APLMF ASIA-PACIFIC LEGAL METROLOGY FORUM

23rd APLMF Meeting Tokyo, Japan

Working Group Report 2016

Training Coordination

Report prepared by	Marian Haire
Position	Manager Training and Technology Transfer
Organisation	National Measurement Institute
Contact details	Marian.haire@measurement.gov.au

This report provides a summary of the Training delivered by APLMF since the 22nd APLMF meeting held in Honolulu, Hawaii on 27-30 October 2015 and an update on the MEDEA project from the perspective of the MEDEA Coordination Committee.

Training delivery

At the 22nd APLMF meeting members agreed to deliver the following training courses as part of the MEDEA project sponsored by PTB.

Course	Venue/host	Trainers	Delivery dates
Verification of fuel dispensers	Pattaya City, Thailand	Australia	11–13 July 2016
Mass standards	Jakarta, Indonesia	Japan	30 Aug – 1 Sept 2016
Verification of non-automatic weighing instruments	Kuala Lumpur, Malaysia	Malaysia	28 Nov–1 Dec 2016

The first two training courses have been delivered and the final one on non-automatic weighing instruments is organized and will be delivered the week following the 23rd Forum meeting. All economies involved have delivered on their commitment in a very professional manner. Very comprehensive reports have been produced for the first two training programs. Copies are included at Appendix 1 and 2.

Each training course has included a topic on traceability to demonstrate the importance of traceability to verification of measuring instruments.

In 2015 we identified suitable trainers from developing economies who were willing and capable of delivering the fuel dispenser training course. This initiative saw trainers from Thailand, Cambodia and Philippines deliver a second fuel dispenser course in Pattaya Thailand in July 2016. They were supported by Brad Larter from Australia. They did a very good job and the Cambodian trainer has agreed he could deliver alone at some future time. He demonstrated superior knowledge, his English skills were excellent and he is a very capable trainer. Dr Matsumoto has also identified staff from developing economies who could deliver the Rice Moisture training course at a future date.

The mass standards course organized by Dr Matsumoto has provided some very useful feedback as it was a course attended by both legal and scientific participants. See feedback in Appendix 2. It would appear organizers should think carefully about how technical information is delivered during a joint workshop. While there may be some advantages by hosting a joint workshop there is benefit in splitting the participants for the theory components of the workshop.

Suliana Binti Ghazalli from Malaysia will assist in the delivery of the NAWI course to be held in Malaysia. She will be delivering the segment on traceability.

Verification and pattern approval of water meters

Australia has nominated to deliver this training course in Malaysia in 2017. The training program will focus on the practicalities of testing water meters in accordance with relevant international standards (OIML R 49 and ISO/IEC 17025). The training would also include information regarding the operating principles of common water meter types, the relevant tests and typical results as well as expected failure modes during type approval testing, verification testing and in-service testing. The program could also include practical demonstrations if there are available facilities

The program will include information on the following points:

- Laboratory design and operation
- Reference standards and equipment
- Estimation of measurement uncertainty
- Meter types and operating principles
- Test procedures (type approval and initial verification)
- Analysis of results, acceptance criteria and possible failure modes
- Test procedures (in-service inspection)
- Analysis of results, acceptance criteria and possible failure modes

2017 MEDEA Project Schedule

The table below outlines this working group's work plan for delivery in 2017. At the upcoming forum meeting we will need to assign delivery dates for each of these courses.

Course	Host Economy	Trainers	Schedule
Verification of weighbridges	China	China	9. 2017
Verification of bulk flow meters for petrol and diesel	Thailand	Australia	24-28 July 2017
Verification and pattern approval of water meters	Malaysia	Australia	2017 (3 days)
Verification of rice moisture meters			
Launch of Joint Guide 1			June 2017
APMP/APLMF Workshop on National Metrology Infrastructure			End of June 2017
Online training based on survey results	Secretariat		

MEDEA project

The MEDEA project continues to provide very positive outcomes for APLMF. The MEDEA coordination committee (CC) meets regularly using the internet and one face-to-face meeting in Bangkok in June 2016. The new APLMF secretariat is continuing to update procedures for running training events. All activities are being evaluated and comments are reviewed by the CC. Evaluations are now completed using survey monkey which is working well. The APLMF secretariat has agreed to follow up participant's action plans and will report accordingly.

In 2016 the Secretariat introduced the uploading of training materials to Google Drive. This means we no longer have the expense of printing copies of the documents as participants are expected to print out their own copies. We are not entirely confident this is working for all participants. Communication around this point needs to be increased to ensure participants understand they are expected to review the documentation before the course.

A member of the Secretariat team has attended every training event to supply administrative and technical support to trainers. Secretariat staff attending also have technical background so they can support the overall delivery of the training.

At every training event the secretariat makes a compilation of all economy reports. This provides a snapshot of the region and allows for instant comparison regarding implementation of OIML

recommendations.

MEDEA website

The description of the work packages and a list of past and planned activities conducted under the MEDEA project are provided on the PTB-website: https://www.ptb.de/lac/index.php?id=medea Logging in with login: “medea” and password: “apmp_aplmf_2014” gives additional access to invitation brochures, nominations sheets, and training reports for the individual activities. Further, the tab “international cooperation group” provides information about the institutes that offer training programs and support the area of metrology for developing economies in Asia.

Test Procedures Guide Documents

At a previous APLMF meeting there was discussion about producing regional test procedures. This was later modified to the production of guide documents rather than regional test procedures. To initiate the development of these guide documents trainers are asked to create a summary of the test procedures they are advocating in the training they deliver on behalf of APLMF. The summary produced from each training course delivered in 2015 was then used to create a series of surveys. The purpose of the surveys is to agree baseline tests that are acceptable to all members.

Five surveys were distributed to all economies and the collated results are providing very useful data. A suggestion has been made to develop online training based on the survey results. PTB has agreed to fund the development of these eLearning modules as part of the MEDEA project. Kevin Gudmundsson from New Zealand will manage this project and is currently developing its scope and working directly with a company who will produce this resource which will be freely available via the Metrology portal

A further survey will be issued towards the end of 2016 which covers the training courses presented this year. Please ensure you respond or advise the Secretariat if you require more time.

MEDEA Joint Programs

Joint 1

Guide 1 is now complete and is undergoing editing and typesetting at the moment. This document is designed to support all economies as they develop their measurement infrastructures. The aim of the document is not to duplicate information freely available in international documents but to make these documents more accessible to developing economies. Since our last meeting there has been opportunity to provide input to the final draft. This document has been jointly written by Dr Grahame Harvey (APLMF) and Abdul Rashid Bin Zainal Abidin (APMP) with input from PTB, Japan and Australia. The final draft of the document will be circulated to all APLMF and APMP members during their Annual meetings in November 2016.

In 2017 there will be a launch of this document where representatives from developing economies representing APLMF and APMP will be invited to attend together for an APMP/APLMF Workshop on National Metrological Infrastructure.

Joint 2: This project is about raising awareness of metrology in the region. This work package will consist of the following three activities:

(i) Development of joint APMP-APLMF metrology web portal to facilitate sharing of information resources

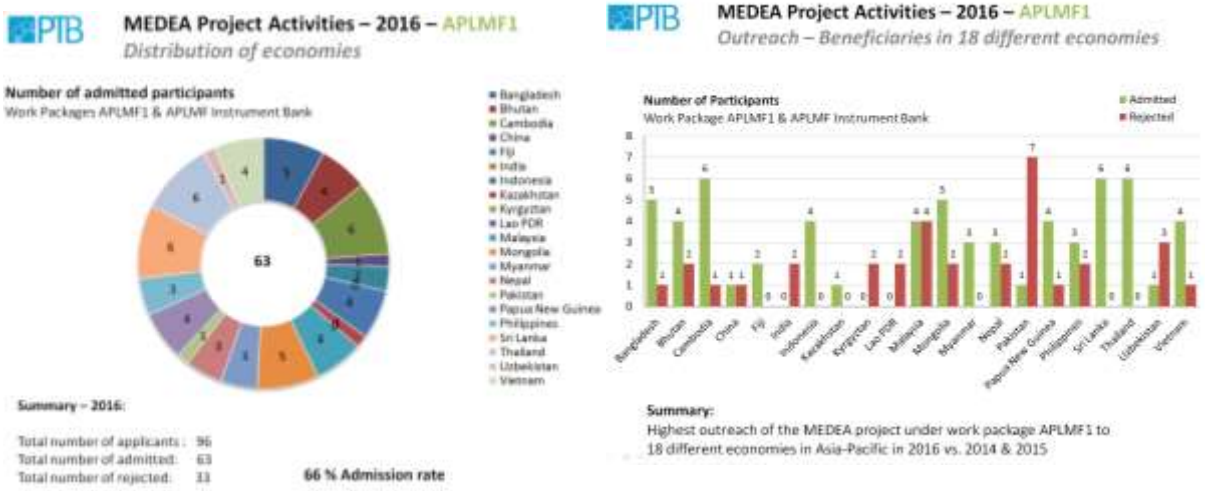
(ii) Development of best practice for improving awareness of metrology through:

- use of case studies of successful metrology interventions or information campaigns
- workshop to share lessons and best practice
- development and sharing of resource and collateral materials

(iii) Sharing of studies that have identified and quantified the impact and contribution of metrology activities to economic growth and societal wellbeing (e.g. impact studies, regulatory assessments, economic assessments**).**

The webportal will also be presented as part of the above-mentioned APMP/APLMF Workshop on National Metrology Infrastructure, planned for 2016. The goals are to build members' understanding of different approaches, tools and techniques for raising awareness, with invited guests who have undertaken programmes and using case study methodology to build skills of participants. Information from this workshop will be added to the portal, expanding the reach of this workshop.

Joint 3: This work package deals with further fostering the collaboration between international cooperation offices of the national metrology institutes and legal metrology authorities in Asia Pacific. This year, PTB welcome Ms Weina CHE from the department of international cooperation and development at NIM China to a 4-week-long study visit at PTB technical cooperation to share expertise in the coordination of the MEDEA project. As a result Ms. CHE has analyzed the distribution of economies supported by the MEDEA project in 2016.



Joint 4: This project provides strategic and performance management for directors using the Balanced Score Card (BSC) technique. It was kicked off at a meeting on July 8th to 10th, 2015, in Malaysia. Directors who attended have tasks to complete over the next 12 months. A smaller group of interested participants from the kickoff workshop have resumed the online counselling process to develop their own institutional strategic plan within the next 6 months. Economies that succeed in developing a strategic plan using the BSC tool may be invited to the APMP/APLMF Workshop on National Metrological Infrastructure to present their lessons learned during a session on strategic management.
PTB will provide additional information about MEDEA's achievements during 2016.

Appendix 1

REPORT FOR TRAINING COURSE ON VERIFICATION OF FUEL DISPENSERS

Dates :11-13 July 2016 Venue :Holiday Inn, Pattaya City, Thailand
Host :Central Bureau of Weights and Measures, Department of Internal Trade, Ministry of Commerce, Thailand

Mr	Hasamin	Sakchai	Organizer	Thailand	Sakchai.h@dit.mail.go.th
Ms	Rahannok	Khemsai	Organizer	Thailand	khemsair@hotmail.com

Trainers:

Mr	Larter	Brad	Trainer	Australia	Brad.Larter@measurement.gov.au
Mr	Choopol	Nopporn	Trainer	Thailand	mynokky@hotmail.com
Mr	Latosa	Jose Marco	Trainer	Philippines	marcolatosa@yahoo.com
Mr	Muy	Samrach	Trainer	Cambodia	samrachmuy@yahoo.com
Ms	Pisankul	Pisakorn	Trainer	Thailand	pisakorn@dit.go.th

1. Objective of the Training

This training course was designed to follow-up a recommendation from a Verification of Fuel Dispensers training course which was delivered in Pattaya City, Thailand in 2015. The objective of this course was to involve trainers from developing Asian economies with the support of a more experienced trainer to provide training to participants from developing Asian economies who verify fuel dispensers, or who have a responsibility for ensuring that fuel dispensers are verified in accordance with OIML recommendations. All course participants were expected to have had practical experience in the field. This training was composed of lectures and practical activities. The lectures outlined the test procedures and the reference standards of measurement used to test a fuel dispenser to ensure it is operating correctly and delivering fuel within the maximum permissible error. The practical component included a demonstration of how to test a fuel dispenser in the field and provided an opportunity for participants to demonstrate their ability to test a fuel dispenser in accordance with OIML recommendations.

This course provided participants with the knowledge and skills to:

- understand the role of trade measurement within an economy
- identify the major components of a fuel dispenser
- analyse the fuel dispenser's operating environment to determine how it could impact on its performance
- identify sources of any possible operational error
- verify a fuel dispenser in accordance with the test procedures and workplace health and safety guidelines

2. Target Group

The target group for this training course was participants:

- from developing economies within Asia;
- experienced in the verification of fuel dispensers; and
- willing to train others when they return to their economy, or at future APLMF training courses.

3. Description of the Training Course

MEDEA is a four year project managed by Physikalisch Technische Bundesanstalt (PTB) and funded by the German Federal Ministry for Economic Cooperation and Development (BMZ) which aims to foster and further develop the capabilities of the Asia Pacific Metrology Programme (APMP) and the Asia Pacific Legal Metrology Forum (APLMF) to support developing economies in the Asia-Pacific region.

The project aims to improve the ability of the regional metrology specialist networks in Asia to:

- promote metrology systems within developing economies; and
- strengthen the metrology systems/infrastructure of their respective members from developing economies.

The APLMF has responsibility for the work package APLMF1. This consists of eleven training courses that will be provided over a three year period. The Verification of Fuel Dispensers is one of these training courses.

Prior to the commencement of the training course, the trainers and participants were provided access to Google Drive. The Verification of Fuel Dispensers Course in Pattaya City was the APLMF's pilot in deploying Google Drive to provide training materials and administrative documents which can be easily accessed by Secretariat personnel on the ground at training courses. Also, the trainers were asked to upload training materials to the drive to enable the participants to view and print materials before the course. It was hoped that this approach would improve the training experience for all involved, particularly the participants as they would have the opportunity to pre-read materials allowing them to come to the course better prepared. The APLMF Secretariat Phil Sorrell met with Brad Larter from National Measurement Institute Australia on the day prior to the three day training course commencing to ensure the meeting room was set up appropriately. The training room and facilities were both of a high standard.

The training course was formally opened by Mr Suchat Sinrat, Deputy Director General, from the Department of Internal Trade. The APLMF Secretariat Phil Sorrell welcomed everyone and wished them a very successful week. A full list of participants can be found in Annex 2. In addition to the 17 official participants, Thailand had an additional 6 of observers present during the training.

Following introductions and an overview of the course, each economy provided a report explaining how their economy regulates fuel dispensers. This information has been collated and is shown in Annex 3. Not all economies are OIML compliant and many admit there is a lack of appropriate resources to maintain an effective legal metrology framework. Some economies also highlighted a lack of appropriate regulation to ensure a successful system of legal metrology. Everyone seemed to learn something new during the training.

The methodology adopted for this training course is one where the theory component of the course is delivered during day one and two and on the third day the course participants are provided an opportunity to gain practical experience in the verification of fuel dispensers. Throughout the three day training course participants were encouraged to ask questions to clarify their understanding. Many of these questions related to practical problems they had in the field. A number of the participants communicated throughout the training course that software control and a lack of type approval system were causes of concern for their economy. Where software was not an issue there were controls in place, or large oil companies managing the software to ensure there was a degree of confidence that there was no fraud.

On day one Jose Marco Lactosa from Industrial Technology Development Institute of Philippines presented training on the requirements of working safely with petroleum products and the traceability of reference standards. Jose Marco Lactosa was very confident in his communication and his training session was well received. On day two Samrach Muy from National Metrology Center of Cambodia delivered training relating to the preparation and equipment requirements for testing fuel dispensers, followed by the elements of completing a visual inspection of a fuel dispenser. During Samrach Muy's training session, the participants were more engaged and participated by answering questions that were asked of them. As previous course participants, Samrach Muy and Jose Marco Lactosa both communicated their knowledge clearly and demonstrated an ability to engage with the course participants.

On day three, all participants were taken to Junpen PTT Sriracha Co. Ltd petrol service station in Sriracha, Chonburi province to gain practical experience in the verification of fuel dispensers using the test procedures presented. The two trainers from Thailand Pisakorn Pisankul and Nopporn Choopol assisted in the practical demonstrations and supervision of the participants at the service station. Pisakorn Pisankul and Nopporn Choopol initially demonstrated the correct method for testing a fuel dispenser to all participants and throughout the day they worked alongside the course participants in groups of two to provide them with an opportunity to test the fuel dispenser individually. As previous course participants experienced in delivering practical training, Pisakorn Pisankul and Nopporn Choopol were very competent and confidently answered questions asked by the course participants.

4. Highlights/Lessons Learned

All the objectives of the training were met, with all planned activities detailed in the program being successfully completed. The trainers from Thailand, Cambodia and Philippines all demonstrated a high level of competence as trainers and were able to support the needs of the participants. During the final day of the training course, the participants practically demonstrated fuel dispenser verification and they understood the test procedures. All candidates participated well and were very willing to be involved in the group exercises.

The target group for the program was generally correct and many of the candidates were young enthusiastic participants who learnt quickly. However, there were some older participants and some participants who had high level positions within their institutes. Previous experience has highlighted that the ideal candidate for the MEDEA program is a new generation or next cohort of managers. As previously identified, the ideal candidate would be a young person with potential to learn and develop new skills and knowledge.

At the conclusion of the training course, the course participants were asked to provide feedback by submitting responses to a survey monkey questionnaire. Overall 66.67% of participants rated the course highly.

The logistics for the course were meticulously provided by the Sakchai Hasamin, Khemsai Rahannok and a number of their colleagues from Thailand. This is supported by feedback from the course participants, of which 91.67% confirmed the logistics were perfect. Of the twelve participants who completed the survey 83.33% gave the highest rating for the preparation and advance information and 58.33% provided the highest rating for the quality of the course materials. It was noted that not all course participants had ready access to the training materials. Some participants accessed the training materials directly from their laptop computers and others had printed versions of the training materials. However the majority of participants did not have ready access to the course training materials and instead relied of simply viewing the PowerPoint presentations which had been prepared by the trainers.

The course participants highlighted the group work and practical field work as being the most effective part of the training. The feedback suggested that there was a need for the duration of the course to be extended to accommodate requests for more group work and practical experience testing fuel dispensers.

On the final day of the training course, there was a very limited amount of time afforded to the participants to be able to prepare and deliver their action plans. During the presentation of their action plans, the majority of the course participants committed to providing their colleagues with further training after returning to their home country.

5. Next Steps/ Follow-up

- Participants to complete the points detailed on their action plans.
- APLMF Secretariat to follow-up within 6, and 12 months to record the progress against the action plans
- Trainers to be available to answer questions.

Annex 1: Workshop Program

Monday 11 July	Venue: Holiday Inn Pattaya	
Time	**Details**	**Presenter**
08:30 – 09:00	Registration	Host
09:00 – 09:40	Welcoming address from the host economy Opening ceremony (APLMF Secretariat) Group photo taking	APLMF and Host
09:40 – 10:00	Introduction	APLMF and Host
10:00 – 10:45	Overview of the course Economy reports - explains how fuel dispensers are verified in each economy	APLMF and a trainee from each economy
10:45 – 11:15	***Coffee Break***	
11:15 – 12:30	Economy reports continue	APLMF and a trainee from each economy
12:30 – 14:00	Lunch break	
14:00 – 15:30	Working safely with petroleum products Construction of a fuel dispenser	Marco Latosa
15:30 – 16:00	Coffee break	
16:00 – 17:00	Traceability	Marco Latosa
18:00 – 20:00	***Welcome dinner***	Host

Tuesday 12 July	Venue: Holiday Inn Pattaya	
Time	**Details**	**Presenter**
09:00 – 10:30	Preparation for testing Equipment for testing petrol and diesel	Samrach Muy
10:30 – 11:00	***Coffee Break***	
11:00 – 12:30	Visual Inspection Functional Tests	Samrach Muy
12:30 –14:00	***Lunch***	
14:00 – 15:30	Performance Tests	Pisakorn Pisankul Nopporn Choopol
15:30 – 16:00	***Coffee Break***	
16:00 – 17:00	Question and answer session	All trainers

Wednesday 13 July	Venue: A Petrol Station	
Time	**Details**	**Presenter**
08:20	Travel to the training venue	
09:00 – 10:30	Observe demonstration of individual tests Group discussion of procedures	Pisakorn Pisankul Nopporn Choopol
10:30 – 11:00	***Coffee Break***	
11:00 – 12:30	Students practice technique in small groups Participants work together to answer test questions	All trainers
12:30 – 14:00	***Lunch***	
14:00 – 15:00	Each student demonstrates the procedure of testing a fuel dispenser Participants work together to answer test questions	All trainers
15:00 – 16:00	Travel back to hotel	
16:15 – 17:00	Action Plans – Presentations	All trainers

Annex 2: List of Participants

Title	Family name	Given name	Institute	Economy	Email Address
Mr	Rahman	Mohammad Shaifur	Bangladesh Standards and Testing Institute	Bangladesh	shaifur.itsb@gmail.com
Mr	Kamruszaman	MD	Bangladesh Standards and Testing Institute	Bangladesh	zamanbsti@gmail.com
Mr	Wangchuk	Namgay	Bhutan Standards Bureau	Bhutan	namwangz2013@gmail.com
Mr	Phorn	Rattanak	National Metrology Center, Ministry of Industry and Handicraft	Cambodia	rattanakdolvt@gmail.com
Mr	Vieng	Somann	National Metrology Center, Ministry of Industry and Handicraft	Cambodia	viengsomann@gmail.com
Mr	Budiman	Firmansyah	Directorate Metrologi	Indonesia	firewolf3582@gmail.com
Ms	Pratami	Mutya	Directorate Metrologi	Indonesia	pramtya1139@gmail.com
Ms	Wan Nur Fara Shimma	Daud	Ministry of Domestic Trade, Cooperative and Consumerisme, Enforcement Division	Malaysia	nurfara@kpdnkk.gov.my
Ms	Batsuuri	Amartuvshin	Mongolian Agency for Standardization and Metrology	Mongolia	amartuvshin@masm.gov.mn
Mr	Ojha	Kamal	Nepal Bureau of Standards and Metrology	Nepal	ojhakamal@yahoo.com
Mr	Crucero	Cedric	Industrial Technology Development Institute, NML	Philippines	cedcrucero@gmail.com
Mr	Vovovon	Sylvester	National Institute of Standards and Industrial Technology	Papua New Guinea	sylvester.vovovon@nisit.gov.pg
Mr	Senaweera	Lalith	Measurement Units, Standard and Services Department	Sri Lanka	lalitnishantha718@gmail.com
Mr	Ariyapala	Ambalakande	Measurement Units, Standard and Services Department	Sri Lanka	ariyapala@gmail.com
Mr	T.Watthanaphon	Rueangsiri	Central Bureau of Weights and Measures	Thailand	taro26111@hotmail.com
Mr	Kongsilt	Chanecharkrit	Northern Weights and Measures Center (Chiang Mai)	Thailand	chanecharkrit@gmail.com
Mr	Bui Trung	Dung	Directorate of standards, metrology and quality	Vietnam	dungchihang@gmail.com

Annex 3: Summary Economy Report

Summary of Economy reports									
Economy	**Legislation**	**SI**	**MPE used %**	**Inspector of 3rd pty**	**Verification periods**	**OIML compliant**	**Type approval**	**Issues**	**Other**
Bangladesh	Yes	Yes	0.3	Inspector	1 Year	Yes	Yes	Lack of resources	
Bhutan	Yes	Yes	0.5	Inspector	1 Year	Yes	Yes	No legal metrology system	
Cambodia	Yes	Yes	0.5 Initial 1.0 subsequent	Inspector	1 Year	Yes	No	Resources including officers and budget Public awareness	
Indonesia	Yes	Yes	0.5	Regional responsibility	1 Year	Not fully adopted	Yes		
Malaysia	Yes	Yes	0.5	Verification officers – Licensee	Periodic 1 Year	Yes	Yes		
Mongolia	Yes	Yes	0.5	Inspector	6 Months	Unsure	Yes		
Nepal	Yes	Yes (no legal req)	+0.5 -0.25	Inspector	1 Year	No	No	Tampering Lack of training	
Philippines	Yes	Yes	0.5	Local government NML	2 Months	Not yet working towards	No		
Papua New Guinea (NIST)	Yes (ICCC is regulator)	Yes	Price only	Inspector (ICCC)	1 Year	Yes	No	Conflict between regulators	
Sri Lanka	Yes	Yes	+0.5 -0.25	Inspector	2 Years	Yes usually	Yes	Lack of resources and knowledge	
Thailand	Yes	Yes	Variable Up to 2L 5mL	Inspector or licensee	1 Year	Yes	No		
Vietnam	Yes	Yes	0.3	Inspector or licenced verifiers		Yes	Yes	No regulation regarding maintenance	

Summary of Action Plans				
Title	**Surname**	**First Name**	**Economy**	**Action Plans**
Mr	Rahman	Mohammad Shaifur	Bangladesh	Look at reviewing verification procedures and implement additional tests.
Mr	Kamruszaman	MD	Bangladesh	
Mr	Wangchuk	Namgay	Bhutan	Train staff on verification procedures and examine process with review of legislation.
Mr	Phorn	Rattanak	Cambodia	Implement training in Cambodia and have meeting with all petrol station owners to discuss the benefits of fuel dispenser verification.
Mr	Vieng	Somann	Cambodia	
Mr	Budiman	Firmansyah	Indonesia	
Ms	Pratami	Mutya	Indonesia	Share knowledge with colleagues & improve understanding of issues with software.
Ms	Wan Nur Fara Shimma	Daud	Malaysia	Share knowledge with inspectors and verification officers.
Ms	Batsuuri	Amartuvshin	Mongolia	Study English to improve future understanding.
Mr	Ojha	Kamal	Nepal	Look at systems for pattern approval & verification certificates
Mr	Crucero	Cedric	Philippines	Disseminate knowledge to colleagues
Mr	Vovovon	Sylvester	Papua New Guinea	Update procedure. Consult with previous participant from ICCC and train
Mr	Senaweera	Lalith	Sri Lanka	Share experience amongst staff & train inspectors and oil company rep
Mr	Ariyapala	Ambalakande	Sri Lanka	
Mr	T.Watthanaphon	Rueangsiri	Thailand	Train colleagues on tests for fuel dispensers verification learned from this course.
Mr	Kongsilt	Chanecharkri	Thailand	1.Transfer of knowledge and experience from training to colleagues. 2.Study the possibility of bringing knowledge and experienced in Training Course to application and develops in Verification of Fuel Dispensers.
Mr	Bui Trung	Dung	Vietnam	Review current MPEs

Suggestions:

- PNG suggested language barriers make it difficult to interact and participate fully
- A number of suggestions for more practical-based training
- More awareness amongst trainers of language barriers


PTB
DIT
THE MEDEA TRAINING COURSE ON
THE VERIFICATION OF FUEL DISPENSERS
11 - 13 JULY, 2016, PATTAYA, THAILAND


Nepal

-

-

Appendix 2

Final Report of Training Course on Mass Standards

Dates: 30th August (Tue) to 1st September (Thu), 2016
Organizers:
1. Physikalisch-Technische Bundesanstalt (PTB), Germany
2. Asia-Pacific Legal Metrology Forum (APLMF)

Venue and Accommodation:
1. **Borobudur Hotel**, Jl. Lapangan Banteng Selatan No.1, Ps. Baru, Sawah Besar, Jakarta, Indonesia

Host:
1. Directorate of Metrology (DoM), Ministry of Trade, Indonesia
2. National Metrology Institute of Japan (NMIJ), AIST, Japan

Trainers:
1. Mr. Julian Crane (APLMF secretary/trainer, MBIE, New Zealand)
2. Mr. Masaaki Ueki (primary trainer, NMIJ, Japan)
3. Dr. Tsuyoshi Matsumoto (coordinator/trainer, NMIJ)
4. Mr. Tsutomu Horikoshi (assistant trainer, NMIJ)
5. Mr. Nobuhiko Azami (assistant trainer, NMIJ)

1 Objective of the Training

1.1 Introduction

Mass is one of the SI base units and mass measurement plays an important role in metrology including legal metrology which is closely related science, technology, transactions and human life. Weights are commonly used in mass measurement and this category of artifact is necessary to maintain a traceability system for mass.
APLMF has been conducting training courses on non-automatic weighing instruments (NAWI) for over 20 years in order to support legal metrology officers from developing economies to implement harmonized verification procedures. In addition, APMP has recently conducted a Workshop on Calibration of Laboratory Scales in September, 2015 in Beijing, PR China.
In these training courses, APLMF and APMP members requested additional support in the form of a new training program to explain how to maintain and provide mass standards. As a result, this training course was planned as a joint program participated both by APLMF and APMP with a support of the MEDEA project coordinated by PTB in Germany.

1.2 Objectives

This training course was designed for the officers, experts and scientists who calibrate and/or verify standard weights in accordance with OIML Recommendation R 111: 2004 “Weights of classes E_1, E_2, F_1, F_2, M_1, M_{1-2}, M_2, M_{2-3} and M_3”. Its contents were composed of both lectures and a practical activity. The lectures included outline of mass standards, treatment of measurement uncertainty, technical requirements based on R 111 and practical procedure for calibrating/verifying standard weights. The practical activity was provided to demonstrate how to calibrate smaller weights based on a reference

weight using a sub-multiple method. The participants then had an opportunity to practice using this procedure.
This course provided participants with the knowledge and skills to:

- understand the role of mass standards for scientific and trade measurements within an economy,
- identify the important requirements for standard weights based on OIML R 111,
- understand proper operating/environmental conditions for calibrating/verifying standard weights,
- identify possible sources of measurement uncertainties, and
- calibrate or verify standard weights in accordance with the procedures specified in OIML R 111.

2 Target Group

This course targets participants who deal with weights in the middle and lower classes (such as F_2 and M_{1-3} specified in R 111). However, this course will also be useful for participants who wish to establish a primary laboratory dealing with weights in higher classes (E_2 or F_1). All participants are expected to have practical experience in calibrating, comparing and verifying such weights.

3 Description of the Training Course

In this chapter, outline of the training course is described. See **Annex 1** for the final program and **Annex 2** for the final participants list.

3.1 Opening ceremony

On Tuesday 30th, the training course started off with an opening ceremony at a meeting room in the Borobudur Hotel. On behalf of the host economy, Mr. Hari Prawoko (Director of Metrology/DoM) delivered an opening address. Mr. Julian Crane and Dr. Tsuyoshi Matsumoto followed and delivered addresses on behalf of APLMF and the trainers of NMIJ.

3.2 Economy report

On Tuesday after the opening ceremony, one representative from each of the participating thirteen economies provided an economy report with presentation slides on current situation in traceability and metrological control systems on mass standards. Names of the representatives, who provided the report, are given below. See **Annex 3** for a summary of economy reports.

(1) Mr. Mohammad Mamunur Rahman (Bangladesh)
(2) Mrs. Leki Choden (Bhutan)
(3) Mr. Channsokha Tep (Cambodia)
(4) Ms. Putri Kania Hasana (Indonesia)
(5) Mr. Viktor Milokumov (Kazakhstan)
(6) Ms. Suliana Ghazalli (Malaysia)
(7) Ms. Delgermaa Lkhagvadorj (Mongolia)
(8) Dr. Mar Lar Win (Myanmar)
(9) Mr. Allan Baba Barilae (Papua New Guinea)
(10) Mr. Kiveen Suycano (Philippines)
(11) Mrs. Kalani Sandya Mallawaarachchi (Sri Lanka)
(12) Ms. Chayanisa Na Lampoon (Thailand)
(13) Mr. Tien Dan Nguyen (Viet Nam)

3.3 Lectures

In the afternoon on Tuesday 30th, Mr. Julian Crane provided an economy report “Metrological Control of Masses in New Zealand”. Dr. Matsumoto followed with the lectures on “Traceability in scientific and legal metrology” and “Introduction to mass standards including an economy report (of Japan)”.
On Wednesday 31st, Mr. Horikoshi and Mr. Azami jointly provided lectures on “Outline of standard weights – Technical requirements based on R 111”. Mr. Ueki followed with two lectures on “Evaluation of the uncertainty of mass calibrations” and “Introduction to the practical training”.

3.4 Practical activity

In the morning on Thursday 1st, a practical activity was provided in another room next to the meeting room in the Borobudur Hotel. This activity was conducted by separating the 21 participants into three groups of seven members which were numbered as A, B and C. The leader as well as the members of each group had been selected by the trainers in advance on Wednesday. Ms. Putri Kania Hasana (ID*), Mr. Viktor Milokumov (KZ*) and Ms. Suliana Ghazalli (MY*) served as the leaders of Group A, B and C, respectively. All trainers instructed the activity by the three groups. Eight observers from the host economy carefully watched this group activity. (* Country code in ISO 3166: see **Annex 2**.)
To enable such a practical activity in the limited condition in the hotel, the host (DoM) provided three sets equipment in advance. Each set comprised a precise mass comparator (maximum capacity of 52 g and minimum readability of 1 μg) and two weight sets (F2 class with nominal values of 1, 2, 5 and10 g). Air conditioner and three tables provided by the hotel were utilized to maintain an environmental condition which was acceptable in a training course. To prepare for the practical activity, the trainers conducted a preliminary measurement on Wednesday after the training course.
A sub-multiple calibration method, which had been developed and proposed by NMIJ based on R 111, was employed in the practical activity. This method is frequently used by the calibration laboratory at the highest level (usually, at an NMI) to calibrate smaller weights based on the primary standard. In this method, a precise comparison of ‘conventional masses’ (see OIML D 28) between two combined weights, which have the same total nominal value, is conducted using the mass comparator. This comparison is repeated ten times in the NMIJ method for different combinations of weight. In each step, a common comparison method called ‘ABBA’ was used. The entire procedure of 10 comparisons was repeated two times in the present training course. It meant that each group conducted a total of 20 comparisons in two cycles. The practical activity had been finished in much shorter time than the duration expected by the trainers.

3.5 Presentation on the calibration results

In the afternoon on Thursday after the practical activity, the three group leaders reported the calibration results with additional comments including difficulties and experiences faced/obtained during the practice. Mr. Ueki and Dr. Matsumoto chaired this session. A numerical analysis on the measurement results obtained by the three groups showed a fairly good consistency. The trainers concluded therefore that the practice was finished successfully and a further repetition was not necessary.
All groups reported that the calibration was conducted by changing the operator. It meant that each participant had one or two opportunities of practice. In the comments, some members pointed out the limitation to the room size in the hotel and lack of number of equipment compared to the total number of participants.

3.6 Summary discussion

A summary discussion on entire training course including future directions was conducted with the chair, Dr. Matsumoto. The following is a summary of the discussion.

(1) Firstly, Dr. Matsumoto inquired the background of each participant in mass measurement by simply selecting one from the three categories; (1) scientific metrology (2) legal metrology and (3) both. The fraction of replies was almost 1/3 for each of the three categories.

(2) In addition to the sub-multiple calibration, many economies requested a practice with a one-to-one comparison between two weights with the same nominal value. This method is used widely in the middle or lower layer of traceability including verifications/inspections in legal metrology.

(3) There was a need for a training course on verification of NAWI by the participants from the authorities in legal metrology. Dr. Matsumoto replied that APLMF had conducted many courses for NAWI and another course would be held in Malaysia in November, 2016.

(4) There was a need for a practical method to analyze/evaluate the real material used for weight (MY). The participants told that there had been a problem and doubt in the quality of weights. Some manufacturers may not use the correct material given in the specifications.

(5) A question from KZ pointed out insufficient data for evaluating uncertainty using Type-A method when it is applied to the weight of 1 g in the NMIJ method. This question was based on a fact that this weight (1 g) had been compared only once. Mr. Ueki replied that the lack of information was compensated by the entire process of recursive calculations on the results obtained in 10 comparisons.

(6) Practical method to evaluate uncertainty in conventional mass of a weight (KZ & PH). Mr. Ueki provided explanations adequately.

(7) A need for a training item to measure magnetic properties of weight (KZ).

(8) Evaluation of all uncertainty factors such as density of air & weight, temperature, humidity, atmospheric pressure, volume of weight and magnetism (KZ and others).

(9) Recommended format of measurement error and uncertainty to be expressed on a calibration certificate.

(10) An inquiry about a globally-accepted sub-multiple calibration method (KZ). Mr. Ueki explained that the method used in this training course was merely an example in Japan. He encouraged each economy develop its own method. Dr. Matsumoto inquired the participants an existence of an original calibration method in each economy, and a half of them replied 'Yes'.

(11) Regarding the practical activity for calibration, most of the participants admitted their importance for understanding the contents of the lecture. Many of them also replied that present time length of practice was sufficient.

(12) There was a strong need for continuing training activities in mass standards (by most of the participants).

3.7 Action plans

A summary discussion was conducted on 'action plans' to be sought and achieved by each participants after going back to his/her economy. Mr. Crane and Dr. Matsumoto chaired this session and they requested each economy present the plan orally and briefly. Dr. Matsumoto requested the participants propose a realistic plan which would be achieved in three years. A summary of the action plans is provided in **Annex 4**.

3.8 Closing ceremony

At the end of the training course, a closing ceremony was conducted in the meeting room. Dr. Matsumoto, Mr. Crane and Mr. Ueki handed certificates of attendance to all of the 29 participants including the 8 observers. All of the five trainers signed on the certificates in advance. The ceremony was concluded by the remarks provided by Mr. Prawoko, Mr. Crane and Dr. Matsumoto that contained deep gratitude to the MEDEA project.

3.9 Materials / documents

For the benefit of the participants, APLMF secretariat provided an online storage 'Google Drive'. All participants accessed the storage using private PCs and Wi-Fi (Wireless LAN) provided by the hotel. All training materials (final program, lecture slides/documents, economy reports, worksheets with measurement results and photos) were then shared with the participants, observers, host staffs and the secretariats of PTB and APLMF.

3.10 Support by the host economy

Under the support by PTB, DoM and the hotel provided (1) lunch, coffee/tea break and dinner from 30th August to 1st September, and (2) transportations by taxi from/to the Jakarta International Airport for the foreign participants and trainers. DoM also provided necessary equipment and consumable materials for the practical activity on 1st September. Mass comparators and weights were temporarily transferred from the main campus of DoM in Bandung.

4 Highlights / Lessons Learned

4.1 Were the objectives of the training course met?

Yes. All items in the objectives were explained. Some of them were also demonstrated and / or practiced on.

4.2 Was the right target group attracted by the training?

Yes. All of them were the right staffs to be invited to the present training course. This course was a unique joint meeting attended by the experts both from the two different fields, i.e. scientific metrology (APMP) and legal metrology (APLMF).
Although the two fields took up almost at the same portion in the participants, contents of the present course, particularly the practical activity, had to prioritize mass standards at a higher level in scientific metrology due to an employment of sub-multiple method. As a result, the actual contents were shifted more scientific-oriented and thus deviated from the original target in the invitation brochure, which aimed weights in the 'middle and lower classes'.
In addition, there was a difficulty in conversation in English with some participants though it did not become a serious impediment to the training course.

4.3 What was the feedback of the participants (results in scores)?

A link to the feedback form (questionnaire) using an online system 'Survey Monkey' was sent from the secretariat of PTB to all participants in advance by email. All participated economies replied to the form by the end of the training course. However, some economies had to submit a joint reply of two participants because the system did not accept the second entry from an economy using the same PC.
All participants provided favorable and appreciative comments. They seemed to understand the main objectives of the present course. Many of them requested to repeat such a training course. A summary of all numerical scores is shown below:

- ✓ **Organization and logistics:**

  Preparation of advance information: Perfect 61 % / Good 39 %
  Logistics: Perfect 61 % / Good 33 % / Average 6 %
  Time schedule & overall duration: Perfect 39 % / Good 39 % / Average 22 %
  Quality of information material: Perfect 28 % / Good 72 %

- ✓ **Program and contents:**

  Quality of information material: Perfect 28 % / Good 72 %
  Relevance of topics for your work: Perfect 44 % / Good 56 %
  Quality of satisfaction of your expectations: Perfect 28 % / Good 61 % / Average 11 %

- ✓ **Group work:**

  Topic was relevant: Perfect 44 % / Good 56 %
  Group discussions were helpful to gain a better understanding of the topic:
  Perfect 44 % / Good 50 % / Average 6 %

- ✓ **Rating of the training on an overall basis:**

  Perfect 33 % / Good 61 % / Average 6 %

Following is a summary of comments provided in the feedback forms.

- ✓ **Organization and logistics:**

(1) More days (5 days) for training are requested. Too many topics were provided in the 3 days. We can concentrate on one topic more deeply.

(2) The contents should cover a wider range including both scientific and legal metrology.

(3) The legal metrology and scientific metrology could be separated to provide a more effective training course.

(4) A follow up course is needed for the sub-multiple calibration method.

(5) Environmental condition for the practical calibration activity was not good due to the too many number of participants in a tight space.

(6) Information about the preparation of documents was not consistent. PTB required participants bring printed documents, but they were already printed by the host.

(7) Google Drive was useful to share information.

(8) We cannot afford to use such a good comparator with 6 digits. We use a scale only with two digits in my economy.

(9) An optional tour to an NMI should be provided.

(10) There was a difficulty in English in some participants.

(11) Compliments to PTB as well as requests to its logistics such as, selection of air ticket, nomination procedure, etc.

- ✓ **Program and contents:**

(12) It was a valuable experience to practice on the sub-multiple calibration method. We have never used such a method.

(13) Lower levels of mass standards should be also covered.

(14) One-to-one method with the same nominal value (not only the sub-multiple method) should also be covered.

(15) We need a lecture on new definition of kilogram.

(16) We need lectures with demonstration for measuring density, magnetism and surface roughness of weights.

(17) Q&A by the trainers on the final day may not be necessary and we need more practical sessions. There were other comments though that "the Q&A session was useful".

(18) Practical procedure to evaluate measurement uncertainty was useful. However, we need more samples and practical exercises.

(19) The contents contained a lot of valuable information including those of OIML R 111.

✓ **Group work (practical activity of calibration):**

(20) Practical activity was a valuable experience. It was the most effective part.

(21) We should have more practical part.

(22) The size of each group (7 members) was too large.

(23) The data sheet with calculation tables (Excel) provided by NMIJ was useful.

✓ **Rating of the training on an overall basis (general comments):**

(24) It was good to know the calibration procedure employed in NMIJ. We will review our procedure and introduce it.

(25) The trainers need to be improved in communication skills. There was another comment "our trainers were so friendly that impressed me".

(26) MEDEA should continue trainings for; dissemination of mass standard / solid density, calibration of standard weights and determination of CMC.

(27) We need a workshop on practical evaluation of measurement uncertainty.

(28) Most of the information in this training has already been implemented in our laboratory.

(29) We need to improve the environmental condition in our laboratory (by many).

(30) We need a text book for mass standards. We hope to translate it to our language.

(31) We need more international inter-comparisons for mass standards.

(32) It was a valuable experience to exchange of information among the participants and the trainers from different economies including the economy reports (by many).

(33) We will share information in my institute and plan domestic trainings (by many).

(34) We will review our procedures and/or technical regulations (by many).

(35) Pay attention to the choice of the trainers and materials. Invite more expertise trainers.

4.4 What was the feedback of the trainers?

Followings are the important comments provided by the trainers. They reported that this training course was successful in the scientific aspect while they commented that a training program in legal metrology in the future should be restructured or separated.

(1) The trainers believed that the sub-multiple calibration method was understood well, and this training course almost achieved its objectives in scientific metrology.

(2) Practical activities for both sub-multiple and one-to-one calibrations and analysis of measurement uncertainty should be strengthened in the future.

(3) If we continue a training course on mass standards in the scientific field, it should target the NMIs in APMP while an invitation may also be sent to the authorities in legal metrology.

(4) The trainers realized that the participants from legal metrology had more concerns in verification of mass standards in the lower level (M_{1-3} classes) with one-to-one comparison and another training program for verifying NAWIs.

(5) To respond the needs from the legal metrology, some part of the present course might be merged into the present training program on NAWI under APLMF. A lecture on R111 and a short practice on one-to-one comparisons of mass standards (M class) could be added to the NAWI program.

4.5 What were the highlights of the course?

This training course was the first trial dedicated only for 'mass standards' in the many training courses or workshops that have been organized by APLMF and APMP. The organizers therefore designed the contents to be composed of (1) basic understanding of OIML R 111 and (2) practical calibration procedure using the sub-multiple method, on which NMIJ had sufficient experience. These components primarily targeted applications in legal metrology and scientific metrology, respectively

As a result, there were many competent participants. The participants from the NMIs in scientific metrology particularly gave valuable questions, comments and suggestions as it was summarized in 4.4. It seemed that some of them were able to serve as a trainer in the near future.

Regarding logistics, the organizers wish to emphasize the dedicated efforts by the host organization, DoM. The local staffs provided meeting rooms/accommodations at the highest quality located conveniently in the heart of Jakarta. The staffs also provided facility with high quality and kind care for all participants / trainers.

Regarding share of electronic information, it has been improved significantly with an employment of Google Drive that was introduced by the APLMF secretariat. Another employment of an online feedback system 'Survey Monkey', which was provided by PTB, greatly facilitated prompt submission of the comments from the participants. The Wi-Fi network of the venue underpinned the use of the two innovative IT systems. In the former training courses, more traditional methods such as electronic mail, USB memory sticks and CD-ROMs were used. Regarding the IT instruments, most of the participants brought their own PCs.

4.6 Lessons Learned: What recommendations would you give to the MEDEA Coordination Committee and trainers of other courses?

Regardless the above effort to design a joint program both for scientific metrology and legal metrology, the organizers/trainers had a regret in which the main target of the present course had to

be more scientific-oriented aiming at the upper level of traceability. In the summary session, it seems that a large part of the questions and comments were given by the participants from the scientific metrology. The participants from legal metrology even seemed to hesitate to express their own ideas. It is needless to say that an important objective of MEDEA is cooperation or synergy between the two fields. Although this target is correct ideally, the trainers however realized a large difference in concerns and daily activities between the two fields in metrology. We recommend the organizers of the future joint programs keeping in mind that it is inherently difficult to plan and implement a joint technical training program attended and satisfied by the two different fields. If there is a chance to repeat such a training course, two sessions for practical activity could be provided, i.e., one is dedicated for upper level of traceability and another is designed for more practical applications in the real field.
Regarding the share of documents, we can consider a possibility of a future training course/seminars without (or minimum amount of) papers although the host in DoM kindly provided hard copies of all training materials.

5 Next Steps / Follow-up

5.1 What are the agreed next steps after the training?

As it was mentioned in 4.3, many participants requested to continue such training program in in mass measurement. It should be noted however that the participants from legal metrology requested more practical contents, e.g., direct comparison method of the weights in lower classes of M_{1-3} and another course dedicated for weighing instruments (NAWI). On the other hand, another group from scientific metrology preferred the present scheme of training in mass standards with more technical/theoretical contents including evaluation of measurement uncertainty.

5.2 What are the suggested follow-up activities?

It is generally recommended to continue a follow-up training program in mass standards. It should be noted however, there is still a large difference in concern between scientific metrology and legal metrology. A solution might be an organization of two separate courses in APMP and APLMF while a joint invitation could be sent to both organizations.

Annex 1: Final Program
Training Course on Mass Standards
30 August – 1 September, 2016 in Jakarta, Indonesia

Tuesday, 30 August Venue: Borobudur Hotel Jakarta		
Time	**Details**	**Presenter**
08:30 – 09:00	Registration	Host
09:00 – 09:30	Opening ceremony with welcome address from the host economy, APLMF Secretariat and the trainers Group photo taking	APLMF, trainers and Host
09:30 – 10:00	***Coffee Break***	
10:00 – 10:20	Introduction and overview of the course	Trainers
10:20 – 12:00	Economy reports	All participants
12:00 – 13:40	Lunch break	
13:40 – 14:20	Metrological Control of Masses In New Zealand	Mr. Crane
14:20 – 15:00	Traceability in scientific & legal metrology, introduction to mass standards and economy report	Dr. Matsumoto
15:00 – 15:30	Coffee break	
15:30 – 16:50	(Continued the lecture)	Dr. Matsumoto
19:00 – 21:00	Welcome dinner at Bogor Restaurant in the hotel	Host (DoM)
Wednesday, 31 August Venue: Borobudur Hotel Jakarta		
Time	**Details**	**Presenter**
09:00 – 10:40	Outline of standard weights – Technical requirements based on R 111	Mr. Horikoshi and Mr. Azami
10:40 – 11:10	***Coffee Break***	
11:10 – 12:20	(Continued the lecture)	
12:20 – 13:50	***Lunch***	
13:50 – 15:10	Evaluation of the uncertainty of mass calibrations	Mr. Ueki
15:10 – 15:40	***Coffee Break***	
15:40 – 16:30	(Continued the lecture)	Mr. Ueki
16:30 – 17:00	Introduction to the practical training	All trainers
18:00 – 19:00	Dinner at Bogor Restaurant	Host (DoM)
Thursday, 1 September Venue: Borobudur Hotel Jakarta		
Time	**Details**	**Presenter**
09:00 – 10:50	Practical training for calibration in three groups	All trainers
10:50 – 11:20	***Coffee Break***	
11:20 – 12:00	Questions and answers with discussion	All trainers
12:00 – 13:40	***Lunch***	
13:40 – 14:40	Presentation on the calibration results in groups	All participants
14:40 – 15:20	Summary discussion with action plans	All participants
15:20 – 15:50	***Coffee Break***	
15:50 – 16:30	Closing ceremony	All participants
18:00 – 19:00	Dinner at Bogor Restaurant	Host (DoM)

Annex 2: List of participants (trainees)

No.	Title	First name (Given)	Last name (Family)	Position / Responsibility	Institute	Economy
1	Mr.	Mohammad Mamunur	Rahman	Inspection, calibration and verification of mass standards at laboratory and in the field.	BSTI (Bangladesh Std. & Testing Inst.)	Bangladesh (BD)
2	Mrs.	Leki	Choden	Calibration/verification for weights and measures and metrological services for public awareness. Drafting of quality manuals, technical procedures and instructions for the laboratory.	BSB (Bhutan Standards Bureau)	Bhutan (BT)
3	Mr.	Rathanak	Seng	Verification of mass standards and other kinds of measuring instrument.	NMC (national Metrology Center)	Cambodia (KH)
4	Mr.	Channsokha	Tep	Calibration and verification for mass, volume and pressure.		
5	Mrs.	Machida Nurul	Kholishoh	Officer for Inspection and calibration	DoM (Directorate of Metrology), Min. of Trade	Indonesia (ID)
6	Ms.	Putri Kania	Hasana	Calibration of mass standards		
7	Mr.	Viktor	Milokumov	Maintenance of the state mass standards and verification of mass standards.	KazInMetr (Kazakhstan Inst. of Metrology)	Kazakhstan (KZ)
8	Ms.	Suliana	Ghazalli	Maintenance of mass std., develop. of new std., calibration & verification of mass std. & weighing inst., type approval of legal instruments, drafting of regulations, training, int. comparisons, and proficiency tests.	NMIM (National Institute of Metrology Malaysia), SIRIM	Malaysia (MY)
9	Ms.	Suhaidah	Amizam	Maintenance of std., develop. of new std., calibration & verification services, type approval in legal metrology, drafting of regulations, collaborative activities, and supervision of junior staff.		
10	Mr.	Batkhuu	Chanarav	Verification officer at the mass standards laboratory	MASM (Mongolian Agency Std. & Metrology)	Mongolia (MN)
11	Ms.	Delgermaa	Lkhagvadorj	Calibration of weights and balances		
12	Dr.	Mar Lar	Win	Head of mass laboratory	DRI (Dept. of Research & Innovation), Min. of Education	Myanmar (MM)
13	Ms.	Daw Thinzar	Tun	Technician of mass laboratory		
14	Mr.	Allan Baba	Barilae	Calibrations / verifications for mass & related quantities including maintenance the environment. Due to the low manpower (only 5), I often take on other roles.	NISIT (National Institute of Std. & Industrial Technology)	Papua New Guinea (PG)
15	Mr.	Kiveen	Suycano	Deputy head of the mass standards section for calibration, review/approval of reports and management of proficiency tests.	NML-ITDI (National Metrology Lab. – Ind. Tech. Dev. Inst.)	Philippines (PH)
16	Ms.	Arachchige Dona Sharmila Priyadarshani	Kumarapeli	Calibration and verification	MUSSD (Measurement Units, Standards & Services Dept.)	Sri Lanka (LK)
17	Mrs.	Kalani Sandya	Mallawaarachchi	Technical manager		
18	Ms.	Chayanisa	Na Lampoon	Calibration of standard weights and maintenance of the accurate standards in the center.	Northern Weights & Meas. Center (Chiang Mai), Dept. of Internal Trade	Thailand (TH)
19	Mrs.	Krongkarn	Mangdindam	Calibration of standard weights and maintenance of the accurate standards of the North Eastern Weights and Measures Branch Offices.	Central Bureau of Weights & Meas. (Nonthaburi), Dept. of Internal Trade	
20	Mrs.	Thanh Phuong	Do Ngoc	Work with southern Viet Nam metrological staff of STAMEQ	STAMEQ (Directorate for Std., Metrology & Quality)	Viet Nam (VN)
21	Mr.	Tien Dan	Nguyen	Verification and drafting of metrological technical requirements		
22-29	Eight observers from Indonesia					

Annex 3: Summary of economy reports provided by the APLMF secretariat

Economy	Legislation	Metrological Control System	Organisations in System	OIML R111 Compliant	Class of weights used	Issues or Problems
Bangladesh	Standards of Weights and Measures Ordinance 1982	NMI-BSTI: Member of ISO & BIPM. Signatory of CIPM MRA. Member of OIML. Full member of APMP.	BSTI NMI Legal Metrology / National metrology	Yes	E1 and lower	None reported
Bhutan	Bhutan Standards Act 2010	Seeking Accreditation , based on legislation	NML	Yes	F1 and lower	Experienced staff Funding
Cambodia	Metrology law of Cambodia 2009	NMC Department of legal Metrology	Ministry of Industry and Handicraft NMC 4 x Departments of Metrology	Yes	E1 and lower	Adjustment of electronic instruments
Indonesia	Legal Metrology Act (1981) and related regulations	National mass std. is maintained by DoM. Other primary stds. are maintained by Depute of Calibration, Instrumentation and Metrology - the Indonesian Institute of Sciences.	Ministry of Trade, Directorate of Metrology, Local Governments	Laboratory procedure compliant with OIML R111	All classes (E1, E2, F1, F2 and M1-M3) are used Class F and M are used for legal metrology	None identified
Japan	Measurement Act (1992) and related regulations	There are (1) a voluntary traceability system, JCSS (Japan Calib. Serv. Sys.) and (2) a provision system of verification standards in legal metrology.	METI (Ministry of Economy, Trade and Industry), NMIJ (Nat. Met. Inst of Japan), local governments and JCSS labs.	Our technical standards in JIS are almost compliant with R 111.	All classes are used. The classes F & M are used in legal metrology.	Traceability with JCSS and another system for verification standards.
Kazakhstan	Ensuring the unity of measurements Act 2000	CTRM Kazakhstan Institute of Metrology Laboratories Accredited	Kazakhstan Institute of Metrology	yes	E1 and lower	None identified
Malaysia	National Measurement System Act 2007 Weights and measures Act 1972	Primary standard held by NMIM Laboratory Accreditation ISO	National Metrology Institute of Malaysia	Yes	E1 and lower	None identified
Mongolia		Accreditation for laboratory from KOLAS	MASM	Yes	E0 and lower	Personnel Funding
Myanmar	Draft law from PTB Waiting for Parliamentary signoff	Seeking Accreditation for laboratory 2016	Ministry of Education Department of Research and Innovation National Standards and Quality Department (Metrology Division)	Partly compliant	E2 and lower	Not identified
New Zealand	Weights and Measures Act 1987 and associated regulations	NZ primary standards maintained by the Measurement Standards Laboratory (MSL) Legal Metrology Standards maintained by Trading Standards	Measurement Standards Laboratory (MSL) for scientific metrology Trading Standards for legal metrology	Mostly compliant with R111	E1,E2,F1,F2 and M1 to M3 Class F and Class M used for legal metrology	None Identified
Papua New Guinea	NISIT Act 1993	Traceable through Australian primary standards Seeking Accreditation for laboratory	NISIT (National Institute of Std. & Industrial Technology)	Partly compliant	E2 (through Australia)	Funding New legislation required
Philippines	National Metrology Board	ISO 17025 Accredited laboratory (DAKKS)	Nat. Met. Lab. of the Philippines National Metrology Board (NMB)	Mostly compliant to R111	E2 and lower	No technical guidelines NMB not convened
Sri Lanka	Measurement Units Standards and Services Act No. 35 of 1995	Primary std. and legal metrology maintained by the Nat. Meas. Lab. of the Measurement Units Standards and Services Department	Ministry of Industry and Commerce	Laboratory procedure compliant with OIML R111	E1,E2,F1,F2 and M1 to M3 Class F and Class M used for legal metrology.	
Thailand	Weights and Measures Act B.E. 2574 (1999)	Primary std. is maintained by National Institute of Metrology (Thailand) (NIMT). Legal metrology is maintained by Central Bureau of Weights and Measures (CBWM).	NIMT for scientific metrology Trading Standards for legal metrology (CBWM).	Laboratory procedure compliance with OIML R111	E1,E2,F1,F2 and M1 to M3 Class F and Class M used for legal metrology.	None identified
Vietnam	Metrology Law 2012 Government issued circulars	STAMEQ VMI Quatest Accredited Laboratories	MOST STAMEQ	Mostly compliant	E1 and lower	None identified

Annex 4: Summary of action plans provided by the APLMF secretariat

Summary of Action Plans				
MEDEA APLMF1: Training Course on Mass Standards				
Jakarta, Indonesia – 30 Aug – 01 Sep 2016				
Title	**Surname**	**First Name**	**Economy**	**Action Plans**
Mr	Rahman	Mohammad Mamunur	Bangladesh	Improve environmental controls, Domestic training for colleagues , Develop procedures with information from training course
Mrs	Choden	Leki	Bhutan	Share information received on course and train fellow staff , Amend procedures to include air buoyancy correction
Mr	Seng	Tatanak	Cambodia	Share knowledge gained on course with colleagues Seek funding to improve systems and equipment
Mr	Tep	Channsokha	Cambodia	
Mrs	Kholishoh	Machida Nurul	Indonesia	On return instigate discussion around dissemination method with colleagues , conduct cross check on domestic method against method shown on training course , conduct in house training in DoM
Ms	Hasana	Putri Kania	Indonesia	
Mr	Milokumov	Viktor	Kazakhstan	Streamline and simplify procedures from information gathered from course , Present training to domestic laboratories
Ms	Ghazalli	Suliana	Malaysia	Disseminate knowledge between all laboratory staff , conduct cross check between dissemination method presented and domestic method being used , deliver training to MOT Inspectors
Ms	Amizam	Suhaidah	Malaysia	
Mr	Chanarav	Batkhuu	Mongolia	Give a presentation on course on return. Prepare a training course for verification officers
Ms	Lkhagvadorj	Delgermaa	Mongolia	
Dr	Win	Mar Lar	Myanmar	By using NIMJ method, share information and training course with colleagues and to train other mass laboratories in Myanmar.
Ms	Tun	Daw Thinzar	Myanmar	
Mr	Barilae	Allan Baba	Papua New Guinea	Report back to and pass on information from course to colleagues , Use course material to train new recruits , work to build the hierarchy of calibration services
Mr	Suycano	Kiveen	Philippines	Presentation to colleagues , Information from course will be used to help draft practical guides , launched on World metrology day , Information from course will be used in technical guidelines
Ms	Kumarapeli	Arachchige Dona Sharmilia Privadarshani	Sri Lanka	Implement dissemination scheme , share information with colleagues , develop calibration scheme
Mrs	Mallawaarachchi	Kalani Sandya	Sri Lanka	
Ms	Na Lampoon	Chayaisa	Thailand	Present to colleagues , train staff with knowledge gained from course , develop calibration scheme
Mrs	Mangdindam	Krongkarn	Thailand	
Mrs	Do Ngoc	Thanh Phong	Vietnam	Information from course will assist with technical research, Share knowledge gained on course with colleagues, We can advise STAMEQ leaders to develop metrology policy, comments on technical document such as: implement harmonized verification procedures on Mass standard methods and means of verification, or Mass standard Calibration procedure
Mr	Nguyen	Tien Dan	Vietnam	

Annex 5: Photographs

Group photo at the lobby of Borobudur Hotel (30 August)

Lectures (30-31 August) and practical activity (1 September)