

**INTERNATIONAL WORKSHOP
ON MINERALS PROCESSING AND BENEFICIATION
Johannesburg, South Africa
25– 27 September 2012**

BRIEF REPORT

Most of the developing countries are generally richly endowed with minerals, biodiversity and other resources in comparison with the developed countries. The minerals are vital for the creation of wealth and immensely contribute to improving the overall quality of life. These resources are important value-creating asset for the developing countries in this rapidly changing world. Unfortunately, these are not fully exploited in developing countries due to the lack of advanced skills, modern and innovative research and technology and the new world trade regime. Many minerals are still exported as ores, concentrates or metals, without significant downstream processing or value addition. Therefore there is an urgent need for the policy makers, scientists, technologists, academics and other industry experts to come together and assess ways and means to address the aforementioned skills gap.

In view of the above, the Centre for Science & Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre) organised a three days 'International Workshop on Minerals Processing and Beneficiation' during 25-27 September 2012 in Johannesburg jointly with the Department of Science and Technology (DST) of South Africa for brainstorming by international policy makers, scientists and technologists, mining industry executives, mineral industry and technology producers, investors, exploration people, mine owners and traders, planners and decision-makers.

The workshop was attended by the participants from 22 countries, including Cambodia, Egypt, Eritrea, Guyana, India, Indonesia, Iraq, Jordan, Kenya, Malawi, Malaysia, Mauritius, Myanmar, Nigeria, Pakistan, Sri Lanka, Tanzania, Uganda, Vietnam, Zambia and Zimbabwe and the host country South Africa. Besides 35 South African participants from organisations like the Department of Science and Technology (DST), Department of Mineral Resources (DMR), Minerals Processing & Beneficiation Industries Association of South Africa (MPBIASA), Nuclear Energy Corporation Limited (NECSA), MINTEK and other agencies concerned with Minerals Processing & Beneficiation, the 28 overseas participants were from Cambodia [Mr. Choup Sokuntheara, Deputy Director, Department of Geology, General Department of Mineral Resources, MIME]; Egypt [Prof. Dr. Ahmed Yehia Abdel-Rahman, Vice Chairman, Central Metallurgical R&D Institute, Cairo]; Eritrea [Mr. Mebahtu Ekubazghi Hadgu, Director, Ministry of Energy and Mines (DOM), Asmara]; Guyana [Mrs. Dianne McDonald, Senior Mineral Processing Engineer II and Head, Guyana Geology and Mines Commission]; India [Prof. G.S. Roonwal, Visiting Professor, Inter University Accelerator Centre, New Delhi; and Ms. Isha Sehgal, Research

Assistant, NAM S&T Centre, New Delhi]; .Indonesia [Dr. Anggoro Tri Mursito, Deputy Director/Head, Division for Earth Resources and Mineral Engineering, Research Center for Geotechnology, Indonesian Institute of Sciences]; Iraq [Mr. Jamal Ibrahim Hussien, Senior Chief Engineer and Head, Industrial Applications Division / Manufacturing Center, Ministry of Science and Technology, Baghdad]; Jordan [Dr. Awni Al-Otoom, Associate Professor, Chemical Engineering Department, Jordan University of Science and Technology, Irbid]; Kenya [Ms. Tabitha Wambui Githinji, Graduate Assistant, Department of Geology, University of Nairobi, Nairobi]; Malawi [Mr. Burnett John Wyson Msika, Principal Mineral Processing Engineer, Department of Mines, Lilongwe]; Malaysia [Dr. Ismail Ibrahim and Mr. Md Muzayin Alimon, Senior Research Officers in the Mineral Research Centre, Minerals and Geoscience Department, Perak]; Mauritius [Dr. Kishore Boodhoo, Lecturer, University of Mauritius, Reduit]; Myanmar [Dr. Shwe Wut Hmon Aye, Associate Professor, Department of Metallurgical Engineering and Materials Science, West Yangon Technological University, Yangon]; Nigeria [Engr. M. M. Gaji, Senior Scientific Officer, Energy Commission of Nigeria, Abuja; and Ms. Nwokemodo Ebele Chinenye, Asst. Chief Scientific Officer and Mrs. Elizabeth Olive Wuyep, Senior Scientific Officer in the Raw Materials Research and Development Council (RMRDC), Abuja]; Pakistan [Dr. Shahzad Alam, Director General, Pakistan Council of Scientific & Industrial Research (PCSIR), PCSIR Laboratories Complex, Lahore]; Sri Lanka [Dr. Anton Sarath Jayakody, Geologist, Geological Survey and Mines Bureau, Pitakotte]; Tanzania [Mr. Hamis Mwinyihija Komba, Assistant Commissioner for Minerals Beneficiation and Value Addition and Mr. Elias Pascal Mahwago Kayandabila, Senior Geologist in the Ministry of Energy and Minerals, Dar Es Salaam]; Uganda [Mr. Eng. William Balu-Tabaaro, Mining Engineer, Geoengineering Technologies (U) Ltd. Mineral Engineering Consultancy]; Vietnam [Dr. Tran Thanh Hai, Associate Dean, Hanoi University of Mining and Geology, Hanoi]; Zambia [Mr. Lungu Chozi Vincent, Special Research Fellow, Department of Metallurgy and Mineral Processing, School of Mines, University of Zambia, Lusaka]; and Zimbabwe [Prof. Francis Pedzana Tinogonda Gudyanga, Permanent Secretary, Ministry of Science and Technology, Harare; Mr. Louis Mabiza, General Manager, Zimbabwe Platinum Mines (Pvt) Ltd, Zimplats and Ms. Georgina Miriro Mufunda, Sales Executive (Projects), Minerals Marketing Corporation of Zimbabwe, Harare].

In the Inaugural Session of the workshop, Ms. Mmampei Chaba, Acting Deputy Director-General: International Cooperation and Resource, Department of Science and Technology, South Africa welcomed the delegates after which Prof. Arun P. Kulshreshtha, Director, NAM S&T Centre, in his remarks presented the genesis of the workshop and gave a brief background of the NAM S&T Centre and the details of its activities aimed at the promotion of South-South cooperation. This was followed by an Inaugural Address by Honourable Mrs. Naledi Pandor, Minister of Science and Technology of South Africa. The Minister mentioned that according to some surveys South Africa is one of the richest mineral resource holders in the world. The contribution of mining industry including the goods and services provided to the industry and the value-added

beneficiation of mining outputs amounts to between 15-20% of South Africa's GDP and is crucial to the economic development of the country in both historical and contemporary terms. She added that recently there have also been significant new discoveries of mineral resources in Ghana, Uganda, Tanzania and Mozambique. The new resource-rich countries can and should do beneficiation and localisation, which are the two overlapping processes. In this context the Minister quoted the examples of the abundant sources of titanium and platinum minerals and fluorine in South Africa in which little value is added before export. She observed that the Non-Aligned Movement must make the best use of the resources in our soil and put in place the institutions, policies and laws needed to ensure that natural resources benefit all of our citizens. In conclusion, the Minister also mentioned that South Africa is thrilled at the prospect of hosting the 13th Governing Council meeting of the NAM S&T Centre in September 2013 and is looking forward to assuming the position as the Centre's President. The Inaugural Session ended with a Vote of Thanks by Prof. Francis Pedzana Tinogonda Gudyanga, Permanent Secretary, Ministry of Science and Technology, Zimbabwe.

During the workshop the scientific papers and country status reports were presented in four Technical Sessions respectively chaired by (i) Prof. Francis Gudyanga of Zimbabwe and Dr. Johann Nel, Manager / Chief Scientist, Applied Chemistry Plasma Technology, Nuclear Energy Corporation Ltd. (NECSA), South Africa; (ii) Mrs. Dianne McDonald of Guyana and Ms. Setepane Mohale, Chief Director: Minerals Policy and Promotion, Department of Mineral Resources (DMR), South Africa; (iii) Prof. G.S. Roonwal of India and Mr. Hamis Mwinyihija Komba of Tanzania; and (iv) Dr. Shahzad Alam of Pakistan and Prof. Ben Turek, Member of Parliament of South Africa and Visiting Professor, University of Kwa-Zulu-Natal.

The Technical Session commenced with a key note lecture on 'Sea Floor Sulphides Deposits' delivered by Prof. G.S. Roonwal (India). Subsequently the presentations made in the technical sessions were on 'An Application for Java Natural Silicates Mineral and Recycled Amorphous Silica and Its Beneficiation for Production of Advanced Material and Pharmaceutical Raw Materials' by Dr. Anggoro Tri Mursito (Indonesia); 'Mineral Processing and Beneficiation Initiatives, Opportunities and Challenges: A Case of Malawi' by Mr. Burnett John Wyson Msika (Malawi); 'Bioleaching in Mineral Processing and Beneficiation' by Ms. Isha Sehgal (NAM S&T Centre); 'The Chemistry of Minerals obtained from the Combustion of Jordanian Oil Shale' by Dr. Awni Al-Otoom (Jordan); 'Zimbabwe (proposes) to host a Pan-African Minerals Institute of Science and Technology (Pamist)' by Prof. Francis Pedzana Tinogonda Gudyanga (Zimbabwe); 'Challenges Associated with Columbite Processing and Beneficiation In Nigeria' by Elizabeth Wuyep (Nigeria); 'Platinum in Zimbabwe and It's Beneficiation' by Mr. Louis Mabiza (Zimbabwe); 'Mineral Beneficiation and Value Addition: Tanzania Perspective / Overview' by Mr. Hamis Komba and Mr. Elias Kayandabila (Tanzania); 'Overview of Minerals Processing and Beneficiation in

Kenya' by Ms. Tabitha Wambui Githinji (Kenya); 'Bench Scale Feldspar Flotation for Malaysian Pegmatite Ore using Non Hydrofluoric Modifier and Mixed Collector' by Dr. Ismail Ibrahim (Malaysia); 'The Role of Pakistan Council for Scientific and Industrial Research in R&D on Exploration of Mineral Reserves and its Industrial Utilization' by Dr. Shahzad Alam (Pakistan); 'Exploration and Potential Exploitation of Manganese Nodules in the EEZ and ECS of Mauritius' by Mr. Kishore Boodhoo (Mauritius); 'Small-Scale Gold Mining in Cambodia' by Mr. Choup Sokuntheara (Cambodia); 'Manufacture of Industry Spares From Copper Based Alloys: Development and Status in Zambia' by Mr. Lungu Chozi Vincent (Zambia); 'The Mineral Industry of Egypt' by Prof. Dr. Ahmed Abdel-Rahman (Egypt); 'Challenges of Brine Mining and Processing in Nigeria' by Ms. Ebele Nwokemodo (Nigeria); 'Mineral Exploitation in Nigeria: Challenges and Prospects' by Engr. M. M. Gaji (Nigeria); 'Geological Resource Potential Of Vietnam And Current Mining Practices' by Dr. Tran Thanh Hai (Vietnam); 'Initiatives by the Guyana Geology and Mines Commission to Improve Mineral Recovery and Increase Profitability in the Local Mining Sector- A Status Update' by Ms. Dianne McDonald (Guyana); 'Can't the Mineral Sector Make a Significant Contribution towards the Development of Sri Lanka?' by Mr. Anton Sarath Jayakody (Sri Lanka); 'Application of Ore-Microscopy in Mineral Processing Technology' by Prof. G. S. Roonwal (India); 'Overview of Myanmar Minerals Resources' by Dr. Shwe Wut Hmon Aye (Myanmar); 'Processing Uganda's Mineral Resources' by Mr. W. Balu Tabaaro (Uganda); 'The Human Resource in the Mineral Sector of Eritrea' by Mr. Mebrahtu Ekubazghi (Eritrea); 'Improvement and Development Carbon Steel by Thermal Spray Method' by Mr. Jamal Ibrahim Hussen (Iraq); and 'Mineral Beneficiation in South Africa through Emerging Nanotechnologies: Vanadium and Titanium Oxides as Smart Nano-Materials' by Professor Malik Maaza of iThemba LABS-National Research Foundation of South Africa, Somerset West, Western Cape Province; 'Minerals Beneficiation Strategy for South Africa' by Ms. Setepane Mohale, Chief Director: Minerals Policy and Promotion, Department of Mineral Resources (DMR); 'Investigation into the Biomedical Applications of Gold' by Dr. Raymond Hewer, Head, Biomed, Advanced Materials Division, Mintek; 'The New Metals Development Network of the AMI' by Dr. J T Nel, NECSA; 'Igoli' by Mr Nirdesh Singh, MINTEK; 'Overview of MINTEK' by Mr Alan McKenzie, MINTEK; and 'Access to Global Trade Market Opportunities by Mr Phineas Mohlala, MPBIASA, all from South Africa.

Prof. Arun Kulshreshtha made a brief presentation on 'The Role of the NAM S&T Centre for the Promotion of SouthSouth Cooperation in Science and Technology' in Technical Session IV. At the end of the session, Prof. Ben Turok, M.P. remarked that it is important to carry out comparative studies and draw lessons from different case studies He further said that the essential consideration for beneficiation should be on the value chain and linkages, and the factors are where the resources lie; how could these be harvested; who could harvest these; and who could be the beneficiary. He added that these issues cannot be discussed only by the government representatives and there should be a dialogue and cooperation between the private and public sectors.

A formal Banquet Dinner was hosted by Mr. Cecil Masoka, Director, Multilateral Cooperation, Department of Science and Technology (DST) of South Africa. Technical visits for the foreign delegates were organised to the Gold Reef City, where the visitors got an opportunity to descend down to a 220 m Gold Mine shaft and had a guided underground tour and also watched a 12.5 kg gold pour, and to MINTEK, the scientific institute dealing with minerals processing technologies and research.

In the Concluding Session, based on valuable feedback and critical comments of the delegates, a 'Johannesburg Resolution on Minerals Processing and Beneficiation' was unanimously adopted. 'Certificates of Participation' were handed over to the participants of the Workshop by Ms. Mmampei Chaba and Prof. Kulshreshtha. The Workshop concluded with the participants thanking and greatly applauding the efforts made by the NAM S&T Centre and Department of Science & Technology, South Africa in organising such a wonderful and useful Workshop.