Thursday June 23rd

09.10 Technical Session I
Chairmen: I. Demers (Université du Québec en Abitibi-Témiscamingue, Canada) and C. Brough (Petrolab Limited, UK)

09.10 Keynote Lecture: The mine of the future – even more sustainable
R.J. Batterham, University of Melbourne, Australia.....1

09.40 Applications of hyperspectral mineralogy for geoenvironmental characterisation
N. Fox, J. Moltzen, A. Parbhakar-Fox and L. Jackson (University of Tasmania, Australia).....7

10.00 Automated environmental mineralogy: the use of liberation analysis in humidity cell testwork
C. Brough, J. Strongman, J. Fletcher (Petrolab Limited, UK), R. Bowell, R. Warrender (SRK Consulting, UK) and A. Barnes (Geochemic Ltd, UK).....29

10.20 Coffee

11.00 Evaluating resource efficiency at major copper mines
S. Spuerk, M. Drobe and B.G. Lottermoser (RWTH Aachen University, Germany).....45

11.20 Sustainable extraction of raw materials
T. Henckens, P. Driessen and E. Worrell (Utrecht University, The Netherlands).....56

11.40 Sustainable practices in the management of mining waste: a focus on prevention
E. Lebre, G. Corder and A. Golev (Sustainable Minerals Institute- University of Queensland, Australia).....76

12.00 An environmental performance assessment of froth flotation for coal recovery and sulfur removal from fine coal waste
B.M. Fundikwa, S.T.L. Harrison and J.L. Broadhurst (University of Cape Town, South Africa).....95

12.20 Assessing the potential risks with elemental deportment from gold waste rock
A.K.B. Opitz, S.T.L. Harrison, J.L. Broadhurst and M. Becker (University of Cape Town, South Africa).....114

12.40 Recycling indices for a circular economy
A. van Schaik (MARAS, The Netherlands) and M.A. Reuter (Helmholtz Institute for Resource Technology, Germany).....123

13.00 Lunch
14.00  **Technical Session 2**  
Chairmen: Y. Shen (University of New South Wales, Australia)

14.00  **Opportunities for soil-related applications of fine coal processing wastes in South Africa**  
H.-M. Stander, J.L. Broadhurst, S.T.L. Harrison (University of Cape Town), J.R. AmaralFilho and B.A. Firpo (Federal University of Rio Grande do Sul, Brazil)....148

14.20  **Comparing the environmental performance of rare earth deposits using GaBi software to perform a cradle-to-gate Life Cycle Assessment**  
R. Pell and F. Wall (University of Exeter, UK)....177

14.40  **Sustainability contributions of minerals and mining – a focus on the Sustainable Development Goals**  
B.C. McLellan (Kyoto University, Japan)....198

15.00  **Membrane use to recover metals and reuse wastewater**  
S.P. Chesters, M.W. Armstrong, J. Hamp (Genesys International Ltd, UK) and F. del Vigo (Genesys Membrane Products, Spain)....214

15.20  **Recovery of metals from spent lithium ion batteries using electrochemically produced acidic anolyte**  
N.J. Boxall, K.Y. Cheng, C. Morris, A.H. Kaksonen (CSIRO Land and Water, Australia), N. Haque and W. Bruckard (CSIRO Mineral Resources, Australia)....228

15.40  **Valorisation of acid mine drainage treatment sludge by combination with a natural soil as an oxygen barrier cover for mine waste reclamation**  
I. Demers, M. Mbonimpa, M. Benzaazoua, M. Bouda, S. Awoh, S. Lortie and M. Gagnon (Université du Québec en Abitibi-Témiscamingue, Canada)....253

**Friday June 24th**

08.50  **Technical Session 3**  
Chairmen: C. Young (Montana Tech, USA) and M. Benzaazoua (Université du Québec en Abitibi-Témiscamingue, Canada)

08.50  **Keynote Lecture: Best practice in efficient mineral processing – comminution energy curves**  
M. Battersby (Maelgwyn Mineral Services Ltd, UK)....278

09.20  **Quantifying metal values in e-waste in Australia**  
A. Golev, D.S. Lopez and G. Corder (Sustainable Minerals Institute, University of Queensland, Australia)....279

09.40  **Metal speciation of historic and new copper mine tailings from Repparfjorden, Northern Norway, before and after acid, base and electrodialytic extraction**  
K.B. Pedersen, A. Evenset, M. Frantzen (Akvaplan-niva AS, Norway), P.E. Jensen and L.M. Ottosen (Technical University of Denmark, Denmark)....290

10.00  **Kinetic principles based geochemical evaluation of acid mine drainage: a case study in Artvin, Turkey**  
G. KalyoncuErguler (MTA, Turkey), Z.A. Erguler, H. Akcakoca and A. Ucar (Dumlupinar University, Turkey)....313

10.20  **Reducing the self-heating of sulphides by chemical treatments**  
F. Rosenblum, S. Moon, J.A. Finch, K.E. Waters (McGill University, Canada) and J.E. Nesset, Nessetech Consulting Services Inc, Canada)....334
Comparative study on the effect of fragmentation type on components liberation during recycling of printed wiring boards
R. Martino, S. Gaydardzhiev (University of Liege, Belgium), C. Iseli, M. Streicher-Porte (University of Applied Sciences and Arts, Switzerland) and A. Weh (Sefrag AG, Switzerland)....343

An example for sustainable technology diffusion in mining: achieving belt conveyor systems in the German hard-rock quarrying industry
T. Braun, A. Hennig and B.G. Lottermoser (RWTH Aachen University, Germany)....355

Carbothermal reduction of copper smelter slags for recycling into pig iron and glass
P. Sarfo, G. Wyss, A. Das, C. Young (Montana Tech, USA) and G. Ma (Wuhan University of Science & Technology, China)....369

Integrated management of pyrrhotite tailings at Raglan mine: Part 1: challenges of desulphurization process and reactivity prediction
M. Benzaazoua, M., Bouzahzah, F. Lessard, B. Bussière, I. Demers, M. Kongolo (Université du Québec en Abitibi-Témiscamingue, Canada) and L. Kormos (XPS Consulting & Testwork Services, Canada).....384

Integrated management of pyrrhotite tailings at the Raglan mine: Part 2: assessment of desulphurized tailings as cover materials to control AMD
F. Lessard, B. Bussière, M. Benzaazoua (Université du Québec en Abitibi-Témiscamingue, Canada), J. Côté (Université Laval, Canada) and L. Marcoux (Glencore, Canada).....540

Leaching behavior of heavy metals from fired bricks containing different mine wastes
Y. Taha, M. Benzaazoua (Université du Québec en Abitibi-Témiscamingue, Canada), R. Hakkou and M. Mansori (Université Cadi Ayyad, Morocco).....553

Environment issues on industrial processing of raw agate
F. Vilasbôas, C.R. Santos, I.A.H. Schneider (Universidade Federal do Rio Grande do Sul, Brazil), J.C.S.S. Menezes (Universidade do Oeste de Santa Catarina, Brazil) and R.A. Silva (IMED, Brazil).....576

Experimental and numerical modelling of solid particle erosion
C.Y. Wong, J. Wu, L. Graham, G. Short, J. Boulanger and C. Solnordal (CSIRO, Australia).....589
A pre-concentration application for high voltage selective fragmentation
D. Parvaz, A. Mosaddeghi and A. Weh (SELFRAG AG, Switzerland).....605

Model study of the combustion of biomass in an ironmaking blast furnace
Y. Shen, A. Yu (Monash University, Australia), T. Shiozawa (University of New South Wales, Australia) and P. Austin (BlueScope, Australia).....612

Including mineralogical attributes and sustainability indicators into a modelling framework of a magnetic separator
E. Charikinya, J. Robertson, A. Platts, M. Becker, D. Bradshaw (University of Cape Town, South Africa) and P. Lamberg (Luleå Technical University, Sweden).....625

Breakage characteristics of incinerator bottom ash in the HV pulse power process
A. Weh and A. Mosaddeghi (SELFRAG AG, Switzerland).....651

Investigating various ammonium salts as lixiviants in the extraction of calcium from iron making slag
I.C. Kohithetse, M.S. Manono and C.K. Thubakgale (Vaal University of Technology, South Africa).....660

Evaluating the recovery of Cu from a copper converter slag using froth flotation
M.S. Manono, C.K. Thubakgale, D. Selowa (Vaal University of Technology, South Africa) and M.M. Ramakokovhu (Tshwane University of Technology, South Africa).....678

Adsorption kinetics of salicylhydroxamic acid on the oxides of various rare earth elements
G. Galt, A. Das, R. James and C. Young (Montana Tech, USA).....695

Evaluating environmental risks of historic slag: upgrading value through microanalytical characterisation
A. Parbhakar-Fox, N. Fox (University of Tasmania, Australia) and B. Lottermoser (RWTH Aachen University, Germany).....N/A

ST Equipment & technology; opportunities in triboelectrostatic separation
L. Baker (ST Equipment & Technology LLC, USA).....N/A