Asia-Pacific
Economic Cooperation

Asia-Pacific
Legal Metrology Forum

Report of Training Course on Verification of LPG (Liquefied Petroleum Gas) Fuel Dispensers

APEC/APLMF Training Courses in Legal Metrology (CTI 11/2006T)

August 28 to September 1, 2006
Shanghai, People's Republic of China

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APEC#207-CT-01.2 ISBN 4-9905094-5-6

March 2007

Training Course on Verification of LPG (Liquefied Petroleum Gas) Fuel Dispensers
August 28 to September 1, 2006

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Foreword

This booklet is one of the outcomes of the APEC Seminars and Training Courses in Legal Metrology titled “Training Course on LPG (Liquefied Petroleum Gas) Fuel Dispensers” that was held from August 28 to September 1, 2006 at the Bund Hotel in Shanghai, the People’s Republic of China. This training course was a follow-up after the two training courses on fuel dispensers held in 2001 and 2005. It was organized by the Asia-Pacific Legal Metrology Forum (APLMF) with a support fund of APEC Trade and Investment Liberalization and Facilitation (TILF) program, CTI-11/2006T. The training course was also supported by (1) General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ), (2) Shanghai Institute of Measurement Testing Technology (SIMT), (3) National Measurement Institute, Australia (NMIA) and (4) National Metrology Institute of Japan (NMIJ). Having this result, I would like to extend my sincere gratitude to Mr. Liu Xinmin of AQSIQ, Prof. Shao Li of SIMT, Mr. Ronald Stephen Plummer of Tasmanian Consumer Affairs, Mrs. Marian Haire of NMIA and Mr. Li Jinsi of Beijing Institute of Metrology. Also special thanks should be extended to the APEC Secretariat for their great contributions.

We have conducted the survey among the APEC member economies concerning seminar and training programs in legal metrology to find their needs as well as possible resources available in the region. The survey shows that there is a strong need for a training course designed for fuel dispensers. Also, as a result of the previous training courses on fuel dispensers, an independent program dedicated for LPG was requested by the member economies. LPG fuel disperser is one of the important categories of instrument in legal metrology closely connected to our daily life as energy sources used in household, restaurant, hotels, vehicles, etc. In addition, according to the globalization of international trade in worldwide, the compliance to international recommendations related to fuel dispensers, which is represented by the OIML Recommendation R117, is getting an important issue for the APEC and APLMF member economies.

Main target of this training course was to assist the experts in charge of verification of LPG fuel dispenser in the member economies to learn in depth and to develop common understanding about the verification procedures based on the international standards and OIML recommendations. Thus the target would meet the APEC objective to harmonize metrology legislation with OIML international recommendations. The contents of the training course were focused on the understandings of basic principle and construction of fuel dispensers, safety precautions in dealing with dispensers, international or national recommendations related to the fuel dispensers, and learning of actual verification procedures through practices at a real facility using fuel dispensers.

In view of these situations, the Training Course on LPG Fuel Dispensers provided an opportunity to the Asia-Pacific region with a sure basis of confidence in Legal Metrology related to LPG dispensers. I would like to say that this is certainly a valuable step to fruitful activities in order to build a technical infrastructure for the verification of fuel dispensers in the Asia-Pacific region.

I am really pleased to have this outcome from the training course and again deeply appreciate invaluable voluntary efforts of the APEC and APLMF secretariats.

March 1, 2007

Dr. Akira Ooiwa
APLMF President

Summary Report on
the Training Course on Verification of LPG Fuel Dispensers

The Training Course on Verification and In-service Inspection of LPG (Liquefied Petroleum Gas) Fuel Dispensers was held from 28 August to 1 September 2006 at The Bund Hotel in Shanghai, the People's Republic of China. This course was jointly presented by Asia–Pacific Legal Metrology Forum (APLMF) and the Asia–Pacific Economic Cooperation (APEC) with support from the General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) of the People's Republic of China, the Shanghai Institute of Measurement and Testing Technology (SIMT) of the People's Republic of China, the National Measurement Institute, Australia (NMIA) and National Metrology Institute of Japan (NMIJ).

The main objective of this training was to provide officials in charge of verification of Liquefied Petroleum Gas (LPG) dispensers with training on safety requirements, properties of LPG, dispenser components, metrological requirements for dispensers, and procedures for verification including necessary equipment. The training course included both lectures in a classroom and field training at a facility with LPG dispensers. The course provided support to member economies to assist them in meeting the APEC and APLMF objective to harmonise metrology legislation on OIML international recommendations.

24 trainees attended the course from the following 14 different economies namely: Cambodia, Chile, Hong Kong China, Indonesia, Republic of Korea, Lao PDR, Malaysia, Mongolia, People's Republic of China, Peru, Philippines, Chinese Taipei, Thailand and Vietnam. Two trainers from Australia provided the training. The executive secretary of APLMF and more than thirteen staff from the host economy also supported the course. Most of the participations from outside China were supported by APEC or APLMF. The host economy provided the venue, transportation and meals. In addition the host and APLMF graciously provided two evening functions to provide an opportunity for the participants to get to know each other and to exchange information informally.

Petroleum products play an important economic and commercial role within our economies. As the price of petrol is rising across the world many consumers and governments are seeking more affordable sources of fuel for transportation. LPG currently is less expensive and also less polluting than the more commonly available fuel sources. This could mean an increase in the number of LPG dispensers within our region and an increased need for experienced staff to verify these dispensers. The fuel dispensed at these service stations must be measured using an accurate and reliable system to provide confidence to the consumer. As part of the process of ensuring fuel dispensers are reliable and accurate modern economies implement a national measurement system which includes pattern approval of fuel dispensers and periodic verification of these instruments while they operate in the marketplace. OIML member economies implement the recommendations contained in OIML R 117. This agreed set of internationally accepted test procedures is used for both pattern approval and verification of fuel dispensers.

OIML R 117, issued in 1997, was used by the NMIA to develop this Train-the-Trainer package. All Trade Measurement inspectors in Australia have been trained and most licensed certifiers have also attended training. The objectives of the Train-the-Trainer course delivered in Shanghai are to provide:

- highly competent individuals from member economies with a training package they can use in their own economies to implement OIML R 117;
- opportunities for in-depth discussion to clarify understanding of the test procedures for LPG dispensers; and
- a sound basis for harmonisation of verification of LPG dispensers within the region.

By providing regionally consistent training aligned with international best practice and standards, APLMF is assisting with the harmonisation of legal metrology within the region. Thus it provides greater confidence between economies and a strong support network between senior staff who are implementing OIML R 117 within the region.

The training course on LPG fuel dispensers has been delivered three times before within the Asia Pacific region: the first time was in 2001 in Beijing; the second time was in 2003 in Hanoi and the third time in 2005 in Pattaya, Thailand. This training program provides participants with a CD ROM containing electronic copies of all the training materials used throughout the course. This will allow course participants to modify this work to suit their economy and to train others when they return to their own workplace. Read only versions of all APLMF training courses are also available on the APLMF website.

The CD ROM for Fuel dispensers – LPG Dispensers contains:

- NMI V 2-2 Uniform Test Procedures for the Verification, Certification and In-service Inspection of fuel dispensers – LPG.
- Trainers Manual – providing step-by-step instructions for the trainer
- Learners Manual – notes on the course including exercises to reinforce learning
- Assessment Manual – some questions to assess how much has been understood
- Assessment Manual Answers
- PowerPoint presentation with embedded video outlining the steps required to test a dispenser

The training course was officially opened by Madam Kong Xiaokang, Deputy Director General, Department of International Cooperation, AQSIQ who welcomed all participants to Shanghai and encouraged them to learn as much as possible during the course. Prof. Shao Li, Director of SIMT also delivered a short address where he acknowledged the sharing of information between participants was an essential aspect of these types of courses. Dr. Tsuyoshi Matsumoto, APLMF Executive Secretary, gave an opening address including the backgrounds and objectives of the training course. Mrs. Marian Haire presented both Madam Kong and Prof. Shao with a token of appreciation to acknowledge their valuable contribution to the course and the work of APLMF. After the opening ceremony, each economy delivered a short report outlining their experience with LPG dispensers and explaining how verification is managed within their economy. The information presented by all economies provided a deeper understanding of how the procedure of verification varies within the region. While many participating economies have a fully implemented metrological control system in place for LPG dispensers others are currently establishing a system. This made the timing of this course particularly valuable. By gaining an overview of the requirements they will be better able to inform new policy directions upon return to their economies. An important aspect of this training course was the in-field practice. Practical training was carried out in a laboratory at SIMT. This allowed each participant to gain knowledge of the process under the guidance of experts who work in the SIMT laboratory. These experts ensured that each participant was given the opportunity to observe the procedures required to test an LPG dispenser.

APLMF would like to acknowledge the hard work and dedication of the following individuals who worked cooperatively to ensure the training achieved a successful outcome. Madam Kong Xiaokang, AQSIQ who agreed to host the training. Mr. Han Jianping and his team who managed all the practical arrangements to ensure the course would run smoothly. Prof. Shao Li who provided the facility and personnel for the practical training exercise. Mr. Ron Plummer, Principal Inspector from the Standards Branch of Tasmanian Consumer Affairs, Australia who presented the training. Mr. Plummer has more than twenty years experience working as an inspector and is an accredited national trainer within Australia. His experience makes him a highly competent trainer. Mr. Li Jinsi, Senior Engineer from the Beijing Institute of Metrology who supported Mr. Plummer throughout the course. Mr. Zhang

Zhengming and Miss Zhang Liping who assisted participants as they obtained practical experience using equipment at SIMT. Mrs. Marian Haire, Manager, Training and Technology Transfer, NIMA, coordinated the development of the package and presented the training aspects of the course. Dr. Tsuyoshi Matsumoto, executive secretary of APLMF who provided support and administration of the training course. All the participants worked hard and applied themselves to the task of ensuring they got the most from the course. They showed dedication and interest throughout the training. They participated in the challenge when asked to demonstrate they understood the materials and presented the information back to the group with good humour and imagination.

The closing ceremony was conducted on Friday 1 September where Mr. Liu Xinmin of AQSIQ, Prof. Shao Li and Mrs. Marian Haire presented certificates to the 24trainees. Most of the participants returned evaluation forms which provided valuable information for the organisers. They commented on the practical nature of the course, the clarity of the presentation, the effectiveness of the CD ROM presentations and the experience and knowledge of the presenters. When asked what they would change, suggestions were made which would extend the scope of the course. Some wished they could have more time for practice and others wanted to include more information on pattern approval. The participants found it most valuable to have an opportunity to discuss in depth the issues related to the implementation of OIML R117 and to have practical ways to implement it in their own economies. All participants went away determined to train others and to discuss how they would implement the procedures in their economies.

Mrs. Marian Haire
Manager
Training and Technology Transfer
National Measurement Institute, Australia

Asia-Pacific Economic Cooperation

Asia–Pacific Legal Metrology Forum

APEC/APLMF Seminars and Training Courses in Legal Metrology (CTI 11/2006T)

Training Course on Verification of LPG (Liquefied Petroleum Gas) Fuel Dispensers

August 28 to September 1, 2006
at the Bund Hotel in Shanghai, the People's Republic of China

Program

Organizers:

1. Asia–Pacific Economic Cooperation (APEC)
2. Asia–Pacific Legal Metrology Forum (APLMF)

Supporting Organizations:

1. General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) of the People's Republic of China
2. Shanghai Institute of Measurement Testing Technology (SIMT)
3. National Measurement Institute, Australia (NMIA)
4. National Metrology Institute of Japan (NMIJ)

Main Objective:

This training course intends to provide officials in charge of verification of fuel dispensers for Liquefied Petroleum Gas (LPG) training on general safety, properties of LPG, dispenser components, requirements on dispensers, and procedures for verification including necessary equipments. The training course includes both lectures in a classroom and field training at a facility with LPG dispensers. The course aims to assist member economies to meet the APEC and APLMF objective to harmonise metrology legislation on OIML international recommendations.

Trainers:

1. Mrs. Marian Haire, Manager, Training and Technology Transfer, National Measurement Institute, Australia
2. Mr. Ron Plummer, Principle Inspector, Standards Branch from Tasmanian Consumer Affairs, Australia
3. Mr. Li Jinsi (assistant trainer), Senior Engineer, Beijing Institute of Metrology

Registration:

Fill attached "Registration Form" and send it to the APLMF secretariat by **July 31, 2006**.

Visa assistance:

If you need a visa to enter PR China, please fill up the bottom portion of the "Registration Form" for 'Visa information'. This information will be forwarded to the host by APLMF secretariat. Upon receipt of the information, the host will send an official letter of invitation for visa application.

Venue and Accommodation:

Bund Hotel
525 Guang Dong Road, Shanghai, PR China
Tel: +86-21-63522000, Fax: +86-21-63522777
E-mail: salesez@thebundhotel.com
http://www.thebundhotel.com/

If you hope to reserve a room at the venue with a rate USD87 net/night, please fill up the "Hotel Reservation Form" and send it to the host in PR China by **July 31**.

Access Information

The Bund Hotel is conveniently located in the heart of the downtown city of Shanghai, 48 km away from Pudong International Airport. Regarding the access to the venue, vans from/to the Pudong International Airport would be provided on August 27 and September 2 (details will be informed later).

Contact Persons for the Training Course:

1. APLMF Secretariat (registration and travel support)
Dr. Tsuyoshi Matsumoto & Ms. Ayako Murata

APLMF Secretary
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 & sec@aplmf.org

2. Working Group of Training Coordination of APLMF (lecture and training materials)
Mrs. Marian Haire

Training Coordinator, National Measurement Institute, Australia
PO Box 264, Lindfield, New South Wales 2070, Australia
Tel: +61-2-8467-3575, Fax: +61-2-8467-3784
E-mail: marian.haire@measurement.gov.au

3. Host in PR China (visa assistance, accommodation and venue)
Mr. HAN Jianping and Mrs. XIE Hongyan

Dept. of International Cooperation,
General Administration of Quality Supervision, Inspection and Quarantine
NO. 9 Madiandonglu, Haidian District, Beijing, the People's Republic of China
Tel: +86-10-82262171, Fax: +86-010-82260215
E-mail: hanjp@aqsiq.gov.cn & xiehy@aqsiq.gov.cn

Final Program

Day 1: Monday, August 28 **Venue: Bund Hotel**

Time	Details	Presenter
14:00 – 14:15	. Opening ceremony -Introduction by Mr. Han Jianping, Director Division, Department of International Cooperation, AQSIQ -Welcome address by Mrs. Kong Xiaokang, Deputy Director-General, Dept. of International Cooperation, AQSIQ -Opening address by Dr. Tsuyoshi Matsumoto, APLMF Secretary -Welcome address by Prof. Shao Li, Director, Shanghai Institute of Measurement and Testing Technology	APLMF and Host
14:15 – 15:30	. Overview of the course . Economy reports: a trainee from each economy explains the system used to verify LPG fuel dispensers in their economy.	Marian Haire and trainees
15:30 – 16:00	*Coffee Break*	
16:00 –17:40	. Economy reports continue	
19:00-21:00	. *Welcome dinner at the Zhong Fu Grand Hotel, No. 619 Jiujiang Road, Shanghai*	Host

Day 2: Tuesday, August 29 **Venue: Bund Hotel**

Time	Details	Presenter
9:00 – 10:40	. Properties of LPG . Working safely with LPG . Construction of an LPG dispenser.	Marian Haire and Ron Plummer
10:40 – 11:00	*Coffee Break*	
11:00 – 12:30	. Preparation for testing . Equipment for testing LPG dispensers . Visual Inspection	Ron Plummer
12:30 – 14:00	*Lunch Break*	
14:00 – 15:30	. Functional tests	Ron Plummer
15:30 – 16:00	*Coffee Break*	
16:00 –17:00	. Performance testing using a master meter	Ron Plummer

Day 3: Wednesday, August 30 **Venue: Bund Hotel**

Time	Details	Presenter
9:00 – 10:30	. Performance testing using a master meter	Ron Plummer
10:30 – 11:00	*Coffee Break*	
11:00 – 12:30	. Performance testing using a master meter . Question and answer session	Ron Plummer and Marian Haire
12:30 – 14:00	*Lunch Break*	
14:00 – 15:30	. Performance testing using the gravimetric method	Ron Plummer
15:30 – 16:00	*Coffee Break*	
16:00 – 17:00	. Performance testing using the gravimetric Method . Question and answer session	Marian Haire and Ron Plummer

Day 4: Thursday, August 31 Venue: LPG Testing Facility of the Shanghai Institute of Measurement Testing Technology (SIMT)

Time	Details	Presenter
8:30	*Leave the hotel lobby for the facility by bus*	
9:30 – 10:30	. Observe demonstration of individual tests . Discussion in classroom of procedure	Ron Plummer, Marian Haire and Li Jinsi
10:30 – 11:00	*Coffee Break*	
11:00 – 12:30	. Participants work in groups to conduct individual tests according to the test procedures. . Discussion in classroom of procedure	Ron Plummer, Marian Haire and Li Jinsi
12:30 – 14:00	*Lunch Break at the New Palace Restaurant*	
14:00 – 15:30	. Observe demonstration of tests as carried out in the field. . Discussion in classroom of procedure	Ron Plummer, Marian Haire and Li Jinsi
15:30 – 16:00	*Coffee Break*	
16:00 –17:00	. Participants work in groups to conduct tests according to the test procedures	Ron Plummer, Marian Haire and Li Jinsi
18:00	. *Return to the hotel by bus*	

Day 5: Friday, September 1 Venue: Bund Hotel

Time	Details	Presenter
9:00 – 10:30	. Group presentations . Discussion and feedback	Marian Haire and trainees
10:30 – 11:00	*Coffee Break*	
11:00 – 12:30	. Continue the group presentations . Discussion and feedback	Marian Haire and trainees
12:30 – 14:00	*Lunch Break*	
14:00 – 15:30	. Continue the group presentations . Discussion and feedback	Marian Haire and trainees
15:30 – 16:00	*Coffee Break*	
16:00 – 16:20	. Closing Ceremony - Introduction by Mr. Han Jianping, AQSIQ - Give certificates to all trainees by Mr. Liu Xinmin, Prof. Shao Li and Mrs. Marian Haire. - Farewell address by Mr. Liu Xinmin, Deputy Director-General, Department of Metrology, AQSIQ - Closing address by Mrs. Marian Haire - Closing address by Dr. Tsuyoshi Matsumoto	APLMF and Host
19:00-21:00	. *Farewell dinner at the Chao Yue Xuan Restaurant in the Salvo Hotel, 339 Guang Dong Road, Shanghai*	APLMF and Host

Participants List: Training Course on LPG Fuel Dispensers

Aug. 28 - Sep. 1, 2006 at the Bund Hotel in Shanghai, PR China

No.	Category	Economy	Name	Organization
1	**Trainer**	**Australia**	Mrs. Marian Haire	National Measurement Institute
2	**Trainer**	**Australia**	Mr. Ronald Stephen Plummer	Principal Inspector, Measurement & Standards Branch, Tasmanian Consumer Affairs
3	**Trainer**	**PR China**	Mr. Li Jinsi	Senior Engineer, Beijing Institute of Metrology
4	**Host**	**PR China**	Mr. Han Jianping	General Administration of Quality Supervision, Inspection and Quarantine
5	**Host**	**PR China**	Mrs. Kong Xiaokang	General Administration of Quality Supervision, Inspection and Quarantine
6	**Host**	**PR China**	Mr. Liu Xinmin	General Administration of Quality Supervision, Inspection and Quarantine
7	**Host**	**PR China**	Mrs. Ma Yan	General Administration of Quality Supervision, Inspection and Quarantine
8	**Host**	**PR China**	Prof. Shao Li	Shanghai Institute of Measurement and Testing Technology (SIMT)
9	**Host**	**PR China**	Mr. Wang Yi	Shanghai Municipal Bureau of Quality and Technical Supervision
10	**Host**	**PR China**	Mr. Wang Zi Gang	Beijing Institute of Metrology
11	**Host**	**PR China**	Ms. Wen Hui Qing	Shanghai Institute of Measurement and Testing Technology (SIMT)
12	**Host**	**PR China**	Ms. Xie Hongyan	General Administration of Quality Supervision, Inspection and Quarantine
13	**Host**	**PR China**	Mr. Zhang Jin Ming	Shanghai Institute of Measurement and Testing Technology (SIMT)
14	**Host**	**PR China**	Mrs. Zheng Chunrong	Shanghai Institute of Measurement and Testing Technology (SIMT)
15	**Host**	**PR China**	Mr. Zheng Guanghui	Shanghai Municipal Bureau of Quality and Technical Supervision
16	**Host**	**PR China**	Mrs. Zheng Huaxin	General Administration of Quality Supervision, Inspection and Quarantine
17	**APLMF**	**Japan**	Dr. Tsuyoshi Matsumoto	APLMF / National Metrology Institute of Japan (NMIJ)
18	Trainee	**Cambodia**	Mr. Sea Kimhoun	Ministry of Industry, Mines and Energy.
19	Trainee	**Chile**	Ms. Paola Llanos Vega	Superintendency of Electricity and Fuels
20	Trainee	**PR China**	Mr. Bu Zhancheng	Hebei Provincial Institute of Metrologicial Supervision and Measurement
21	Trainee	**PR China**	Mr. Gao Zhenhua	Hubei Institute of Measurement and Testing Technology
22	Trainee	**PR China**	Ms. Jin Se	Shenyang Energy Standard Metrical Institution of China
23	Trainee	**PR China**	Mr. Liu Zhenzhong	Tianjin Research Institute of Metrology
24	Trainee	**PR China**	Mr. Tao Meng	National Institute of Metrology P.R.China
25	Trainee	**PR China**	Mr. Sun Dayong	Shenyang Energy Standard Metrical Institution of China
26	Trainee	**PR China**	Miss Wang Can	Shanghai Institute of Measurement Testing Technology (SIMT)

27	Trainee	**PR China**	Mrs. WU Wei	Xi'an Institute of Measurement and Testing
28	Trainee	**PR China**	Miss Zhang Liping	Shanghai Institute of Measurement Testing Technology (SIMT)
29	Trainee	**PR China**	Mr. Zhang Zhengming	Shanghai Institute of Measurement Testing Technology (SIMT)
30	Trainee	**Hong Kong China**	Dr. Tran Chuong Hao	Government Laboratory
31	Trainee	**Indonesia**	Mr. Denny Tresna Seswara	Ministry of Trade of Republic Indonesia
32	Trainee	**Lao PDR**	Mr. Viengthong Vongthavilay	Department of Intellectual Property Standardization and Metrology, National Metrology Center
33	Trainee	**Malaysia**	Mr. Peter J. Berinus Agang	Ministry Domestic Trade and Consumer Affairs
34	Trainee	**Mongolia**	Mr. Gomboragchaa Magsarjav	Mongolian Agency for Standardization and Metrology
35	Trainee	**Peru**	Mr. Nikko Suaki Meza Valencia	Institute for the Defense of Competition and the Protection of Intellectual Property (INDECOPI)
36	Trainee	**Philippines**	Mr. Robert R. Cardinales	Department of Energy
37	Trainee	**Republic of Korea**	Mr. Sung Wook Kim	Korea Machinery-Meter and Petrochemical Testing & Research Institute (MPI)
38	Trainee	**Republic of Korea**	Mr. Ji Hoon Song	Korea Machinery-Meter and Petrochemical Testing & Research Institute (MPI)
39	Trainee	**Chinese Taipei**	Mr. Yang Shan-Yuan	Ministry of Economic Affairs
40	Trainee	**Thailand**	Miss Panawan Khumlor	Department of Internal Trade, Ministry of Commerce
41	Trainee	**Viet Nam**	Mr. Nguyen Cao Phuc	Vietnam Metrology Institute-VMI/STAMEQ

* Names are listed in alphabetical order of their categories, economies and last names.

Lecture

The documents used in the lectures given by Mr. Ronald Stephen Plummer and Mrs. Marian Haire are available on the NMIA website at:

http://www.nmi.gov.au/index.cfm?event=object.showContent&objectID=74988C39-65BF-4956-B1713514C993AD19

or go to http://www.nmi.gov.au and click on “PUBLICATIONS.” The documents are titled “NMI V documents (uniform test procedures).”

Country Report
of
the Kingdom of Cambodia

Training Course on
Verification of Liquefied Petroleum Gas Fuel Dispensers

August 28 – September 01, 2006
In Shanghai, P. R. of China

By Mr. SEA Kimhoun
Chief Office, Control and Verification,
Department of Metrology
Ministry of Industry, Mines and Energy

1- Self-introduction

My name is SEA Kimhoun. I work as an Inspector of Department of Metrology (DOM), Ministry of Industry, Mines and Energy (MIME). I have been working in Metrology since 2000. Presently, my position is Chief of Control and Verification Office in charge of verification and inspection of all kinds of weighing and measuring instruments. Some time, I have to train also for provincial verification officers.

2-History

-1964 Establishment of the National service of Weights and Measures, under the Ministry of Industry.

-1975-79 No activities.

-1995 Re-Establishment of Weights and Measures Unit, under the Ministry of Industry, Mines and Energy (MIME).

-1999 The Weights and Measures Unit upgraded to the Department of Metrology.

-2000 Corresponding member of the International Organization of Legal Metrology (OIML).

-2002 Member of Asia Pacific Legal Metrology Forum (APLMF).

3- Structure of Metrology

Recently, the Metrology of Cambodia is split between the Department of Metrology (DOM) and Industrial Laboratory Center of Cambodia (ILCC).

DOM has the responsibility for all Legal Metrology Activities and keeps the Secondary and Working Standards.

ILCC keeps the Primary Standard and also implements the Industrial and Scientific Metrology requested by DOM. Our structure is as below (See annex No. 1).

4- Verification of Non-LPG Dispensers in Cambodia

A- Visual Inspection

A-1- Required Data:

-To record the date of test, registered trading name, the mark, model, pump number.

A-2- Assessment of Fuel Dispensers:

A-2-1- External inspect the Fuel Dispensers:

-To check the fuel dispenser is firmly fixed on its foundation, all indications are visible under conditions day and night, nozzle must terminate the delivery ….

A-2-2- Internal inspect the Fuel Dispenser:

-To check the apparent leaks at the pump, hose, meter, gas elimination device, the components are located and fitted in accordance with the certificate and verification mark and seals are in place ….

4- Verification of Non-LPG Dispensers in Cambodia (con't.)

B- Performance Tests:

- Volume for testing is 05 litre.
- Display of indicator of Fuel Dispenser is compared with Working Standard Vessel
- The MPE is +/- 0.5%.

5-Current situation about verification of LPG Fuel Dispensers

Why not the LPG Fuel Dispensers are verified ?

While there are more than 200 Non-LPG stations and more than 200,000 vehicles in the country, there are less than 7 LPG stations recently installed and about 1000 vehicles mostly taxis vehicles are powered by LPG. They sold LPG to the public without limitation by volume (Litre). We use the weighing method for verification of the LPG productions. We have not the Type Approval.

6-Conclusion and Acknowledgment

Cambodia has opportunity as a member of APLMF and always received technical support and financial assistance from the APLMF executive secretary and all friends' members made Cambodia upgrade herself to participate in the regional and international metrology activities.

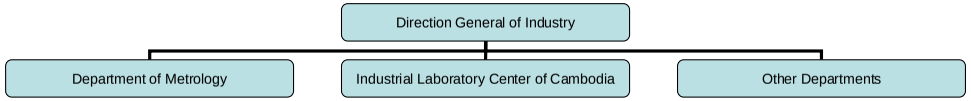
On behalf of DOM, Cambodia I would like to express my gratitude to APLMF and APEC secretariat and the host country for sponsorship and organizing this training course.

Thank you for your kind attention.

Annex 1

Organization Chart

Ministry of Industry, Mines and Energy



Under DoM:

1-There are five offices

a- Admin. and Legislation.
b- Control-Verification.
c- Technological Development of Metrology.
d- Provincial Management Metrology.
e- Tax-Accounting.

2-Room Verification of DoM, consists of

a- Mass Section.
b- Volume Section.
c- Temperature Section.
d- Pressure-Force Section.
e- Dimensional Section.
f- Electricity Section.

3- Five Regional Verification Centers (Regional).

4- Twenty-four Provincial Metrology Offices (Local).

Under ILCC:

-There are two Laboratories

a- Food, Microbiology, Chemical Lab.
b- Scientific, Industrial Metrology Lab.

Report
on
Verification of Liquefied Petroleum Gas Fuel Dispensers in Cambodia

1- Self-introduction

My name is SEA Kimhoun. I work as an Inspector of Department of Metrology (DOM), Ministry of Industry, Mines and Energy (MIME). I have been working in Metrology since 2000. Presently, my position is Chief of Control and Verification Office in charge of verification and inspection of all kinds of weighing and measuring instruments. Some time, I have to train for provincial verification officers.

2- History

-1964 Establishment of the National service of Weights and Measures, under the Ministry of Industry.
-1975-79 No activities.
-1995 Re-Establishment of Weights and Measures Unit, under the Ministry of Industry, Mines and Energy (MIME).
-1999 The Weights and Measures Unit upgraded to the Department of Metrology.
-2000 Corresponding member of the International Organization of Legal Metrology (OIML).
-2002 Member of Asia Pacific Legal Metrology Forum (APLMF).

3- Structure of Metrology

Recently, the Metrology of Cambodia is split between the Department of Metrology (DOM) and Industrial Laboratory Center of Cambodia (ILCC).

DOM has the responsibility for all Legal Metrology Activities and keeps the Secondary and Working Standards.

ILCC keeps the Primary Standard and also implements the Industrial and Scientific Metrology requested by DOM. Our structure is as below (See annex No. 1).

4- Verification of Non-LPG Fuel Dispensers

A- Visual Inspection

A-1- Required Data:

To record the date of test, registered trading name, the mark, model, pump number.

A-2- Assessment of Fuel Dispensers:

A-2-1- External inspect the Fuel Dispensers:

To check the fuel dispenser is firmly fixed on its foundation, all indications are visible under conditions day and night, nozzle must terminate the delivery ….

A-2-2- Internal inspect the Fuel Dispenser:

To check the apparent leaks at the pump, hose, meter, gas elimination device, the components are located and fitted in accordance with the certificate and verification mark and seals are in place ….

B- Performance Tests:

- Volume for testing is 05 litre.

- Display of indicator of Fuel Dispenser is compared with Working Standard Vessel
- The MPE is +/- 0.5%.

5- Current situation about Verification of LPG Fuel Dispensers

Why not the LPG Fuel Dispensers are verified?

While there are more than 200 Non-LPG stations and more than 200,000 vehicles in the country, there are less than 7 LPG stations recently installed and about 1000 vehicles mostly taxis vehicles are powered by LPG. They sold LPG to the public without limitation by volume (Litre). We use the weighing method for verification of LPG productions. Recently. We have not Type Approval.

6- Conclusion

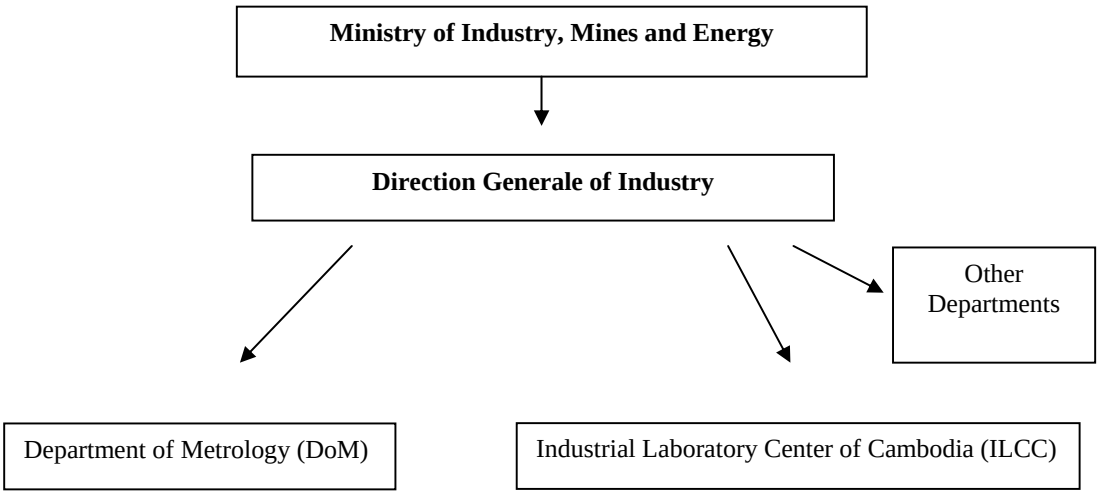
Cambodia has opportunity as a member of APLMF and always received support technical and financial assistance from the APLMF executive secretary and all friends' members made Cambodia upgrade herself to participate in the regional and international metrology activities.

On behalf of DOM, Cambodia I would like to express my gratitude to APLMF and APEC secretariat and the host country for their sponsorship and organizing this training course.

Thank you for your kind attention.

Annex 1

Organization Chart



* Under DoM:

1-There are five offices

a- Admin. and Legislation.
b- Control-Verification.
c- Technological Development of Metrology.
d- Provincial Management Metrology.
e- Tax-Accounting.

2-Room Verification of DoM, consists of

a- Mass Section.
b- Volume Section.
c- Temperature Section.
d- Pressure-Force Section.
e- Dimensional Section.
f- Electricity Section.

3- Five Regional Verification Centers (Regional).

4- Twenty-four Provincial Metrology Offices (Local).

*Under ILCC:

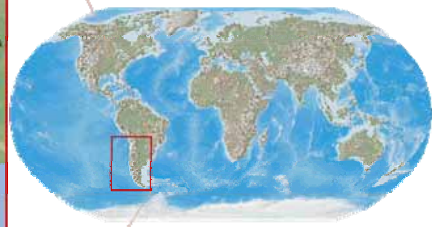
-There are two Laboratories

a- Food, Microbiology, Chemical Lab.
b- Scientific, Industrial Metrology Lab.

SEMINARS AND TRAINING COURSES IN LEGAL METROLOGY

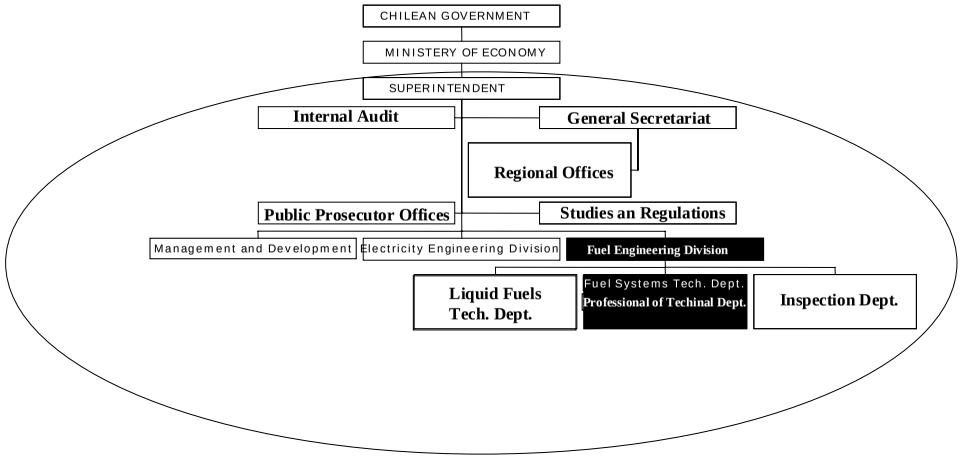
PAOLA LLANOS VEGA

WORLD LOCATION

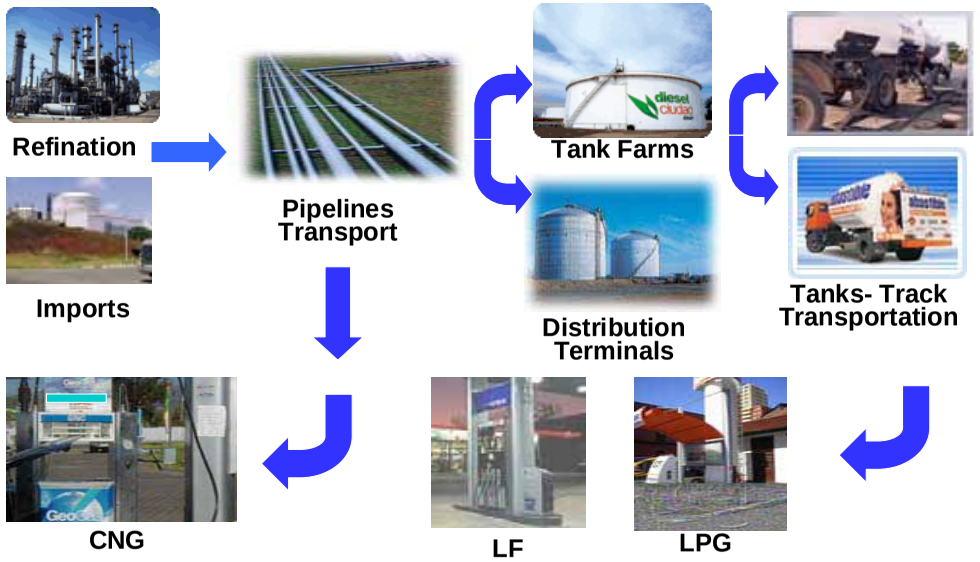


Chile is a long and narrow land strip (8,000 km) located far South of South America, divided in 13 regions, with 16.000.000 habitants roughly.

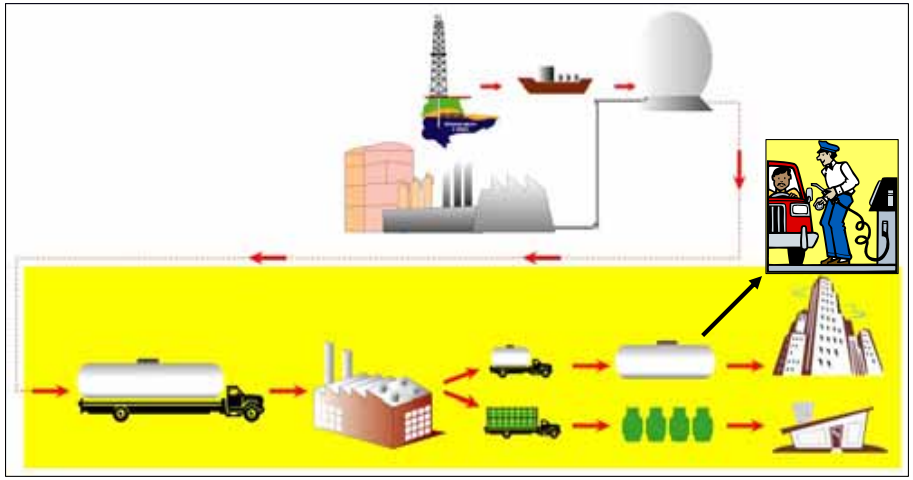
POSITION IN OUR ECONOMY



DISTRIBUTION CHAIN



DISTRIBUTION CHAIN



DISTRIBUTION LPG CHAIN

Oil pipelines
- Oil pipelines 10" V Región - Santiago
- Oil pipelines 6" VIII Región - Santiago

Direct selling: to user
- LPG Cylinders (5, 11, 15 and 45 kg) (70 %)
- Selling to Bulk Tanks (30 %)
- Distribution mininetworks (meter)
  Tanks (0.5, 2 and 4 m^3)

Dispensing Facilities
- LPG for Vehicles
- LPG for Marítime vehicles

Home Distribution
- Selling by Telephone
- Selling by Internet

LPG IMPORTERS AND PRODUCERS

ENAP, the National Petroleum Company is the single Fuel producer in Chile, by means of Its branch Companies:

- Aconcagua Oil Refinery, located in the Vth Region
- Bio Bio Oil Refinery, located in the VIIIth Region
- Enap Magallanes Oil Refinery, located in the XIIth Region

Currently, there are three LPG importer and distribution companies in Chile, named:

Abastible

Gasco

Empresas Lipigas

LPG TYPICAL USE IN CHILE

Manufactoring Instalations (Factories):

- ✓ As fuels in ovens, dryers, cauldrons, etc...
- ✓ As raw material for production of CO_2 and propellants of spray

LPG TYPICAL USE IN CHILE

- ✓ Homes: Heating water and insides enviroments principally (cauldrons) and cooking (kitchens)
- ✓ Supplied by means of cylinders, containers and mininetworks distribution.




LPG TYPICAL USE IN CHILE

Vehicles Powered By LPG

- ✓ Companies utility vehicles and taxi fleets principally
- ✓ Chilean automotive fleet: 10,000,000 vehicles.
- ✓ 1,200 vehicles are powered by LPG
- ✓ 6,151 vehicles are powered by CNG (typical usage, taxi)



LPG IN CHILE

- ✓ LPG SUPPLY REQUIREMENTS:
  - SOLD ILIMITATED
  - TECHNICAL REQUIREMENTS, Set by National Standard NCh 72.Of1999 and NCh 2115.Of98

NCh 72.Of1999 "Liquified petroleum gases – Specifications"

NCh 2115.Of98 "Liquified petroleum gases for automotive use – Specifications"

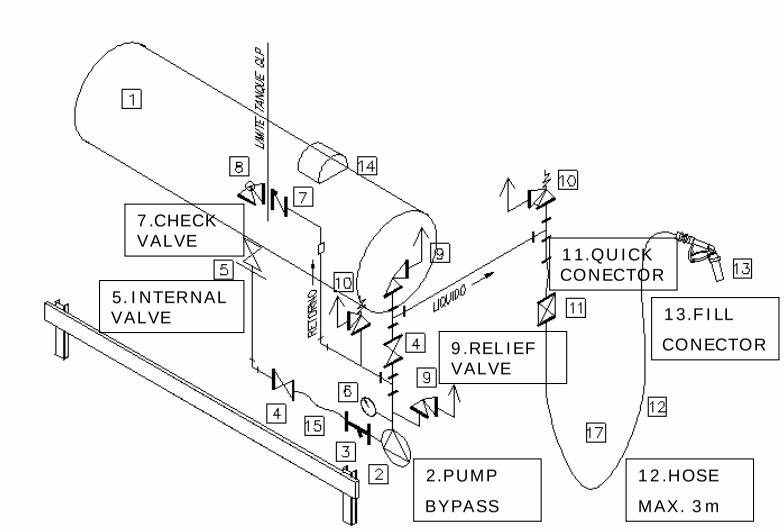
LPG FACILITIES AND REQUIREMENTS APPROVALS

- ✓ REQUIREMENTS:
  - Technical: NCh.2103 Of.2001.

    "Liquified petroleum gases – Automotive LPG Dispensing Facilities - minimum safety requirements"
  - Safety and registration: Resolución SEC N°
    - RE-1026/2005 "minimum safety and registration requirements for automotive LPG Dispensing Facilities"
    - RE-973/2005 "Establece protocolo de certificación e inspección de estaciones de LPG"
- ✓ APPROVALS NEEDED:
  - Certification type of completed dispenser unit. (Issued in origin)
  - Certification of LPG Facility Instalation (SC-06).

Registration (SEC).

TECHNICAL CARACTERISTICS



LPG FUEL DISPENSING FACILITIES

LPG FUEL DISPENSING FACILITIES

INSPECTION OF LPG FUEL DISPENSING FACILITIES

REMOTE SHUT OFF

WARNING SIGN

BARRIERS

FIRE RESISTANCE FLOOR

LPG -GNC –LF FACILITIES

NON PUBLIC FACILITIES (INDUSTRIAL OWNERS)

PUBLIC FACILITIES

PUBLIC LPG FACILITIES	NON PUBLIC LPG FACILITIES	PUBLIC CNG FACILITIES	NON PUBLIC CNG FACILITIES	PUBLIC VEHICLE LF FACILITIES	NON PUBLIC LF FACILITIES
48	732	14	0	525	1242

LPG fuel dispensers in China

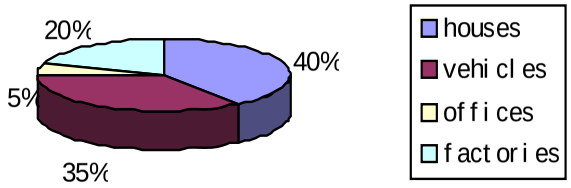
Wang can
Shanghai,China

1. LPG consumption in China

   China has the second largest consumption of LPG in the world

2. Major users of LPG

   Houses, offices ,factories,vehicles



3. LPG used for vehicles

   Fuel gas automobiles

   150,000 gas mopeds

   20,000 taxis and buses

   above 100 LPG gas stations in Shanghai

4.Legal measurement control

JJG997-2005

by General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ)

Verification and Type approval

5.Verification testing includes:

Appearance and performance

Gas tightness

Indication error

Repeatability

Temperature indication error

Temperature compensation error

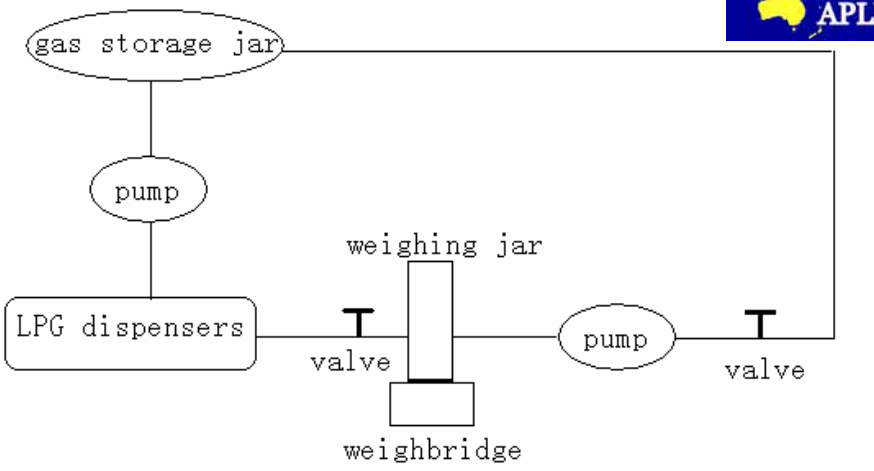
6.Testing methods:

master meter method

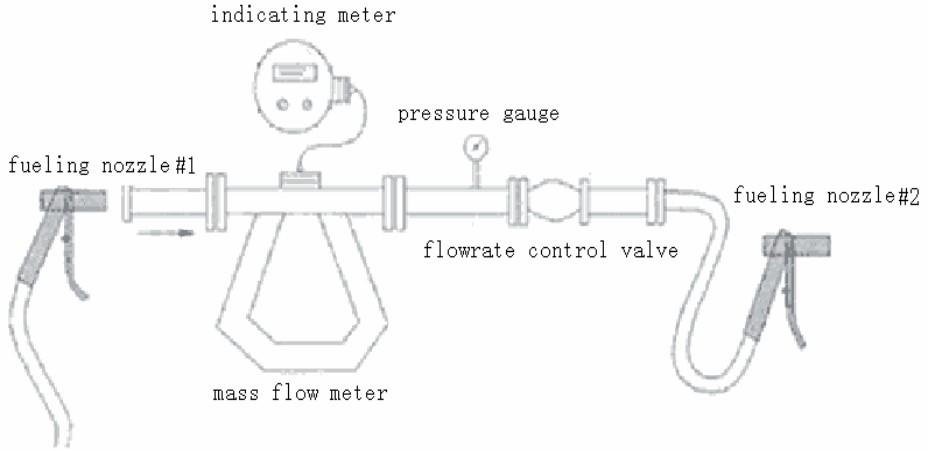
gravimetric method

volumetric method

Laboratory/on-line testing



testing method in the laboratory



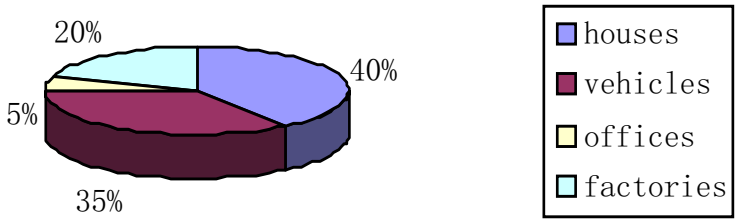
online testing with the gravimetric method

The end!

Thanks you very much!

Good afternoon, everyone. I'm very glad to be here to attend this training course. And it's really a great honor to give a presentation about verification of LPG fuel dispensers in China, especially in Shanghai. First, please allow me to introduce myself. My name is Wang can. I come from Shanghai Institute of Measurement and Testing Technology (abbr. SIMT). My position is an intern in flow measurement department. So now, learning testing methods and standards relative to flow measurement is my responsibility. I'm looking forward to making a solid foundation for future profession after training here.

As well know, with the high-speed development of the economy in China, the LPG consumption rate is increasing year by year. Because of its advantage, LPG can be put to a number of uses. For example, space heating in offices, heating and cooking in houses. Bottled LPG had served as the main cooking fuel of urban residents in some areas. LPG is also used as chemical raw materials in the factories. Following is the percentages of LPG users in China.



Fuel gas automobiles and other motorized vehicles, such as mopeds and taxis, are the major users of LGP in China. According to the statistic datum of Shanghai, The number of taxis, which are powered by LPG, is about 20,000. Meanwhile, there are also above 150,000 mopeds in Shanghai. The number of the LPG gas stations is the largest of China. It exceeded 100 in 2005.

LPG productions, sales, storage and transport had already formed an enormous industry. The project of "west to east gas transmission" will also bring with prospective market. It's necessary to realize legal metrological control on LPG dispensers. General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) regulate type approvals and verifications with the regulation JJG997-2005. The testing procedure includes appearance and performance test, gas tightness test, repeatability test, indication error test, temperature compensation error test, and temperature indication error test. Reverification interval is no longer than half a year. Verifications are performed on meters at the place of service both gravimetrically and volumetrically. In the laboratory of shanghai, we have the verification facilities which can be traced to the nation primary standards of weight .our laboratory is responsible for issuing type approval certificates for trade measuring instruments.

That's all. Thanks for your attention. Welcome to shanghai and wish you'll have a good time in shanghai.

Government Laboratory

The Government of the Hong Kong Special Administrative Region

TRAN Chuong Hao

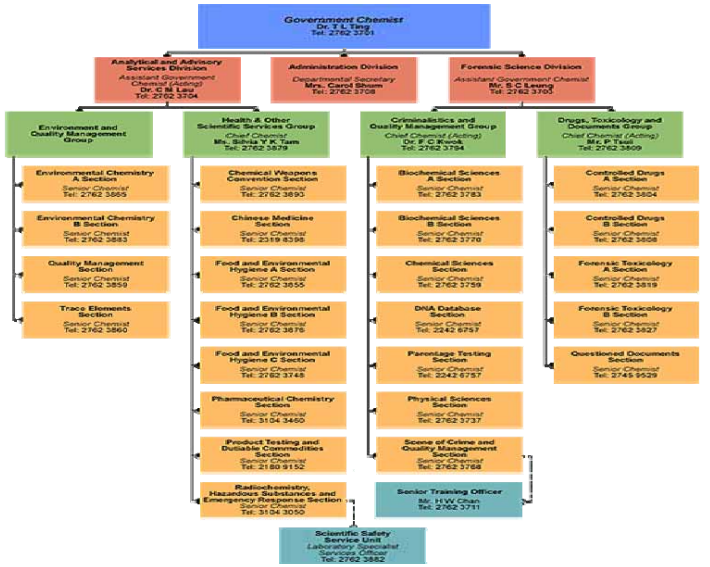
Government Laboratory

- Established since 1913.
- Provides a full range of analytical, investigatory and advisory services to various Government departments.

Government Laboratory

- Two operational divisions
  - Analytical and Advisory Services Division
  - Forensic Science Division

Government Laboratory



Product Testing and Dutiable Commodities Section

- Provides analytical and advisory support to the Customs and Excise Department in the enforcement of legislation concerning revenue collection and consumer protection.

Product Testing and Dutiable Commodities Section

- For LPG dispenser, we are currently not equipped to provide such testing service.
- The Customs and Excise Department has been carrying out some of the verification works.
- Some of the tests have been contracted-out to private testing laboratory.

Product Testing and Dutiable Commodities Section

Product Testing and Dutiable Commodities Section

Product Testing and Dutiable Commodities Section

- More information about the Government Laboratory can be found at www.govtlab.gov.hk

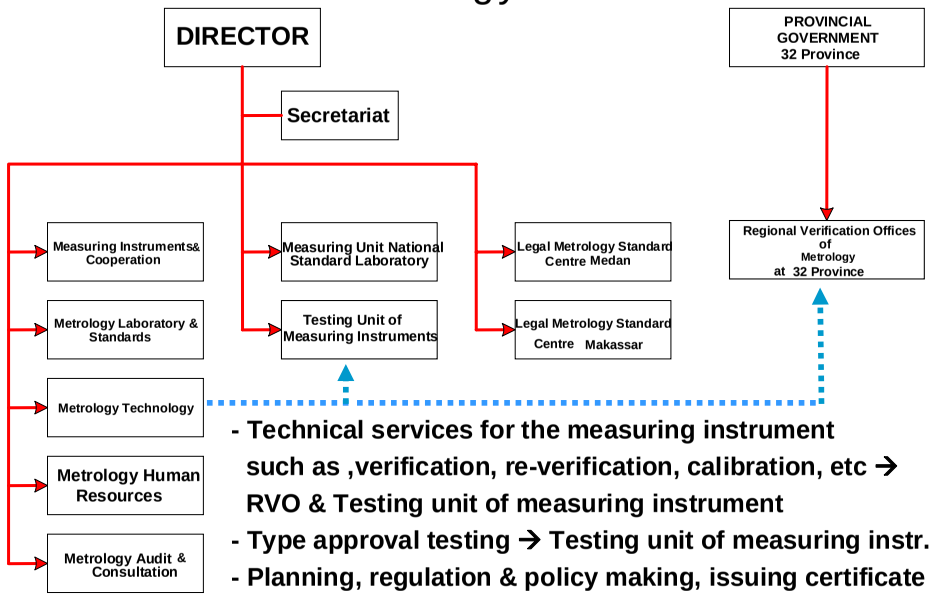
- Thank you

SECURITY ISSUE
OF ELECTRONIC FUEL DISPENSERS

Presented in Training Course on LPG Fuel Dispenser
Shanghai, The People's Republic of China

DIRECTORATE OF METROLOGY
MINISTRY OF TRADE
REPUBLIC OF INDONESIA
2006

Organization of Directorate of Metrology



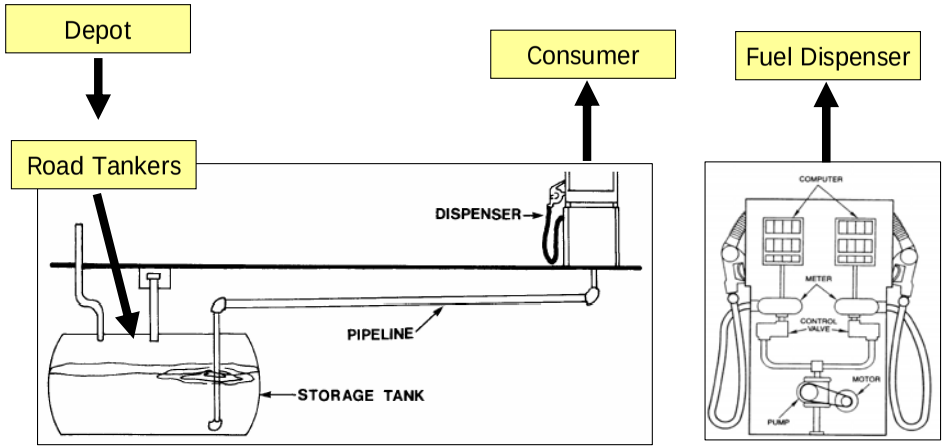
- **Technical services for the measuring instrument such as ,verification, re-verification, calibration, etc → RVO & Testing unit of measuring instrument**
- **Type approval testing → Testing unit of measuring instr.**
- **Planning, regulation & policy making, issuing certificate of the type approval → metrology technology**

Used & condition of LPG in Indonesia

- The major users of LPG are used in house, offices and vehicles (public transport → minibus)
- In this time → used in vehicles are decreasing because of the LPG stations & installations are minimum
- Type approval is required for LPG fuel dispenser. Certificate of type approval is issued by metrology technology (DOM). Type approval testing is issued by testing unit of measuring instruments (DOM). Verification and re-verification of LPG fuel dispenser is by RVO (re-verification interval is 1 year)
- Verification and re-verification performed on meters at the place of service
- Verification use volumetrically method → vehicles
  Verification use gravimetrically method → pre package (LPG Tube)

Current Issue :

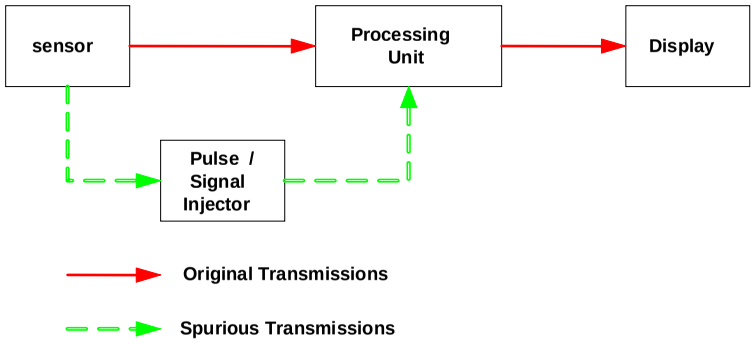
- Manipulations of Measurement data in Electronic Fuel Dispensers



fuel Station (SPBU) Overview

How to manipulate of Fuel Dispenser ?

- The modus : using a additional device. The additional device (pulse /signal Injector) is change original signal from sensor (pulse generator) to be spurious signal.
- The spurious signal will be process by processing unit.
- Volume of liquid that released difference with display



Case of Manipulation

- Investigation for fuel station in Bandung at July 11, 2006 → indication that the fuel station is manipulating fuel dispenser → use additional device

Switch On/Off in control room

Cabling from control room to fuel dispenser

Cabling in fuel dispenser

Additional device in fuel dispenser

Solution

Target : to protect from manipulation of measurement data of fuel dispenser → <u>security regulations</u>

<u>Policy</u>

- Design Standard of Procedure (SOP) for security in fuel dispenser (General Requirement & security tips per type approval) → executed by original inspector
- Auditing & inspection of fuel dispenser → executed at time of verification/re-verification or at complaints by ***consumer***
- Requirement for proffering type approval is must give detail documentation of fuel dispenser

Documentation for all type of fuel dispenser that we need are

- Basic : manual book, manual operation, manual instruction, etc
- Others : Schematics/wiring diagram, flow diagram hw & sw, hw & sw portioning, sw & hw structure, etc

References for design security regulation

- International Recommendation OIML R 117 "Measuring system for liquids other than water"
- International Recommendation OIML R 118 " Testing procedures & test report format for pattern evaluation of fuel dispenser for motor vehicles"
- Result from joint research with university of security for electronic measurement instruments, consist of : → *conducted next year*
  - Procedure to secure measurement instruments
  - Design and implementation of security algorithms (ex : cryptography)

THANK YOU

SECURITY ISSUE
OF ELECTRONIC FUEL DISPENSERS

by
Denny Tresna Seswara
Sub Directorate/Division of Metrology Technology

I. ORGANIZATION OF DIRECTORATE OF METROLOGY (DOM)

Directorate of Metrology (DOM) was built in 1928 at Bandung and responsible for legal metrology in Indonesia. DOM belongs to the Ministry of Trade, Directorate General of Domestic Trade.

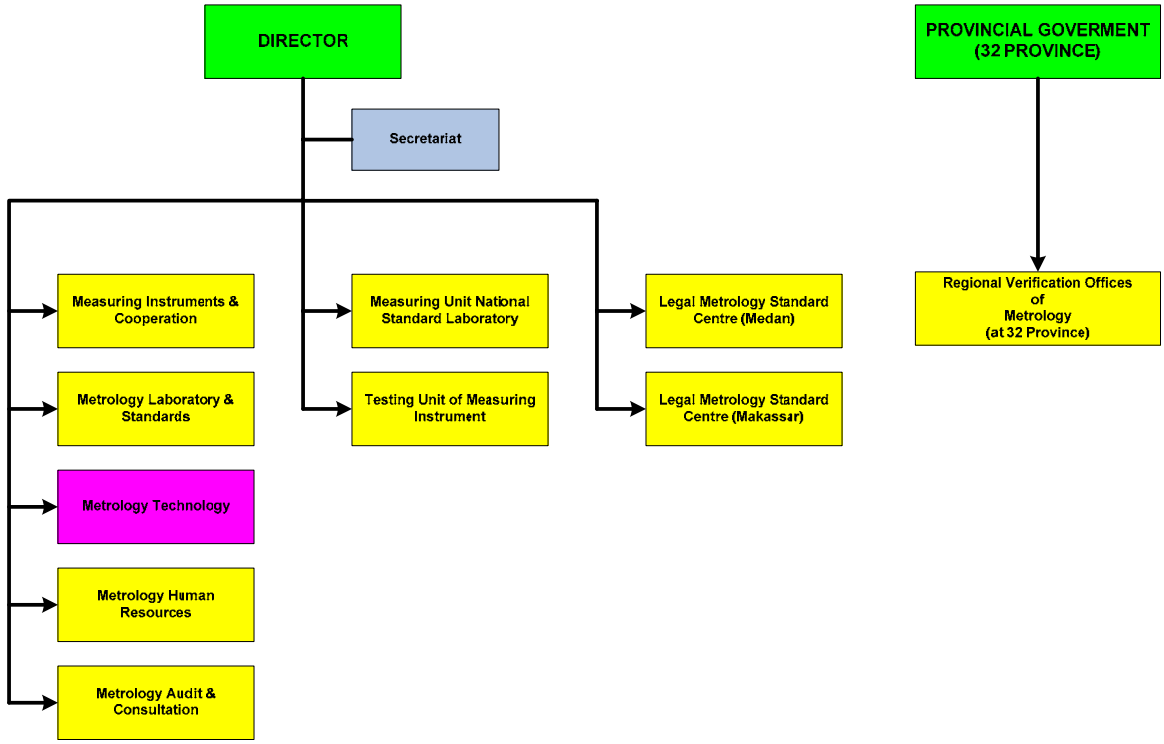


Figure 1. Organization of DOM

The organization of DOM is shown in Figure 1. There are five sub directorates/divisions, secretariat, two Units and two Legal Metrology Standard centers in DOM organization. The sub directorates are consists of Measuring Instrument & cooperation, Metrology Laboratory & standard, Metrology Technology, Metrology Human Resources and Metrology Audit & Consultation. Main functions of sub directorates are;

- ❖ Planning and Policy making for legal metrology;
- ❖ Technical service for issuing certificate of type approval;
- ❖ Enforcement of the measurement law;
- ❖ Administration and Supervision of legal metrology system;
- ❖ Dissemination of legal metrology system;
- ❖ International cooperation;

The units of DOM are consists Measuring Unit National Standard Laboratory and Testing Unit of Measuring Instruments. Main functions of Unit are;

- Technical services for measuring instruments, including maintenance of primary standard of mass, calibration of secondary standards, type approval test and verification/re-verification
- Technical services administration

DOM has been already for establishing Legal Metrology Standard (LMS) centers at Medan and Makassar. LMS center at Medan has territory in Sumatera Island, Java Island and Kalimantan Island. The other Islands are covered by LMS Makassar (Sulawesi Island, Bali Island, Papua Island, etc). Main function of LMS will be;

- Conducting calibration of secondary standard that Regional Verification Offices (RVO) have, giving technical assistance to RVO and giving short-term training for RVO and industrial sector within the territory.

Regional Verification Offices (RVO) at provincial government are responsible for verification/re-verification and inspection of measuring instrument.

Type approval for fuel dispenser and industrial meters is tested in fuel oil meter laboratory which belongs to testing unit of measuring instrument, but the certificate of type approval is issued by metrology technology. There are two measuring systems for fuel dispenser and industrial meters, both of which use kerosene both. The measuring systems do not compensate the effect of viscosity on flow meter to be tested such of flow meter is used to measure heavy oil, gasoline, LPG, etc.

Metrology Technology not only issue certificate of type approval, but also plan regulation and policy to support technical operation for testing unit of measuring instruments and RVO provincial government.

The major user of LPG in Indonesia is used in house, but at the past LPG also used in vehicles. The decreasing user of LPG in vehicles is caused decreasing of LPG fuel dispenser or LPG station. The kinds of vehicles use LPG is public transport such of minibus. The reasons why LPG was not popular used in vehicles;

- Need modification on vehicle, especially in storage tank and machine;
- More not safety than fuel oil (gasoline, etc);
- Limited LPG station.

At the page 2 is shown that type approval testing or verification required for all imported measuring instruments (fuel dispensers, flow meter, etc).Type approval is issued by metrology technology but type approval testing by testing unit of measuring instruments. The prototype of fuel dispenser is tested by testing unit of measuring instruments, including verification but re-verification and fuel dispenser which has certificate of type approval is issued by RVO. The re-verification interval is one year. Verification and re-verification which done by RVO is performed on meters at place of service.

Gravimetrically verification is performed for LPG which is used in house. Volumetrically verification is performed for LPG which is used in vehicles.

II. THE CURRENT ISSUE

Most of the fuel dispenser is used electronic devices to compute of measuring data. For application and implementation, electronic fuel dispensers use processing unit which consists of processor, memory, peripheral of input/output, display, etc. Sensor of liquid flow rate or measurement transducers is used pulse generator. Output of pulse generator is digital signal and will be input for processing unit.

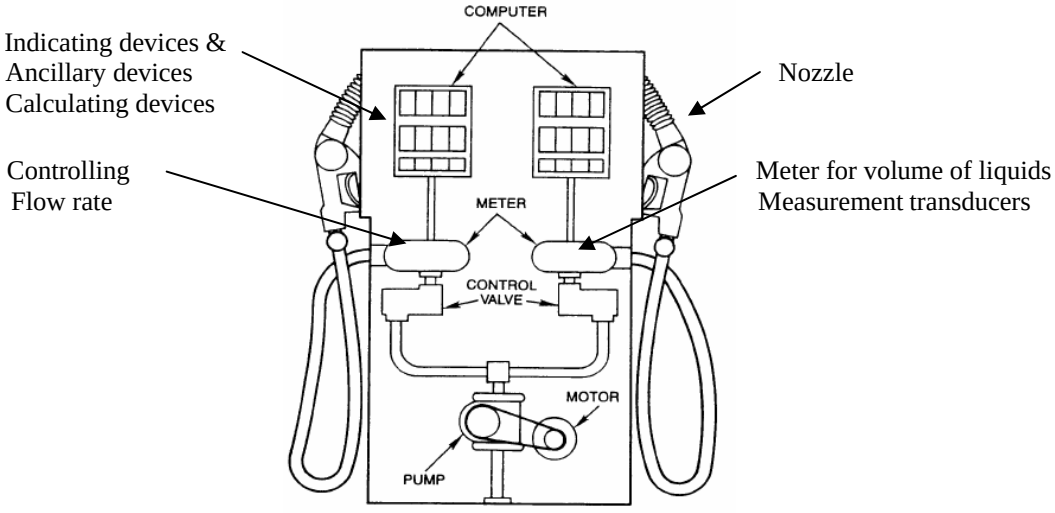


Figure 2. Fuel Dispenser Elements

The elements of fuel dispenser are shown at figure 2. Verification or re-verification of fuel dispenser implemented in Indonesia ensure measuring volume, but do not ensure modules of fuel dispenser properly working as metrology specification and condition. For ensuring of metrological specification and requirement, before verification requires functionality testing task per modules.

The current issue in Indonesia is manipulation measuring data of fuel dispensers. Modus of manipulation measuring data is used an additional device. The additional device produce spurious signal. The additional device change original signal of pulse generator to be spurious signal. Figure 3 is described how additional device manipulate measuring data.

Spurious signal from additional device will be input of processing unit and processed. The original signal from pulse generator is disconnected.

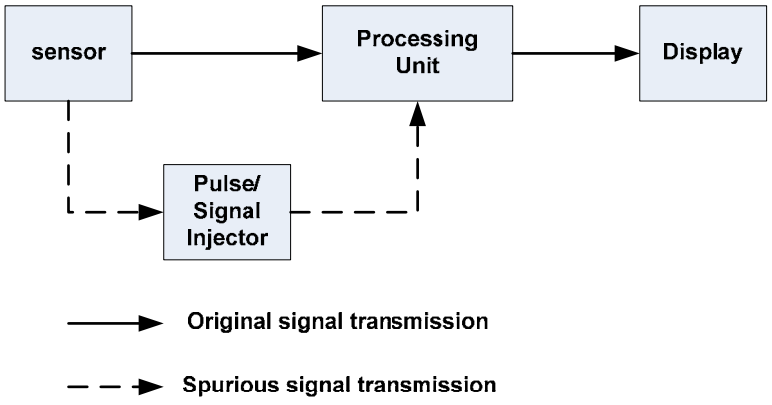


Figure 3. Manipulating modus of fuel dispensers

Figure 4. The additional device for manipulate measuring data of fuel dispensers

At the fuel dispenser, the additional device is attached to change measuring data from pulse generator/measurement transducer. To deceive executor official of verification or re-verification at place of service, Fuel dispenser systems is attached ON/OFF switch. The location of the place of switch is not far from fuel dispenser, locating in control room. The switch is controlling the additional device by cable. The switch is attached to anticipate inspection before verification/re-verification process.

The attached additional device at fuel dispenser is shown in figure 4. Ellipse in figure 4 describes output of pulse generator and to be input of additional device. The output of pulse generator not ought to pass at the additional device but to processing unit. Square in figure 4 describes output of the additional device and be input of processing unit. Square in left corner is shown at figure 4. Representing input of additional hardware is connected to ON/OFF switch in the control room.

Modus manipulation input of pulse generator doubled pulse outcome of measuring in pulse generator. The doubled pulse is produce liquid (fuel) less than original pulse, so that reading of display on fuel dispenser difference with volume of liquid that released.

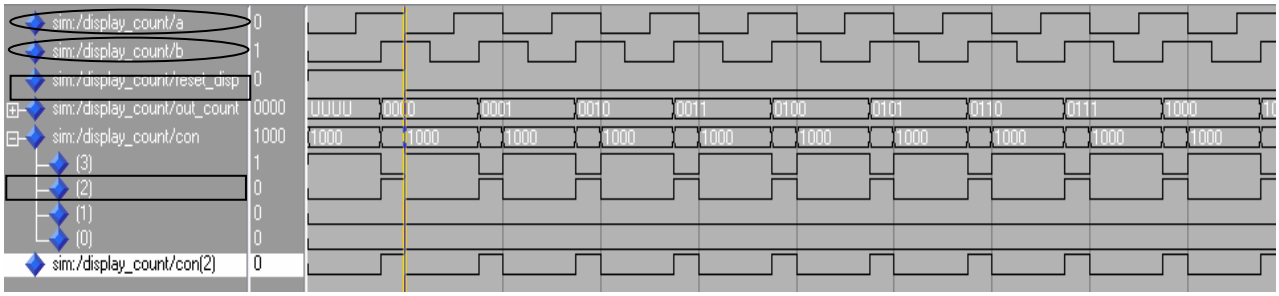


Figure 5. Simulation of pulse generator reader on fuel dispenser

Simulation of pulse generator reader on fuel dispenser is shown in Figure 5. The simulation is made from VHDL (Very high speed Hardware Description Language) programming. VHDL is a software programming language used to model the intended operation of piece of hardware. There are two aspects to description of hardware that VHDL facilitates; true

abstract behavior modeling and hardware structure modeling. This simulation is made by hardware structure modeling facilitation.

Output of pulse generator produce two output which consist of output **a** and output **b.** The outputs are shown in figure 5 with circle. The outputs have different phase same as "incremental encoder". Difference of pulse among output a and output b produce pulse that showing in figure 5 with square [con(2)]. Pulse [con(2)] is used to be input of processing unit on fuel dispenser. Next step, the pulse [con(2)] is used to be trigger of up-counter that showing in figure 5 with square [out_con].

III. POLICY AND REGULATION

For protecting from manipulating measurement data of fuel dispenser need planning and design of security regulations. The regulations require policies to ensure that regulation properly working as expected result. Policies task divided into two, internal policy and external policy.

Internal policy ensures our metrology institutions (DOM and RVO) to prepare execution of security regulations. Internal policy is as below:

- Short course of electronic measurement instrument is necessary to do. Because of globalization of technology in measurement instruments, human resources development becomes more important. The short course is executed for original inspector in DOM or RVO.
- Planning and design security regulation to protect from manipulating measurement data of fuel dispenser.
- Planning of metrological functionality testing task per modules to ensure metrological specification and requirement are correctness.
- Planning and design standard of procedure to secure fuel dispensers with reference of International Recommendation OIML R118 "Testing procedures and test report format for pattern evaluation of fuel dispensers for motor vehicles ".
- Planning of Design and implementation security modules in pulse generator of fuel dispenser based on cryptography algorithms.

External policy ensures planning and design of security regulation. The regulation is executed by original inspector at metrology institutions (DOM and RVO) to audit gas station/fuel station in Indonesia. External policy is as below:

- Requirement of raising type approval encloses detail documentation of measurement instruments especially fuel dispensers. The requirement of type approval is as below:
  - Basic: Manual book, manual operation, manual instruction describe how to operate the fuel dispenser.
  - Advance: Schematics/wiring diagram, flow diagram hardware and software, hardware & software portioning, software & hardware structure describe how to design and verify the fuel dispenser.
- Auditing of gas station/fuel station is conducted by RVO under guidance of DOM. The auditing of gas station/fuel station is executed at the time of verification/re-verification, complaints of gas/fuel station consumers if they get volume of fuel decreasing than original volume and suddenly inspection without time interval.
- Socialization of regulations which have been released (standard of procedure verification/re-verification of fuel dispenser).

Security regulation of fuel dispenser will be design is consist of metrological requirements of fuel dispensers. The metrological requirements are as below:

- Reference of International Recommendation OIML R117 "Measuring systems for liquids other than water" is consist of measuring system and its constituents, Specific types of measuring systems, Metrological characteristics, Test conditions and Electronic or electrical equipment especially electronic seal.
- Reference of research result of security electronic measurement instruments is consists of procedure to secure measurement instrument, security algorithm for design and implementation and etc. The research will be conduct next year.

Biography:

Name : Denny Tresna Seswara
Place of Birth : Malang, Indonesia
Date of Birth : 29 January, 1974
Division : Metrology Technology
Job description : - Planning and making policy
- Planning and making regulation
Background of Education
: Master degree in microelectronics

Current Situation about LPG Fuel Dispensers in Japan

August 28, 2006
By Tsuyoshi Matsumoto
National Metrology Institute of Japan (NMIJ)
National Institute of Advanced Industrial Science and Technology (AIST)

AIST

Brief Introduction of National Institute of Advanced Industrial Science and Technology (AIST)

- About **7,000** employees including permanent (2500), assistant staffs and guest scientists.
- Established in **2001** as a semi-private institute by amalgamating 16 government institutes.
- Headquarters are located in **Tsukuba** and **Tokyo** plus there are 8 local branches.
- **NMIJ** is a part of 60 research units in AIST with about **400** employees.

AIST

National Metrology Institute of Japan (NMIJ)

Director	Deputy Director	Principal Research Scientist	Unit Staff
Time and Frequency	Time Standards	Electricity and Magnetism	Electricity Standards 1
	Wavelength Standards		Electricity Standards 2
	Frequency Measurement Systems	Electromagnetic Waves	Radio-Frequency
Lengths and Dimensions	Length Standards		Electromagnetic Fields
	Dimensional Standards	Photometry and Radiometry	Laser Standards
Mechanical Metrology	Mass and Force Standards		Optical Radiation
	Pressure and Vacuum Standards	Quantum Radiation	Ionizing Radiation
	Legal Weighing Metrology		Radioactivity and Neutron
Acoustics and Vibration Metrology	Acoustics and Ultrasonics	Inorganic Analytical Chemistry	Inorganic Standards
	Vibration and Hardness		Environmental Standards
Temperature and Humidity	Thermometry	Organic Analytical Chemistry	Organic Standards 1
	Cryogenic Thermometry		Organic Standards 2
	Radiation Thermometry		Bio-Medical Standards
	Humidity Standards	Materials Characterization	Surface and Thin Film Standards
Fluid Flow	Gas Flow Standards		Nanopore Standards
	Liquid Flow Standards		Polymer Standards
	Legal Flow Metrology	Reference Materials System	
Material Properties and Metrological Statistics	Thermophysical Properties	Legal Metrology	
	Fluid Properties	Dissemination Technology	Calibration and Verification
	Metrological Statistics and Particle Measurement		Pattern Approval
Metrology Management Center			
Metrology Management Center	Metrology Planning Office	Reference Materials Office	Metrology Training Center
	Metrology Quality Office	International Metrology Cooperation Office	

AIST

1. Self-introduction *of Tsuyoshi Matsumoto*

1.1. What is your position and responsibility in your economy?

Executive Secretary of APLMF. As a staff of NMIJ, I am in charge of international affairs in legal metrology. Previously, I worked on the measurements of thermo-physical properties in high temperatures.

1.2. Will you be required to train others? Yes

If so, how will you train?

As an organizer of APLMF training courses.

1.3. Do you have any experiences verifying fuel dispensers?

No. But attended 3 APLMF training courses on fuel dispensers.

2. Use of LPG in your economy

2.1. Who is the major users of LPG? How is it used?

*Total consumption of LPG in Japan is about **18,000,000** ton/year. About **77%** of LPG is directly imported using tankers and the rest is produced in the process of oil refinery. LPG supports **5%** of the overall energy consumption in Japan.*

* Photo: http://www.j-lpgas.gr.jp/

AIST

2.1. Who is the major users of LPG? How is it used?

Major Users of LPG in Japan	
Type of users	Percentage
Private homes and business use (offices, stores, restaurants, hotels, etc.)	51 %
Energy/heat source for factory	26 %
Material for chemical plants	12 %
LPG-powered vehicles	9 %
Electricity power plants	2 %

NATIONAL INSTITUTE OF ADVANCED INDUSTRIAL SCIENCE AND TECHNOLOGY (AIST)

AIST

2.2. If LPG used for vehicles, how many number of vehicles are powered by LPG? And what kinds of vehicles use LPG?

*There are total about **295,000 (0.37%)** LPG vehicles owned by taxi companies, public organizations, truck companies, and delivery companies. Number of **private LPG vehicles** is about **9 %** of all LPG vehicles. Total Number of LPG-Stations is **about 1,900***

* Photo: http://www.j-lpgas.gr.jp/

NATIONAL INSTITUTE OF ADVANCED INDUSTRIAL SCIENCE AND TECHNOLOGY (AIST)

AIST

LPG-Powered Vehicles in Japan*

Type of Vehicle	Total
Taxies	242,010 (almost all taxies)
Passenger cars	20,889
Trucks	21,750
Vehicles for special use	10,718
Buses	114
Total (% to all vehicles)	**295,481** (0.37% out of 79,000,000)

* As of February, 2006 (http://www.j-lpgas.gr.jp/)

NATIONAL INSTITUTE OF ADVANCED INDUSTRIAL SCIENCE AND TECHNOLOGY (AIST)

3. Legal metrological control

3.1. What are the units of measure used for LPG?

L (liter) for liquid LPG dispensers

m3 (cubic meter) for gaseous LPG

3.2. What organizations regulate type approvals and verifications of LPG ?

Local governments *are in charge of* ***verification.***

NMIJ, AIST *in charge of* ***pattern approval****.*

3.3. How long is the reverification interval?

4 years *for liquid LPG dispensers .*

(10 years for LPG gas meters for private house use)

3.5. Are verifications performed on meters at the place of service?

Yes*. All verifications of liquid LPG dispensers are conducted at the gas stations because an LPG facility is required.*

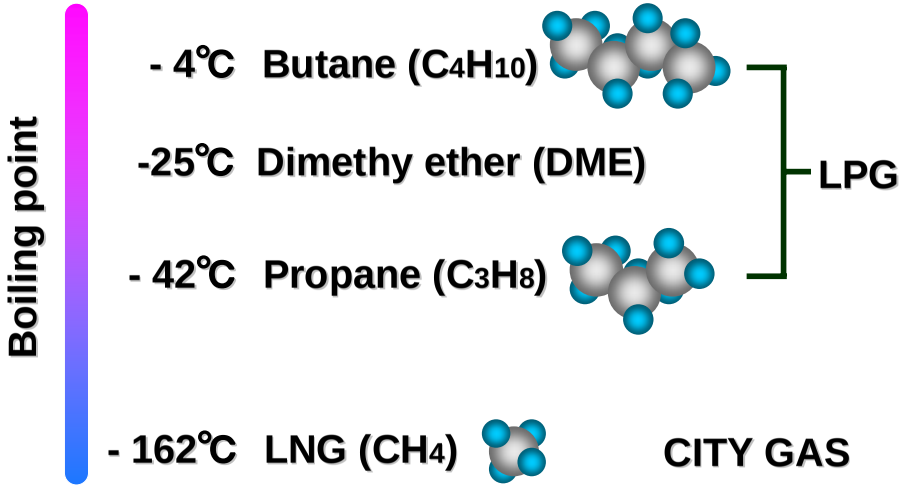
3.6. Are verifications performed gravimetrically? or volumetrically?

Gravimetrical method *are mostly used. The density of the liquid LPG is decided with a density hydrometer suspended in the pressure vessel.*

Volumetric method *is also used in some cases with a syringe-type pressure vessel .*

Thank you for your attention

CHARACTER OF LPG



LPGas Smile for Human and the Earth

- SUPPLY (2004)

  217 Million Metric Tons

- DEMAND (2004)

  213 Million Metric Tons

Source: Statistical Review of Global LP Gas 2005
(World LP Gas Association)

LPGas Smile for Human and the Earth

PRODUCTION (2004)

U.S.A.	46.1 Million MT
SAUDI ARABIA	18.6 Million MT
CHINA	13.2 Million MT
CANADA	10.7 Million MT
ALGERIA	9.0 Million MT
TOTAL	217.1 Million MT

Source: Statistical Review of Global LP Gas 2005
(World LP Gas Association)

LPGas Smile for Human and the Earth

DEMAND (2004)

- U.S.A. 53.1 Million MT
- CHINA 19.2 Million MT
- JAPAN 17.7 Million MT
- MEXICO 10.3 Million MT
- INDIA 9.9 Million MT
- TOTAL 212.7 Million MT

Source: Statistical Review of Global LP Gas 2005
(World LP Gas Association)

EXPORT (2004)

- SAUDI ARABIA 12.5 Million MT
- ALGERIA 7.2 Million MT
- UAE 6.7 Million MT
- CANADA 5.5 Million MT
- NORWAY 4.2 Million MT
- TOTAL 70.9 Million MT

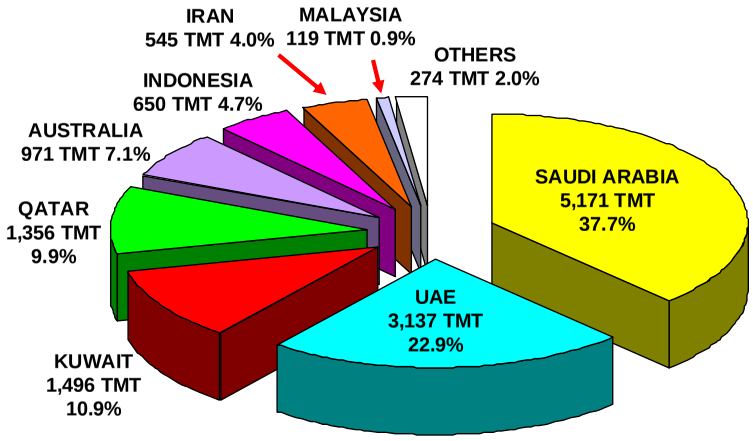
Source: Statistical Review of Global LP Gas 2005
(World LP Gas Association)

IMPORT (2004)

- JAPAN 13.9 Million MT
- U.S.A. 8.9 Million MT
- CHINA 6.4 Million MT
- KOREA 4.0 Million MT
- TURKEY 3.5 Million MT
- TOTAL 67.1 Million MT

Source: Statistical Review of Global LP Gas 2005
(World LP Gas Association)

LPG IMPORT SOURCES IN JAPAN (FY2004)



Source: Japan LP Gas Association

LPG DEMAND IN JAPAN
(FY2004)

- **TOTAL DOMESTIC DEMAND**
  17.9 Million MT
- **SUPPLY FROM REFINERIES**
  4.2 Million MT
- **IMPORT VOLUME**
  13.7 Million MT

Source: Japan LP Gas Association

VLGC (2004)
(VERY LARGE GAS CARRIER)

- **OVER 100 VESSELS**
  - Over 40 vessels for Japan
- **CAPACITY**
  - Around 44 Thousand Metric Tons
- **SPEED**
  - AROUND 17 Knots
  - Saudi Arabia (Ras Tanura) – Japan 17days
  - Algeria - Japan 30days

Source: The Gas Carrier Register 2005

IMPORT TERMINAL
IN JAPAN (2004)

- **36 Terminals**
- **Total Capacity 4.2 Million MT**
- **LPG Storage (Refrigerated)**
- **Supply Chain**
  - To Secondary Base (By Coastal Tanker)
  - To Filling Station (By Tank Truck)
  - To end user (By Coastal Tanker, Tank Truck)

Source: Japan LP Gas Association

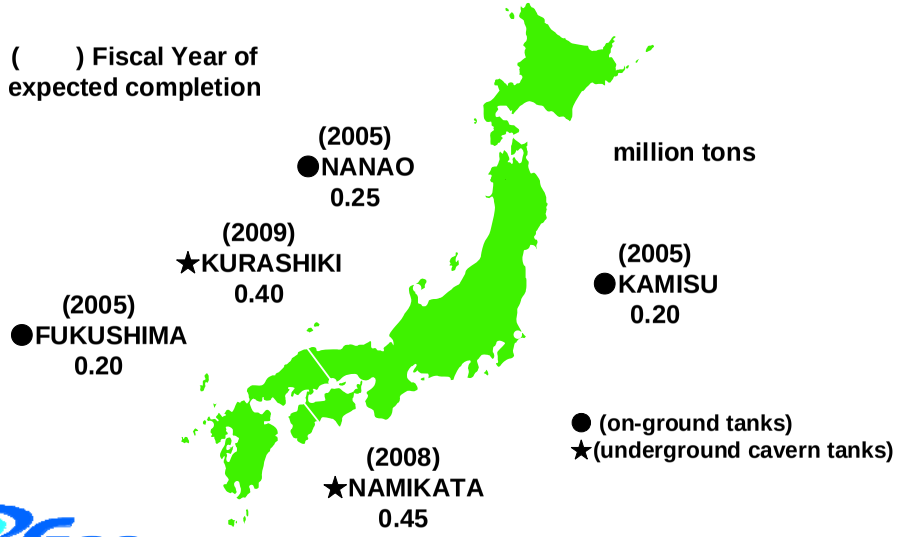
YAMAGUCHI（JAPAN）

SECUREMENT OF STABLE SUPPLY

- **Necessity of Stockpile**
  - **Private Sector Stockpile**
    - **50days' stock of Annual Import volume**
  - **National Stockpile**
    - **1.5Million tons in FY2010**

*** Currently Three Bases are under construction**
*** Two Bases opened in 2005**

LPG NATIONAL STOCKPILING BASES CONSTRUCTION SITES



COASTAL TANKER (2004)

- **65 Vessels**
- **Capacity 500 MT～1,800 MT**
- **Delivery**
  - **From Import Terminal and Refinery to**
    - **Big End User (Petrochemical Company, Power Plant, Industrial Plant)**
    - **Secondary Base**

Source: Japan LP Gas Association

SECONDARY BASE (2004)

- 60 Bases
- Total Capacity 117 TMT
- LPG Storage (Pressurized)
- Supply Chain
  - To Filling Station and End User (By Tank Truck)

Source: Japan LP Gas Association

TANK TRUCK (2004)

- Total 6,978 Vehicles
- Capacity 5.0 MT ~ 13.4 MT
- Delivery
  - From Import Terminal and Refinery and Secondary base to
    - Filling Station, End user

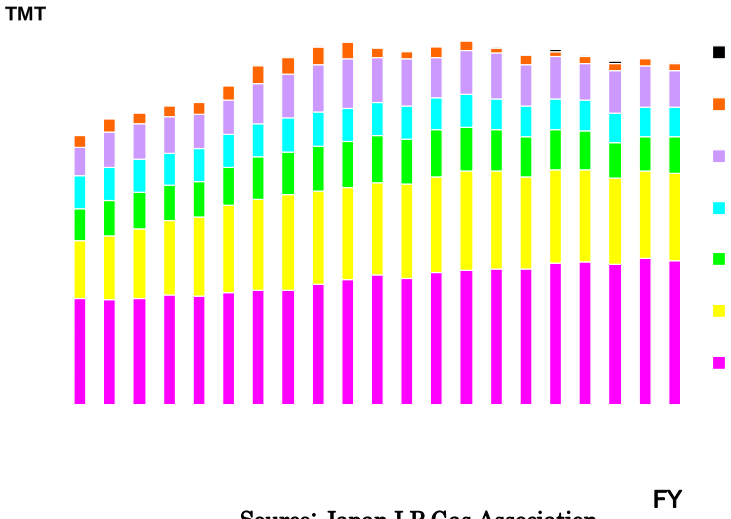
Source: Japan LP Gas Association

FILLING STATION (2004)

- 2,513 Stations
- Fill LPG to Cylinder
  (Normally 20 KG / 50 KG)
- Supply Chain
  - End user (Residence & Shops) and retailer
    - (Retailer 26,288)

Source: Japan LP Gas Association

CONSUMPTION BY USE



Source: Japan LP Gas Association

RESIDENTIAL & COMMERCIAL

- **Total Consumption**
  - 7,802 TMT(43.2% FY2003)
- **User**
  - Residence(Cooking, Heating, Hot water)
    - Around 26 Million Households out of 50 Million in Total
  - Restaurant etc.
    - Around 1 Million Shops

Source: Japan LP Gas Association

INDUSTRIAL USE

- **Total Consumption**
  - 4,740 TMT(26.3% FY2003)
- **User**
  - Industry

(Steel, Ceramic, Food Processing, and Nonferrous Metal, Textile/Pulp & Paper etc.)

Source: Japan LP Gas Association

CITY GAS

- **Total Consumption**
  - 1,492 TMT(8.3% FY2003)
- **User**
  - Feed for City Gas

Source: Japan LP Gas Association

AUTOMOBILE FUEL

- **Total Consumption**
  - **1,628 TMT(9.0% FY2003)**
- **User**
  - **Automobile(Taxi, Truck)**
    - **294,314 cars(2005)**

Source: Japan LP Gas Association

CHEMICAL FEED

- **Total Consumption**
  - **1,981 TMT(11.0% FY2003)**
- **User**
  - **Petrochemical Company**

Source: Japan LP Gas Association

POWER PLANT

- **Total Consumption**
  - **402 TMT(2.2% FY2003)**
- **User**
  - **Electricity Power Company**

Source: Japan LP Gas Association

Overview of Legal Metrology on LPG Dispenser in Republic of KOREA

APEC/APLMF Seminars and Training Courses
In Legal Metrology

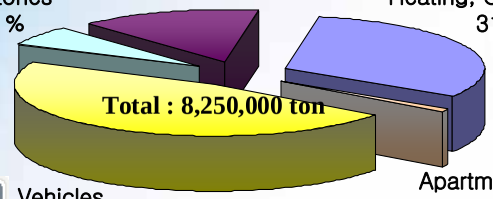
Presented by
Sung-Wook Kim, Assistant Manager
Korea Machinery-Meter and Petrochemical Testing and Research Institute

Aug 28, 2006

Contents

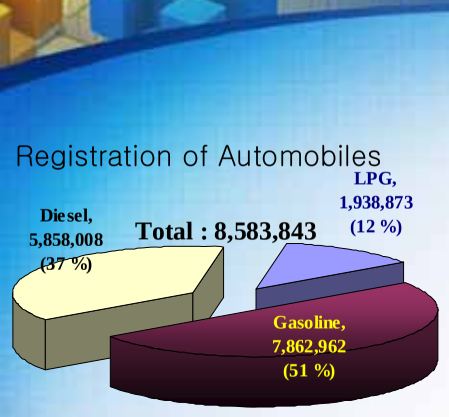
I Use of LPG in Republic of Korea
II Legal Metrology System of LPG Dispenser
III Future Steps

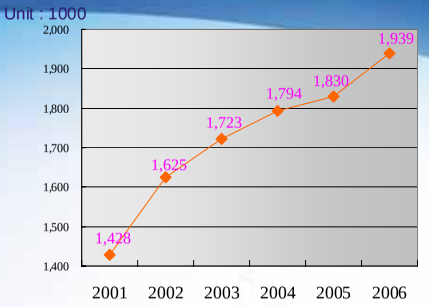
I. Major users of LPG



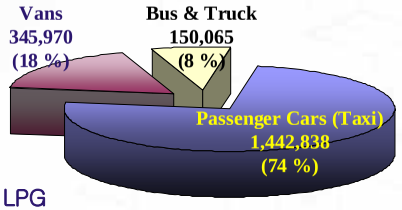
[Source ; Ministry of Commerce, Industry & Energy, 2003]

I. Situation of Automobiles using LPG





A Total Number of Automobiles using LPG



Distribution of Automobiles using LPG

[Source ; Ministry of Construction & Transportation, 2006]

I. Units for trade

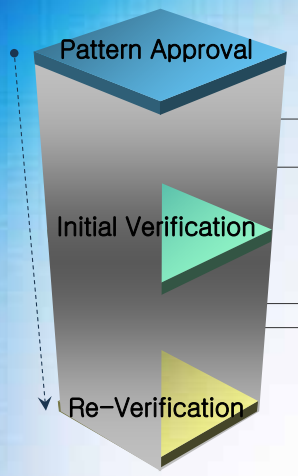
Unit of Measure used for LPG

Storage Facilities **kg** → Auto gas station, Propane gas bottling stations **L** **kg** → Customer

Total : Approx. 860 LPG stations

II. Legal Metrology System of LPG Dispenser

" Under the Law on Metrology, LPG Dispensers used for automobiles shall be subjected to legal metrology control"



- Issuing Authority
  - Issuing pattern approval certificate
- Designated Testing Laboratory
  - Issuing test reports

- Designated Verification Bodies are in charge of initial verification of all legal measuring instruments including LPG dispensers

- Each regional governmental offices are in charge of periodical verification and inspection of all LPG dispensers in service
- Verification interval
  - 2 years for LPG & Fuel dispensers

II. Organization (Pattern approval)

MOCIE
Ministry of Commerce, Industry and Energy

MOCIE

- Ministry of Commerce, Industry and Energy (MOCIE) has the responsibility for the type approval by the Act.

KATS

Ministry of Commerce, Industry and Energy
Korean Agency for Technology and Standards

- The Minister of MOCIE has delegated the authority to the Administrator of Korean Agency for Technology and Standards (KATS)
- KATS is the authority responsible for issuing type approval certificates for the measuring instruments for use of trade or certification as prescribed by the Ordinance of MOCIE

MPI

- The tests for type evaluation shall be performed in the labs designated by the KATS. These laboratories shall comply with requirements in ISO/IEC 17025 "General requirements for the competence of testing and calibration laboratories"

Korea Machinery-Meter and Petrochemical Testing and Research Institute

II. Organization (Verification)

KATS

- The Administrator of KATS has the authority of verification for the measuring instruments prescribed by the presidential Decree. The criteria for verification are prescribed by the Administrator of KATS.

MPI

- KATS may designated specialized institute for verification
- MPI is the verification body designated by KATS
  - 1 Head office & 5 Regional branch offices

II. Technical Requirements

"Technical requirements on LPG dispenser was revised in 2005 in consideration of OIML R 117/118"

(Implementing from Jan. 2007)

LPG dispenser

Requirements

·Visual inspection
- Data plate, Indicator

·Functional tests
- Zero-setting, Price computing

·Performance tests
- Accuracy : ± 1.0 %

Requirements

·Visual inspection

·Performance tests
- Accuracy : ± 1.0 % (Q_{min} ~ Q_{max})

·Endurance test : 100 hour

·Functional tests
- Checking facility, Zero-setting, Price computing

·Additional testing for electronic dispensers
- Dry, cold, Damp heat
- Power voltage variations
- Short-time power reductions
- Electrical bursts
- Electrostatic discharges
- Electromagnetic susceptibility

II. The method of verification

- All verification on LPG dispensers is performed at the place of service
- The method of measuring for accuracy
  - Gravimetric test method
- Equipment for LPG Dispensers
  - Weighing instruments
  - LPG Hydrometer (additional thermometer is attached)
  - Pressure container

III. Future Steps

○ **Our country is transferring legal metrology rights to nongovernmental organizations ; Issuing of a certificate on pattern approval**

○ **National type approval and verification standards are harmonized with international standards on legal measuring instruments**

○ **According to revision of the Law on Metrology, Pattern approval is going to be mandatory from the beginning of 2007**

Thank you for your attention

For further information

· Send e-mail to : swkim@mpi.or.kr

· Visit MPI's Website : www.mpi.or.kr

· Fax your name and address to : 82-31-785-1239

APEC/APLMF Seminar & Training Course on LPG

28/08/06 – 01/09/06

In Shanghai ,China

Presentation by : Viengthong VONGTHAVILAY

Deputy Director
National Metrology Center
Lao ,PDR

1. ***What is your position and responsibility in your economy ?***

- ***I am deputy director of Lao national metrology center and***
- ***Responsible for Inspecting and controlling of all activities related to Metrology(both Legal and Physical) in the country side and be supervised in general during the absence of my director.***

2. Will you be required to train others? If so ,how will you train ?

- Yes
- Participate to the yearly Program of APLMF Training Courses and ASEAN.

3. Do you have any experiences verifying fuel dispensers for petrol or LPG ? If "yes" please give the type of dispensers.

- Yes , I have but only with fuel dispensers for petrol and currently these activities have been implemented in the whole country since the year 2001.

Use of LPG in your economy.

1. Who are the major user (s) of LPG? How is it used? For example, used in houses, offices, factories, vehicles etc.

- Regarding the used of LPG in Lao.PDR the major users are customers who used LPG tanks just for cooking in the houses, restaurants ,Offices and factories.
- Except vehicles because we don't have any experiences and its technologies yet.

2. If LPG used for vehicles, how many number of vehicles are powered by LPG? Please give an approximate total number or a percentage to all vehicles. and what kinds of vehicles use LPG?

None, and I expected and be hopefully to learn and get experiences with all of our colleagues in this meeting

***Legal metrological control on LPG dispensers in your economy*.**

1. ***what are the units of measure used for LPG?***

   Systems International Unit (KG)

END OF PRESENTATION

And Before End On behalf of Lao Participant May I express my Sincere thank to APLMF as well as NMIJ And particularly Dr.Matsumoto who gave me an opportunity To be here in Shanghai and know all of our colleagues countries participants. Thank you !

VERIFICATION OF LPG DISPENSER IN MALAYSIA

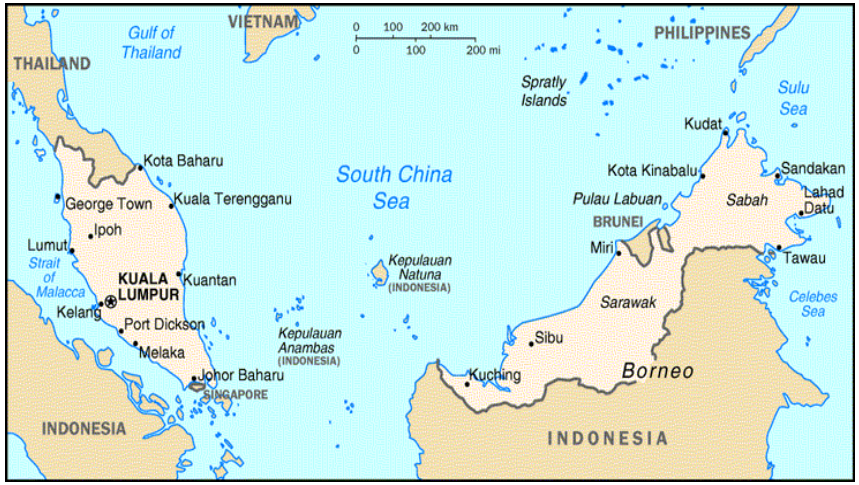
By

Peter J. Berinus Agang

Assistant Director

MINISTRY OF DOMESTIC TRADE AND CONSUMER AFFAIRS, MALAYSIA

MALAYSIA



MALAYSIA

- Consist of 13 state where 11 state in Peninsular Malaysia and 2 state in Borneo Island
- Federal Territory 3 state Kuala Lumpur,Labuan and Putrajaya
- Malaysia national capital is Kuala Lumpur
- Federal Government Administration Centre at Putrajaya
- Multi racial country with 26 million population
- Comprising three main ethnic Malay, Chinese, Indian and indigenous races

MEASUREMENT LAW & REGULATION

- Weight and Measure Act 1972 (ATS)
  - Regulated and governed by Enforcement Division under the Ministry of Domestic Trade and Consumers Affairs. (MTDCA)
  - Section 14 of weight and measure require mandatory verification and re-verified for all weighing and measuring instrument for trade purpose
  - LPG dispenser must have a pattern approval from National Metrology Laboratory (NML) before can be used for trade
  - Enforcement of the act carried out by weight and measure inspector

Used of LPG in Malaysia

- The only distributor of LPG in Malaysia is Petronas.
- Typical user of LPG are buses, taxis and also private user
- LPG sold in liter (L) unit

Vehicle Used LPG

VERIFICATION OF LPG IN MALAYSIA

- Since April 2005, LPG dispenser verification services in Malaysia has being privatized to Metrology Corporation Malaysia (MCM)
- Re-verification done every 12 month
- Verification by Volumemetric method

Limit of Error	Volume Indication
Repeatability	+ / -0.5 %
Linearity	+ / -1 %

- No of test run 5 at a constant Flowrate

VERIFICATION OF LPG IN MALAYSIA

- MCM issued verification certificate
- Seal the pump
- Stick security label and verification plate
- Dispenser must be re-verified if seal broken
- (Repair or relocation) before annual re-verification

ELECTRONIC LPG DISPENSER

FUTURE PLAN

- Train more enforcement officer how to do verification and re-verification on LPG
- Help MCM to setup a laboratory on LPG measurement.

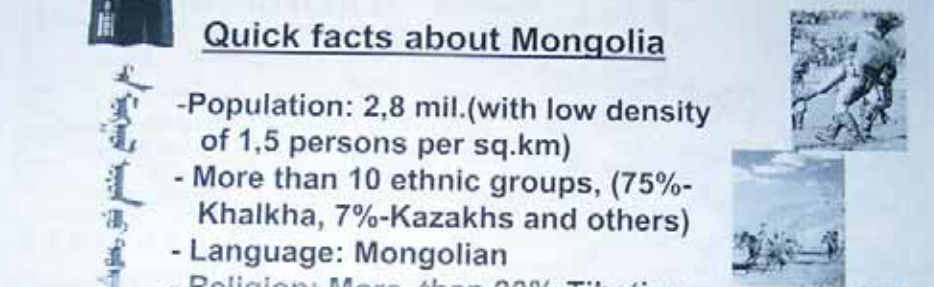
- THANK YOU

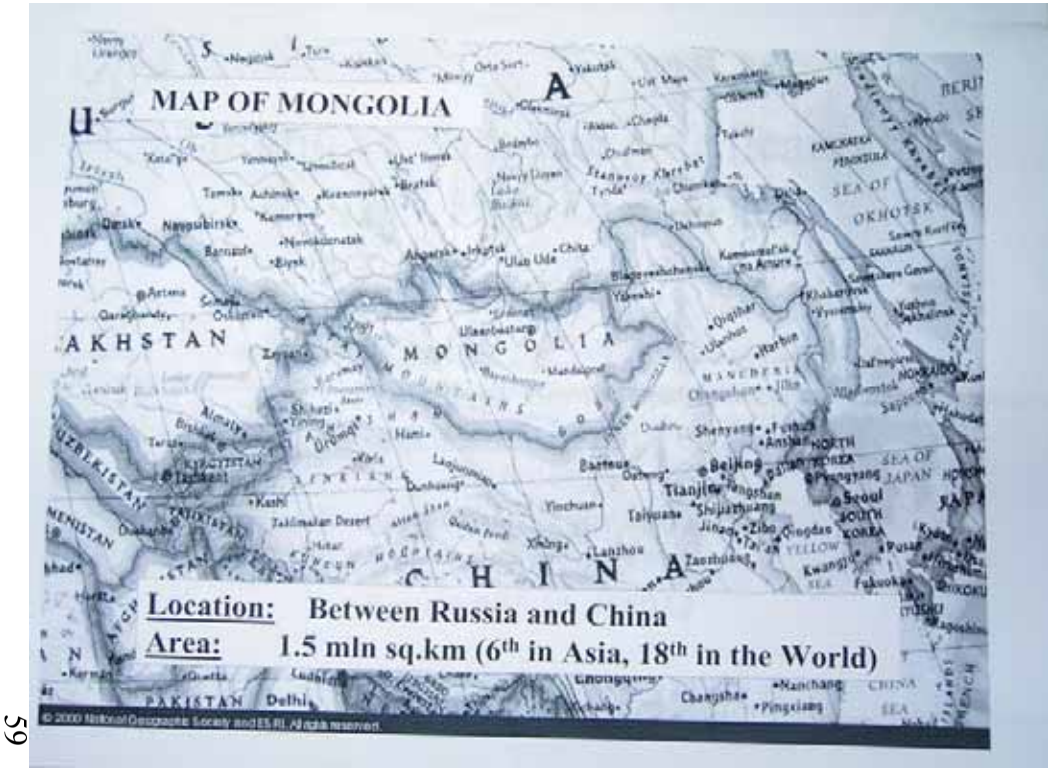
Training Course on Verification of LPG Fuel Dispensers

Magsarjav GOMBORAGCHAA
Verification officer for volume laboratory
Metrology department
Mongolian Agency for Standardization and Metrology
E-mail: masm@mongol.net
Tel: + 976 11 263792
Fax: + 976 11 458032

Quick facts about Mongolia

- Population: 2,8 mil.(with low density of 1,5 persons per sq.km)
- More than 10 ethnic groups, (75%-Khalkha, 7%-Kazakhs and others)
- Language: Mongolian
- Religion: More than 90%-Tibetian Buddhist Lamaism, 6%-Muslim
- Climate: Extreme continental, 4 distinct seasons





Brief introduction of MASM

Mongolian Agency for Standardization and Metrology was established in 1924. The organization is located in the central part of the country in the capital city of Ulaanbaatar.

Brief introduction of MASM

The MASM is a government regulatory body responsible for coordinating and managing the activities of Metrology, Standards, Certification and Accreditation throughout the country.

The highest decision making body of the center is MASM Council which consists of 20 members, who represent government and non-government organizations and approved by the government. The center executes its activities with 120 employees and implements its policy via the local centers for standardization and metrology in 21 aimags (provinces).

Mongolian Agency for Standardization and Metrology

Measurement Standards

The metrology center maintains the Mongolian national measurement standards for the SI units of mass, time and frequency, voltage, solid density, temperature and volume.

Main activities include:

- Development of national measurement standards system
- Dissemination of national measurement standards
- Development of Certified Reference Materials
- Calibration of measurement standards and instruments

Legal Metrology

- Pattern approval of measuring instruments
- Verification of mandatory instruments as required by law
- Licences for manufacture, repair and sale of measuring instruments
- Control of packaging/quantities

The metrology department verifies over 50 thousand measuring instruments per year.

Use of LPG in Mongolia

- I am a verification officer of volume measurement laboratory.
- I have an experience verifying fuel dispensers for petrol and LPG.
- I have experienced in the accuracy testing of weighing elements. Class-II, capacity 25-150 kg.
- However, approximately 1 000 vehicles powered by LPG. Its about 1% of all vehicles in Mongolia.
- Usually taxi companies use LPG. They make contract to buy LPG from the importer company. There are 10 LPG stations. A few restaurants and organizations use LPG other than vehicle purposes.
- Kg is the measure unit for LPG.
- Verification on LPG dispensers is one of the most difficult issue which occurs to our organization. Because, lack of measurement instrument.
- Our organization regulate type approvals and verifications of LPG dispensers. And reverification interval is 6 months. There are no verifications performed on meters at the place of service. Verification performed gravimetrically.

TRAINING COURSE ON LPG FUEL DISPENSERS SHANGHAI, CHINA

ECONOMY: PERU

ORGANIZATION: INDECOPI - NATIONAL METROLOGY SERVICE

TRAINEE: Nikko Meza.

LOCATION

PERU IS PART OF LATIN AMERICA.

IT IS LOCATED IN THE OCCIDENTAL PART OF SOUTH AMERICA

Peru is the land of the INCAS Empire

INFORMATION

- **Country (long form) Republic of Peru**
- **Capital Lima**
- **Total Area 1 285 215 square kilometers**
- **Population 27 483 864 (July 2001 est.)**
- **Languages Spanish (official), Quechua (official), Aymara**
- **Religions Christians (Catholic and anothers) 99 %**
- **Government Type Constitutional Republic**
- **Currency 1 Nuevo Sol (S/.) = 0,30 US$**
- **Industry mining of metals, petroleum, fishing, textiles, clothing, food processing, cement, steel, metal fabrication**
- **Agriculture coffee, cotton, sugarcane, rice, wheat, potatoes, coca; poultry, beef, dairy products**
- **Peru has the biggest biodiversity of the world**
- **Natural Resources copper, silver, gold, petroleum, wood, fish and others**

INTRODUCTION

INDECOPI

- What is your position and responsibility in your economy?

I am a technical metrologist of the Volume and Density laboratory in the National Metrology Service – INDECOPI.

I am in charge of the calibration service of Standard Test Measures.

INTRODUCTION

- Will you be required to train others?

Yes, but in medium or large period, when the State decides the fiscalization of LPG service stations. At first, there will be more stations and the fiscalization office will need to buy the standards.

- If so, how will you train?

Teaching to every trainee what I learned in this course.

Use of LPG in my economy

- Do you have any experiences verifying fuel dispensers?

Only a training course about type approvals and verification of dispensers of liquid fuels, in Paraguay two years ago. I don´t have any experience in LPG dispensers

Use of LPG in my economy

- Who are the major user(s) of LPG in Peru? How is it used?

Nowadays the main use of LPG is as in-house fuel and, to a less extent, as fuel for vehicles and industries.

- If LPG for vehicles, how many number of vehicles are powered by LPG ?

There a no statistics about this. An estimate is 5000 vehicles. This includes cars, lift trucks and buses.

Legal Metrological Control on LPG dispensers in my economy

- **What are the units of measure used for LPG?**

  The units of measure used is the Liter for vehicles and pounds for use domestic.

- **Are type approvals and verifications required for LPG dispensers in your economy?**

  The type approvals and verifications are not required for LPG dispensers in my economy. But in medium or large period, when the State decides the fiscalization of LPG service stations, the verifications will be required.

Number of service stations of LPG in Peru

Peru has 98 service stations:

Lima (CAPITAL)	**64 stations**
Other cities	**34 stations**

Thank you!

Nikko Meza Valencia
INDECOPI - PERU
nmeza@indecopi.gob.pe

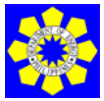
Training Course on Verification of LPG Fuel Dispensers

A Brief Presentation by

ROBERT R. CARDINALES

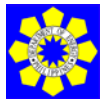
August 28-September 1, 2006

Bund Hotel, Shanghai, People's Republic of China

Republic of the Philippines  Department of Energy

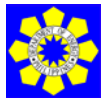
SELF-INTRODUCTION

- Senior Science Research Specialist
- Officer-in-charge, LPG Section
- Involved in both the development of standards and formulation of guidelines for the Auto LPG Industry



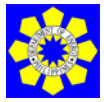
LPG Dispenser Training

- Echo seminar necessary for :
  Standards Formulation and Regulations
  Field Monitoring and Inspection
- Experience limited to petrol dispensers:
  Self-contained (suction and pressurized) pumps, electronic or mechanical metering



Major Users of LPG

- Household and Commercial (for cooking)– 85%
- Industrial Users (ceramics, glass, metal factories) – 14%
- Automotive – less than 1% at present of the overall LPG nationwide consumption



LPG Vehicles

- Metro Manila – 5,000 taxis out of 48,000
- Rest of the Country – 1,200 taxis

Metrological Control for LPG Dispensers

- Unit of Measurement Used – Liters
- Policy for regulation of type approvals and dispenser verification not yet finalized.
- Proposed government units to regulate:
  - Department of Energy for fuel dispenser standards and regulations.

Initial Auto LPG Introduction

- Early 1980 – LPG vehicles was introduced, mostly for company fleet units and imported cars from Korea and Japan. Not progressed due to:

  - Lack of Refueling Stations
  - Low quality conversion kits
  - Cheap petrol prices, with LPG for automotive taxed same as diesel at P1.63/liter
  - Supply and logistics

Auto LPG Update

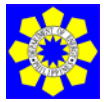
- Year 2003 - Re introduction of LPG as automotive fuel mainly for passenger taxis
- Industry deregulation brought in new players
- Zero-rated special tax and duty on LPG, including auto-use

  - High petrol prices per liter Php 25.00 for LPG as against Php 45.00 for unleaded gasoline per liter (present)
- Final draft of amended Philippine National Standards (PNS) for cylinders, and dispensing stations submitted for promulgation.

Auto LPG Update

- PNS for Code of Practice for conversion and Guidelines for registration and operation of LPG vehicles under review.
- Guidelines to implement the PNS to be amended to adopt to present situation by concerned government agencies. DOE to monitor compliance of Auto LPG Dispensing Station including dispenser types.

THANK YOU



The verification process of LPG fuel dispenser

Yang Shan-Yuan
E-mail: Vincent.Yang@bsmi.gov.tw

Instruments

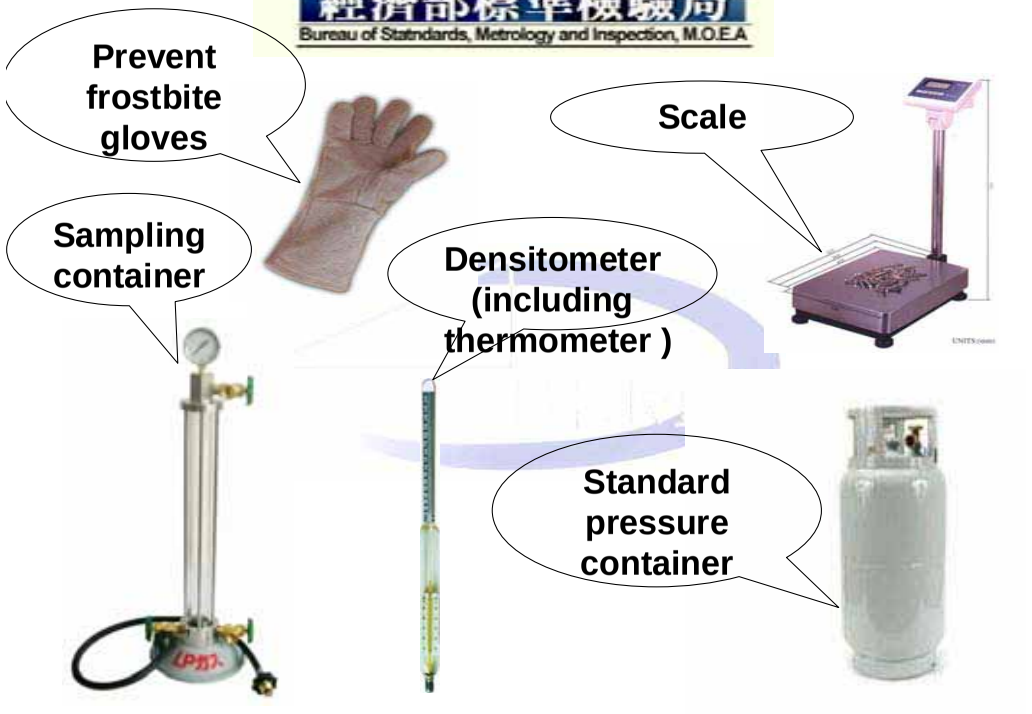
- ❖Standard scale
- ❖Standard pressure container
- ❖Sampling container
- ❖Densitometer (including thermometer)
- ❖Prevent frostbite gloves

Instruments

- ❖ Stop Watch
- ❖ Calculator
- ❖ Temperature – Density table (15℃)

Tools

- ❖ Record table
- ❖ lead sealing clam
- ❖ lead sealing
- ❖ lead wire
- ❖ Verification compliance tag



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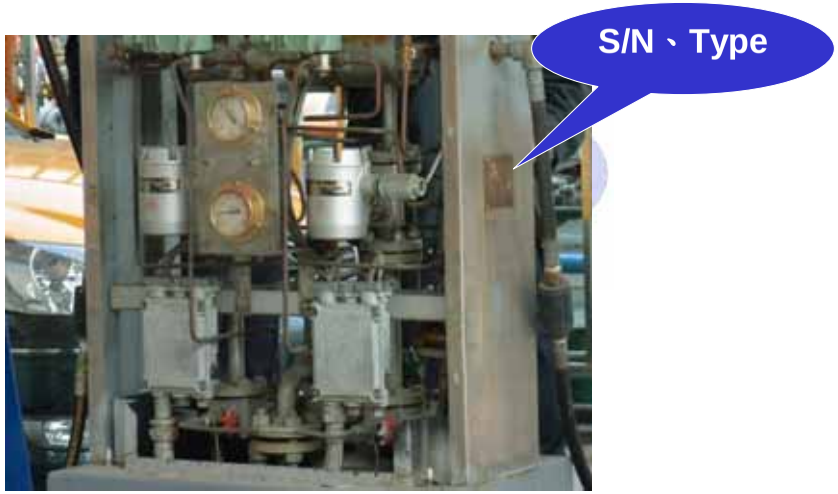
Bureau of Statndards, Metrology and Inspection, M.O.E.A

Visual Inspection



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Visual Inspection

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Visual Inspection

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Check instruments

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Check instruments

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Check instruments

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Check instruments

Pressure container test

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Leakage test

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Weigh empty container

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Verification

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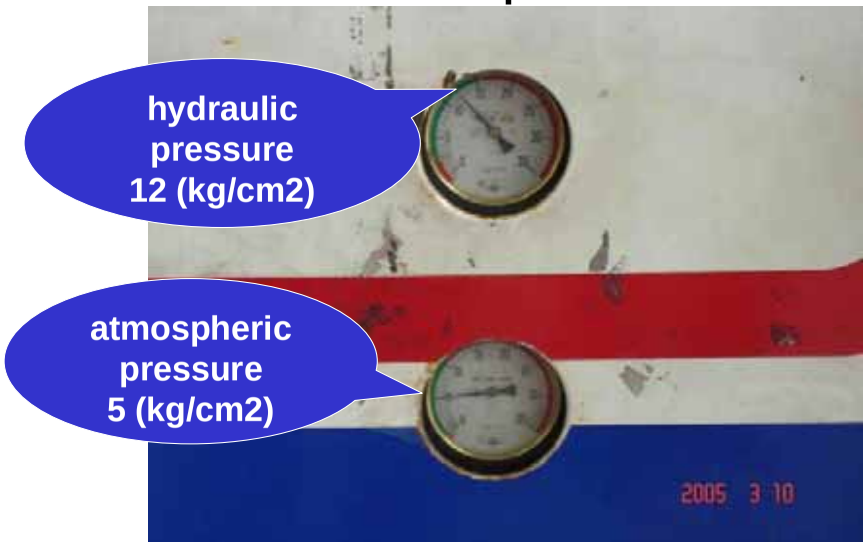
Record pressure



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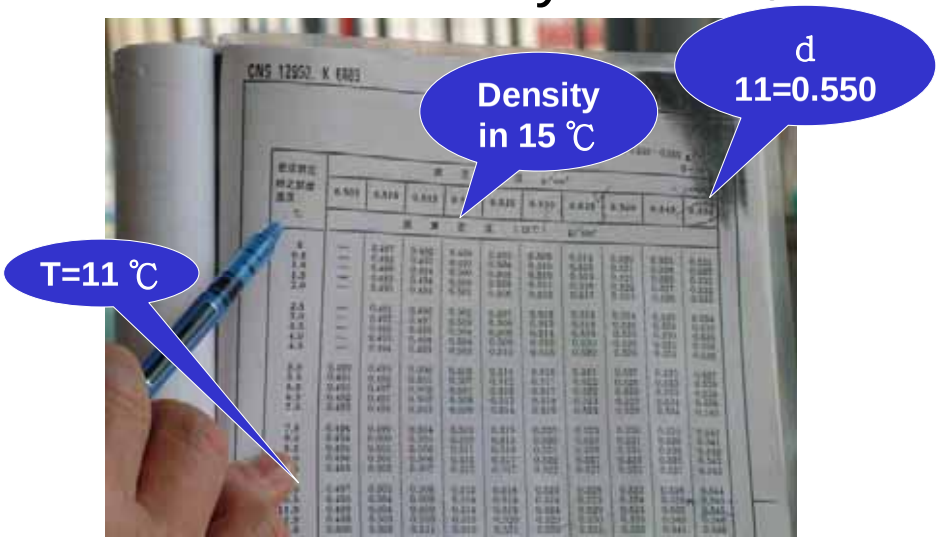
Read the density and temperature

Find the density in 15 ℃



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Calculate the error

$$E = I - \frac{W}{d_e} + I \times \beta(P_1 - P_e)$$

- E：error
- I：The value shown on the display
- W：W_2-W_1
- d_e :The density of LPG in 15 ℃
- P_1 : hydraulic pressure
- P_e： atmospheric pressure
- β ：0.00035 / kg / cm^2

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Calculate the error

W_1=15.64 kg，W_2=27.57 kg，d=0.544(g/cm^3)，
T=11 ℃ ，d_{15}=0.549 (g/cm^3) ，t=54(s)
I=21.97 L，
P_1=12 (kg/cm^2)，P_e=5 (kg/cm^2)

E＝21.97－21.73+21.97 X 0.00035 X（12-5）
＝ 0.293408 (L)

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Maximum permissible error

- If verification volume > 20L
  MPE= Verification volume * ±1 %
- If verification volume <= 20L
  MPE= Verification volume * 0.2L

Verification result

- MPE=21.97* ±1 % = ±0.2197(L)
- E＝0.293408 (L)
- **Fail in this test**

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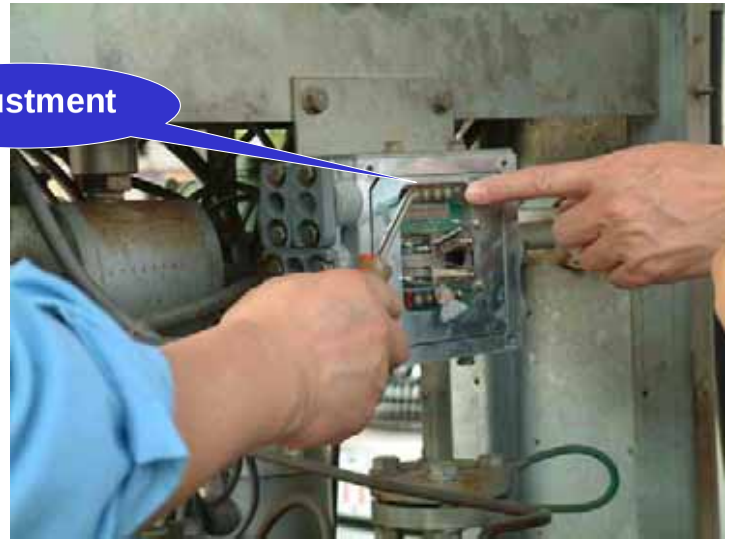

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Thank you for your attention

APEC/APLMF Training Course on LPG Fuel Dispensers
August 28 – 1 September,2006 in Shanghai,China

Verification and Inspection of LPG Fuel Dispensers in Thailand

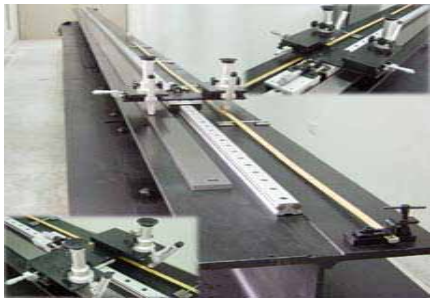
Panawan Khumlor
Eastern Verification Center (Chonburi)
Department of Internal Trade
Ministry of Commerce

LPG Fuel Dispensers in Thailand

- *Part 1 :Weights and Measures in Thailand*
- *Part 2 :Use LPG in Thailand*
- *Part 3 :The Legal for LPG dispensers in Thailand*
- *Part 4 :Inspection and Verification for LPG dispensers*

Part 1:Weights and Measures Office in Thailand

Part 1:Weights and Measures Office in Thailand



Verification and Inspection of every weight and measures and instrument for weighing or measuring for trade

Part 2 : LPG dispensers in Thailand

Using of LPG Fuel

- In Thailand ,users of LPG are taxis,vans,tuk tuk,pick up and private cars.

Number of LPG Stations

- There are currently……serviced LPG station in Thailand.

Part 3 :The Legal for LPG dispensers in Thailand

The regulation by Central Bureau of Weights and Measures,Department of Internal Trade,Ministry of Commerce. (As a consequence became a member state of the OIML,almost of Thailand's regulations refer to OIML Recommendation)

The legal unit

-The unit used in sale of LPG fuel is Liter (L).

The re-verification interval

-The re-verification interval is 2 year and it works at place of service.

Part 4:Inspection and Verification for LPG dispensers

The methods in we used are performed gravimetric.

Test procedure

- Zero setting
- Price computing
- Interlock

Maximum Permissible Error

-Verification 0.6 %
-In-service inspection 1 %

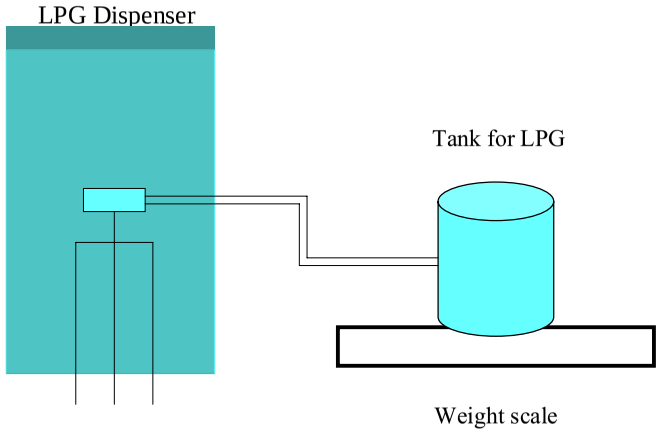
Accuracy test

- 3 runs.

Reference standards of measure used to test LPG dispensers gravimetrically.

- Weighing instrument
- LPG cylinder
- Standard masses Inspector is class M1
- Hydrometer
- Thermometer
- Pressure gauge

LPG dispensers test gravimetrically



Thank you.

Control & Use of LPG in Vietnam

Presentation by : Nguyen Cao Phuc

Volume & Flow Laboratory
Vietnam Metrology Institue - VMI

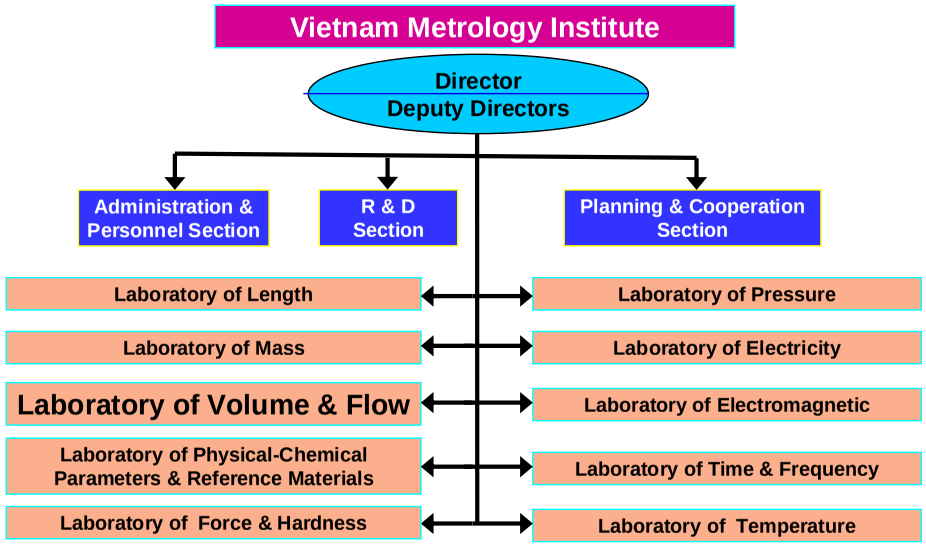
Contents

1. Introduction
2. Use of LPG in Vietnam
3. Legal Metrology control on LPG dispensers

Introduction

- I am PHUC, from Volume & Flow laboratory of VMI
- Volume & Flow Lab is one of ten VMI's Laboratories
- Vietnam Metrology Institute (VMI) was established in 1962 and now belong to Directorate for Standards and Quality (STAMEQ).

Organization Chart of VMI



: VMI calibration laboratories are accredited by VILAS

Volume and Flow Laboratory

The main tasks :

- To establish, maintain and custody national measurement standards in the filed of volume and flow.
- To conduct scientific and technical research in metrology;
- To carry out metrology activities of dissemination measurement technology, calibration, verification, testing, information, training and international cooperation.
- To carry out type evaluation and to issue type approvals for measuring instruments in the filed of volume and flow.
- Extension the education & training programs for the inspectors, metrology technicians of branch offices or authorized offices.

Verification & Calibration works in the field of Volume and Flow




Ability & Activities



Standards & Measuring Instruments for Verification and Testing fuel dispenser

Test items of testing fuel dispenser

Environment chamber:
Temp : (-20 - 50)°C
Humidity : (19 - 97)%


A set of volume standards with capacity from 2L to 200L.
Accuracy class: 0.1

Current situation Use of LPG in Vietnam

- LPG mainly used for household purposes (occupied 70%) and the remaining used for industry. Some major customers are brick plants, porcelain- ceramic factories, art-workshops, hospitals, laundries, restaurants, hotels...
- LPG used rarely for vehicles. A few taxi and bus companies in big cities (Ha noi, Ho CHi Minh, Vung tau...) are powered by LPG . Therefore gas stations are very rare. There are only 2 gas stations in Hanoi now.
- In the future, with government's effort to decrease air pollution, hoping that use of LPG for vehicles will be more developed.

Current situation Use of LPG in Vietnam

- Amount of LPG consumption in the market is about 750,000 tons per year.
- Vietnam can manufacture LPG and production make up about 45% total consumption.
- Some names LPG dispensers in the market : COPRIM, BATCHEN ...

Legal Metrology control on dispensers

- The legal units of measure for the scale of volume in Vietnam is cubic meter or liter. However, in LPG shipping and receiving procedures, kilogram or ton is popular adopted.
- Accuracy class of LPG dispensers : 1.0

  Fuel dispenser : 0.5
- Re-verification interval : 1 year
- Regulations : follow OIML R117

  Issued: Methods and means of verification on Fuel dispenser and LPG dispenser
- At present, regulation for LPG flow meter verification are prepared to issue .

Legal Metrology control on dispensers

- Methods for verification :
  - The volumetric method : uses a master meter or volume standards as a traceable reference standard
  - The gravimetric method : uses mass in conjunction with a weighing instrument as a traceble reference standard

- Normally, verification works are performed in gas station.
- All dispensers that pass verification will be lead-sealed with wire and stamp a conformity sticker.

THE END

Thank you for your attention!