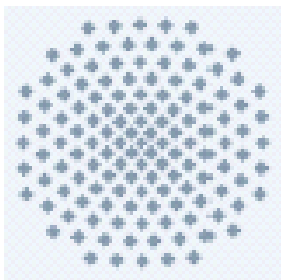




**9th Evaluation Workshop
within the SADC MET
Proficiency Testing
Scheme for Water Testing
Laboratories
Chemistry part**

Addis Ababa, Ethiopia

19 – 22 November 2012



Report on the 9th Evaluation Workshop within the SADC MET Proficiency Testing Scheme for Water Testing Laboratories

Addis Ababa, Ethiopia, 19 – 22 November 2012

Prepared by Dr.-Ing. Michael Koch

Summary

The workshop covered the evaluation of the 9th SADC MET Water PT round and all aspects that could be derived from the results. The results showed more or less the same picture as in the previous year. Still there are some laboratories that continue to fail in the PT, most probably due to the absence of adequate corrective actions, improper use of suitable analytical methods and also use of non-suitable methods.

Two SADCWaterLab working groups were established during the 2009 meeting in the Seychelles. One is dealing with recommendations for suitable analytical methods, the other one with the follow-up the Training of Trainers held in 2010 in Livingstone, Zambia.

Most of the participants are still very enthusiastic. So despite of the only slow improvement of the quality of the PT results it is recommended to continue the PT system. Nevertheless the system should move more to sustainability. As a first step to sustainability, travel costs to the workshop reported here had to be covered by the participants themselves. The structure of local coordinators is very useful, but still has to be improved. The commitment of local coordinators differs very much. But to minimize logistical problems and to increase the number of participants the local coordinators play a crucial role. One of the main obstacles for further expansion of the system and for improvement of the quality of the labs is the lack of awareness on the importance of PT or – even more basic – the importance on quality assurance in the chemical lab. To overcome this problem the results of this workshop were communicated to all participating laboratories via a short report. To raise awareness amongst the policy makers in the laboratories the leaflet prepared by SADCWaterLab explaining the importance of quality management in the laboratory and participation in PT schemes should be used. In addition workshops on national level are indispensable. This is mainly the task of the persons trained at the training for trainers in Livingstone, Zambia, in August 2010. In this training course material for a basic course on quality assurance in the analytical laboratory was provided and the participants were trained to present this in a workshop.

The assessment procedure of the PT using limited standard deviations has again proven to be very effective. The statistical methods are in accordance with the internationally recommended procedures.

The evaluation workshop also contained training sessions on “Calibration”, “Certified Reference Materials” and “Metrology in Chemistry” as well as the SADWATERLAB General Assembly.

Introduction

The workshop reported here followed previous workshops held in

- Windhoek, Namibia (Feb 2004),
- Pretoria, South Africa (Dec 2004),
- Dar es Salaam, Tanzania (Nov 2005),
- Gaborone, Botswana (Nov 2006),
- Dar es Salaam (Dec 2007),
- Kampala, Uganda (Dec 2008),
- Mahé, Seychelles (Nov. 2009),
- Windhoek, Namibia (Nov. 2010) and
- Port Louis, Mauritius (Nov. 2011).

The reports are available from <http://www.sadcmnet.org>. As a result of these workshops the first and second proficiency tests for water testing laboratories were organised by Umgeni Water (Pietermaritzburg, South Africa), the following rounds after a training in Germany by Namwater (Windhoek, Namibia). The main aim of this workshop in Addis Ababa was the discussion of the evaluation of the ninth PT round on chemical parameters and to find a way to sustainability of the PT scheme.

The improvement of cooperation between laboratories within the SADCWaterLab Association was also discussed during the workshop.

Participants

The chemistry workshop was attended by 36 participants from the following countries:

- Botswana 2
- DRC 2
- Ethiopia 9
- Kenya 3
- Lesotho 1
- Malawi 1
- Namibia 2
- Seychelles 1
- Swaziland 1
- Tanzania 7
- Uganda 3
- Zambia 1
- Zimbabwe 3



A complete list of participants with e-mail addresses is given in annex 1.

PT Workshop Programme

Monday, 19 November 2012:

Welcome, Opening, reports of local coordinators, reports from SADCWaterLab working groups, report of the PT provider

Tuesday, 20 November 2012:

Evaluation workshop, PMC meeting

Wednesday, 21 November 2012:

SADCWaterLab working group meetings, training, PMC meeting

Thursday, 22 November 2012:

SADCWaterLab General Assembly, lab visit at Ethiopian Conformity Assessment Enterprise (ECAE)

Monday, 19 November 2012

Welcome and Opening

The participants of the workshop were welcomed and the workshop was officially opened by

- Mr. Donald Masuku, SADC MET Regional coordinator, National metrology institute of South Africa
- Mr. Vivian Radeconde SADCWaterLab vice chair, Seychelles Bureau of Standards
- Ms. Kathrin Wunderlich, PTB
- Mr. Gashaw Tesfaye, Director of the Ethiopian Conformity Assessment Enterprise

Donald Masuku explained the programme of the workshop.

Local coordinators: Report

To facilitate the organisation of the PT rounds and to reduce shipment costs local coordinators (LC) for each country have been installed. During the workshop the local coordinators were requested to give a short report for participants of both workshops on their activities.

Angola

No representative

Botswana

Currently there are five Laboratories in Botswana that are potential participants. Three of them participated, one had problems to pay the fee. There are four additional laboratories in the mining industry, but they do not intend to participate.

The Water Utilities Center will be accredited soon.

The LC wants to organize a local training workshop in March or April 2013.

Democratic Republic of Congo

From the 20 labs in DRC (8 in the water sector) five laboratories participated in the PT. So there is hope that next year it will be eight participants. In 2012 a control charts training was conducted. More training is planned for 2013.

Lesotho

A national laboratory association was registered, but not all of the members are doing water testing. Visits to the labs were done to provide advice. Currently there is only one active lab in the water sector (Water Sewage Company). No training was organized by the trained trainers.

Ethiopia

Three labs have been contacted, but no budget was available to participate. A five-day training in ECAE was performed for measurement uncertainty estimation and validation of methods. Ethiopia has a national laboratory association which also is marketing the PT scheme.

Malawi

Changes in persons were the major challenges in Malawi. A national lab association was formed. This structure will be used to market the PT scheme. No training was organized.

Kenya

Marketing the PT scheme is an ongoing process. In 2012 15 laboratories participated and the LC is still trying to recruit more participants for the next years. Customs problems were encountered in 2012. Two trainings were organized: One on ISO 17025 at the National Quality Institute and one for the sugar sector at KENAS. Training was also offered in conjunction with the food PT evaluation workshop. In December 2012 a regional metrology conference will be organized.

Mauritius (written report)

10 laboratories were invited for participation, but finally only three of them participated. Different reasons for not participating were reported. MSB will continue to market the scheme.

Madagascar

No report available. Two labs participated

Namibia

There are three water laboratories in Namibia and all of them participated. Maybe one of the mining laboratories will participate in future. The questionnaire for the fish PT was forwarded to a laboratory in Walfishbay. A SADCAS training with a Swedish expert took place and a training on statistical method validation with Prof. Paul de Bievre. The National Standards Institute is trying to find our possibilities for a national laboratory association.

Seychelles

Only SBS participated in the PT although marketing was done to other labs. Currently there is no training planned.

Swaziland

The local coordinator passed away in 2012.

There are 7 laboratories for water analysis in Swaziland (two only occasionally). No one participated in the 2012 round. The low participation is mainly due to the currently very low economy. One laboratory was recently accredited for microbiology and soon also for chemistry. A national laboratory accreditation was just formed. One of the trainers trained in Livingstone is still present, but up to now there have been not enough participants to organize a training. This hopefully will change in 2013. Two laboratories are interested in a microbiology PT.

Tanzania

12 laboratories participated in the PT round.

Together with other trainers many training workshops have been organized (on ISO 17025, method validation, control charts, reference materials and other challenges). Continuity of staff and lack of awareness are the major problems. At the moment there is no national laboratory association in place, but a new structure for water quality labs will be installed with 16 labs for 25 regions within Tanzania.

Uganda

Five laboratories initially registered for the PT, but only four delivered results. The number of participants was limited, because parameters and matrix of the PT do not exactly match the needs of the labs. In future the LC will target those labs that exactly analyze the offered matrix. Training on QA issues was conducted in 2011. UNBS benefitted very much from the SACMET PT scheme in the accreditation process. Major challenges are the low awareness and difficult e-mail communication. Often there is no response, so phone calls are preferable.

Zambia

The local coordinator was not present. There should be more than seven laboratories for water testing, but only two participated. No information was available on activities of the local coordinator. Information was passed to five laboratories by Zambia Bureau of Standards (ZABS), but in those labs no budget for participation was available. No training from the trained trainers has taken place. A national laboratory association was registered early 2012 carrying out 3 trainings (GLP, validation, uncertainty). The trained trainers are members of the executive committee of the lab association. It is expected that the lab association increases awareness in QA topics.

Zimbabwe

Seven laboratories participated in the PT. The national laboratory association performed a 5-day-training in March 2012 with support from PTB on statistics, control charts, metrology, ISO 17025, validation, principle of PTs, SACMET PT.

T. Ditsabatho: Report from the ToT working group

Teddy Ditsabatho explained the objectives of the ToT programme. Trained persons were obliged to perform training activities in their countries. A database of trainers was compiled. The following challenges were identified:

- Not all workshops were done as promised
- For workshops being done not in all cases this was reported to the secretariat
- Corrective actions were not done in all participating countries
- Staff turnover leads to unavailability of trained persons

Although there is the possibility of sponsorship for workshops from PTB, this opportunity was not used in all countries.

There were intensive discussions on the future of the ToT programme and how to ensure that training activities are done in all countries. Standard associations and national lab associations could help.

There was also a long discussion on how to do corrective actions. M Koch stated that all tools for corrective actions are given in the trainings. K Mbwambo summarized that mutual help between laboratories is crucial.

M. Conradie: Report from the methods working group

Methods for analyzing anions were collected and sent back to all participants. Only comments from Mauritius and the Seychelles were received. The chair of the working group was changed to Vivian Radegonde (Seychelles).

M. Conradie: Report of the PT provider

Meryllinda Conradie gave a report on the 8th PT round. For the people participating for the first time she shortly introduced NamWater and gave a short overview on the project activities since 2004. With 57 participants in the PT round the overall number is quite stable, but the distribution between countries is changing. In 2012 there were a lot participants from Kenya and Tanzania (12 each), but for other countries it is still low or decreasing. An increasing number of participants would be beneficial in the interest of sustainability.

She also explained all the steps of the PT provision.

In detail she explained the gravimetric preparation of the PT samples and the calculation of the reference values including its uncertainties. Procedures for documentation storage of samples and dispatch including packaging and labelling were shown.

Evaluation and assessment was made as in the previous years using a reference value derived from gravimetric formulation as assigned value and the standard deviation of the data with fitness-for-purpose limits for the proficiency assessment. Scoring was made using z-scores.

- Angola: One laboratory paid the fee, but did not submit results
- In Kenya there was a serious delay due to customs problems. One lab from Kenya requested 2 parcels and an additional parcel was sent separately. In this case there was no customs problem. So it seems to be completely unpredictable.
- Again there were problems with files > 5MB. Such big files are blocked by NamWater IT and cannot be received
- Shortage of staff in and scheduling of a PT round between normal laboratory activities is an ongoing challenge.
- Registration forms in some cases were not received in time or sometimes not at all. So laboratory information and contacts are not available
- Registration forms often were not clear
- Return date for the results was 10th of August 2012, but last results were received in October only. This caused a delay with the evaluation report. Therefore the evaluation report was not distributed according to schedule

The complete presentation is enclosed in annex 2.

Tuesday, 20 November 2012

M. Conradie: PT evaluation results

Meryllinda Conradie explained in detail the results of the evaluation, including the evaluation and assessment process, the performance scoring, and the limits for the standard deviation for proficiency assessment. She also showed the progress of parameters over the previous rounds and the concentration ranges used.

Then she went through all the parameters in detail with the following steps:

- Reference values and mean of participants as well as the results of the expert laboratories. Uncertainties were shown where available
- Graphical display of the means vs. the reference values
- Standard deviation of the data sets vs. the concentration including the limit used for the proficiency assessment
- Development of the standard deviation over the various PT rounds
- Development of the percentage of non-satisfactory results
- The performance development in the individual laboratories
- Graphical display and statistics of all data sets
- Percentage of methods used
- Comparison of methods
- A summary for the respective parameter.

The complete presentation is included in annex 3.

The summaries for all the parameters were as follows:

Sulphate:

- Average recovery (93,4%) was lower than in the last rounds
- STD are still quite high, especially for low conc.
- Still many data outside the limits, especially for the low level
- Gravimetric methods often delivers too low values
- Not a big change compared to 2011

Chloride:

- STD not much different from last rounds, maybe a bit better
- 24% of the data outside – no change
- Argentometric titration has many high values (exactly as in last rounds!)– incorrect recognition of endpoint?
- As in 2011 problems with spectrometric method

Fluoride:

- A lot of too high results for lowest level (21 out of 31 data) (all of the colorimetric results!)
- STD very similar to last year (very high, > 100%, for the low level)
- Increased percentage of non-satisfactory results (54%)
- Method specific evaluation exactly as in 2011
- All in all exactly the same problems as in 2011

Nitrate:

- More labs reporting in wrong units; labs either do not read / do not understand / are not able to calculate or convert to the correct unit
- STDs very high – mostly because of wrong units
- Percentage of non-satisfactory results again very high (units!) – 48%
- What means colorimetric? Many different methods behind that!

Phosphate:

- Again some labs reported in wrong units; therefore average recovery low
- STD a bit better 17 -30%
- Percentage of non-satisfactory results slightly better (31%)

TDS:

- Although it was clearly specified that a gravimetric determination is required – method information was not reported - “other”
- Methods were reported as “an electrode method”? These are obviously different measurands!!
- Average recovery of 95% is not too bad
- STD better than last year, but still too high
- Percentage of non-satisfactory results slightly better (30%), but it was made clear now, that the determination should be gravimetric

Conductivity:

- Obviously serious problems with units
- STD of the values with correct units are not bad
- Percentage of non-satisfactory results is very high (50%)

Calcium:

- Perfect average recovery
- STD – no change compared to 2011
- Percentage of non-satisfactory results 31% - no improvement
- Method specific evaluation very similar to 2011

Magnesium:

- More titrimetric results than in 2011 - with the problems of a high portion of too results for this method
- STD higher than last year
- Results worse than last year

Sodium:

- Problems with high results for lowest level – high blank?
- No improvement in the STDs
- Percentage of non-satisfactory results higher (41%) mainly due to problems with lowest level

Potassium:

- Average recovery is ok
- STDs higher than in previous rounds
- Percentage of non-satisfactory results with 34% a bit worse than in 2011

Iron:

- Problems with the lowest level – high blank?, high STD (68%!)
- Same picture as in 2011

Manganese:

- STDs much better than last year, comparable to previous rounds
- Improved percentage of non-satisfactory results (17%)

Aluminium:

- Higher concentrations than last year
- STDs similar to previous rounds
- Problems with the low level (52% of the results outside the limits)
- Problems with the colorimetric method

Lead:

- Obviously problems with the lowest level – high blank? high STD (83%!)
- STDs for the other levels is fine
- Similar picture for the methods

Copper:

- Similar performance to last year
- Good standard deviations - around 10 %

Zinc:

- Similar to last year
- But the STD for lowest level is significantly higher, maybe due to a lower conc.
- For the two higher levels everything is fine

Chromium:

- Blank problems with the lowest level?
- The mean of the labs is quite low in comparison with ISWA and IWW as well
- The calculation of the reference values were checked for transcription errors and confirmed to be correct
- The colorimetric methods again has a high number of too low values – is that a method to determine Cr(VI)?

Nickel:

- High STD for the lowest level just as in the previous rounds

Arsenic:

- Low number of values
- STDs higher
- Obviously problems with AAS

Cadmium:

- STDs better than last year, but in the same range as in the previous rounds

Cobalt:

- Slight improvement in the STDs

Overall picture

The number of parameters analyzed by the participants varies very much. Only 5 laboratories analyzed all parameters. Three of them were successful in all parameters.

Merylinda Conradie drew the following conclusions:

- There is no real improvement, the standard deviations are still high
- The same mistakes are being done as in previous rounds; e.g.

- Reporting of results in wrong units (N and not NO_3^- and as P and not PO_4^{3-})
- Use of non-standard methods
- Stating the concentration ranges obviously did not help to improve the results
- Corrective actions (investigate problems / determine the root cause) are still not implemented
- Recommended methods must be finalized and implemented

She identified the following challenges for 2013:

- Use old PT samples to implement corrective action immediately
- Use the ranges to avoid complete outliers
- Apply internal quality control
- Equipment, method comparison, assistance and continuous education amongst the SADC MET lab association is very important and a good platform for networking

Group discussions on the evaluation results

The participants divided into 4 groups to discuss issues around the PT round and the way to proceed. Several questions were given as a basis for discussion and the results of the discussions were then presented to all participants.

Is the selection of parameters still fit for purpose?

- Yes, but there is a need to consider other parameters – pesticides? (not in this scheme)
- Yes, but additional parameters should be considered (pH, Hg, Se)
- Yes, but consider to include alkalinity, total hardness and Hg

Decision: The PT provider will check the possibility to use anion sample to include pH

Are the concentrations ok?

- Yes, but WHO limits should be considered especially for cations (one level below the limit!)

Decision: PT provider will check the WHO guidelines

Are the standard deviation limits still ok?

- Yes, but in future they could be made uniform
- For now they should be maintained
- For anions to keep at 10%, cations to keep at 20%, for difficult analytes consider increasing to 25% (for low levels)

Decision: PT provider (together with consultant) will decide whether to increase limits for low concentrations

What could the PT provider do to resolve the problem with wrong units?

- It's not the task of the PT provider
- LCs should communicate to participants the issue of units and any other guidelines
- PT provider clearly states what unit to use
- In the reports to individual labs these problems should be highlighted
- Use national forums to discuss this issue

- The PT provider can do nothing; everything necessary is already done
- Results in wrong units should not be considered

Decision: PT provider will include a leaflet especially dealing with the unit problem

How can bad performing labs be convinced to do corrective actions?

- Forms to be provided by the PT provider for corrective action and root cause analysis
- Because of confidentiality issues the information should not go to 3rd party
- LCs to organise follow-up meetings
- Corrective paper to be recirculated with report every year
- Networking to be encouraged
- Lab association to take action (LC)
- LC to organise meetings with participants to highlight this
- Training on how to handle PT results
- PT provider to link labs

Decision: It was decided that no action is required.

Any suggestions for changing reporting of results in the workshop and in the written report?

- Information given is ok
- More information on methods would be beneficial
- Written report should be accompanied with a certificate and comment on the need for corrective action
- Summary instead of detailed report in the workshop
- Format for the report is ok; method information is valuable
- Written report: adding annex with a table of lab code, z-score and method information (no countries)

Decision: PT provider and consultant to decide how to shorten the report at the workshop

How to achieve sustainability?

- Cost analysis by the PT provider to get an idea what is needed
- LCs to market the scheme to potential participants
- Awareness creation on the benefits of the PT, target decision makers and lab community through different forums at national level (lab association)
- Labs should include PT participation in their budget
- Consider increasing fee from 200 \$ to 250 \$ (transportation costs around 250\$ per parcel)
- Membership fees for lab association
- Encourage organisations to support their labs and the PT scheme
- Workshop to be reduced; training on national level
- Training with fees (partly supporting the PT scheme)
- Future hosts consider to use their own facilities to reduce costs

Decision: More discussions needed. Further decisions to be taken by SADCWaterLab Association.

What participation fee would be adequate and affordable?

- 200 \$ is ok, depending on cost analysis
- PT provider to provide real costs to see what is realistic

Decision: To be decided after discussion of cost analysis

Do we need a workshop every year?

- At least every two years
- Yes, it's still needed for capacity building in the labs
- Yes, still necessary, but consider to have them on a 2 years basis

Decision: Workshop could be reduced to 2 days (one for evaluation, one for SADCWaterLab issues), use e.g. hosts' facilities, enable accommodation in cheaper hotels, on the longer term maybe workshop every two years

Wednesday, 21 November 2012

SADCWaterLab Working Groups

Both working groups (Methods and ToT) had a meeting. The results of these discussions will be published in the SADCWaterLab Newsletter.

Training session on “Calibration”

Kezia Mbwambo (Tanzania) gave a training on “Calibration”. The complete presentation is included in annex 4.

Training session on “Metrology in Chemistry and Traceability of Measurement Results”

David Koech (Kenya) presented the principles of “Metrology in Chemistry and Traceability of Measurement Results”. His slides are included in annex 5.

Training session on “Reference Materials in Analytical Chemistry”

Vivian Radegonde (Seychelles) finalized the training with a presentation on “Reference Materials in Analytical Chemistry”. The slides are available in annex 6.

Thursday, 22 November 2012

SADCWaterLab General Assembly

SADCWaterLab had its General Assembly in the morning. There will be minutes prepared by the secretary.

As a summary the decision taken in the General Assembly are noted here:

- Fish-PT: Vivian Radegonde will contact IAEA in Monaco to find out if there possibilities to participate in their Fish-PT
- Next evaluation workshop: 3-day workshop (for evaluation, training and SADCWaterLab one day each); training will be given by external experts as a refresher for trained trainers; PTB will sponsor accommodation for 25 participants and food during the workshop.
- PT participation fee: will stay at 200 US-\$ (total actual costs are currently around 400 US-\$ per participant)
- SADCWaterLab Newsletter: contributions to be sent to secretariat by 15th January

- Local Coordinators reports: a quarterly review is required about what is going on in their respective country. This will be coordinated by the SADC MET secretariat.
- Microbiology PT: Many thanks to UNBS for their efforts. It turned out that it is not possible to transfer the German PT system to the African region (mainly due to climate and transportation issues). Other possibilities will be checked.
- Next PT round: announcement will go out end of February

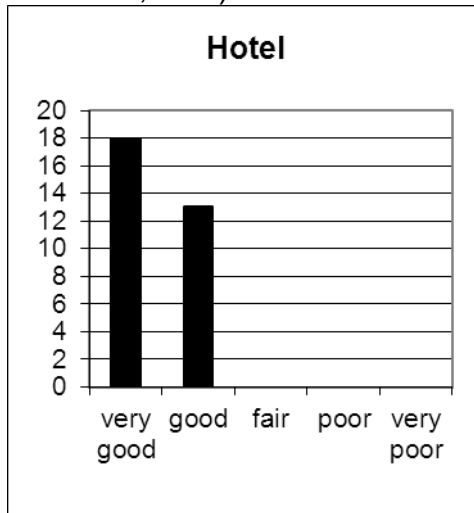
Evaluation questionnaire

M. Koch distributed an evaluation questionnaire (see annex 7) for the chemistry part of the workshop to be filled out by all participants.

The results of this questionnaire are given on the following pages:

Hotel and conference facilities

How do you judge the hotel (accommodation, food)?

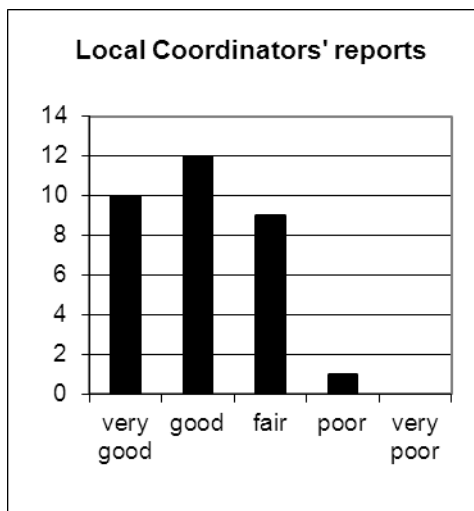


How do you judge the venue of the workshop (conference room)?

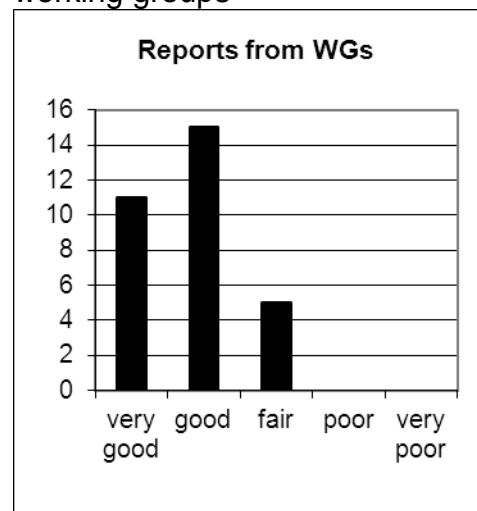


How do you judge the different parts of this workshop?

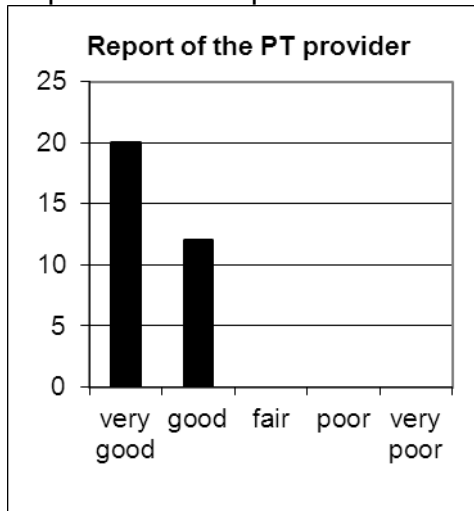
Local Coordinators' reports



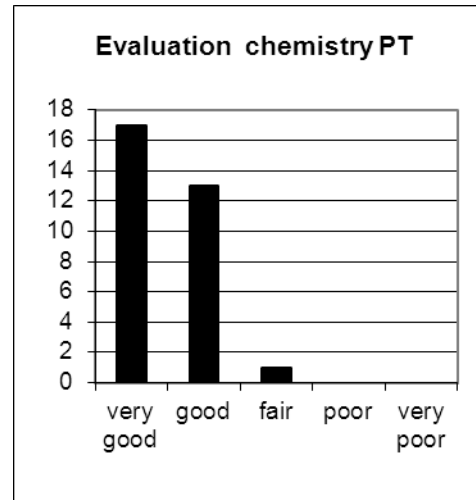
Reports from the SADCWaterLab working groups



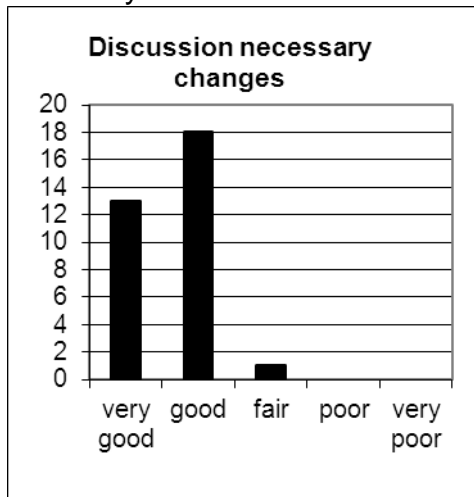
Report of the PT provider



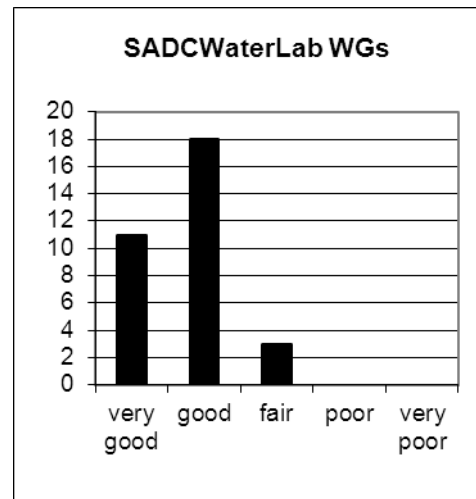
Evaluation of the PT



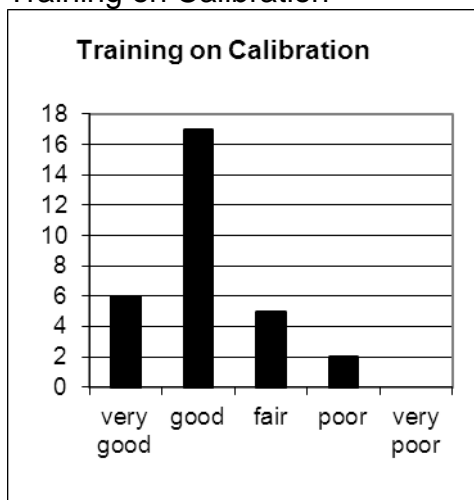
Discussion about necessary changes in the PT scheme and the way to sustainability



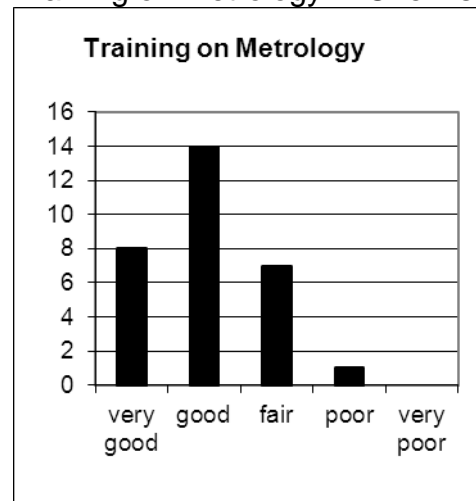
SADCWaterLab WGs "methods" and "training"



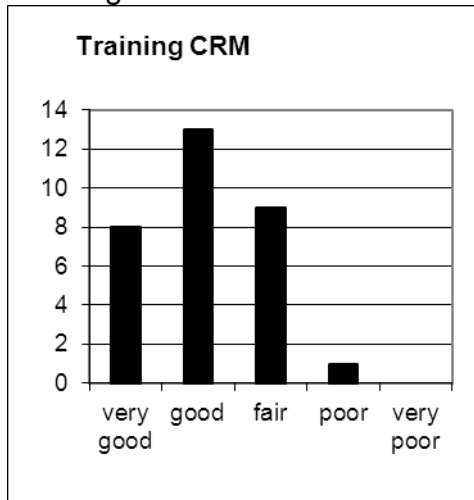
Training on Calibration



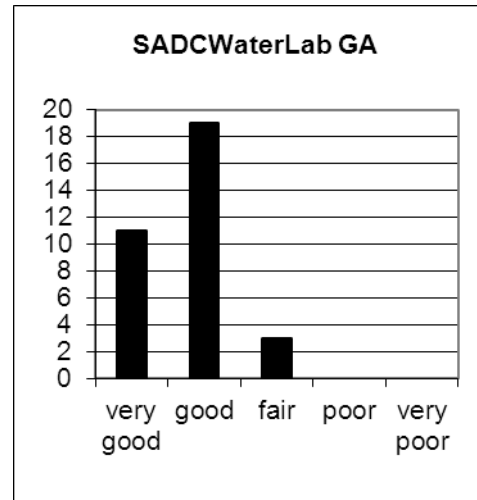
Training on Metrology in Chemistry



Training on Reference Materials



SADCWaterLab General Assembly



The five most important topics

- Training on calibration (22)
- PT evaluation (21)
- Training on Metrology in Chemistry (19)
- PT provider report (18)
- Training on CRM (18)
- Methods WG (9)
- Sustainability of PT without PTB (7)
- SADCWaterLab General Assembly (7)
- ToT WG (7)
- Local coordinators' reports (5)
- Discussion about necessary changes (3)
- Report from WG (3)
- Methods validation and measurement uncertainty (2)
- Local trainings (2)
- Group discussions (1)
- Importance of regional integration of labs (1)
- Control chart software (1)
- PT programme in the world (1)
- Root cause analysis and corrective action (1)

Expectations fulfilled?

29 participants answered „Yes“, one was partially satisfied (without giving any reasons), two participants were not satisfied because of the following reasons:

- I was expecting detailed discussion on each analysis and the way forward
- Reports from local coordinators are lacking in content

Benefits

- Performance of my laboratory over time and efficiency of corrective actions implemented.
- From this workshop I am benefited on recommendations about the methods and in what way the PT samples were prepared to adopt for interlaboratory comparison of analysts' performance.
- Networking and clarification of issues.
- Networking
- Networking with different technical personnel
- An urge to improve on Quality Control in testing labs
- (1) Importance of Quality Control and Quality Assurance. (2) Comparison of the different methods used in the PT process in terms of accuracy and efficiency
- Networking with participants
- Interaction with participants
- I have been able to discuss analytical problems facing several labs in our region and how these issues or problems can possibly be solved
- Learning and networking
- The ultimate benefit was the interactive nature of the workshop and the feedback on the PT results. Training was also equally impressively given.
- I realized the need for discussions
- Networking and understanding of the SADCMET programs and objectives
- Training
- As the first time in this workshop, I find the PT provider arrangement very useful
- Motivation
- On how best we can use best method for analysis of some parameters
- Networking and sharing of experience with other labs/participants
- Methods performing well and the opportunity to network
- Training
- Sharing and exchange of knowledge from lab community
- Importance of corrective actions and training
- Networking and information sharing
- It is good for experience sharing
- Shared experience with other colleagues
- I benefited a lot on calibration and using statistical data

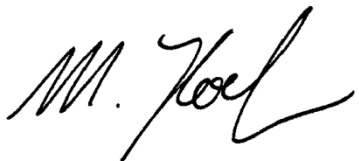
Other comments

- I feel that PTB should have provided dinner on arrival night and on 22/11/12 seeing as they were paying for my night and breakfast on 22/11/12. I would like to express my sincere appreciation for the support that PTB has given us regarding this PT scheme. I would also like to appreciate the PT provider for the work she puts into preparing samples for us. I would also like to thank ECAE for the hospitality.
- Training: The "training" that was offered during the workshop were more of presentations rather than training. Consider referring to them as such or, if training is a necessary component of the workshop, then there should be an

evaluation of the effectiveness of training, i.e. test. There is also need to engage participants through exercises after each presentation.

- (1) Please ensure proper and organized local coordinator reports at the workshop. (2) Ensure all laboratories' personnel participating in the scheme are given opportunity to attend the workshop. (3) Provide more time in the workshop for exercise of the training topic to ensure understanding of the topics.
- I would like to see more practices on training than theories, e.g. on calibration topics you show people how to calibrate
- On the presentations it should be included which method would be best
- Enlighten on the need for accelerating process for accreditation of water testing labs
- Organizing such workshops and standardizing our labs at regional and national level is very important. In the coming year I will organize at least 4 PT training programs with or without external assistance

Report prepared by

A handwritten signature in black ink, appearing to read 'M. Koch', with a stylized, cursive script.

Dr.-Ing Michael Koch
Stuttgart, 31.1.2013