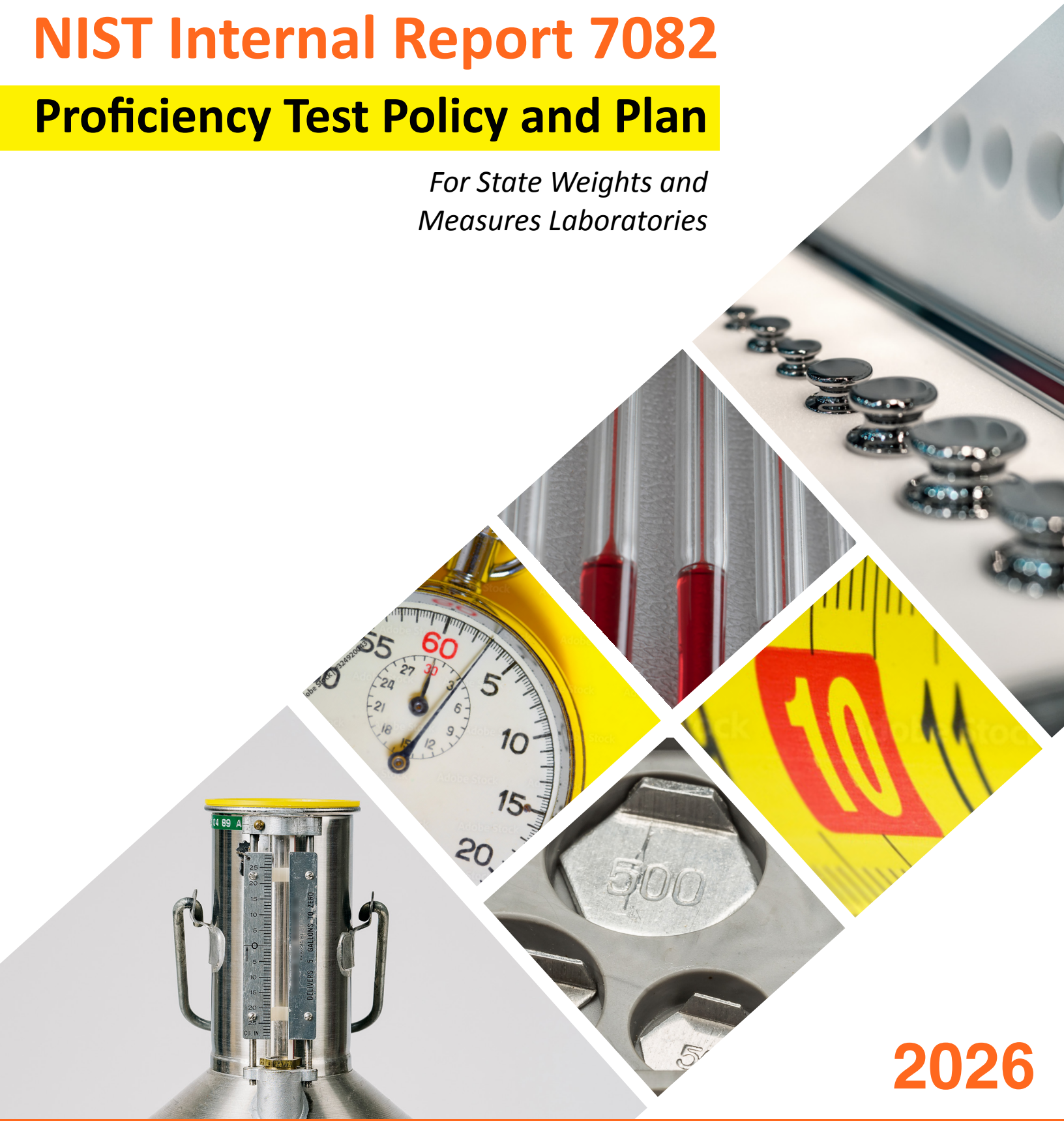
OFFICE OF
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NIST Internal Report 7082

Proficiency Test Policy and Plan

For State Weights and Measures Laboratories



2026

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NIST Internal Report (NISTIR)

NISTIR 7082

Proficiency Testing Policy and Plan

for State Weights and Measures Laboratories

Micheal M. Hicks
Elizabeth A. Koncki
Tobias Herman
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January 2026



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Publication History

Approved by the NIST Editorial Review Board on 2026-01-12.
Supersedes NISTIR 7082 (February 2018) https://doi.org/10.6028/NIST.IR.7082-2018

How to Cite this NIST Technical Series Publication

Hicks M, Koncki E, Herman T, Baucom IC, Lippa KA, (2026). NISTIR 7082 Proficiency Test Policy and Plan for State Weights and Measures Laboratories. (National Institute of Standards and Technology, Gaithersburg, MD), NIST Interagency/Internal Report (NISTIR) - NISTIR 7082-2026. https://doi.org/10.6028/NIST.IR.7082e2026

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Abstract

This publication provides the policies and plans for the Proficiency Testing (PT) Program of the National Institute of Standards and Technology (NIST) Office of Weights and Measures (OWM). This OWM Proficiency Testing policy and plan has been updated to ensure compliance with the latest applicable documentary standards and policies of the International Laboratory Accreditation Cooperation (ILAC).

The PT program has been in place since the early 1980s as a core part of the support to State weights and measures laboratories through regional measurement assurance programs. Original activities were conducted as "round robin" tests in support of ongoing measurement assurance activities related to support for state laws with requirements for metrological traceability to national and international standards.

The 2026 edition was updated based on feedback from users and included review and associated updates based on the latest applicable policies of the ILAC, NIST Handbook 143, Recognition Program (2023), NIST Handbook 150, National Voluntary Laboratory Accreditation Program (NVLAP) Procedures and General Requirements (2020), and the latest available documentary standards for proficiency testing, including ISO/IEC 17043:2023, Conformity Assessment — General requirements for the competence of proficiency testing providers, and ISO 13528:2022, Third Edition, 2022-08, Statistical methods for use in proficiency testing by interlaboratory comparison.

Keywords

Accreditation, calibration, interlaboratory comparison, proficiency testing, recognition, training, metrological traceability.

Acknowledgments

The following individuals served a key role in the review of this publication:

- Georgia L Harris, formerly of the NIST Office of Weights and Measures
- Wilson Ombati Nyangau, International Associate, NIST Office of Weights and Measures
- Michael Stocker, NIST Office of Weights and Measures
- Robert Knake, Chief, NIST National Voluntary Laboratory Accreditation Program (NVLAP)
- Sally Bruce, Manager, NIST Quality Management System
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1. Introduction

1.1. Background

This document is designed to assist state weights and measures laboratories and Regional Measurement Assurance Program (RMAP) participants in identifying the minimum level of proficiency testing needed on an ongoing basis to comply with international expectations to minimize risk. This publication is an integral component of the National Institute of Standards and Technology (NIST) Office of Weights and Measures (OWM) PT Program Quality Management System (QMS). It is paired and used in conjunction with the NISTIR 7214, Office of Weights and Measures Quality Manual for Proficiency Testing and Interlaboratory Comparisons. Standard Administrative Procedures and forms referenced in this document are integrated in NISTIR 7214.

NIST Handbook 143, NIST OWM Recognition requires participating labs to adhere to this document to receive recognition. In addition to state weights and measures laboratories, the OWM PT program includes participation by the U.S. Department of Agriculture (USDA)/Grain Inspection, Packers, and Stockyards Administration (GIPSA)/Master Track Scale; Los Angeles County Weights and Measures; the District of Columbia; the U.S. territories of Puerto Rico; the U.S. Virgin Islands, as described in NIST Handbook 143, and industry laboratories regularly involved in RMAP activities. In realizing compliance with this policy, some of the proficiency tests will be conducted through the RMAP regional groups and others will be coordinated on a national basis.

The terms Interlaboratory Comparison (ILC) and Proficiency Testing (PT) are often used interchangeably. However, PTs are a subset of ILCs that may be used for other purposes. Hereafter in this document, the term PT will be used to refer to all proficiency tests and ILCs for simplicity, recognizing that some ILCs are not designed to be PTs. This policy and plan address these different coordination needs. The OWM PT program serves purposes beyond demonstrating proficiency for recognition and accreditation activities. PT involves the use of interlaboratory comparisons for the determination of laboratory performance for:

a) evaluating and monitoring measurement scope capabilities;

b) identifying risks/problems and initiating corrective actions;

c) establishing the effectiveness and comparability of measurement methods;

d) evaluating method performance characteristics;

e) providing additional confidence to laboratory customers;

f) identifying differences among peer laboratories;

g) educating participating laboratories based on comparison outcomes;

h) validating uncertainty claims;

i) evaluating a reference value; and

j) providing additional confidence in conformance statements.

While OWM does not operate a formal accreditation program, OWM is responsible for implementing a weights and measures laboratory recognition program according to NIST Handbook 143, Program Handbook. OWM issues Certificates of Metrological Traceability that detail defined measurement scopes to support legal metrology measurements that underpin U.S. trade and commerce. This policy and plan document is consistent with international policies set forth by the International Laboratory Accreditation Cooperation (ILAC) as of 2026. It also supplements the PT requirements in NIST Handbook 143 and ISO/IEC 17025.

As part of the State Laboratory Recognition Program (NIST Handbook 143), OWM is responsible for training and conducting PTs through the RMAPs. RMAP groups are independently operated and are not operated by NIST. NIST provides training and PT participation opportunities through the annual RMAP meetings as a payment in kind requirement of NIST Handbook 143 for laboratory Recognition. RMAP member States generally host the annual training events. Weights and Measures Associations (Southern, Northeast, Central, Western) co-host the RMAP training events by assisting with registration, collecting registration fees, and managing contracts with hotels and training sites.

The RMAPs are composed of six regions. Metrologists from state weights and measures laboratories within the six regions are required to attend annual training and participate in scheduling a PT in planned measurement areas aligned with their OWM recognition measurement scope. At the meeting of each RMAP, each participant laboratory has its own PT participation plan based on its laboratory's scope to prove proficiency in each area of testing performed. Most PT plans are organized and planned to cover proficiency in every area of calibration based on the lab's scope within a four-year period. State weights and measures laboratories may also seek accreditation from accreditation bodies that are signatories to the ILAC Mutual Recognition Arrangement (MRA). The RMAP PT four-year plan and results may be used to meet both recognition and accreditation requirements.

The six regions are:

1) Northeastern Measurement Assurance Program (NEMAP);

2) Southeastern Measurement Assurance Program (SEMAP);

3) Southwestern Assurance Program (SWAP);

4) Mid-America Measurement Assurance Program (MidMAP);

5) Western Regional Assurance Program (WRAP); and

6) Caribbean Measurement Assurance Program (CaMAP).

All OWM proficiency tests are planned, coordinated, and analyzed by an administrative team consisting of PT coordinators, PT analysts, and NIST OWM point of contact. All members of the administrative team are required to be technical experts and members of the RMAP groups. The

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ongoing operation of PTs in the RMAPs is managed according to a regional schedule. All OWM PTs are managed and operated by NIST OWM and final, amended, and addendum reports are reviewed, produced, and signed by NIST OWM.

OWM policies and procedures are aligned with the most recent ILAC documents and ensure that formal PT planning and follow-up continue to be implemented.

In this document, the following verbal forms are used:

- "Shall" indicates a requirement;
- "Should" indicates a recommendation;
- "May" indicates a permission; and
- "Can" indicates a possibility or a capability.

1.2. Definitions

For the purpose of this document, terms and definitions from the International Vocabulary of Metrology (VIM, 2012) are included below in addition to those associated with the OWM PT Program.

a) **Accreditation:** A formal process of determining the technical competence of a laboratory to carry out specific types of testing, measurement, and calibration. It provides formal acknowledgement that the laboratory is competent, impartial, and independent. Regular evaluation occurs to ensure continued conformance with requirements and to check that standards of operation are being maintained.

b) **Calibration:** Operation that, under specified conditions, in a first step, establishes a relation between the quantity values with measurement uncertainties provided by measurement standards and corresponding indications with associated measurement uncertainties and, in a second step, uses this information to establish a relation for obtaining a measurement result from an indication (VIM, 2012).

c) **Certificate of Metrological Traceability:** Document issued by OWM to a participating State weights and measures laboratory that has been granted recognition according to NIST Handbook 143 requirements and is always issued with a Measurement Scope.

d) **Confidentiality:** Property that information is not made available or disclosed to unauthorized individuals, entities, or processes. OWM PTs are not confidential, but PT data and PT reports have usage restrictions. PT reports are available through the Freedom of Information Act.

e) **Corrective Action:** An action taken to eliminate the causes of an existing nonconformity or other undesirable situation to prevent recurrence.

f) **Impartiality**: presence of objectivity.

- Note 1: Objectivity means that conflicts of interest do not exist or are resolved so as not to adversely influence subsequent activities of the laboratory.

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- Note 2: Other terms that are useful in conveying the element of impartiality include "freedom from conflict of interests", "freedom from bias", "lack of prejudice", "neutrality", "fairness", "open-mindedness", "evenhandedness", "detachment", "balance".

g) **Interlaboratory Comparison**: The organization, performance and evaluation of measurements or tests on the same or similar items by two or more laboratories or inspection bodies accordance with predetermined conditions.

h) **Intralaboratory Comparison**: The organization, performance, and evaluation of measurements or tests on the same or similar items within the same laboratory in accordance with predetermined schedule

i) **Laboratory:** An organization that performs tests, calibrations, and/or sampling associated with subsequent testing or calibration. When a laboratory is part of an organization that carries out activities in addition to calibration and testing, the term "laboratory" refers only to those parts of that organization that are involved in the calibration and testing process. A laboratory's activities may be carried out at a permanent, temporary, or remote location. A laboratory may be further defined as being a physical entity that is a testing or calibration facility that is separate and apart physically from any other laboratory whether sharing common ownership, management, or management systems with any other laboratory.

j) **Measurement Procedure:** A detailed description of a measurement according to one or more measurement principles and to a given measurement method, based on a measurement model, and including any calculations used to obtain a measurement result (VIM, 2012).

k) **Measurement Scope:** A range of approved measurements issued by OWM to a participating State legal metrology laboratory that has been granted OWM recognition. The measurement scope is found on the Certificate of Metrological Traceability and details calibration services for which the laboratory is recognized.

l) **Metrological Traceability**: The Property of a measurement result whereby the result can be related to a reference through a documented unbroken chain of calibrations, each contributing to the measurement uncertainty (VIM, 2012).

m) **Participant:** Laboratory, organization, or individual metrologist that undertakes activities related to proficiency testing and submits the measurement results for performance evaluation by the proficiency testing provider (NIST OWM).

n) **Proficiency Testing:** The determination of the calibration or testing performance of a laboratory or the testing performance of an inspection body against pre-established criteria by means of interlaboratory comparison.

o) **PT round:** Single complete sequence of proficiency testing, including the evaluation and reporting of the performance of participants.

p) **PT scheme:** Proficiency testing designed and operated in one or more proficiency testing rounds for a specified area of measurement, testing, calibration, examination, sampling or inspection.

q) **PT item:** Sample, product, artefact, reference material, piece of equipment, measurement standard, object, image, data set, or other information used for proficiency testing.

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r) **PT administrative team**: A collection of NIST OWM Laboratory Metrology Program staff and selected qualified technical experts, such as from NIST or RMAP groups that serve as PT regional coordinators, PT coordinators, and PT analysts engaged in the planning and/or evaluation of a PT in the OWM PT program. NIST OWM provides the final review and approval of PT decisions and results

s) **PT analyst:** Assigned person who is responsible for handling data-related activities for the PT, including initial review, data entry in analysis tools, initial assessments and selection of reference values, and providing recommendations to OWM regarding final evaluation and assessment.

t) **PT coordinator:** Assigned person who is responsible for implementation of the PT, including preparation and submission of the PT plan for participant review and OWM approvals, managing the flow and oversight of the schedule, shipping, intervening on problems that arise with the PT and ensuring completion of the PT in a timely manner.

u) **OWM Recognition Program:** A NIST OWM Program that provides guidance, technical support, training, assistance, and recognition (see NIST Handbook 143) to state legal metrology laboratory programs to ensure traceability to the International System of units.

1.3. Abbreviations and Acronyms

Table 1. Abbreviations and Acronyms Used in this Publication.

Abbreviation or Acronym	Description
IACET	International Association for Continuing Education and Training
IEC	International Electrotechnical Commission
ILAC	International Laboratory Accreditation Cooperation
ILC	Interlaboratory Comparison
ISO	International Organization for Standardization
LAP	Laboratory Auditing Program
MRA	Mutual Recognition Arrangement
NIST	National Institute of Standards and Technology
NISTIR	NIST Internal Report
NVLAP	National Voluntary Laboratory Accreditation Program
OWM	Office of Weights and Measures
PT	Proficiency Testing
PTG	Proficiency Testing Guide
RMAP	Regional Measurement Assurance Program
SAP	Standard Administrative Procedure

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1.4. Normative References

The following documents or contents therein are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced documents (including any amendments) applies.

- ISO/IEC Guide 98-1:2024, Evaluation of Measurement Data – Guide to the Expression of Uncertainty in Measurement (GUM).
- ISO/IEC Guide 99:2007, International Vocabulary of Metrology – Basic and General Concepts and Associated Terms (VIM), 3rd edition, 2008 version with minor corrections (Confirmed 2015), (also known as JCGM 200:2012).
- ISO/IEC 17011:2017, Conformity Assessment – Requirements for Accreditation Bodies Accrediting Conformity Assessment Bodies.
- ISO/IEC 17025:2017, General Requirements for the Competence of Testing and Calibration Laboratories.
- ISO/IEC 17043:2023, Conformity Assessment – General Requirements for Proficiency Testing.
- ISO 13528:2022, Third edition, Statistical Methods for use in Proficiency Testing by Interlaboratory Comparison.
- ILAC P9: 2024, ILAC Policy for Participation in Proficiency Testing and/or Interlaboratory comparisons other than Proficiency Testing.
- ILAC P10: 2020, ILAC Policy on Metrological Traceability of Measurement Results.
- ILAC-P14: 2020, ILAC Policy for Uncertainty in Calibration.
- NIST Handbook 143:2023, NIST Office of Weights and Measures (OWM) Recognition, 7th Edition.
- NIST Handbook 150:2020, NVLAP Procedures and General Requirements.
- NIST Handbook 150-2:2024, NVLAP Calibration Laboratories.
- NISTIR 7214:2026, Office of Weights and Measures, Quality Manual for Proficiency Testing and Interlaboratory Comparisons

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2. Program Scope

2.1. Purpose and Description

The OWM PT program is primarily administered to support the metrological traceability legal requirements of the U.S. states and territories that operate through the Regional Measurement Assurance Program (RMAP). Participation in all OWM proficiency tests is limited to state weights and measures laboratories and some non-state weights and measures laboratories, where personnel have demonstrated adequate on-the-job training and successful completion of applicable OWM training seminars. State metrology staff are automatically eligible to participate in planned OWM PT program activities if suitable training has been completed or if participation is approved by OWM.

Non-state weights and measures laboratory participants who are associate members of the RMAPs are eligible to participate in the OWM PT program only when personnel have successfully completed training requirements, according to NIST Handbook 143 (at suitable and NIST OWM approved levels), participated in annual RMAP training on an ongoing basis, and/or are approved for participation by OWM with NISTIR 7214 Form PTF-03.

OWM personnel are responsible for evaluating PT program participants, including the approval or denial of participation before a PT commences. The OWM PT program is not available to support unsolicited requests or contracts for services outside of the RMAP groups.

2.2. Measurement Parameters

NIST Handbook 143 defines measurement echelons, including measurement parameters, uncertainties, and methods. At a minimum, on average, laboratories are required to have objective evidence of ‘favorable/successful’ proficiency testing results for each discipline in their scope of accreditation/recognition where PTs are available within a four-year cycle. Successful PT completion in one measurement area, range, or parameter does not necessarily indicate that a laboratory will be successful in other areas. PT requirements shall be met for all measurement parameters where a laboratory staff member serves as an approved signatory because each scope area is based on a unique system of resources, including facilities, standards, and equipment.

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Table 2. PT Parameters, Schedules, and OWM PT Program Scope

Measurement Parameter	Typical Calibration Standard	Typical Recognition Scope Range	Typical PT Range and Sets	Minimum Required Participation Cycle (Alternating Units)	Recommended Participation by Parameter
Mass Echelon I	Mass Standard	30 kg to 1 mg 50 lb to 0.001 lb 8 oz to 0.031 25 oz	50 lb, 20 kg, 10 kg, 5 kg, 2 kg	4 year	2 year
			1 kg to 1 mg 1 lb to 0.001 lb	4 year	
Mass Echelon II	Mass Standard	1 200 kg to 1 mg 2 500 lb to 0.001 lb 8 oz to 0.015 625 oz	1 000 lb, 500 lb	6 year	2 year
			50 lb, 20 kg, 10 kg, 5 kg, 2 kg	4 year	
			1 kg to 1 mg 1 lb to 0.001 lb	4 year	
Mass Echelon III	Mass Standard	2 500 kg to 1 mg 2 500 lb to 0.001 lb 8 oz to 0.015 625 oz	1 000 lb, 500 lb	6 year	2 year
			50 lb, 25 kg, 25 lb, 10 kg	4 year	
			5 kg to 100 mg 1 kg to 1 mg 10 lb to 0.001 lb	2 year	
Volume Echelon I (Gravimetric)	Prover	500 L to 100 mL 100 gal to 1 gill	100 gal	6 year	2 year
	Slicker		5 gal, 10 gal, 15 gal	4 year	
	Glassware		1 L to 100 mL 1 gal to 1 gill	4 year	
Volume Echelon II (Volume Transfer)	Test Measure or Prover	5 000 L to 100 mL 2 000 gal to 1 gal	100 gal	6 year	2 year
			10 gal to 50 gal	4 year	
	Prover		5 gal, 1 gal	2 year	
Length	Tape	Up to 30 m Up to 200 ft	100 ft	4 year	2 year
	Rule	Up to 1 m Up to 24 in	18 in	4 year	
Temperature Accuracy Class I, Class II, Class III, and Class IV	Liquid-In-Glass Thermometers, RTD's, SPRT's, Thermistors, and Thermocouples	230 °C to -30 °C 450 °F to -25 °F	100 °C to 0 °C	4 year	4 year
Frequency	Tuning Fork	10 kHz to 1 kHz	7 000 Hz to 1 000 Hz	4 year	4 year
Time	Stopwatch	≤ 24 h	3 h	4 year	4 year

NOTE: Mass Echelon I, II, and III correspond to details published in NIST Handbook 143 and are directly related to OIML R111 classes of weights: Echelon I equals E_1 and E_2; Echelon II equals F_1 and F_2; and Echelon III equals M_1, M_2, M_3, etc. The ASTM E617 classes correspond to those of OIML R111. NIST Handbook 105-1 (1990), Class F weights correspond to Echelon III. Volume Echelon I is related to gravimetric volume calibration measurement procedures. Echelon II is related to volume transfer test methods. Temperature accuracy classes are related to guidance published in NVLAP 150-2 Annexes.

Six-year exceptions are provided for large trailer-mounted provers and mass standards due to cost and logistics.

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3. Requirements

It is NIST OWM policy to comply with ILAC policies and ISO/IEC 17043 when operating the PT program. OWM does not claim conformance with ISO/IEC 17011 and is not an accreditation body under the ILAC Mutual Recognition Arrangement (ILAC MRA). Its Recognition Program (NIST Handbook 143) for state weights and measures laboratories ensures metrological traceability to the International System of Units (SI) and the implementation of uniform international measurement practices. NIST Handbook 143 is based on ISO/IEC 17025 and requires participation in a measurement assurance program and ongoing proficiency testing. This policy and plan document is designed to ensure state weights and measures laboratories demonstrate competence and proficiency in respective measurement areas of interest and conform with NIST Handbook 143 and ILAC P9, *ILAC Policy for Proficiency Testing and/or Interlaboratory Comparisons other than Proficiency Testing*.

4. Policies

4.1. Policy for PT Program Operations

The NIST OWM offers International Association for Continuing Education and Training (IACET) accredited training seminars in the fundamentals of metrology, mass, volume, and advanced mass metrology areas to state weights and measures laboratories, and industry participants. To participate in mass and volume metrology PTs, the successful completion of the respective training seminar is required. The completion of the Fundamentals of Metrology seminar at a minimum is required for other disciplines not covered in NIST OWM training (e.g., time, frequency, temperature), along with records of expertise in the PT discipline requested via NISTIR 7214 Form PTF-02, *PT Participation Request – Training/Qualification Form*. OWM may allow staff without the necessary NIST or equivalent training to participate, with the provision of oversight by qualified personnel and objective evidence of on-the-job training. OWM also uses the PT results to evaluate the application of training concepts in participant state weights and measures laboratories through the Laboratory Auditing Program (LAP) problems defined in NIST Handbook 143. The LAP problems integrate proficiency tests and serve as special internal technical audits of participant technical competency.

Participants must be identified and approved for participation by OWM in the PT Plan during the planning stages prior to its commencement for each PT. Laboratory staff shall demonstrate proficiency in each measurement area identified on the laboratory scope according to Table 2. Failure to participate in available PTs and satisfy Table 2 minimum period of participation requirements shall negatively impact approved signatory and recognition status, measurement parameters may be removed from the laboratory's recognition scope until applicable proficiency tests are completed. NIST Handbook 143 requires the use of proficiency testing and interlaboratory comparisons as a mechanism to ensure measurement result quality and validate calibration methods consistent with requirements in ISO/IEC 17025 and to objectively validate laboratory measurement capability.

Laboratories shall report actual measurement uncertainties on calibration certificates for all proficiency tests consistent with ISO/IEC Guide 98-1 (GUM) and ILAC P14.

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Laboratories shall maintain records of PT participation, conduct follow-up evaluations, and demonstrate corrective action effectiveness when PT failures occur. Pass/fail criteria are determined and documented during the planning phase of each PT and communicated to participants.

Feedback, inquiries, or complaints regarding any aspect of the OWM PT program may be submitted by completing NISTIR 7214 Form PTF-01 (*Feedback, Inquiry, and Complaint Form*). Appeals regarding OWM decisions (outside of performance evaluations) must be submitted in writing on the laboratory's official organizational letterhead. General feedback may be submitted to OWM at any time and is solicited as a part of each PT Report. OWM acknowledges receipt of input and manages communications following the OWM PT program NISTIR 7214 SAP 02, *Standard Administrative Procedure for Handling Action Items*.

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4.2. Participation Policy

Any laboratory organization that would like its metrology personnel to participate in a PT activity within the scope of the OWM PT program must agree to operate in accordance with these policies and conditions for participation.

a. The participating organization shall annually attend RMAP meetings and participate in PT/ILC planning discussions.

b. Metrologists and their participating organizations shall be technically qualified for the measurement parameter of interest based on recognition or accreditation to ISO/IEC 17025 (or compliance as approved by OWM). State weights and measures staff shall comply with NIST Handbook 143 training requirements or receive exceptions from OWM during PT planning phase with NISTIR 7214 Form PTF-02. Industry laboratory staff must complete available OWM seminars where applicable and/or document additional training for staff members by using NISTIR 7214 Form PTF-02 and agree to NISTIR 7214 Form PTF-03.

c. Each participating organization and metrologist shall follow all PT plan details and instructions, including the use of designated procedures where specified, or a laboratory procedure must be submitted and approved by OWM during the PT planning phase.

d. All OWM proficiency test reports are considered open to public review, with names of organizations and participants listed. Participants must waive confidentiality as a condition of participating in OWM proficiency tests. Anonymity is not implied or guaranteed. However, there are restrictions on the appropriate sharing and use of PT reports.

e. PT participants shall not use any PT report for any purpose other than internal measurement assurance, staff technical competency (LAP problems) or accreditation/recognition activities. The use of OWM proficiency tests in sales, marketing, publication/presentation, or sharing or advertising of the results of any participating laboratory is strictly prohibited.

f. A PT participant shall not falsify any measurement results or other information submitted to OWM. Otherwise, the laboratory's submitted measurement results will be voided.

g. Each PT participant shall keep details regarding the activity in confidence. Seeking to obtain measurement information for artifacts prior to participation in the proficiency test (collusion) is prohibited. Participants shall share data only with the PT analyst or OWM personnel. Sharing any artifact reference information or measurement results between participants is prohibited.

   Exception: PT analyst or OWM may communicate draft normalized error (E_n) and normalized precision (P_n) values or significant error/bias to individual laboratories. This exception enables immediate investigation, corrective action, and retesting (if needed) by the participant before the artifact is transferred to the next scheduled organization. This allows the participant to submit a second set of amended measurement results to be included in the PT final report along with the initial measurement results. In compliance with ISO/IEC 17025, the participant shall state what was done differently to obtain the new set of amended results.

h. The form for *RMAP Associate Membership Application PTF-03*, is available for new organizations that have not previously been RMAP members. Any non-state weights and measures laboratory seeking to participate in the RMAP proficiency tests must be approved by state members for associate membership within the RMAP. Potential RMAP members must be sponsored by the state in or near which the organization resides. Applicants must agree to annual RMAP participation and compliance with policies as stated in this document. [See NISTIR 7214 *Forms PTF-02 and PTF-03, RMAP Associate Membership Application Form*]

OWM reserves the right to refuse participation to any laboratory or participant if the laboratory or participant has violated any of its documented quality policies, including but not limited to the following:

a. failing to meet training and/or qualification requirements;

b. collusion to obtain advanced information about expected measurement results and falsification of reported results;

c. failing to follow procedures for artifact care and handling;

d. repeated schedule delays;

e. failure to attend an RMAP scheduled meeting; or

f. other technical issues that could adversely affect the results for the other PT participants.

When OWM identifies a policy or technical violation that negatively impacts any PT activity, each participating organization and associated participants shall be notified in writing. In some cases, technical guidance may be provided to ensure that the laboratory has an opportunity for corrective action following the NISTIR 7214 Standard Administrative Procedure 05, *Handling Collusion, Falsification, or Participant Operational Failures*.

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4.3. Recognition Requirements

A participant laboratory seeking initial OWM recognition (NIST Handbook 143), reinstating lapsed recognition, or maintaining ongoing recognition shall participate in the OWM PT program and comply with the policies of this document. Laboratories initiating recognition must complete at least one approved PT aligned with each major parameter within the requested measurement scope before a Certificate of Measurement Traceability is granted, as practical and available. Laboratories seeking ongoing recognition shall participate in at least one PT for each measurement area included in the laboratory's scope of recognition during a four-year period. Section 5 (PT Participation Plan) details these requirements.

Each laboratory shall develop a PT participation plan that is coordinated with the appropriate RMAP region. The laboratory PT participation plan shall be consistent with the minimum PT program participation guidelines in Table 2. An example PT participation plan is available within this document (Table 3). The laboratory shall annually review the PT participation plan and consider any operational changes, such as facility, personnel, equipment, standards, methods, measurement scope, or other factors.

Unique measurement parameters, artifacts, or methods may require special PT considerations. If a suitable PT is unavailable, OWM may consider and coordinate an alternative approach. All PTs require completing a formal PT Plan (NISTIR 7214 *PT Plan Template*, PTT-01) and shall be approved by OWM before commencing.

4.4. Laboratory and Individual Staff Competence Status

Laboratory recognition is contingent on successful PT participation. Each metrologist who has successfully performed within an OWM PT has demonstrated competence for that parameter. The laboratory organization must maintain at least one competent metrologist (Approved Signatory; see NIST Handbook 143) per measurement parameter within the recognized scope to achieve and retain recognition. Multiple approved signatories within a measurement parameter are permitted and encouraged. Metrologists who do not successfully demonstrate competence through an OWM PT or who have demonstrated successive failures shall not be granted Approved Signatory status for the laboratory unless appropriate corrective actions are implemented and demonstrated.

Laboratory management shall ensure that each staff member is approved to perform calibrations within the recognized measurement scope and is involved in each proficiency test, as possible, when the artifact(s) arrives at the facility. This is an essential element of effective succession planning. Approval for any PT participant who does not have an Approved Signatory status or NIST training should be based on qualifications of the laboratory and records of on-the-job training. Such staff must operate under the supervision of a qualified metrologist. Failing to comply with this requirement may impact the laboratory recognition status. Each person intending to participate in a PT must be explicitly named in the PT Plan document, be identified in the laboratory PT Follow Up forms, and be identified in the four-year laboratory analyses.

PT performance is not independent of laboratory processes. Each PT participant is evaluated in conjunction with the laboratory operational system (e.g., facility, equipment, standards, methods).

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5. PT Participation Plan

The information presented below provides guidance for planning PT activities to meet the OWM PT program policy requirements. The level of organization and frequency of proficiency tests provided in this document is based on the following considerations and guiding principles.

a. **PT four year plan and schedule.** Each Region (RMAP) shall develop a PT four year plan and schedule and update them at least annually so that PTs can be organized on a regional and/or national level. NIST OWM participates in all planning discussions and evaluates each specific plan for compliance to program policies before authorizing the initiation of the activity. State laboratories are required to ensure that their laboratory scope is covered in the RMAP plan or seek additional PT opportunities. NIST OWM may develop and update a PT plan for programs that require national coordination.

b. **Review PT Participation Plans.** Each RMAP region shall annually review PT Participation Plans to determine if the "frequency" is appropriate and adequate. A maximum number of PTs will be coordinated each year, balancing between the full parameters/scopes of the laboratories and a reasonable PT workload. Coordination between RMAP regions is also acceptable to allow a new metrologist to participate in a PT within another region without having to wait an extended time period for the PT to be conducted in their region. Out-of-region participation requests shall be documented within individual PT plans and approved by OWM before the activity is initiated.

c. **Regional and National PTs.** The number of laboratories with the measurement capabilities for the specific metrology parameter affects whether a PT is conducted regionally or nationally. For common measurement parameters, multiple PTs in the same measurement parameter shall simultaneously be organized within the RMAPs to enable laboratories and metrologists to participate. For less common measurements, OWM will coordinate a PT on a national basis in order to have an appropriate number of participants that meet the PT requirements for the scope parameter.

d. **Measurement Parameters.** Preference is given to measurement parameters with the largest workloads within the State laboratories. The number of measurements made within a specific measurement parameter is considered. For example, mass calibrations make up nearly 90 % of the State Laboratory Program workload (see NCSLI's 2024 State Laboratory Program Workload Survey) and length calibration accounts for about 1 %. Therefore, more PTs are required in mass than length. The historic stability of the standards used and tested within a specific metrology area shall be considered. Length standards in use within a laboratory have been shown to be more stable than mass standards. For this reason, fewer length PTs are required to provide adequate demonstration of measurement competency.

e. **Cost and Logistics.** The long-range PT participation plan for participant laboratories, RMAPs, and OWM shall include plans to develop proficiency tests for each measurement parameter as it is economically and logistically feasible. The cost and logistics of the PT will be considered in selecting artifacts and in scheduling shipping. For example, large volume (e.g., 100 gal) or large mass (e.g., 500 lb)

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proficiency tests that require the movement of a trailer-mounted artifact through RMAP regions are coordinated and overseen by NIST with assistance from regional PT Coordinators. The frequency of this type of PT is also limited by cost of the standard because it is impractical to purchase multiple standards and by the length of time necessary to circulate the standard to all laboratories within each region. In contrast, smaller artifacts are easily shipped at a modest cost. Thus, the period between PTs for a large volume 100 gallon prover may be on a longer schedule (e.g., 5 years or 6 years), whereas a small volume 5 gallon test measure may be on a more frequent (e.g., 1 year or 2 years) schedule. When conducting PTs with large calibration items (such as provers for liquefied petroleum gas (LPG), weight carts, or railroad test cars) is not considered feasible; these items are not required to be part of the PT plan. However, demonstration of competency for such items is required during training and/or onsite assessments.

f. **Minimum requirements.** Each State laboratory shall participate in one PT per major sub-area of their accredited and/or recognized scope at least every four years (and in each scheduled PT within their RMAP region when available). It is recommended that organizations participate in PT activities for each specific measurement parameter and calibration method that the laboratory employs as a part of the ongoing measurement assurance program. Failure to participate in an available PT shall negatively impact accreditation/recognition with potential removal of measurement capabilities from a laboratory scope.

   Each laboratory shall ensure its participation in the RMAP PT planning during each four year cycle.

g. **Range.** The specific ranges selected within each measurement parameter will be considered and should vary for each PT. For example, the range of 20 kg to 2 kg may be selected one year and the range 1 kg to 1 mg may be selected in another. Single weights and/or sets may also be considered.

h. **Special PTs.** Non-typical types of PT or Interlaboratory Comparison activities include the evaluation of:calibration of masses with unique densities or surface finishes;

   - calibration of mass standard density or magnetism;
   - tests of environmental equipment used in buoyancy corrections (temperature, pressure, relative humidity);
   - key comparisons;
   - tests for new designs of field standards used in weights and measures;
   - tests for evaluation of environmental effects on calibration values and uncertainties;
   - tests for comparison of measurement procedures; and,
   - tests for evaluation and verification of measurement traceability.

6. PT resources. The OWM PT quality system procedures, forms, and tools are used to implement PT activities, including planning and reporting (see NISTIR 7214, *Office of Weights and Measures Quality Manual for Proficiency Testing and Interlaboratory Comparisons*). PT follow-up tools include forms to help the laboratory document a successful PT as well as analyze and implement appropriate corrective action when unsuccessful PT results occur. The PT guide for PT Follow-up (NISTIR 7214 PTG-02) can help guide laboratories in conducting measurement assurance assessments using the results of proficiency tests. The PT *Follow up Form* (PTF-10) (included in the PTG-02) shall be submitted to OWM by State laboratories as a part of annual recognition reviews.

The sample matrix shown in Table 3 illustrates an example of how a laboratory can document both a four year minimum plan (10 year period for this example) and a proficiency testing strategy that will ensure each parameter within the accredited/recognized measurement scope is evaluated according to the requirements of this policy

Table 3. Example PT Participation Plan

Parameter	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Mass Echelon I	1 kg to 1 mg 4 yr	500 lb 6 yr	20 kg to 2 kg 4 yr		1 kg to 1 mg 4 yr		20 kg to 2 kg 4 yr	500 lb 6 yr	1 kg to 1 mg 4 yr	
Mass Echelon II	20 kg to 2 kg 4 yr	500 lb 6 yr	1 kg to 1 mg 4 yr		20 kg to 2 kg 4 yr	1 lb to 0.001 lb 4 yr		500 lb 6 yr	20 kg to 2 kg 4 yr	1 kg to 1 mg 4 yr
Mass Echelon III	50 lb to 10 kg 4 yr	500 lb 6 yr	10 lb to 0.001 lb 2 yr	50 lb to 10 kg 4 yr	1 kg to 1 mg 2 yr	50 lb to 10 kg 4 yr	10 lb to 0.001 lb 2 yr	500 lb 6 yr	1 kg to 1 mg 2 yr	50 lb to 10 kg 4 yr
Volume Echelon I	5 gal slicker 4 yr	1 qt to 1 gi glass 4 yr	100 gal prover 6 yr		5 gal slicker 4 yr	1 L to 100 mL glass 4 yr		5 gal slicker 4 yr	100 gal prover 6 yr	1 qt to 1 gi glass 4 yr
Volume Echelon II	25 gal to 10 gal prover 4 yr	5 gal test measure 2 yr	100 gal prover 6 yr	5 gal test measure 2 yr	25 gal to 10 gal prover 4 yr	5 gal test measure 2 yr	25 gal to 10 gal prover 4 yr	5 gal test measure 2 yr	100 gal prover 6 yr	5 gal test measure 2 yr
Length		18 in ruler 4 yr		100 ft tape 4 yr		18 in ruler 4 yr		100 ft tape 4 yr		18 in ruler 4 yr
Temperature All Echelons			thermo-meter 4 yr				thermo-meter 4 yr			
Frequency	tuning fork 4 yr				tuning fork 4 yr				tuning fork 4 yr	
Time		stop-watch 4 yr				stop-watch 4 yr				stop-watch 4 yr

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