheet.

**Note:** The numbering of the checklist items correlates to the numbering scheme in NIST Quality Manual for Measurement Services, QM-I.

### 1 Scope

The Division has listed the service id numbers, SRM numbers, and services covered by their quality system.

### 2 References

Note: all references should be informative and not normative, if not must be followed explicitly.

The Division has a reference list beyond what is found in QM-I.

### 3 Definitions

Note: The definitions within QM-I should not be reiterated here.

The Division has listed definitions beyond QM-I.

## Assessors:

- Review QM-II/QM-III and supporting documents prior to assessment date
- Visit labs where services occur
- Document comments and findings using Findings Spreadsheet

NIST QMS ASSESSMENT						Page 1 of 1	
Assessed Area: Div. 685 Flow and Air speed						Assessment date: 9-11 July 2013	
Assessed by: Michael Lewis						Response date of	
Item No.	17025 Req.	QM-I Ref.	QM-II Ref.	Observations/Findings	Corrective Actions	Non conformity	Comment
1		5.10.3		Natural Gas Flow area: "For the Director of the National Institute of Standards and Technology" needs to be included on the reports/certificates for the signature of personnel		X	
2	2	2		References are now footnoted in the text of the QM sub-level documents, include all references in addition in one place in the QM sub-level documents (either in Section 2 or an Appendix).			X
3		ed		In Gas Flow meter area, QMIV-26'3 PVT, check edit section 5.9 records seems to be a cut and paste extra or misplacement in the document.			X
4		ed		In the Liquid Flow meter QM, check for commercial product name, either add the NIST disclaimer or change to a generic description.			X
5		ed		Make naming of LabView uniform. Also see Finding #4 to see if it is applicable.			X
6		5.4.1		Natural Gas Flow: SP 250 change for typical calibration procedure Section 2.4; B. Table 2.2 and other locations of the procedure description. The current procedure has been modified from the original.		X	
7		ed		Water Calibration area: refer to marked up copy of the QM-IV for edits and comments.			X
8		ed		Natural Gas Flow: refer to marked up copy of the QM-IV for edits and comments.			X
9		5.4.1		Natural Gas Flow: Frequency of the calibrations of the reference standards is mentioned in the QM-IV as periodic and in other cases as routinely. These are vague and need to be specific.			X
10		5.5		Natural Gas Flow QM-IV section 5.5.1 reference to NIST Handbook 150 and a declaration that the requirements of HB150 are followed.			X
11		5.6		Natural Gas Flow QM-IV 5.6.2.1.2 addresses a calibration of the gas chromatograph and the use of a certified natural gas mixture. This statement in the QM-IV lends itself to needing more detail and addressing of traceability.			X

# Assessment Documentation

## NARRATIVE SUMMARY OF THE QUALITY MANAGEMENT SYSTEM ASSESSMENT FOR FLOW AND AIR SPEED NIST DIVISION 685

This report is delivered by Michael Lewis, technical assessor.

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Michael Lewis

### NOTES

- This report is property of NIST. The assessor is committed to keep due confidentiality.
- This report is issued on 11 July 2013.

### 0. INTRODUCTION

The Mutual Recognition Arrangement (MRA) of national measurement standards and of calibration and measurement certificates issued by national metrology institutes was drawn up by the International Committee of Weights and Measures (CIPM), under the authority given to it in the Metre Convention, for signature by directors of the national metrology institutes (NMIs) of Member States of the Convention. The objectives of the MRA are:

- to establish the degree of equivalence of national measurement standards maintained by NMIs;
- to provide for the mutual recognition of calibration and measurement certificates issued by NMIs;
- thereby to provide governments and other parties with a secure technical foundation for wider agreements related to international trade, commerce and regulatory affairs.

As a part of its process, quality systems and demonstrations of competence by NMIs are required.

The outcome of the process is to issue statements of the calibration and measurement capabilities (CMCs) of each NMI in a database maintained by the BIPM and publicly available on the Web.

It is also required that the Sistema Interamericano de Metrologia (SIM) as the corresponding Regional Metrology Organization, to undertake a general review of the NMI's quality management systems and its assessments at a maximum interval of five years, which is to be done through the SIM Quality System Task Force (QSTF).

Thus, NIST, as the national metrology institute in United States, has decided to undertake the later requirement including the results of this on-site assessment.

### 1. OBJECTIVE AND SCOPE OF THE ON-SITE PEER REVIEW

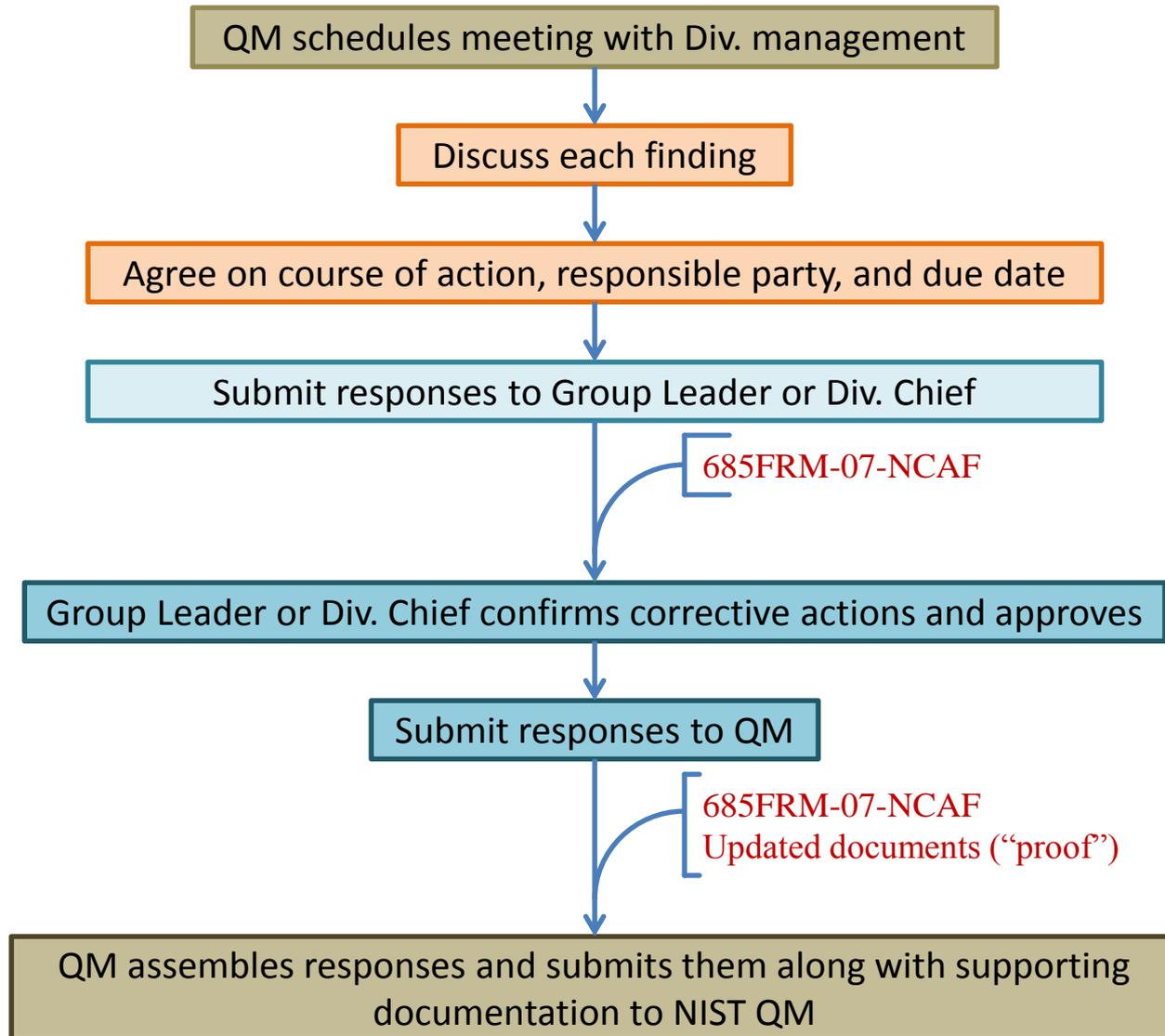
The objective of this review is to assess the implementation of the standard ISO/IEC 17025 within the calibration processes performed in NIST. This review covers the Quality Management System (QMS) underpinning the CMCs in flow and airspeed as referred in the Annex A of this report.

This on-site assessment covered the technical aspects of the services. The management system aspects of the quality system of this Division were assessed in June 2013 and August 2012.

### 2. REVIEW CRITERIA

- ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories.
- NIST QM-I along with its checklist (focusing on Section 5)

# Responses: Responsibilities and Documentation



# Responses: Responsibilities and Documentation

QM-II-685 Section 4.5.1:

*When a nonconforming situation is recognized, ...Nonconforming Work Report Form, 685FRM-07-NCAF, shall be completed by the Measurement Staff recognizing the concern. ...As required, corrective actions are taken immediately.*

Concern as stated by NIST Assessment team

Initial response and Cause analysis

Response and Corrective Action

Non-conformity and Corrective Actions Form 685FRM-07-NCAF

FY: 2013 Division Log No.: 50  
Measurement Service:  Measurement Service Log No.:   
Initiator: NIST-level Assessment Team Date Received: 7/11/2013  
Measurement Staff (MS): Jodie Pope Date Received: 7/12/2013  
Group Leader (GL): Mike Moldover Date Received: 8/13/2013  
Quality Manager (QM): Catherine Cooksey Date Received: 8/13/2013

**COMPLAINT**

Does this qualify as a complaint?  Yes  No. If Yes, complete this subsection.

Customer:  Phone Number:   
Point-of-Contact:  Email:   
Folder Number:  SRM Number:  SRD Number:

**NON-CONFORMITY**

Concern: Nonconformity finding: In the Report issued to customers, a statement about the measurement traceability and that the calibration is valid for the particular range was not present. (Finding 14, Flow-Airspeed)

Initial Response: Nonconformity needs to be addressed and corrected.

MS Initials: JGP Date: 7/12/2013 GL Initials: MM Date: 8/13/2013  
Cause Analysis: A statement regarding the measurement traceability and the validity of the calibration for the particular range is not included in the calibration report.

MS Initials: JGP Date: 7/12/2013 GL Initials: MM Date: 8/13/2013

**CORRECTIVE ACTION**

Does this non-conformity require a corrective action?  Yes  No. If Yes, complete this subsection.

Corrective Actions: SP 250 has been revised to reflect the change of procedure.

MS Initials: JGP Date: 7/12/2013 GL Initials: MM Date: 8/13/2013

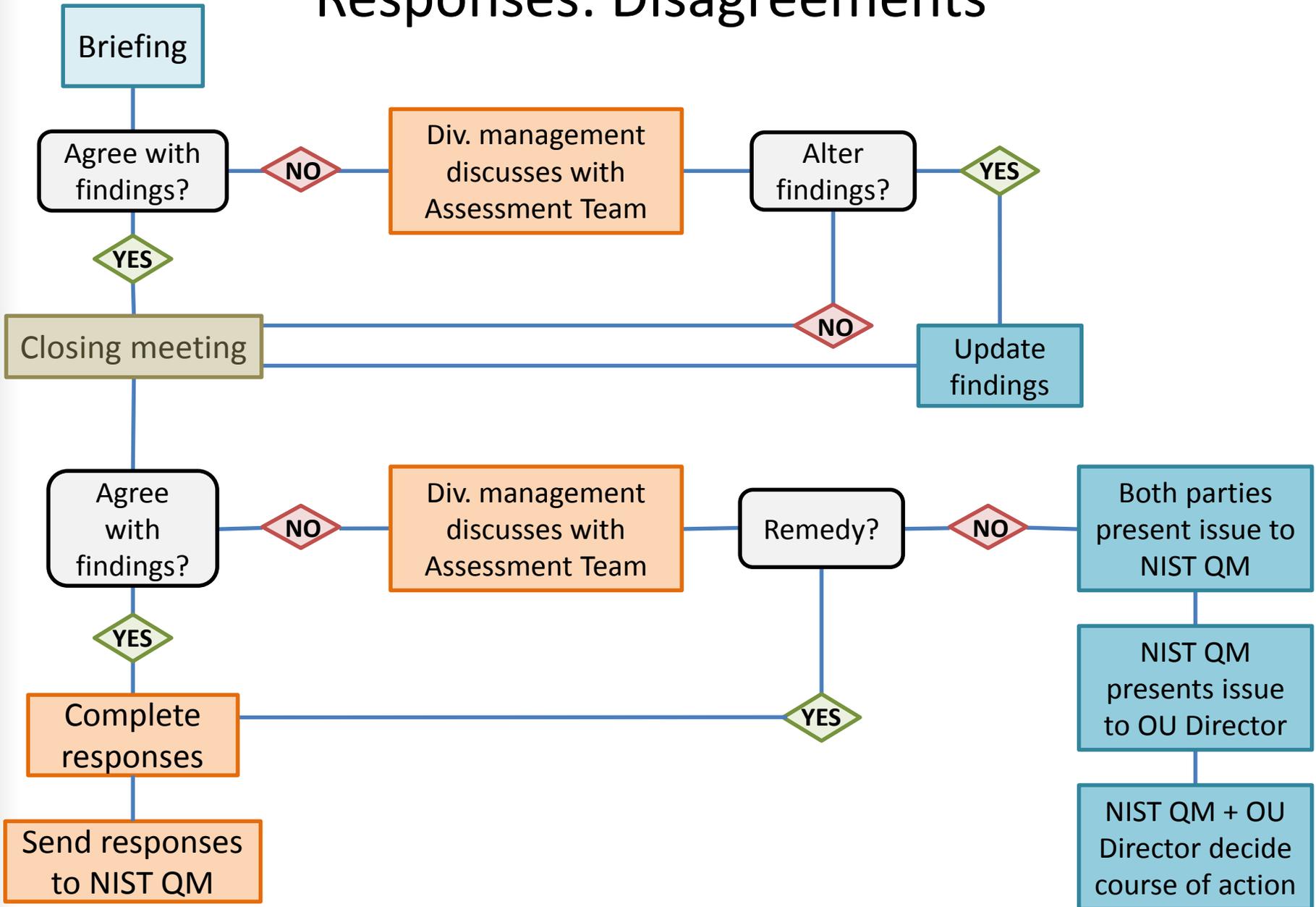
**FOR QM ONLY**

Follow-up with Customer:

QM Initials:  Date: -----

Date Closed: 8/15/2013

# Responses: Disagreements



# Time Management

