



Analysis of the APLMF Survey on Benefit of Training Provided within the Asia Pacific Region by APLMF between 1995 and 2005

This survey was carried at the end of 2005 and requested information about all training courses presented by APLMF since 1997. 20 economies responded to the survey. They were: Australia, Cambodia, Canada, PR. China, Hong Kong China, Indonesia, Japan, DPR. Korea, Rep. Korea, Lao PDR., Malaysia, Mongolia, New Zealand, Papua New Guinea, Philippines, Singapore, Chinese Taipei, Thailand, U.S.A. and Vietnam. This represented 19 of the 20 member economies and one response from a corresponding member.

Part 1

1. Describe how important the APLMF Training Program is to your economy.

The survey respondents unanimously agreed that APLMF training programs were very important to their economy and listed the following outcomes to illustrate their effectiveness:

- Increased knowledge and expertise of key personnel with respect to OIML recommendations, regional differences and issues relating to testing of measuring instruments;
- Clarification of OIML recommendations that were previously misunderstood;
- Increased confidence that OIML recommendations are being interpreted correctly;
- Increased implementation of OIML recommendations within economies, as a result of greater understanding of the international requirements, helping to increase harmonisation between economies;
- New metrological regulations drafted to bring metrological control systems in line with international systems.
- Knowledge transfer from trained officers to other officers and industry within their economies;
- Resource requirements to implement new recommendations clearly understood;
- Safety measures implemented for fuel dispenser testing;
- Greater understanding of how each economy's metrological system compares with others within the region;
- Sharing of information and practices between economies at an informal level;
- New streamlined procedures adopted as a result of increased understanding; and
- Training provided a supportive environment for staff to learn how to assess measuring instruments.

2. When staff attend a training course which of the following best describes how the information received at the training course is shared with others?

All economies reported that staff attending APLMF training programs are expected to pass on their knowledge to others. 50% do this in a formal manner and 50% do this informally.

3. The APLMF website contains copies of training materials distributed at APLMF Training courses.

All economies reported they have access to the APLMF website and 18 economies reported this information was useful to them.

4. In relation to OIML recommendations list your economy's priorities for implementation over the next five years.

This question produced a very wide range of responses. The areas mentioned more than 3 times were as follows:

Priority area	Economies with this priority
NAWI	8
Measuring systems for liquids other than water (Fuel dispensers)	8
Water Meters	5
Electricity meters	4
Pre-packaged goods	4
Automatic weighing	3

5. What support will you require to implement the priorities listed in 4 above?

10 respondents requested training as an appropriate form of support for the implementation of their priorities. Another economy requested information about the implementation of OIML recommendations in other APLMF member economies.

Other Comments

It is important that APLMF courses are targeted to the needs of participating economies and attended by appropriate people within those member economies. It may be important to set some criteria or have some specifications for course participants that could go out with the invitation to attend a course. The challenge for APLMF is to ensure participants have the appropriate level of skills and a reasonable command of English. It will be difficult for the APLMF secretariat or the training course organizers to make this decision. Member economies will need to ensure they implement a process to ensure they select competent and appropriate participants. Some course participants, although highly skilled engineers or inspectors often have no training in presentation skills. The courses presenters make an attempt to give participants some presentation experience in order for them to successfully transfer the knowledge to others. Presentation skills may need to be addressed through specific training courses or workshops.

Part 2:

This section provided responses directly related to a specific APLMF training course. Responses have been summarised to highlight how the information was used, how it influenced change and what if any further assistance is required.

Part 2 - A Training Course on: *Introduction to High Capacity Oil and Gas Flow* presented in Tsukuba (Japan) 22-24 Sep. 1997

This seminar outlined the metrological issues related to high capacity flow meters in the oil and gas industry. 24 trainees attended this training course, representing 10 different economies: China (6), Indonesia (3), Malaysia (4), Mongolia, New Zealand, Papua New Guinea, Philippines, Chinese Taipei, USA (2) and Vietnam (4).

Describe how your economy utilized the material presented in this training course.

9 participating economies responded. The remaining 6 economies indicated the training had been useful in assisting them to implement the procedures, train their employees or to draft legislation to prepare for implementation.

Describe how this training course has influenced a change in your daily program.

Attendance at this course influenced changes in legislation; the method for conducting verification; and how metrological control of high flow meters and tank measurement is managed. One economy trained all their staff in the material and sent an expert to the University of Texas Petroleum Measurement Course in Houston, USA for further intensive training.

What further assistance would be supportive for your economy in this area?

Responses included requests for guidance on the development of flow measurement facilities (oil and gas), covering equipment and building layout plans, development of technical procedures and National standards, as well as the provision of written manuals and procedures. Two economies who had not attended the previous training requested the training be provided again.

Further training courses were requested on:

- verification of gas flow meters;
- verification and pattern approval of domestic water meters and gas meters;
- very high capacity flow meter (diameter > 254 cm) using ultrasonic flow meter; and
- uncertainty evaluation.

Part 2 - B Training Course on: *Modernization of Legal Metrology Legislative and Administrative Structures* presented in Tsukuba (Japan) 24-26 Sep. 1997

This was a forum for regional bodies to discuss how their legislation meets the needs of a modern society. 27 trainees attended this training course, representing 11 different economies, Canada (2), PR China (4) Indonesia (3), Malaysia (4), Mongolia, New Zealand (2), Papua New Guinea, Philippines, Chinese Taipei (2), USA (3) and Vietnam (4).

Describe how your economy utilized the material presented in this training course.

10 participating economies responded. This training course allowed those who attended to bench mark their legislation against others within the region. 3 economies used the materials presented to draft legislation to modernise their systems.

Describe how this training course influenced a change in your program.

It created awareness of the need to ensure harmonization with regional and international standards in the drafting of technical legislation and test procedures. In some cases changes were made in legislation or verification procedures to ensure conformity with international regulations.

What further assistance would be supportive for your economy in this area?

Further training courses were requested on:

- international conformity and compatibility in legal metrology and administrative regulations; and
- implementation of OIML recommendations.

Part 2 - C Training Course on: *Pattern Approval of Non-automatic Weighing Instruments* presented in Tsukuba (Japan) on 1-3 Oct. '97; and in Shanghai (PR China) on 3-10 Sep. '98

This was a workshop outlining the test procedures for carrying out pattern approval of non-automatic weighing instruments in accordance with OIML R 76. Participants were provided with a set of written test procedures. 38 trainees attended this training course, representing 14 different economies, Albania (2), PR China, Indonesia (4), Japan (2), Lao PDR, Malaysia (4), Mongolia (2), New Zealand (2), Papua New Guinea(2), Philippines (2), Russia (2), Singapore, Thailand, USA (8) and Vietnam (5).

Describe how your economy utilized the material presented in this training course.

13 economies responded. There was agreement the training had provided greater comprehension and clarification of the OIML recommendation and this had led to successful implementation. By providing training materials it made it easier to train others (engineers and inspectors). The opportunity to practice, see demonstrations and discuss issues with other participants ensured good understanding of the material.

Describe how this training course influenced a change in your program.

- The training increased the skill level of both the participants and those who were trained by the participants later.
- The provision of written test procedures facilitated further training and discussion within an economy.
- It assisted economies to change their procedures so they harmonised with the rest of the region.
- Some economies adopted new legislation to facilitate the implementation of OIML R 76.
- Economies without pattern approval facilities gained confidence to accept OIML Certificates of Conformity and OIML test reports for the registration and approval of weighing instruments for trade use.
- One economy acknowledged the skills acquired assisted them to obtain ISO 17025 Accreditation and OIML Issuing Authority Status for non-automatic weighing instruments.
- Training assisted domestic manufacturers of NAWI to improve their product quality to ensure it meets OIML R 76 requirements.

What further assistance would be supportive for your economy in this area?

Cooperation in testing of measuring instruments among member economies, so that a member economy which lacks certain facilities could use the facilities of a testing laboratory in another economy.

Further training courses were requested on:

- high capacity weighing instruments using OIML R 76;
- a repeat of this training so more staff could attend; and
- a training course for the benefit of weighing instruments suppliers, manufacturers and weights and measures authorities.

Part 2 - D Training Course on: *Introduction to High Capacity Weighing* presented in Shanghai (PR China) 31 Aug. - 2 Sep. 1998

This workshop outlined the test procedures required to verify automatic weighing instruments (rail weighbridges, belt weighers and totalising hoppers) in accordance with OIML R 106, OIML R 50 and OIML R 107. 20 trainees attended this training course, representing 13 different economies, Albania (2), Indonesia, Japan (2), Lao PDR, Malaysia, Mongolia, New Zealand, Papua New Guinea, Philippines, Singapore, Thailand, USA (6) and Vietnam.

Describe how your economy utilized the material presented in this training course.

9 economies responded. The training provided a better understanding of high capacity weighing requirements and was used for in-house training. Implementation was limited in some cases due to lack of equipment.

Describe how this training course influenced a change in your program.

- The training course provided an overview of the requirements for calibration and verification of high capacity weighing instruments.
- Better metrological control of these instruments was achieved as OIML Recommendations were taken into consideration and changes were implemented.
- The course material was adapted and included in type approval manuals.
- In-house training was provided.

What further assistance would be supportive for your economy in this area?

Further training courses were requested, on:

- belt weighers and totalising hoppers, incorporating theory and practice and providing updated test procedure manuals; and
- technical information with opportunities to discuss it with colleagues from other economies.

Part 2 - E Training Course on: *Rice Moisture Meters* presented in Japan 30 Sep. - 10 Oct. 2001; in Khon Kaen (Thailand) on 19-30 Aug. 2002; in Bien Hoa (Vietnam) 30 Aug. - 10 Sep. 2004; and in Chiang Mai (Thailand) 15-26 Nov. 2004

This was a workshop to develop a traceability system of grain moisture measurements suitable for APLMF member economies, and share common knowledge and technical base in this field. 92 trainees attended these training courses, representing 11 different economies, Brazil (2), Cambodia (3), PR China (7), Indonesia (5), Korea (4), Lao PDR (3), Malaysia (5), Myanmar (3), Philippines (17), Thailand (30) and Vietnam (13).

Describe how your economy has utilized the material presented in this training course.

9 economies responded.

- The training provided advice which allowed the rice moisture measurement requirements to be added to technical regulations.
- Current traceability systems and calibration procedures have been assessed to ensure they met the requirements.
- Suitable resources have been purchased to upgrade and/or establish rice moisture measurement testing facilities.
- The materials have been used for in-house training.
- For those not currently carrying out rice moisture testing the course provided meaningful methods which will be implemented in the future.

Describe how this training course influenced a change in your program.

- Technical Regulations have been formulated which will be implemented in the near future.
- The hierarchy of standards has been modified according to the system described in the training course.
- Rice moisture meters are used more effectively.
- The traceability system for rice moisture meters is now based on the international standard protocol and other standards.
- Capability of staff has improved.
- The information has been passed onto regional staff, private industries, manufacturers and farmers.
- The proper method is now applied for preparing reference samples by collecting reference samples according to varieties, accurately considering the moisture range of samples and adjusting moisture content by drying or by moistening.

What further assistance would be supportive for your economy in this area?

Funding support is needed to: purchase rice moisture meters and the equipment for a rice moisture measurement laboratory; and to attend further training courses. Training courses should continue until all economies can achieve a common standard protocol for rice moisture measurement. An intercomparison of moisture meters should be conducted among Asian countries.

Further training courses were requested on:

- establishing the technical criteria for measurement uncertainty;
- differences between the 105 degree dry oven method and the 130 degree method. There is 0.3-0.4 % M.C. difference in two methods (105 C method is used in Korea, Japan and China, and 130 C method in other south Asia);

- re-establishing calibration/traceability systems and validating the verification procedure;
- establishing the traceability system when there are numerous types of rice moisture meters and also many rice varieties (method evaluation for pattern approval and appropriate selection of master or working rice moisture meters); and
- calibrating moisture meters for coffee, oilseeds or wood and gases.

Part 2 - F Training Course on: *Verification of Petroleum and LPG Dispensers* presented in Beijing (PR China) 14-23 May 2001; in Hanoi (Vietnam) 4-9 Aug. 2003; and in Pattaya (Thailand) 25 Apr. - 5 May 2005

This workshop delivered a training package designed to support experts to train verifiers of fuel dispensers within their economy on the procedures required to implement OIML R117. 74 trainees attended these training courses, representing 16 different economies, Cambodia (3), PR China (10), Chinese Taipei, DPR Korea (4), Hong Kong China (3) Indonesia (3), Lao PDR, Malaysia (2), Mongolia (2), Papua New Guinea (2), Peru (2), Philippines (3), Rep. Korea (3), Singapore (2), Thailand (10) and Vietnam (23).

Describe how your economy has utilized the material presented in this training course.

14 economies responded. The materials have been used for in-house training of inspectors, licensees and other colleagues. Several economies have adopted the criteria of OIML R117 requirements for the verification of fuel dispensers (other than LPG) and for LPG dispensers. Joint verification exercises with other government departments on the LPG dispensers in filling stations have been carried out. Pattern approval and verification regulation have been revised to ensure compliance with OIML R 117. One economy has initiated the verification process of petroleum dispensers not previously carried out. The training materials have been translated and summarised. Articles relating to the training have been published in journals.

Describe how this training course influenced a change in your program.

- OIML R117 requirements are being implemented.
- New regulations/guides have been enacted which comply with the training.
- An objective has been set to harmonize related regulations with OIML recommendations.
- The knowledge facilitates interactions and assistance with interdepartmental agencies with responsibilities for the verification of LPG dispensers at the LPG filling stations.
- Instruments are now adjusted based on the tolerance used in the training and this has been accepted by all stations and fuel companies.
- Training of fuel dispenser verification is now included in the training schedule.
- Testing procedures have been translated and adopted.

What further assistance would be supportive for your economy in this area?

Identified assistance included e-mail correspondence with the trainers to advise whenever there are any changes in the verification technology of LPG dispensers and technical guidance in the set up of a full pattern approval laboratory for petroleum and LPG dispensers. Funding support was also sought for attendance at training courses.

Further training courses were requested on:

- verification of large volume flowmeter and road tankers particularly with respect to the temperature compensation;
- pattern approval of fuel dispensers using OIML R 117 and/or provers;
- verification of LPG dispensers (repeat of this course); and
- verification of Coriolis Flow Meters used for custody transfer of fuel/fuel oil products and/or compressed natural gas. Training may include verification (water draw test) of compact provers used in verification (field proving of Coriolis meters.).

Part 2 - G Training Course on: *Developing Legislation for the implementation of OIML R 87 (Prepackaged Goods)* presented in Kuala Lumpur (Malaysia) 28-30 July 2004

This was a seminar examining the pre-packed goods legislative requirements underpinning the implementation of the OIML R 87. 30 trainees attended this training course, representing 12 different economies, Cambodia (2), PR China (2), Hong Kong China, Indonesia (2), Lao PDR (2), Malaysia (15), Myanmar, Papua New Guinea, Peru, Singapore, Thailand and Vietnam.

Describe how your economy has utilized the material presented in this training course.

12 participating economies responded. The training increased understanding of R87 requirements (new version). The materials were used for in-house and industry training. The material has influenced the requirements for controlling prepacked goods, the development of new standards for prepacked goods and changes in legislation. It has assisted ASEAN countries to meet their commitment to implement the common requirements of OIML 87 by 2008.

Describe how this training course influenced a change in your program.

- New regulations were established or existing ones modified to ensure they comply with OIML R 87.
- The current legal metrology framework is being examined to determine what changes are required in order to align with international requirements.
- Test procedures now conform to international practice.
- A review of whether prepacked goods should come in standard sizes is still being considered.
- The training course improved domestic training courses and gave domestic trainers more confidence that they understand the new requirements.

What further assistance would be supportive for your economy in this area?

Identified assistance included e-mail correspondence with the trainers, sharing of information related to prohibitions against misleading packaging, training for more people to assist implementation and funding support for attendance at training courses.

Further training courses were requested on:

- the implementation (practical application) of pre-packages goods (e.g. Calculation of net content of pre-packages goods).

Part 2 - H Training Course on: Automated Sphygmomanometers presented in Taipei (Chinese Taipei) 30 Aug. – 3 Sep. 2004

This was a seminar outlining the issues related to the basic understanding, calibration, standards and regulation of sphygmomanometers. 22 trainees attended this training course, representing 12 different economies: Brunei Darussalam, Cambodia, Chinese Taipei (11), Indonesia, Japan, Malaysia, Mexico, Mongolia, Peru, Singapore, Thailand and Vietnam.

Describe how your economy has utilized the material presented in this training course.

10 participating economies responded. The training course increased understanding on automated sphygmomanometers. OIML R16-1 and OIML R16-2 have been adopted by several economies. One economy is planning to start verification of this measuring instrument in the next few years by coordinating with Ministry of Health. Another economy has translated the material to support implementation. The material has been distributed among relevant staff for study and will be used as a guide for this activity which will be conducted in the future.

Describe how this training course influenced a change in your program.

The training deepened understanding of the issues related to verification of these instruments. OIML R16-1 and OIML R16-2 have been adopted and a draft technical specification for verification and inspection of non-invasive electronic sphygmomanometers implemented. Some economies need to establish official procedures and regulations in order to control these instruments. Once the instruments are controlled, they intend to follow OIML R 16-2 Edition 2002(E) and EN 1060.

Tick the training courses below that would benefit your economy.

Note: In this case a slightly different question was asked in the survey.

Course title	Number of economies requesting this training
Comparison of related regulations and standards	6
Hands-on demonstration of equipment	4
Market analysis of sphygmomanometers	2
Verification of heat meters, OIMLR84, OIMLR75-1,2	1

Part 2 - I Training Course on: *Non-contacting Clinical Thermometers* presented in Bangkok (Thailand) 19-22 Sep. 2005

This was a seminar outlining the issues related to the calibration of clinical thermometers. 38 trainees attended this training course representing 9 different economies: Cambodia, PR China, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Thailand (22) and Vietnam (9).

Describe how your economy has utilized the material presented in this training course.

7 participating economies responded. Most economies who participated have no metrological control established for these instruments. All agreed the information would be useful in the future. One economy has established a plan to set up a calibration facility for non-contacting body thermometers based on the material presented. Others have distributed the material among relevant staff for study and will use it as a guide for this activity which will be conducted in the future.

Describe how this training course influenced a change in your program.

The training course provided basic ideas for consideration in setting up a calibration facility for these instruments. The information was used for in-house training. Two economies have made plans to introduce metrological control in the near future.

What further assistance would be supportive for your economy in this area?

Requested assistance included a proficiency testing program on calibration of non-contact thermometers and funding support to attend training courses.

Further training courses (not seminars) were requested on:

- theory and practical on the thermometers and black body source;
- techniques used to calibrate the thermometers,
- data analysis and measurement uncertainty calculations, and
- information to be reported in the calibration report.

Other comments

This training is very important since most of the hospitals are now using non- contact clinical thermometer and are not aware of the issues of traceability and calibration.

Part 2 - J Training Course on: *Electricity Meters* presented in Hanoi (Vietnam) 9-12 Mar'05

This was a seminar outlining the basic understanding, process for type approval and verification of electricity meters. 35 trainees attended this training course representing 15 different economies: Brunei Darussalam, Cambodia, Chile, Chinese Taipei (2), PR China (3), Indonesia, Lao PDR, Malaysia, Mexico, Mongolia (2), Papua New Guinea, Peru, Philippines, Thailand and Vietnam (17).

Describe how your economy has utilized the material presented in this training course.

13 participating economies responded. Some economies have fully implemented OIML R 46. The material has been used as reference and guidance documents for the maintenance, handling, type approval, verification and re-verification of electricity meters and demand meters. Others have made it a high priority to establish a control system and to train their metrologists. One economy is about to establish a calibration facility to ensure traceability and will be establishing appropriate legislation and regulations as recommended by the training. Another economy has translated the training material and used them to provide in-house training. The training materials have been distributed among relevant staff for study and will be used as a guide for this activity which will be conducted in the future.

Describe how this training course influenced a change in your program.

The training course and its materials have improved verification officers knowledge about theory of electrical measurement, electrical meters and information about the electricity measurement practices in other regional economies. Shortcomings in each economy were highlighted and work commenced towards implementation. Suggestions on administration of type approval of electricity meters were adopted and practices for verifying the compliance of electricity meters with the type approval were considered. While the training has provided a plan to test electricity meters one economy noted they do not have appropriate testing equipment. In-house training has been organised and information disseminated to other relevant authorities.

Currently and over the next 5 years, how do you see the revision of OIML R46 affecting your training courses or regulatory requirements? *Note: In this case an additional question was asked in the survey.*

Most respondents agreed they would be adopting OIML R 46 in time over the next 5 years. In some cases this will require changes to regulatory requirements.

What further assistance would be supportive for your economy in this area?

Requested assistance included opportunities for more technological communication and cooperation between economies to learn more from each other, as well as funding support to attend training courses.

Further training courses were requested on:

- OIML R 46 with an emphasis on practical work using equipment to calibrate a set of watt-hour meters including a module to test harmonic distortion and including a comparison of member economies' regulations and related standards;
- software and programs of electricity meters and prepaid electricity meters; and
- how to set up a testing laboratory for electricity meters.

Part 2 - K Training Course on: *Verification of Non-automatic Weighing Instruments (NAWI)* presented in Bandung (Indonesia) 24 Aug. – 1 Sep. 1999; Hanoi (Vietnam) 8 -

APLMF Secretariat

NMIJ/AIST Tsukuba Central 3-9, 1-1-1 Umezono Tsukuba Ibaraki 305-8563, Japan
TEL +81-298-61-4362, FAX +81-298-61-4393, E-MAIL: e.sec@aplmf.org URL: <http://www.aplmf.org/>

13 Apr. 2002; Shanghai (PR China) 8-12 Nov. 2004; and Jakarta (Indonesia) 12-16 Sep. 2005

This was a workshop to provide a training package that would allow experts to train verifiers of non-automatic weighing instruments within their economy on the procedures required to implement OIML R76. 96 trainees attended these training courses representing 18 different economies: Cambodia (3), PR China (12), Chinese Taipei (3), Hong Kong China, Indonesia (33), Japan (7), DPR Korea (2), Rep Korea (2), Lao PDR, Malaysia (4), Mexico, Mongolia (4), Papua New Guinea (2), Peru (2), Philippines (2), Singapore (2), Thailand (3), and Vietnam (12).

Describe how your economy has utilized the material presented in this training course.

Most economies have implemented OIML R 76 and have developed test methods in calibration and verification of NAWI based on the training materials. However there are issues relating to mechanical weighing instruments as they do not have sufficient resolution and some have a large scale interval (e) which may exceed the MPE considerably. One economy is reviewing metrological and technical aspects of the rules on the determination of precision class, repeatability and zero-test of NAWI based on the training materials. Training was provided for enforcement officers and for NAWI licensed repairers/manufacturers. The training materials were used to upgrade existing training materials and were summarised and published as a report for inspectors to use.

Describe how this training course influenced a change in your program.

OIML R76 is now used as the basis for the evaluation, testing and verification of weighing instruments for trade purposes in most participating economies. Existing test procedures have been streamlined to commensurate with international practice. Differences between current practice and OIML R 76 are understood and have assisted the implementation of OIML R 76. One economy indicated that before attending the training course they did not use OIML R 76 but as a result of the training they now apply OIML R76. NAWI training has been conducted at the inspection level. The training materials were translated.

What further assistance would be supportive for your economy in this area?

Identified assistance included e-mail correspondence with the trainers and more contact between economies implementing OIML R76, as well as funding for attendance at training courses.

Further training courses were requested on:

- verification of weighbridges;
- automatic rail weighbridges;
- pattern evaluation of NAWI;
- calibration of electric weighing instruments;
- more NAWI training so more officers can appreciate the regional differences;
- comparison of member economies' regulations and related standards; and
- verification of mechanical NAWI instruments.