

# TABLE OF CONTENTS

Collaborating Organisations .....	iii
Organising Committees .....	v
Technical and Scientific Reviewers .....	vii
Preface .....	ix
Acknowledgements .....	ix
Sponsors .....	xi

## Keynote and Plenary Sessions

### Keynote Address

Carbon Accumulation in Soils During Reforestation – The Australian Experience After Bauxite Mining .....	3
<i>M. Tibbett</i>	

### Keynote Address

Metallophytes – A Unique Biodiversity and Biotechnological Resource in the Care of the Minerals Industry .....	13
<i>A.J.M. Baker, S.N. Whiting</i>	
Facilitating Mine Closure with a Continuous Analysis and Review System .....	21
<i>D.J. Tongway</i>	
Quantifying the Effect of Substrate Compaction on Root Development in Cover Systems .....	27
<i>A.B. Fourie, M. Tibbett, T. Worthington, A.E. King</i>	
Configuration of Mine Closure Landforms – Geomorphic Approach .....	35
<i>L.F. Sawatsky, A. Beersing, F. Ade</i>	
Using Traditional Ecological Knowledge to Develop Closure Criteria in Tropical Australia .....	47
<i>H.D. Smith</i>	
Tools for Integrated Closure Planning .....	57
<i>A.M. Fleury, C. Copley</i>	
Karst, Mining and Conflict – A Historical Perspective of the Consequences of Mining on the Far West Rand .....	69
<i>E.J. Stoch, F. Winde, E. Erasmus</i>	

## Policy and Regulation for Mine Closure

South Africa's Challenges Pertaining to Mine Closure – The Concept of Regional Mining and Closure Strategies .....	87
<i>D.M. van Tonder, H. Coetzee, S. Esterhuysen, N. Msezane, L. Strachan, P. Wade, T. Mafanya, S. Mudau</i>	
Abandoned Mine Land Program Strategic Planning in the United States – A Case Study .....	99
<i>G.M. Stone</i>	
South Africa's Strategy for the Management of Derelict and Ownerless Mines .....	113
<i>H. Coetzee, N.R. Nengobela, C. Vorster, D. Sebake, S. Mudau</i>	
Establishing a Framework for Intervention and Remediation of Radioactive Contamination from Gold Mining – Learning from the Past .....	125
<i>J.F. Ellis</i>	

## Finance and Costing for Mine Closure

Alternative Approaches for Providing Financial Provision for Mine Rehabilitation and Closure .....	137
<i>D.J. Grant-Stuart</i>	
Closure Planning and Estimating Within the Southern Africa Division of a Global Gold Miner .....	145
<i>M.W. Sutton, H. Pretorius, J.H. Nel, F. Julyan, H.G. Rex</i>	

The Financing of Mine Land Rehabilitation in the Czech Republic .....	161
<i>J. Dvořáček, J. Štěřba, K. Novotný</i>	

### **Mine Closure Planning – Closure Criteria**

Thinking About the End Before You Start – Integrating Mine Closure Planning into Feasibility Studies and Environmental and Social Impact Assessment .....	171
<b>S.J. Finucane</b>	
A Sustainability Criteria and Indicators Framework for Legacy Mine Land .....	183
<b>R.C. Worrall, D.T. Neil, D. Brereton, D.R. Mulligan</b>	
Planning for Mine Closure at De Beers Consolidated Mines – An Integrated Approach .....	195
<b>M. Mban</b>	
Mine Closure to Relinquishment – The Development of Partnerships and Management Tools to Support the Process .....	207
<b>G. McIlveen, D.R. Mulligan, T. Baumgartl, M. Edraki, A. Pudmenzky, L. Rossato</b>	
Comprehensive Planning for Closure of Mining Activities at Early Stages and its Impacts on the Business Plan and Mine Development Operations .....	215
<b>I.P. Flores, K.W. Smith, A. Getahun, I.P. Pérez</b>	
Integrated Solutions for Mine Site Closure and Management – Environmental Risk Assessment, Monitoring and Remediation .....	223
<b>J.R. Candía, A. Oblasser</b>	
Faro Mine Complex Remediation Project – Issues and Options for Closure .....	233
<b>M. Nahir, S. Mead, D. Hockley</b>	

### **Mine Closure Planning – Design and Implementation**

Closure Objectives, Guidelines and Actual Outcomes .....	245
<b>H. Jones</b>	
Mine Infrastructure Planning and Design for Closure – Integrating Sustainable Post-Closure Land-Use from the Outset into the Design of Mine Infrastructure .....	255
<b>B. Rademeyer, T. Le Roux</b>	
Mining for Closure – Design Considerations for UraMin’s Trekkopje Uranium Project .....	269
<b>D. Limpitlaw, T. Mandziak, I. Macpherson</b>	
Mine Closure Planning in the High Andes: Collahuasi – A Case Study .....	277
<b>H. Lagunas, B. Weeks, K. Bocking, E. Salfate</b>	
Planning for Closure – Example from Fäboliden Mine in Sweden .....	285
<b>A.G. Bjelkevik</b>	
Integrated Methodology for the Optimization of Mine Closure .....	297
<b>R. Kahnt, M. Paul</b>	
Dealing with Operational Mine Waste Closure Constraints Through an Integrated Rehabilitation Policy – A Platinum Mine Case .....	309
<b>S.J. van Wyk, P.J.L. Smit, M. van der Merwe</b>	

### **Mine Closure Criteria and Monitoring**

Ecosystem Function Analysis: Measuring and Monitoring for Mine Closure and Completion in Australia and Abroad – 1994 to 2008 .....	321
<b>H.W.B. Lacy, T. File, B. Biggs</b>	

Suitability Analysis for Post-Closure Land Management Options Using a Multi-Stakeholder Decision Support Tool .....	335
<b>H. Soltanmohammadi, M. Osanloo, A. Sami</b>	
Is it Mineral? Is it Vegetable? Perceptions About Ecological Rehabilitation in the Namibian Mining Industry .....	347
<b>T.D. Wassenaar, M. Yates</b>	
Land-Use After Mine Closure – Risk Assessment of Gold and Uranium Mine Residue Deposits on the Eastern Witwatersrand, South Africa .....	363
<b>M.W. Sutton, I.M. Weiersbye</b>	

### **Implementation of Mine Closure**

Creating a Positive Legacy in a Biodiversity Hotspot .....	377
<b>A. Burke</b>	
Commitment, Experience and Teamwork – The Key to a Successful Mine Closure Works Programme at Tanami Mine Site .....	385
<b>R.T. Potts, H.W.B. Lacy</b>	
World Heritage Rescue of Sewell Mining Campsite in Chile .....	395
<b>F. Ravinet</b>	
Land Stability and Hydraulic Impacts of the Flooding of Underground Iron Mines in Lorraine, France – Analysis and Remediation .....	407
<b>D. Midot</b>	
Remediation of Abandoned Lignite Mines in Eastern Germany .....	419
<b>M. Kuyumcu</b>	
Mine Closure in a War Devastated Environment – A Case Study .....	429
<b>M.P. McGann, R.T. Jackson</b>	
Closing Baia de Aries Mine in Romania – A New Challenge .....	439
<b>C. Florea Gabrian, N. Turdean</b>	
Encapsulation of Old Tailings Deposits from Morro Velho Gold Mining in Minas Gerais, Brazil .....	451
<b>A.F. Alves, I. Braga, W. Pó</b>	

### **Modeling and Mitigation of Mine Waste Seepage**

The Influence of Climate on Seepage from Mine Waste Storages During Deposition and Post-Closure .....	461
<b>D.J. Williams</b>	
Prediction of Seepage Emanating from a Residue Disposal Facility for Various Closure Options .....	475
<b>K. Govender, A. van Zyl, N. Bezuidenhout</b>	
The Potential of Woodlands and Reed-Beds for Control of Acid Mine Drainage in the Witwatersrand Gold Fields, South Africa .....	487
<b>P.J. Dye, C. Jarmain, B. Oageng, J. Xaba, I.M. Weiersbye</b>	
Understanding the Water Balance of Potentially Acid Forming Tailings Deposited in a Dry Climate .....	499
<b>P.J. Chapman, D.J. Williams, T.K. Rohde, S.J. Ennor</b>	
An Investigation into the Depth and Rate of Weathering on Witwatersrand Gold Tailings Dam Surfaces as Key Information for Long-Term Acid Rock Drainage Risk Assessments .....	511
<b>N. Bezuidenhout, P.D.S. Rousseau</b>	
Evaluation of Sustainable Remediation Measures for Mine Closure and Derelict Mining Sites – Application of Predictive Geochemical Models and Risk-Based Cost-Benefit Analyses for Decision Making .....	521
<b>G. Deissmann, S. Kistingner</b>	

Stabilization of Pyritic Solid Phases to Mitigate Acid Generation Potential and Metals Leaching .....	531
<b>J. Gillow, J. Horst</b>	
Harnessing Iron Mineral Transformations for the Geochemical Stabilization of Mining Impacts .....	539
<b>J. Gillow, J. Horst</b>	
Integrated Water Management – Assignments of Water Management in Mining Regions .....	547
<b>R. Schwarz, A. Gerth, A. Hebner, L. Mgudlwa</b>	

### **Mine Waste Reclamation**

Revenue Generation During Rehabilitation of Contaminated Land on Gold Mines in South Africa .....	557
<b>C.F. Human, J.C. Botha</b>	
Recovery of Reusable Water from Sulphate-Rich Industrial Effluents .....	565
<b>S. Motaung, J. Maree, L. Bologo, M. de Beer, V. Radebe</b>	
Field Demonstration of Direct Mine-Pool Treatment to Mitigate Acid Mine Drainage .....	575
<b>J. Horst, K. Houston, J. Gillow</b>	
Quasi-Stagnant Mine Waters of Flooded Uranium Deposits as a Utilizable Uranium Source .....	587
<b>B. Michálek, N. Rapantová, A. Grmela, A. Hájek</b>	
The Potential of Plants in Constructed Wetlands for the Removal of Contaminants from Mine Water in Germany .....	599
<b>A. Gerth, A. Hebner</b>	

### **Environmental Legacies and Risk Assessments**

Grain Size Analysis and Elemental Composition of the PM <sub>10</sub> and PM <sub>5</sub> Fractions of Gold-Tailings .....	609
<b>M.E. Ojelede, H.J. Annegarn, M. Mlondo</b>	
Radiometric Surveying in the Vicinity of Witwatersrand Gold Mines .....	617
<b>H. Coetzee</b>	
Geochemical Modeling of the Speciation of Uranium in an Acid Mine Drainage Environment in the Witwatersrand Basin .....	631
<b>H. Tutu, E.M. Cukrowska, T.S. McCarthy</b>	
A Remote-Sensing and GIS-Based Integrated Approach for Risk-Based Prioritization of Gold Tailings Facilities – Witwatersrand, South Africa .....	639
<b>S. Chevrel, L. Croukamp, A. Bourguignon, F. Cottard</b>	
Monitoring Hazardous Wastes Using Space-Borne and Ground-Based Spectroradiometry – Sokolov Lignite Mines, Czech Republic .....	651
<b>S. Chevrel, V. Kopačková, A. Bourguignon, P. Rojík, V. Metelka</b>	
Assessing Post-Closure Metal Dispersion from Sulphidic Mines in the Tropical Climate of North Australia – A Case Study .....	663
<b>M. Edraki, B.N. Noller</b>	
Mercury and Tin Speciation in the Environment of Gold Tailings Dumps in the Central Rand, Johannesburg .....	673
<b>E.M. Cukrowska, J. Lusilao-Makiese, H. Nsengimana, H. Tutu, D. Amouroux, E. Tessier</b>	
Assessment of Cadmium as a Contaminant in Mine Closure .....	681
<b>V. Diacomanolis, J.C. Ng, R. Sadler, M. Nomura, H. Harris, B.N. Noller</b>	
Characterization of Cyanide in Gold Mine Tailings of the Witwatersrand, South Africa .....	689
<b>E.N. Bakatula, H. Tutu, E.M. Cukrowska, I.M. Weiersbye</b>	

## Mine Waste Stabilization

- Failure of an Industrial Residue Cover and Remediation Using the Cellular Confinement System ..... 697  
**M. Abramento, M.M.R. Campos, D.F. Senf**
- Economical Viability of Rehabilitated Sugarcane Agriculture ..... 705  
**H. Kotzé, R. Hattingh, C. Ballot**

## Mine Waste Remediation and Restoration

- Restoring Jarrah Forest after Bauxite Mining in Western Australia – The Effect of Fertilizer on Floristic Diversity and Composition ..... 717  
**R.J. Standish, T.K. Morald, J.M. Koch, R.J. Hobbs, M. Tibbett**
- The Role of Vegetation in Mine Waste Cover Systems with Particular Reference to Australian Mine Rehabilitation ..... 727  
**D.R. Mulligan, D. Doley, T. Baumgartl, K.M. Lynch**
- Establishment of Native Tree Species on Coal Tailings – Lessons from Ebenezer Mine, Queensland, Australia ..... 739  
**R.C. Worrall, A.V. Spain, M. Tibbett**
- Establishment of Four Native Tree Species for Potential Revegetating of Tin-Mined Land in Bangka Island, Indonesia ..... 751  
**E. Nurtjahya, D. Setiadi, E. Guhardja, Muhadiono, Y. Setiadi**
- The Contribution to Closure of Spontaneous Restoration of Industrial Slimes Effluent Dams at the Umbogintwini Industrial Complex near Durban, South Africa ..... 759  
**R.A. Lubke**

## Evaluation of Mine Site Restoration Success

- Developing Achievable Completion Criteria for Fauna – Can it be Done? ..... 773  
**O.G. Nichols**
- Towards Better Restoration Assessment – A Review of the Bioindicator Concept in Rehabilitation ..... 785  
**T.D. Wassenaar, R.J. van Aarde**
- An Ecological Evaluation of Rehabilitation Interventions on Phosphate Mined Land in the West Coast Fossil Park from 1996–2008 ..... 799  
**G.O. Schreiner, E. Pienaar, J.D. van Eeden, M.T. Hoffman, P.J. Carrick**
- Enhancing Conventional Rehabilitation Monitoring in South Africa by Adding Landscape Function Characteristics ..... 809  
**A.S.H. Haagner, K. Kellner, D.J. Tongway**
- Community Structure of Soil Invertebrates Under Differing Restoration Practices – Alluvial Diamond-Mined Sites in South Africa ..... 821  
**C-L. Lyons, M.D. Picker, P.J. Carrick**
- Nematodes as Indicators of Soil Ecosystem Development During Platinum Mine Tailings Rehabilitation ..... 831  
**J. Rossouw, L. van Rensburg, S. Claassens, P.J. Jansen van Rensburg**

## Socio-Economic Impacts of Closure

- Preparation for Closure – Community Engagement and Readiness Starting with Exploration ..... 845  
**E.M. Hoadley, D. Limpitlaw**
- Minimization of Socio-Economic Impacts During Mine Closure ..... 853  
**L. Miradouro, S.M. Piagentini, M.R.S.M. Costa**

Business Expediency, Contingency and Socio-Political Realities – A Case of Unplanned Mine Closure .....	863
<b>M. Chaloping-March</b>	
Viability of Aboriginal Communities Beyond Mine Closure .....	873
<b>N. Ross, B. Bond</b>	
Author Index .....	879
Poster Abstracts .....	883