Fundamentals and LAP Problem Preparation Course

Future Roadmap: “Getting Staff Ready for NIST Seminars”

Series of Self-Study Assignments, Mentoring and On-the-Job Training, Webinars, and Homework Assignments (Blended Learning)
Session Learning Objectives

• IDENTIFY AND DESCRIBE:
  • Expectations for students and mentors for “interim course”
  • New resources (website, forms, and training materials) for On-the-Job Training (OJT) and Mentoring
    • Form for documenting OJT
    • Marked up SOP with Comments – approach for identifying learning objectives
    • Sample forms with learning objectives for SOP 8 Modified Substitution and SOP 19 Volume Transfer
    • Training materials previously shared…..
  • Possible approaches for best preparing new staff
Identifying current staffing needs and solutions
Thank you!

- A coordinated working group to:
  - Identify interim training solutions to obtaining *temporary conditional* Approved Signatory status for new staff; and
  - Consider longer-term improvements for conducting on-the-job training for new staff (Roadmap for staff preparation)

- Thank You:
  - AK – Gary Brown
  - FL – Amy Smith
  - OH – Dan Walker
  - OK – Jeremy Nading
  - OR – Aaron Aydelotte
  - TX – Lisa Corn
  - OWM – Mike Hicks, Val Miller, Isabel Chavez, Mark Ruefenacht, Jose Torres, Georgia Harris

- Be patient! We are all trying to be flexible given current national issues.....
The role of students

(and new staff)
• Take initiative and ask questions!
• Consider it a career and not just a job.
• Complete pre-work/qualify for course (math test) – meets Fundamentals of Metrology requirement
• Complete reading (pre-work and recommendations)
• Complete OJT, self-study, and measurements (student roles)
• Read SOPs and Complete Reading Outlines
• Attend 100 % of the Webinars and Course Assignments
• Be patient – OWM expects that it takes 3 to 5 years to become proficient....
“Fundamentals and LAP Problems Preparation” Course (Blended Learning)

- Prerequisites
  - Math Test, Need SP 811
- Pre-work (same as currently required for Fundamentals of Metrology):
  - NPL Beginner’s Guide to Measurement (link is external)
  - NPL Beginner's Guide to Measurement in Mechanical Engineering (link is external)
  - ISO/IEC 17025:2017 "General Requirements for the Competence of Testing and Calibration Laboratories" (staff must demonstrate they have a copy of this standard)
- Mentoring (will cover later)
  - Lab QMS and Admin Procedures
  - SOP 8 and SOP 19
Modules in the “Fundamentals and LAP Problem Preparation” Course

- Four week course, two 4-hour webinars each week, plus additional homework, self-study, mentoring tasks
- Modules (Webinars)
  - Introduction to Course and LAP Problems; Calibration Certificates (SOP 1)
  - Traceability and Risk (GMP 11, 13)
  - Measurement Assurance (SOP 30)
  - SOP 8, Modified Substitution
  - SOP 19, Volume Transfer
  - SOP 19, Volume Transfer
  - Basic Uncertainty (SOP 29)
  - Proficiency Testing (GLP 1, PT Follow Up)
  - Calibration Certificates (SOP 1) and Wrap Up

**NOTE:** Detailed learning objectives, homework assignments, OJT are posted with the course on the OWM Events page
Reminder: LAP Problems

1. PT in Mass (SOP 8) and PT in Volume (SOP 19)
2. Internal Audit:
   1. Create and evaluate calibration certificates (SOP 1); maybe complete amendments of certificates if needed
   2. Assess Traceability: evaluate supplier calibration certificates, traceability hierarchy, and calibration program and status of equipment and standards
   3. Assess Measurement assurance: evaluate check standards and control charts
   4. Assess Uncertainties: calculate uncertainties and compare with official lab uncertainties
   5. PT Follow Up Form
3. Summary Report – Summarizing all assessments and action items in ONE document (communicating the analysis) and submit to OWM
4. Outputs from the LAP Problems are INPUTS to Lab Internal Audit and Management Reviews

Remember: risk, continual improvement.....
The role of mentors in on-the-job training (and staff preparations)
Mentoring “Requirements”

- Complete and document training on instructional design and assessment methodologies – it’s not just “telling”!
- Conduct OJT on:
  - Lab QMS (ISO/IEC 17025:2017)
  - Lab SAPs (audit process, non conformities, action items)
  - SOP 8 – modified substitution
  - SOP 19 – volume transfer
- Be familiar and supportive of training requirements and LAP problem needs
- Assess reading outlines, perform measurement demonstrations, perform measurement assurance analysis and feedback, observe measurements, identify gaps and provide constructive feedback
Mentor Training Requirements

Training – for Mentor

• Why?
• Ensure consistent use of learning objectives, activities, and assessments
• Provide resources for a skill set beyond “metrology” – *opportunity for professional development*

OJT Tools

• Reading Outline – also used in seminars (dual purpose; save it!)
• SOPs marked up – provide a framework and outline that can be used with ANY SOP
• OJT form – for assessing and documenting objective evidence
• Sample forms
  • SOP 8
  • SOP 19
The laboratory system: Think about *work flow* and the lab processes:

- when conducting OJT,
- for risk assessments,
- for continual improvements,
- approach often used in on-site assessments
Documentary Standard: ISO/IEC 17025
“General requirements for the competence of testing and calibration laboratories”

Resource Requirements (Staff, Facilities, Equipment, Standards)

- Contract Review Capability
- Laboratory Calibration and Measurement Capability

Process Requirements (Care/Handling, Methods, Release ...)

Management Requirements (Risk, QMS, Doc/Record Control, Auditing, Actions, Reviews)
Guidance: QMS and Procedures

Objective

Evidence: Records

- Safety and Lab QMS (QM and SAPs)
  - Failures often noted when OJT for these items is not completed or documented
- Metrology and Laboratory System (Covered in Fundamentals)
  - GMP 12 – selection of SOPs* (in Mass/Volume)
  - GMP 11 and 13 – calibration program and traceability (care/handling of standards and equipment, and supplier evaluation)
- SOP 9, 17, 20, 30 – control charts and measurement assurance
- SOP 29 - uncertainties
- SOP 1 – calibration certificate (and lab admin procedure and templates)
Guidance: QMS and Procedures

Objective

Evidence: Records

- Mass (Covered in Mass) – plus the above
  - SOP 8 – modified substitution
  - SOP 2 – conventional mass and MABC and calculation of air density (and MABC for uncertainties)
  - GMP 10 – good weighing practices
- Volume (Covered in Volume) – plus the above
  - SOP 19 – volume transfer
  - SOP 31 – neck calibration
  - GMP 3 – meniscus reading
  - GLP 10 – water quality and calculations of water density
Checklist of OJT/Mentoring an SOP - I

Accepting Unknown Standards for Calibration: Contract Review (SAP)

Care and Handling of Incoming Items (SAP); Handling Non-conformities (SAP)

Resources: Standards, Equipment, and Environment (GMP 11, 13, Inventories and Calibration Program; SOP Prerequisites)

Processes: Measurement Preparation (SAP, e.g., GMP 12, SOP 8, 19)

Processes: Measurements (e.g., SOP 8, 19)
Checklist of OJT/Mentoring an SOP - II

Processes: Calculations (e.g., SOP 8, 19) (SAP Software V&V)

Ensuring Validity: Measurement Assurance Evaluation (SOP 9, 17, 20, 30 and Section 4 of the Msmt SOPs)

Processes: Uncertainty Calculations (SOP 29, and Section 5 of Msmt SOPs)

Reporting (SOP 1, Section 6 of Msmt SOPs, SAP)

Returning Unknown Standards to Customers (SAP)
Overall Goal?

- Taking staff from “new” hire status to being a productive member of the laboratory; a metrologist with ability to sign calibration certificates and ensure that measurement results are accurate and traceable and compliant with ISO/IEC 17025:2017 and the laboratory quality system.....

- Consistently in all labs....

- Training, on-the-job training, LAP problem completion and assessment (including PTs), and approvals
OJT and Mentoring Resources
• A number of State laboratories have participated in sharing on-the-job training resources during the 2016 RMAPs, during a 2017 Lab Metrology Info Hour, and during the 2020 working group sessions for developing the Fundamentals and LAP Problem Preparation Course.

• Thank you!
  • AK – Gary Brown
  • CA – Tony Gruneisen
  • FL – Amy Smith
  • KS – Keith Arkenberg, Kevin Uphoff
  • MN – Benj FitzPatrick
  • NC – Robert Rogers
  • PA – Jim Gownley
  • TX – Lisa Corn
Website


OWM OJT and Mentoring Resources (for State Labs)

This website was created in support of an interim Office of Weights and Measures course: “Fundamentals of Metrology and LAP Problem Preparation” during 2020 due to the closure of onsite NIST seminars and the impact to State weights and measures programs. Each student registering and attending this course is required to have a laboratory metrologist on staff who will serve as an on-site mentor before and during the seminar.

Mentoring requirements in support of students attending this interim training are available here. These “requirements” may also provide useful guidelines in laboratory administrative procedures for anyone doing mentoring/training of new staff even if not participating in this interim training. Developing the knowledge, skills, and abilities as a “teacher” is supplemental to these mentorship requirements.

LMIH Mentoring and OJT - 2020-08-04
What questions or comments do you have?