COPPER COBALT AFRICA
Incorporating the Ninth Southern African Base Metals Conference
9 – 13 July 2018, AVANI Victoria Falls Hotel, Livingstone, Zambia

FINAL PROGRAMME

MONDAY 9 JULY

8h00 – 12h30  Short Course: An Introduction to the SAMREC and SAMVAL Codes
              Lion Room

8h00 – 16h30  Short Course: Hydrometallurgical Processing of Cobalt
              Elephant Room

15h00 – 17h00 Conference Registration
            Zebra Room

15h00 – 17h00 Uploading of Tuesday presentations with Audiovisual Crew
              Giraffe Room

17h00 – 19h00 Welcome Cocktail Party, sponsored by Sibelco Australia
              The Sundeck, Zambezi River, Royal Livingstone Hotel
TUESDAY AM 10 JULY

07h00 – 17h00  Registration
Zebra Room
07h00 – 14h00  Uploading of Tuesday presentations with Audiovisual Crew
Giraffe Room and Elephant Room

PLENARY SESSION I: COMBINED VENUE: GIRAFFE AND ELEPHANT ROOMS
Session Chair: Kathy Sole, Consulting Hydrometallurgist (South Africa)
08h15 – 8h25  Opening of Conference
Kathy Sole, Conference Chair (South Africa)
08h25 – 8h35  Official Welcome from the Southern African Institute of Mining and Metallurgy
Sehliselo Ndlovu, President of SAIMM (South Africa)
8h35 – 8h45  Official Welcome to Zambia
The Honourable Richard Musukwa, Minister of Mines and Minerals Development (Zambia)
8h45 – 9h25  Keynote Address: Zambian mining’s polymetallic future
Sokwani Chilembo, CEO of the Zambian Chamber of Mines (Zambia)
9h25 – 9h45  Premium Sponsor and Welcome Function Sponsor
Sibelco (Australia)
9h45 – 10h25  Keynote Address: Cobalt and the rise of the lithium-ion battery megafactories
Caspar Rawles, Benchmark Mineral Intelligence (United Kingdom)
10h25 – 10h35  Premium Sponsor
BASF (South Africa)
10h25 – 10h35  TEA BREAK

SESSION 1A – GENERAL: GIRAFFE ROOM
Session Chair: Darius Muma, Mopani Copper Mines and SAIMM Zambian Branch Chair (Zambia)
11h05 – 11h30  1A-1: The state of occupational safety in the South African mining industry: progress, successes and challenges
S. Phakathi and K. Letsoalo, Minerals Council of South Africa (South Africa)
11h30 – 11h55  1A-2: Training of engineering graduates in Zambia to meet mining industry needs
J. Kapobe, C. Mazala and S. Simukanga, Mopani Copper Mines and Zambian Higher Education Authority (Zambia)
11h55 – 12h20  1A-3: Production output of primary copper in South Africa: predicting future trends using the intensity-of-use theory
M.J. Nong, P.J.K. Leeuw and N. M. Cudjoe, University of the Witwatersrand (South Africa)
12h20 – 12h45  1A-4: Project evaluation: the drivers behind a mineral project’s value
B. Botha, VBKOM Consulting (South Africa)

SESSION 1B – HYDROMETALLURGY I: ELEPHANT ROOM
Session Chair: Tanja Marcus, ProProcess (South Africa)
11h05 – 11h30  1B-1: Advances in cobalt recovery and purification
C. Pawlik, Mintek (South Africa)
11h30 – 11h55  1B-2: Milling in acidic raffinate solution in copper–cobalt hydrometallurgy circuits: the next step towards reducing operating costs
E. Mkhize and S. Kumwenda, SENET (South Africa)
11h55 – 12h20  1B-3: Frothing and froth control in copper leach washing and purification circuits
N. Mautsa, M. Bower, B. Nel and J. Miller, Kemira (South Africa and United Kingdom)
12h20 – 12h45  1B-4: Advances in design of copper–cobalt hydrometallurgical circuits: copper circuits
G. Miller, Miller Metallurgical International (Australia)
12h45 – 13h45  LUNCH BREAK
TUESDAY PM 10 JULY

SESSION 2A – GEOLOGY & MINING I: GIRAFFE ROOM
Session Chair: Matt Mullins, Tacoma Strategies (South Africa)
13h45 – 14h10  2A-1: Satellite synthetic aperture radar for mine and tailings dam monitoring
N. Pendock, DIRT Exploration (South Africa)
14h10 – 14h35  2A-2: Review of radar technologies for slope stability in open pit mines
J. Oosthuizen, VBKOM Consulting (South Africa)
14h35 – 15h00  2A-3: Determination of an effective slope monitoring regime for mining a failed zone on the north wall of Nchanga Open Pit 2
C. Silwamba, S. Syamusana and B. Sikakwi (Zambia)

SESSION 2B – SOLVENT EXTRACTION I: ELEPHANT ROOM
Session Chair: Gift Chisakuta, BASF (Zambia)
13h45 – 14h10  2B-1: Techno-economic evaluation of BASF’s new high-temperature solvent extraction reagent
J.J. Taute and S. Archer, BASF and SENET (South Africa)
14h10 – 14h35  2B-2: Management of mixing continuity in a solvent-extraction plant with a leach solution of high silica at Ruashi Mining
14h35 – 15h00  2B-3: Silica mitigation in copper solvent-extraction circuits
K.C. Sole, F. Crundwell, N. Dlamini and G. Kruger, University of Pretoria, CM Solutions and Market to Africa (South Africa)

15h00 – 15h30  TEA BREAK

SESSION 3A – GEOLOGY & MINING II: GIRAFFE ROOM
Session Chair: Matsobane Nong, University of the Witwatersrand (South Africa)
15h30 – 15h55  3A-1: An African Copperbelt-style district in Columbia: Insights from long-wave infrared satellite imaging
D. Forest and N. Pendock, N-Side Mining Technology (Singapore)
15h55 – 16h20  3A-2: Copper ore variability: benefits of advanced simulation
M. Talikka, A. Remes, M. Hicks, J. Liipo, V.-P. Takalo, S. Khizanishvili and M. Natsvlishvili, Outotec (Finland) and JSC RMG Copper (Georgia)
16h20 – 16h45  3A-3: A ranking methodology to prioritise artisanal and small-scale mining projects
S. Rupprecht, University of Johannesburg (South Africa)

SESSION 3B – SOLVENT EXTRACTION II: GIRAFFE ROOM
Session Chair: ***
15h30 – 15h55  3B-1: Additive to mitigate crud formation in solvent extraction operations
B. Mbao, L. Cohen, A. Fischmann, L. Moya, M. Moser and O. Tinkler, Solvay (Zambia and USA)
15h55 – 16h20  3B-2: Loaded organic washing for impurities removal from electrolyte
D. Nel, J. Kyabu, T. Ngoy, P. Koji and P. Bwando, Mutanda Mining and BASF (DR Congo)
16h20 – 16h45  3B-3: On-line analysis in solvent extraction process
R. Abod, L. Koresaar, D. Moreno and T. Balbin, Outotec and Cobre Las Cruces (Finland and Spain)
WEDNESDAY AM 11 JULY

07h00 – 15h00   Registration
                Zebra Room
07h00 – 13h30   Uploading of Wednesday presentations with Audiovisual Crew
                Giraffe Room and Elephant Room

PLENARY SESSION II: COMBINED VENUE: GIRAFFE AND ELEPHANT ROOMS

Session Chair:  Sehliselo Ndlovu, University of the Witwatersrand and President of SAIMM (South Africa)
08h15 – 8h20    Welcome and Announcements
08h20 – 9h00    Keynote Address: The challenges of mining, particularly in Africa (including a brief history of First Quantum Minerals)
                M. Pascal, First Quantum Minerals Ltd (Zambia)
9h00 – 9h10     Premium Sponsor
                Outotec (South Africa)
9h10 – 9h50     Keynote Address: Overview and outlook for the cobalt market
                L. Smith, Core Consultants (United Kingdom)
9h50– 10h00     Premium Sponsor
                Solvay (USA)
10h00–10h30     TEA BREAK

SESSION 4A – COMMINUTION: GIRAFFE ROOM

Session Chair:  Vongani Nkuna, Ivanhoe Mines SA (South Africa)
10h30 – 10h55   4A-1: Assessing the benefits of automatic grinding control using particle size tracking technology for true on-line particle size measurement
                R. Maron, C. O’Keefe and J. Sepulveda, CiDRA Minerals and J-Consultants (USA and Chile)
10h55 – 11h20   4A-2: Influence of water balance and classifier choice on energy efficiency of milling circuits
                A. Hinde, E. Ford, J. Makola and A. Jan, Independent consultant, Mintek, Derrick Solutions International and Derrick Corporation (South Africa and USA)
11h20 – 11h45   4A-3: Merits of optimised milling configuration on process performance: a case study of the mixed ore at Kansanshi
                C. Chongo, K. Ngoisa, P.A. Bepswa and A.N. Mainza, Kansanshi Mine and University of Cape Town (Zambia and South Africa)
11h45 – 12h10   4A-4: Converting of Lubambe Copper Mine ball mill from grate discharge type to an overflow
                A. Mhone, Lubambe Copper Mine (Zambia)
12h10 – 12h35   4A-5: Beneficiation of a complex low-grade chalcopryite ore
                L. Mweene and S. Subramanian (India)
12h25 – 13h30   LUNCH BREAK
SESSION 4B – ELECTROWINNING: ELEPHANT ROOM

Session Chair: Sudhir Thakurdin, Hatch (South Africa)

10h30 – 10h55 4B-1: Design of a selection guide for copper electrowinning sizing: cell arrangement as a function of rectiformer size for varying throughputs
E. Forner, G. Miller, J. Scheepers and A.J. du Toit, DRA Global and Miller Metallurgical International (South Africa and Australia)

10h55 – 11h20 4B-2: Advances in permanent cathode maintenance solutions
L. Nordlund and H. van der Walt, Outotec (Finland)

11h20 – 11h45 4B-3: Lead contamination of copper cathodes: direct electrowinning compared with leach/solvent extraction/electrowinning
G. Mitshabu, C. Tshula, P. Tshisand, B. Faqing and A. Feather, BASF, Gécamines Luilu Refinery and Ruashi Mining (DR Congo and South Africa)

11h45 – 12h10 4B-4: Determination of MCM2 copper cathode sampling regime
O. Mahenga, D. Muma, B. Muleya, E. Musenge and G. Bwalya, Mopani Copper Mines and Zambia Revenue Authority Mineral Beneficiation Laboratory (Zambia)

12h10 – 12h35 4B-5: Electrochemical characterisation of cobalt electrowinning from dilute sulphate solutions
R. Wildenboer, University of Pretoria (South Africa)

12h25 – 13h30 LUNCH BREAK
**WEDNESDAY PM 11 JULY**

### SESSION 5A – HYDROMETALLURGY II: GIRAFFE ROOM

**Session Chair:**

13h30 – 13h55  **5A-1: MesoTherm™ bio-oxidation technology: a simple process for the treatment of base metal sulphide ores**
C. van Buuren, M. Nicolle and J. van Niekerk, Outotec (South Africa)

13h55 – 14h20  **5A-2: Laboratory column leaching of cobalt using raffinate and sodium metabisulphite**
P. Bwando, BASF (Dr Congo)

14h20 – 14h45  **5A-3: Acid bake-leach process for recovering copper and cobalt from complex sulphide–oxide concentrates**
P. Mwamba, J.H. Masinja, J. Manchisi and Y.R.S. Hara, University of Zambia and Copperbelt University (Zambia)

14h45 – 15h10  **5A-4: Polymetallic processing within a circular economy**
P. van Staden, M. Gericke, V. Conic and D. Milanovic, Mintek and Mining and Metallurgy Institute (South Africa and Serbia)

### SESSION 5B – ION EXCHANGE AND MEMBRANES: ELEPHANT ROOM

**Session Chair:** Johanna van Deventer, Purolite (South Africa)

13h30 – 13h55  **5B-1: Recovery of cobalt and nickel from acidic waste streams: effect of chloride, sulfate and column studies using phosphonic acid-functionalised silica**
J.T.M. Amphlett, S.E. Pepper, W. Peng and M.D. Ogden, University of Sheffield (United Kingdom)

13h55 – 14h20  **5B-2: Cobalt–nickel pertraction refinery to process pregnant leach solution from recycled spent catalysts. Part 1: Cobalt extraction from a binary system**
N. Mans, D. van der Westhuizen, D. Bruinsma, P. Cole, J. du Toit, E. Munnik, A. Coates, V. Coetzee and H. Krieg, Northwest University, Bruinsma Solutions, Peter Cole Metallurgical Services, DRA Global and Minemet (South Africa)

14h20 – 14h45  **5B-3: Metal removal from synthetic mine tailings leachates using fixed-bed ion-exchange columns**
A.L. Riley, S.E. Pepper, E.L. Sexton and M.D. Ogden, University of Sheffield (United Kingdom)

14h45 – 15h10  **5B-4: Solvent-impregnated resins for niche applications in metal processing**
V. Yahorava, V. Bazhko and R.R. Leso, Mintek (South Africa)

15h10 – 15h30  **TEA BREAK**

15h30  Buses leave for River Cruise – pick-ups from AVANI Victoria Falls and Royal Livingstone Hotels

16h00 – 18h00  **Luxury Sunset Cruise and Game Viewing on the Zambezi River**
*Sponsored by Axis House*
African Queen and Lady Livingstone

18h30 – 22h00  **Boma Braai Conference Dinner**
*Sponsored by ALS Global*
Mukuni Boma, AVANI Victoria Falls Hotel
THURSDAY AM 12 JULY

07h00 – 16h00  Registration
              Zebra Room
07h00 – 14h00  Uploading of Thursday presentations with Audiovisual Crew
              Giraffe Room and Elephant Room

PLENARY SESSION III: COMBINED VENUE: GIRAFFE AND ELEPHANT ROOMS

Session Chair: Jackson Sikamo, Chairman and Country Manager Chibuluma Mines PLS (Zambia)

08h15 – 8h20  Welcome and Announcements
08h20 – 9h00  Keynote Address: P3-1: The Giant Kamoa–Kakula Project in the Democratic Republic of Congo
              S. Amos, V. Nkuna and B. Matsetela, Kamoa Copper SA and Ivanhoe Mines (South Africa)
9h00 – 9h20  Cruise Sponsor and Social Media Sponsor
              Axis House (South Africa)
9h20 – 10h00 Keynote Address: Urban mining and the pivotal role of hydrometallurgical approaches for recycling secondary source feeds
              B. Currie, Ausenco (Australia)
10h00 – 10h10 Dinner Sponsor
              ALS Global (South Africa)
10h10 – 10h30  TEA BREAK

SESSION 6A – CONCENTRATION AND FLOTATION: GIRAFFE ROOM

Session Chair: Shamudulu Shamaila, Worley Parsons (South Africa)

10h30 – 10h55  6A-1: Empirical model of recovery response of copper sulphide circuit at Kansanshi Mine
              M. Lusamboa and F.K. Mulenga, Kansanshi Mine and University of South Africa (Zambia and South Africa)
10h55 – 11h20  6A-2: Relationship between Kansanshi ore mineralogy and copper recovery across different processing circuits
              L. Little, Q. McLennan, A. Prinsloo, B. Kaputula and C. Siame, Kansanshi Mine (Zambia)
11h20 – 11h45  6A-3: Flotation process metering of concentrate, slurry, air and water flows using non-intrusive fibre-optic sensing
              D. Finfer, Silixa Ltd. (United Kingdom)
11h45 – 12h10  6A-4: Continuous improvement of a copper concentrator by advanced flotation control
              P.D. Knoblauch, Mintek (South Africa)
12h10 – 12h35  6A-5: Development of flotation reagent automated system
              C. Ngulube, W. Munalula and I. Mkandawire, Kansanshi Mine (Zambia)
12h35 – 13h00  6A-6: Copper recovery from carbocenous sulphide ores by flotation
              R.S. Magwaneng, K. Haga, A. Batnasan, A. Shibayama, M. Kosugi, R. Kawarabuki,
              K. Mitsuhashi and M. Kawat, Akita University and Nittestu Mining (Japan)
13h00 – 14h00  LUNCH BREAK
SESSION 6B – PROJECTS AND OPERATIONS I: ELEPHANT ROOM

Session Chair: Eleanore Forner, DRA Global (South Africa)

10h30 – 10h55  6B-1: Processing of Copperbelt historical copper smelter slag through the Chibuluma concentrator and future prospects for maximising value recovery
B. Kaluma, A. Mwanza and J. Sikamo, Chibuluma Mines (Zambia)

10h55 – 11h20  6B-2: Innovative process design for oxide ores in the Democratic Republic of Congo
D. Alexander, C. van der Merwe, R. Lumbule and J. Kgomo, Eurasian Resources Group and Boss Mining (South Africa and DR Congo)

11h20 – 11h45  6B-3: BOSS 50: A fast-track project in the Democratic Republic of Congo
A. Lathwood (DR Congo)

11h45 – 12h10  6B-4: The historic Kipushi zinc project in the Democratic Republic of Congo
B. Masetela, V. Nkuna and S. Amos, Ivanhoe Mines and Kamoa Copper SA (South Africa)

12h10 – 12h35  6B-5: The Mutoshi Project: Part 1 – Metallurgical testwork, process design and project delivery
P. Ilunga, D. Samal, M. Nicolle, M./ Lampi, K. Valkama, J. Edwards and N. Tatalias, Consulting Metallurgist, Chemicals of Africa (Chemaf), Outotec and METC (DR Congo, South Africa and Finland)

12h35 – 13h00  6B-6: Copper refinery modernisation, Mopani Copper Mines plc, Mufulira, Zambia
M. Chooye, R. Patel, A. Pranowo and B. O’Rouke, Mopani Copper Mines and Glencore Technology (Zambia and Australia)

13h00 – 14h00  LUNCH BREAK
THURSDAY PM 12 JULY

SESSION 7A – TAILINGS AND GENERAL: GIRAFFE ROOM

Session Chair: Alain Kabemba, SIMEKA Infrastructure and Services (South Africa)

14h00 – 14h25  7A-1: Dewatering tailings for dry stacking: Rapdi water recovery by means of centrifuges
R. Klug, A. Rivadeneira and N. Schwarz, Flottweg, benaventura and Schwarz Global Consulting (Germany, Peru and South Africa)

14h25 – 14h50  7A-2: Tailings thickener improvements at Sentinel Copper Mine
M. Bower and M. Kynkaanntiemi, Kemira Chemicals and Minera Panama (United Kingdom and Panama)

14h50 – 15h15  7A-3: “Training for Life”
J. Kapobe, M. Milupi, A. Lemmer, C. Mazala and R. Phiri, Mopani Copper Mines (Zambia)

15h15 – 15h40  7A-4: Disruptive effect of battery recycling on the near future cobalt market
N. Steenkamp, Consulting Geologist and Geotechnical Engineer (South Africa)

SESSION 7B – PROJECTS AND OPERATIONS II: ELEPHANT ROOM

Session Chair: Wezi Banda, ERG Africa (South Africa)

14h00 – 14h25  7B-1: Operational experiences of Mufulira ISASMELT technology since inception
J. Kapobe, J. Sasikumar, K. Chitundu, C. Mazala and R. Phiri

14h25 – 14h50  7B-2: Sonic injection in sulphide smelting: an update
J. Kapusta (Canada)

14h50 – 15h15  7B-3: Operational readiness: from project to operating asset
R. Taute and P.M.J.G. Thomson, SENOPS (South Africa)

15h15 – 15h40  7B-4: Outotec service portfolio and recent development in managing asset performance
J. Lempainen and M. Lindemann, Outotec (Finland)

15h40 – 16h15  TEA BREAK AND CLOSE OF CONFERENCE
FRIDAY 13 JULY

Post-Conference Technical Tour to Kansanshi Mine, Smelter, Concentrator and Hydrometallurgy Plant
Sponsored by First Quantum Minerals
Solwezi, Zambia

SAIMM Coordinator: Wezi Banda, ERG Africa (South Africa)
Kansanshi Coordinator: Chanda Ngulube, Kansanshi Mine (Zambia)

06h30  Pickup at AVANI Victoria Falls Hotel and then Royal Livingstone Hotel for airport transfer
07h30  Charter flight to Solwezi
09h15 – 15h15  Technical tour, including lunch
15h45  Charter flight to Livingstone
18h00  Arrival back at AVANI Victoria Falls and Royal Livingstone Hotels
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