Emerging Issues in Developing Countries

This series seeks to inform readers, explore new ideas, and promote discussion on themes related to developing countries and emerging analytical communities. Articles in this series are available from <www.iupac.org/publications/ci/indexes/emerging-issues.html>.

Standardization of Analytical Approaches and Analytical Capacity-Building in Africa

by Robert Maybury, Walter Benson, and David Moore

The 2003 World Bank book entitled *Standards and Global Trade: A Voice for Africa* (edited by John S. Wilson and Victor O. Abiola; ISBN 0-8213-5473-6) reports that trade can be a powerful driver of a country's growth, but in many African countries there are severe barriers to exporting commodities. One such barrier is the poor performance of many African laboratories when testing commodities for export. For a commodity to be exported, its levels of pesticide, heavy metal residue, and other contaminants must be determined through analytical tests. The results of this testing must not only comply with various international standards, but the accuracy and reliability of the results must also be accepted internationally. Yet, few testing laboratories in Africa are able to obtain such trustworthy test results.

The IOCD team's visit to the Uganda National Bureau of Standards (UNBS) in October 2005. Team members (rear, from left) Walter Benson, Albert Pohland, and Geoffrey Kamau, shown with (front left) Anthonia Nakamya (head of the National Drug Authority Quality Control Laboratory in the Uganda National Drug Authority) and Hope Kamusiime (head of the Chemistry Section at UNBS).

A project of the International Organization for Chemical Sciences in Development (IOCD)*—in col-

*** See May-June 2002 CI or <www.iocd.org>. For the project announcement, see Mar-Apr 2005 CI or <www.iupac.org/projects/2004/2004-017-1-500.html>.**

laboration with IUPAC and several other international partners—is assisting analytical laboratories in Africa, initially in Uganda and Kenya, with upgrading their performance in testing export commodities.

The IOCD team during a visit to the Chemistry Department of Makerere University: (from left) Hope Kamusiime, Patrick Wilson, Geoffrey Kamau, Al Pohland, and B.T. Kiremire, professor of chemistry.

The project work plan has three phases:

Phase I: Gathering local information relevant to the export of commodities
In this phase, local personnel first determine which export commodities require analytical testing. Then they must determine which local laboratories can perform the testing.

Phase II. Diagnosis of a laboratory's problems and inadequacies
In this phase, IOCD scientists visit the African country and hold discussions with the manager and scientists of each laboratory to diagnose the particular problems and inadequacies that hinder the reliability and accuracy of the lab's analytical tests. IOCD and the laboratory personnel then agree on appropriate remedial measures and schedule their implementation.

Phase III: Delivery of appropriate remedial measures to build analytical capacity
During the third phase, IOCD collaborates with IUPAC and other partners to implement remedial measures.

The remedial measures involve human capacity building and laboratory upgrading. Capacity building efforts include fellowships awarded to African scientists or managers to work and learn at laboratories in developed countries, visits by foreign consultants to African laboratories, and workshops organized at African laboratories on relevant analytical chemistry topics. Laboratory improvement efforts include customizing international analytical methods to the needs of African laboratories, organizing a laboratory's participation in a proficiency testing exercise with an accredited laboratory, and acquiring better equipment.

Review of the Project's Implementation to Date

IOCD received modest initial funding for the project, including a grant of USD 25 000 from the US National Academy of Sciences and USD 10 000 from IUPAC. With these funds, IOCD initiated work in phases I and II.

IOCD initiated this project in early 2003 after consulting with a World Bank trade development officer who helped IOCD contact trade-development offices and government authorities in Uganda and Kenya. In early 2004, IOCD received approval of a project proposal it had submitted to the Uganda Ministry of Tourism, Trade, and Industry (MTTI).

After some early difficulties, the project began in earnest in October 2005, when a team of IOCD scientists spent one week visiting eight Ugandan laboratories suggested by the director of the Uganda National Bureau of Standards. Team leader Walter Benson, chairman of the IOCD Working Group on Analytical Chemistry and associate member of the IUPAC Chemistry and the Environment Division was accompanied on the visit by Patrick Wilson (U.S. Food and Drug Administration, Office of International Affairs), Albert Pohland (FDA retired, and AOAC International, USA), and Geoffrey Kamau (University of Nairobi, Kenya).

Summary of the IOCD Team's Visit to Uganda

During its visit, the IOCD team determined the following:

- The two private laboratories test exports and are operated competently using official methods. The few problems they had were addressed on the spot.
- Three laboratories do not analyze products for export.
- The remaining three of the eight laboratories, have the potential to undertake export testing after improving their quality assurance, or good

laboratory practice: the Uganda National Bureau of Standards (**UNBS**), the **Government Chemist Laboratory**, and the **Uganda Industrial Research Institute.**

The **UNBS** laboratory has space and a well-trained chemistry laboratory director, but lacks all of the following: space for expansion, additional trained personnel, modern equipment, and a complete quality assurance system. The UNBS lab is performing a few basic tests, but it does not have a means to repair its equipment rapidly and inexpensively. The laboratory for testing microbiological contamination of samples is certified and has a good reputation, but it was closed for repairs while we were visiting.

The **Government Chemist Laboratory** has spacious grounds and facilities, trained chemists, functioning equipment, adequate office space, adequate funding, an advanced pesticide laboratory, and plans to expand. It mainly performs analyses on local samples from the police and local clients. It has a good grasp of the regulatory requirements and use of official methods. In our judgment, it has potential to expand into analyzing products for export.

The **Uganda Industrial Research Institute** (UIRI) is a parastatal, government laboratory that could perform export testing. Its laboratories are large and stocked mainly with analytical equipment in need of repair; they lack staff and funds. We saw little evidence of quality assurance. The Chinese government sent a scientist to UIRI for four years, together with laboratory equipment. A modern nitrogen analytical system for proteins appeared to function correctly. UIRI seems to have little contact with Ugandan industry, but performs some analyses for UNBS.

Conclusions

- All the laboratories have problems with repairing their equipment and ordering chemicals in a timely manner.
- Competition between government laboratories and between industry and government became evident during our visit. This may keep them from cooperating with each other.
- Universities must offer courses and carry out research so that they train chemists in areas needed by government and industry.

Ugandan National Drug Authority laboratory.

The task group believes that IUPAC scientists who would visit Uganda during phase III could have a major impact by offering training in quality assurance, quality control, good laboratory/manufacturing practice, and accreditation to Uganda's industrial, government, and university chemists and microbiologists.

IOCD is waiting for a request from the Ugandan government to start the next phase of the project. Work in Kenya will commence once work in Uganda has been completed.

IOCD has learned an important lesson in carrying out a project that seeks to assist government-operated laboratories in a developing country. As a private nongovernmental organization, we must be mindful of our status as a body outside the government domain. Hence, we must recognize that a government agency is an instrument for carrying out a particular mission, which has been set by legislation or executive order. Those individuals charged with implementing this mission are expected to respect hierarchical lines of authority and we must respect this ordering of responsibility when we interact with them.

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www.iupac.org/projects/2004/2004-017-1-500.html