



# Chemical measurements for our life, our future

During World Metrology Day celebrated annually on the 20th of May, more than eighty (80) countries including Botswana celebrate the impact of measurements on our daily life, with the theme for 2011 being 'Chemical Measurements for Our Life, our Future' which puts emphasis on how chemical measurements influence our everyday life and dictate how our children will live in future.

With the government of Botswana's Economic Diversification Drive, it is even more critical for the country to appreciate Chemistry, commonly referred to as the Central Science, as it is applied in a wide variety of industries which include but are

**THE SCIENCE OF CHEMISTRY IS FUNDAMENTAL TO HUMANITY'S UNDERSTANDING OF THE WORLD AND THE COSMOS. MOLECULAR TRANSFORMATIONS ARE CENTRAL TO THE PRODUCTION OF FOODSTUFFS, MEDICINES, FUELS, METALS, I.E., VIRTUALLY ALL MANUFACTURED PRODUCTS AND EXTRACTED PRODUCTS.**

not limited to Pharmaceuticals, Cosmetic industry, Polymer Production, Textiles, Agriculture (food manufacture and processing), Water Industry, Construction Materials Production, Environmental Protection, Mining etc, as depicted

by the pictures presented above. It is therefore critical for Botswana to effectively harness this science to promote diversification of Botswana's industrial base.

Chemistry is a big part of our everyday life. We find chemistry in daily life in the foods we eat, the air we breathe, the soap we bathe with, the clothes we wear, the tyres of our cars, the money we transact with, our emotions and literally every object we can see or touch. Hence chemical measurements are important to ensure fairness of trade, the quality of the food products and medicines we consume, the safety of chemicals we use in industry and in our homes, the safety of toys our children play with, the quality of air we breathe, and to monitor the effect of all these chemicals and chemical by-products on the environment to ensure that appropriate measures are put in place to save planet earth for future generations.

Botswana Bureau of Standards held workshops in Francistown, Gaborone and Selibe Phikwe this year and called on industries to take heed and use all the services that BOBS offers to improve their competitiveness and effectively leverage on the Government initiatives of the Economic Diversification Drive.

## Chemistry is Everywhere



**GREEN PLANET**



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# REVIEWING AND CLOSING OUT NONCONFORMITIES IN A QUALITY MANAGEMENT SYSTEM

*By Hazwell Nyanda*

The value that is provided to an organization through a quality management system audit can be enhanced or diminished by the review that an auditor conducts of the organization's response to a nonconformity, as well as by the "close-out" process that is applied.

An auditor may add value by ensuring that the organization has satisfactorily addressed the cause of a nonconformity and completed the proposed corrective action as this will increase the likelihood of the organization achieving customer satisfaction.

Management system auditors are responsible for reviewing an organization's response to a nonconformity and verifying the effectiveness of actions taken. There should generally be three parts to the response, depending on the product type or the situation of the nonconformity i.e.



- 1) analysis of cause of nonconformity,
- 2) corrective action plan; and
- 3) correction.

For example, for software, it is inadvisable to implement a correction until the cause of nonconformity is known. Alternatively, if a 'low brake defect' warning light goes on in a vehicle and you correct it by replacing the brake pads before examining if the sensor was faulty, you might fail to resolve the problem.

There are many methods and tools available to an organization for determining the cause of nonconformity, from simple brainstorming to more complex problem-solving techniques. The extent and effectiveness of the corrective actions depends on identifying the real cause of the problem.

In some cases this will assist an organization to identify and minimize similar nonconformities in other areas.

In reviewing the response of an organization to a nonconformity, the auditor should confirm that documentation and evidence for all three parts mentioned above are provided by the organization and are appropriate before accepting the response. Important elements to verify in the review process include:

- descriptions of actions – are they thorough, clear and accurate?
- The dates of completion of corrective actions (note that dates indicating future action are not good practice)
- Evidence supporting the claim that a corrective action has been fully and effectively implemented in the way that it was described.

In addition, the auditor should verify that the organization has ensured that the corrective action taken does not create further problems. It should also be noted that completing both correction and corrective action is not always appropriate and that either correction or corrective action may be sufficient. This may happen, for example, in cases where the nonconformity was absolutely accidental and the probability of reoccurrence is very low.

Effective corrective action should prevent the recurrence of the nonconformity by eliminating the cause.

However, corrective action should not be confused with preventive action. It should be noted that preventive action is not applicable to already detected nonconformities. However, an analysis of the causes of nonconformities may identify potential nonconformities on a wider scale in other areas of the organization and provide input for preventive action.

A variety of methods or activities may be used to close out nonconformities. For example, some will require direct examination on site while others may be closed-out remotely. Before deciding to close-out a nonconformity, an auditor should review what the organization did in respect of analysing the cause and the results it achieved through corrective action. The auditor needs to ensure there is evidence (including supporting documentation) to demonstrate that the described corrective action has been fully implemented and is effective in preventing the nonconformity from re-occurring. Only when the situation is satisfactory should the nonconformity be closed-out.

## EDITORIAL:

by the Marketing & Communications Unit

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# REVIEW OF THE BOS 136-1

**By H. Nyanda**

It is Botswana Bureau of Standards policy to review standards every 5 years to establish if the specifications are still valid and to incorporate any technological and technical changes that may have taken place in the preceding 5 years.

As a result of this policy, BOS 136-1 was 'work shopped' on 17th June 2011 to consider its continued validity within its scope of application. The workshop was necessitated in order to involve as many stakeholders as possible.

## **Introduction**

A water supply system is a system of engineered hydrologic and hydraulic components which provides water supply. A water supply system typically includes a watershed/source, raw (untreated) water collection point such as a dam, untreated water (water being transferred to the

water purification facilities), water purification facilities, water storage facilities such as reservoirs, water tanks, or watertowers and a pipe network for distribution of the treated water to consumers. For a water supply network to operate efficiently inside a building, it has to conform to set specifications.

**THE STANDARD WAS MEANT TO GIVE GUIDANCE TO WATER SUPPLY**

**RETICULATION PROFESSIONALS REGARDING THE MANNER IN WHICH**

**INSTALLATIONS SHOULD BE DONE INSIDE BUILDINGS TO REALIZE EFFICIENT**

**AND EFFECTIVE WATER RETICULATION. IT WAS ALSO MEANT TO PROVIDE**

**USEFUL TECHNICAL INFORMATION TO REGULATORS TO COMPLIMENT THE**

**APPLICATION OF PORTABLE WATER SUPPLY REGULATIONS.**

In 2005, Botswana Bureau of Standards in conjunction with Department of Water Affairs, Water Utilities Corporation and other relevant stakeholders in the water reticulation system developed a standard (BOS 136-1) for installation of water supply systems in buildings, to support the implementation of the Potable Water Supply Regulations for Botswana. The standard was meant to give guidance to water supply reticulation professionals regarding the manner in which installations should be done inside buildings to realize efficient and effective water reticulation. It was also meant to provide useful technical information to regulators to compliment the application of potable water supply regulations.

#### Participants

Participants to the review workshop of the standard comprised of water supply utilities, councils, consulting engineers, government agencies and other private stakeholders in the water reticulation systems. The review considered aspects of design, quality of materials used in water reticulation, layout and installation of pipes and accessories, preservation of the water quality, and inspection and maintenance of the water reticulation systems

### THE REVIEW CONSIDERED ASPECTS OF DESIGN, QUALITY OF MATERIALS USED IN WATER RETICULATION, LAYOUT AND INSTALLATION OF PIPES AND ACCESSORIES, PRESERVATION OF THE WATER QUALITY, AND INSPECTION AND MAINTENANCE OF THE WATER RETICULATION SYSTEMS.

#### Review outcomes

The following were the major issues that were either included or amended in the standard:

- a) Caution to be taken to prevent corrosion when dissimilar metals are connected to each other;
- b) Requirements for ductile pipes, fittings and water mixers;
- c) Considerations to be made when water supply pressure exceeds 600 kPa;
- d) Fire systems installations in a building where a booster pump is not required;
- e) Guidance on the suitable hot water generating system;
- f) Types of water backflow prevention and pressure control devices and how they function;
- g) Specifications for cross-connection control and backflow prevention;
- h) Minimum required water storage capacity for various premises;
- i) Types of hazards associated with the operation of potable water systems;
- j) Daily and average water demand values for domestic, commercial and industrial systems;
- k) Requirements for strainers and drain valves; and

- l) Relationships between various protective devices used in water heaters.

#### Conclusion

These amendments have been made in order to improve the implementability of the standard and to ensure that it takes cognisance of current good installation practices of the water supply systems. It is a requirement of the standards development procedure that standards should be floated for public comments in recognition of the fact that there are a lot more interested stakeholders that may not have participated in the earlier stage(s) of the development or review process. If you are one of them, you may contact BOBS Information Centre to get a copy of the standard so that your views may be considered before the final approval of the standard takes place.

BOBS Information Centre can be contacted at  
infoc@hq.bobstandards.bw or  
3903200.

# FILLING STATION SCAMS,

# DONT BE A VICTIM!

By Chris Muke

How many times have you felt you may have been cheated after filling in at a fuel station? The fuel gauge might not have moved enough to warrant the amount of fuel you paid for or you may have paid for the amount of fuel exceeding the capacity of your fuel tank and wondered how that was possible!

The majority of complaints reaching the Trade Metrology office point fingers at the metering unit of the fuel pump. Suggesting that it could be faulty and therefore requires verification or calibration, in a number of cases this was not the problem. Sometimes the problem lies with the Fraudulent Fuel Pump Attendant, yes the guy that operates the machine. Let us look at how they cheat us so that the next time around they are at the receiving end...

## CON 1

A car pulls up at a filling station and fills for P50.00 and leaves, the attendant does not replace the nozzle in the holster to end the transaction. Replacing the nozzle in the holster, as shown in the picture below, allows the pump to reset to zero before the next transaction.

The attendant places the nozzle strategically outside the holster and calls in the next customer who ends up getting P150.00 worth of fuel when he asked to fill for P200.00. The customer was distracted from observing the transaction by another attendant who asked to check the oil or the tyre pressure. As a result the customer is conned. Sometimes

the customer is directed to a specific pump, where the con will take place, even if there is a conveniently available pump to fill from. This usually happens when the filling station is not busy and the attendants are crowded around that specific pump ready to distract the customer and make a 'kill.'

## CON 2

This usually happens when there are long queues at filling stations, this is a common scene in most of the filling stations and people just lack the patience to wait. The attendant will have a field day as a result.

The attendant will hurry you to move forward and create space for the car behind you, which will also be honking impatiently, and you might end up not looking at the meter as you would want to ease up the queue. Here is what happened; the meter started at zero, you asked to fill for P300.00 and the attendant stopped at P250.00 and you paid P300.00 because you did not have time to glance at the price indication.

## CON 3

Another con is when you ask, for instance, P250.00 of petrol, the attendant deliberately stops at P50.00. He pretends that he misheard you. And you insist on another P200.00 of fuel, if you are not alert enough, the attendant will, without resetting the meter, continue filling from P50.00 and stop at P200.00. A loss of P50.00.

## HOW TO AVOID THE CON

It is your responsibility to ensure that both the price and the meter readings are at zero before the transaction.



This means that when the nozzle is removed from the holster it should cancel the previous transaction and the indications should read zero.

Be very observant when filling your car, especially to avoid stops half way through to what you have asked for. It is important to have the presence of mind because if the attendant can notice your preoccupation, you have let him to take full advantage and will continue to be what he is, happily cheating customers like you every time.

The above mentioned tricks are common across the country, some attendants even have codes or names for them, at one filling station they call the con; 'Mokwepa' derived from the shape taken by the nozzle when it's not replaced in the holster. It takes the form of a snake, a Mamba, ready to strike.

Beware of such attendants who are on a prowl to cheat on the customers.

# RAMMED EARTH CONSTRUCTION

*By Mothusi. N. Ntau*

## Introduction

A company called Tineo Investments (Pty) Ltd, which is based in Maun, has requested Botswana Bureau of Standards to develop a Botswana Standard on Rammed earth structures. Although rammed earth method of building construction has been in practice for centuries, it is not so common in Botswana.

Rammed earth is a form of unbaked earthen construction used primarily to build walls.

Currently the SADCSTAN Technical Committee on Construction is working on harmonizing a code of practice for rammed earth structures.

## Rammed Earth Construction by Tineo Investments (Pty) Ltd

Tineo Investments has constructed a house out of rammed earth. Three (3) test walls (see Figures 1 to 3) were first constructed with three different material constituencies (proportions). The three proportions were:

- 100% gravel;
- 95% gravel + 5% cement stabilizer; and
- 90% gravel + 10% cement stabilizer.

After the assessment of the three test walls exposed to different weather conditions, it was concluded that the combination of 95% gravel + 5% cement stabilizer be used for

the construction of the building. The assessment was mainly based on performance and optimal use of cement stabilizer.



*Figure 1 - Test wall 1 (100% gravel).*



*Figure 2 - Test wall 2 (90% gravel + 10% cement stabilizer).*



*Figure 3 - Test wall 3 (95% gravel + 5% cement stabilizer).*

**Substructure:** During the visit to Tineo Investments (Pty) Ltd it was observed that a two bed-roomed house with kitchen and lounge had been constructed. The foundation was made of a reinforced concrete strip footing of 400 mm thick. A 400 mm thick composite wall of stock-bricks and mass concrete was constructed up to the slab level. The substructure was concluded with a mesh reinforced concrete slab (See Figure 4 below).



*Figure 4 - Typical mesh reinforced concrete slab.*

**Superstructure:** The 400 mm rammed earth wall was constructed with the help of shutter boards, within which the 5% cement-stabilized gravel material is placed and compacted by hand in layers of 50 mm.

casting. A reinforced concrete ring-beam was cast from the window level. Beam filling was constituted of a composite of stock bricks encasing some reinforced concrete.

The internal walls were plastered

#### Advantages and Limitations of Rammed Earth

The following are the most significant benefits of rammed earth construction.

**Sustainable Construction:** Rammed earth, as a natural material without additives, can have significantly lower embodied carbon dioxide and energy than conventionally manufactured building materials.

**Architectural Quality and Flexibility:** Due to availability of a variety of earth material, rammed earth also offers a very wide variety of textures and colours. One may choose to maintain the colour and texture of the basic earth material or compliment it with other materials such as sand/cement plaster or lime to get the desired texture and colour finishes. Rammed earth building is also suited to a variety of small and large scale building projects.

**Contribution to the Building Health and Performance:** Clays within rammed earth are hygroscopic, releasing or absorbing moisture in response to changing local atmospheric conditions. This then implies that the earth walls are very effective in regulating internal relative humidity (between 40% and 60%). The following are the most significant limitations and weaknesses of rammed earth construction.

**Durability:** In the presence of water, rammed earth is susceptible to decay. As a result, it requires a special consideration in design and construction and throughout its service life. The level of maintenance required will generally be higher than that of competing materials.



*Figure 5 - Partially plastered rammed earth wall.*

It was observed that the electrical sockets and conduits were placed in their respective positions before

with sand/cement plaster while the external walls surfaces were being treated with lime paste.



*Figure 6 - Part of the building.*

**Wall Thickness:** The minimum thickness of rammed earth walls is normally 300 mm, typically thicker than many other forms of modern wall construction.

**Thermal Resistance:** Rammed earth derives much of its physical resistance from the material's relatively high density, resulting in poor thermal resistance. External rammed earth walls may need to be thicker (>700 mm), or require use of additional insulation materials in order to meet thermal performance levels of modern energy efficient buildings.

**Material Selection and Variability:**

Not all types of soils are suitable for rammed earth construction; only sub-soils rather than top soils should be used, and should be well graded between gravel and clay-sized

particles. Extensive laboratory testing is often needed to ensure appropriate properties and performance of the selected material.

**Discussions**

Generally the rammed earth method employed by Tineo Investments was found to be satisfactory. Considering the type of foundation used, the wall thickness, the use of cement stabilized gravel and the level of workmanship; the structure would perform better than some of those housing units constructed through the conventional techniques such as mud houses.

Some of the advantages that were noted were that the method is economic, and that the cracks within the wall are localized; i.e. they do not

develop across the walls. It was also noted that buildings constructed using this method are generally energy efficient. One major disadvantage is that since the construction generally takes a longer time than when conventional methods are used.

When employing this method of construction, it is important that developers ensure that they adhere to existing building regulations in Botswana.

It is recommended that a Code of Practice for Rammed Earth Structures be developed as a Botswana Standard.



*Figure 7 - Partially completed house.*



*A woman walking through degraded land in search of water.*

## DESERTIFICATION – A SERIOUS THREAT TO HUMAN LIFE!!

Contrary to the popular belief, desertification is not the expansion of existing deserts, though it can include the encroachment of sand dunes on land. Rather, it is the persistent degradation of dry land ecosystems by human activities and climatic variations. Because of its toll on human well-being and on the environment, desertification has been ranked, by the United Nations Environment Programme (UNEP), among the greatest development challenges of our time as it costs the world more than \$40 billion a year in lost productivity.

Desertification occurs when:

- the tree and plant cover that binds the soil is removed.
- trees and bushes are stripped away for fuel, wood and timber, or to clear land for cultivation.
- animals eat away grasses and erode topsoil with their hooves.
- intensive farming depletes the nutrients in the soil.

Wind and water erosion aggravate the damage, carrying away topsoil (it estimated that 24 billion tons of topsoil is lost annually) leaving behind a highly infertile mix of dust and sand. Incorrect irrigation is commonly used in poorer areas where farmers use canal irrigation and other poor techniques because of lack of water resulting in a build up of salt in the soil. It is the combination of these factors that transforms degraded land into a desert.

The effects of desertification can be devastating. It results in the soil being less usable due to the salt build up making it harder for plant for plant growth. It

results in lack of or even damaged vegetation because of overgrazing or loosened soil burying plants. It causes famine which is greatly contributed to by drought and poor land management. It increases food loss as the soil is not suited for growing food resulting in potential problems like starving. It causes flooding, poor water quality, dust storms, and pollution.

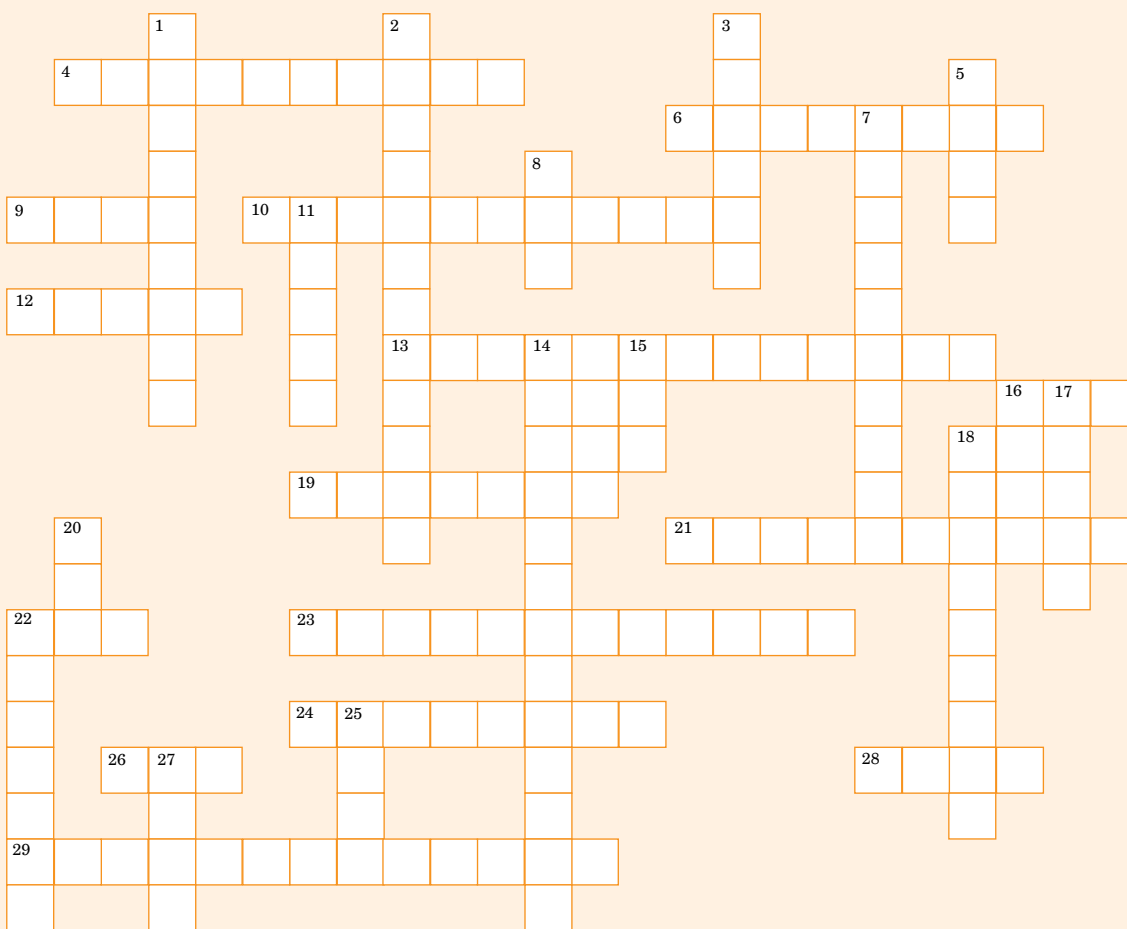
No continent, except Antarctica, is immune from desertification. The problem is particularly acute in Africa where 66 per cent of its land is either desert or dry lands.

After recognizing that desertification is a major economic, social and environmental problem of concern to many countries in all regions of the world, the United Nations Convention to Combat Desertification adopted a Plan of Action to Combat Desertification (PACD). Unfortunately, despite this and other efforts, UNEP concluded in 1991 that the problem of land degradation in arid, semi-arid and dry sub-humid areas had intensified, although there were "local examples of success".

To complement and support the activities of UNCCD and to combat desertification, The International Organization for Standardization (ISO) through TC 207 – The Environmental Management Technical Committee is currently working on 'Guidelines for establishing good practice from combating land degradation and desertification'. These guidelines are expected to give guidance on how to implement the framework stipulated by the UNCCD.

# CROSSWORD

## KNOW YOUR BOBS



**ACROSS**

- 4 Enforced by law [10]
- 6 Highest officer at BOBS (Managing .....)[8]
- 9 Standards Import Inspection Regulation (abr) [4]
- 10 Checking or adjusting the accuracy of a measuring instrument [11]
- 12 Acquisition of knowledge, skills and competence [5]
- 13 Failure to fulfill requirements [13]
- 16 Quality Management Representative (abr) [3]
- 19 In a state of excellence and fit for purpose [7]
- 21 Assessment of products [10]
- 22 International Organization for Standardization (abr) [3]
- 23 Audits/inspections at planned intervals (6 months) [12]
- 24 Document containing rules for repeated use [8]
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- 28 Evidence of QMS certification (Certification ...) [4]
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**DOWN**

- 1 Being objective and neutral [9]
- 2 Keep secret and private [12]
- 3 Customer whose system is certified [6]
- 5 Botswana Bureau of Standards (abr) [4]
- 7 Fulfillment of requirements [10]
- 8 Certification Approvals Committee (abr) [3]
- 11 Systematic, independent evaluation [5]
- 14 Recognition of compliance [13]
- 15 National Standards Body (abr) [3]
- 17 Nonconformity with adverse effects to the system [5]
- 18 The science of measurements [9]
- 20 Quality Management System (abr) [3]
- 22 Final (antonym) [7]
- 25 Assessment/evaluation [4]
- 27 Declaration of product certification (Standards ...) [4]

# Staff News

## Mission, Vision and Values

by Sechaba Portia Motswiri (Graduate Intern- HR)

### NEW STAFF

During the first quarter of 2011/2012 BOBS welcomed the following new members of Team BOBS.

**Ms Sechaba Portia Motswiri** is a Graduate Intern in the Human Resources Unit. Sechaba holds a Bachelor Degree in Human Resources Management from the Nelson Mandela Metropolitan University (NMMU). Sechaba is from Manyana and her interests include personal development through daily reading of magazines and newspapers, networking and she is also a choral music enthusiast.



**Mr. Poloko Tihalerwa** joined BOBS as Graduate Intern in the Department of Commercial Enterprises (Testing Unit). Poloko has BSc in Mathematics and Biological Sciences obtained from the University of Botswana. Poloko's hobbies include networking, reading, poetry, music, sports, debating, boards games and chess. In addition, his interests include engineering, actuaries, mathematical models.



**Mr. Thato Tlhagwane** is a Graduate Intern in the Department of Commercial Enterprises (Testing Unit). Thato is a holder of a BA Degree in Fashion Design which he acquired from Linear Academy in South Africa. Before joining BOBS he worked in several companies such as Raintree Pty (Ltd), Jet stores and Gemeli Clothing. Thato comes from Oodi and his interests include reading and travelling.



**Mr. Merapelo Maribeng** is a Graduate Intern in the Department of Commercial Enterprises (Testing Unit). Merapelo holds BS.c honours in Microbiology obtained from the North West University.



### RESIGNATION

**Mr. Michael Dikoloti** who was based in Francistown Branch as Engineer-Trade Metrology resigned with effect from 22nd April 2011. Team BOBS wishes him success in his future endeavours.

### Mission Statement

To establish national standards, promote and facilitate their implementation with a view to improving industrial competitiveness and efficiency to enhance trade, and protect the consumer and the environment.

### Vision Statement

BOBS is a renowned National Standards Body, whose services are preferred locally and regionally.

### Values

#### **Diligence:**

We carry out our work with accuracy and excellence

#### **Innovation:**

We employ new ideas and improved ways in doing business

#### **Transparency:**

We carry out business in openness and honesty

#### **Team Spirit:**

We work together in good faith, supporting and motivating one another for a common purpose

#### **Botho:**

We display ethical, positive attitude and behavior in conducting our business and contribute with compassion to the community