TABLE OF CONTENTS

Australian Centre for Geomechanics ................................................................. iii
Centre for Land Rehabilitation ........................................................................ iii
Gecamin ........................................................................................................ iv
Committees ................................................................................................... v
Foreword ....................................................................................................... ix
Preface ........................................................................................................ x
Acknowledgements ..................................................................................... xiii
Sponsors ....................................................................................................... xv

Designing, planning and financing closure

Corporate (ir)responsibility: what is it really worth when times are tough? ................................................ 3
S.J. Finucane and T.C. Santini

Financial guarantee of closure costs ............................................................ 17
J. Pimenta de Ávila and M. Sawaya

Closure plan: a tool for mine management and cost savings ............................ 23
A.M. Pulino, E. Chapadeiro, A.A.S. Pena and A.P.M. Saliba

Development of the Pierina Mine closure plan — learning opportunities ........... 31
R. Orellana and M. Robledo

Integration of Antapaccay Project with Tintaya progressive closure plan .......... 39
M. Quiroz, L.A. Espinoza and L. Espinoza

Antamina closure plan: a top-level practice .................................................. 53
A. Mendoza

Integrated water balance and water quality modelling for mine closure planning at Antamina .......... 63
R. Strand, B. Usher, C. Strachotta and J. Jackson

Geochemical assessment of waste rock at the Antamina Mine as part of the closure of waste dumps .... 75
C.A. Aranda

Acid drainage prediction of mining wastes using complementary static chemical tests ................ 87
C. Garcés, M-L. Almendras and C. Quiroz

European waste characterisation standards for acid/neutral rock drainage prevention .......... 99
I. Walder, I. Twardowska, M. Wahlstrom, T. Kaartinen and J.A. Drielsma

Mining in the vicinity of water reservoirs in hard coal mines in the Upper Silesian Coal Basin, Poland ................................................................. 111
P. Bukowski
The Ok Tedi Mine — applying good practice initiatives in planning for the closure of a large and complex mine ................................................................. 119
S. Mackenzie, A. Topurua and M. Werror

Closure planning for a long-lived copper and gold mining operation in Papua, Indonesia .................. 133
A. Mukhsia, J.M. Prewitt and W. Susetyo

Mount Leyshon Gold Mine automated monitoring network: meeting environmental and social commitments ................................................................. 147
R. Haymont and A.M. Vitale

**Stakeholder engagement and community development**

Tea and cake: talking with communities about life after mining .................................................. 159
J.E. Rose and H.L Morgan

Many voices, one plan: eliciting and integrating stakeholder feedback ........................................ 167
D.E. Hockley and G.A. Coulter

Community planning and interaction — Pend Oreille Mine case study ........................................ 181
D.W. Godleewski and M.J. Brown

Proactive stakeholder involvement — Tulawaka’s key towards successful closure ....................... 187
M.F. Kamuzora

Sustainable development activities during closure of the Homestake gold mine .......................... 193
T.A. Duex

Settlement patterns at Ok Tedi — stakeholders, ‘corner’ settlers and invaders ............................ 199
P.C. Carr

Environmental remediation works stimulate renewed interest in mine heritage and tourism at Britannia Beach ................................................................. 205
G. O’Hara, J. Bordian, K. Clausen and B.G. Wernick

Britannia Mine remediation project — community consultation ................................................... 217
L.H. Nikl, B.G. Wernick and G. Sinnett

Strategic planning for mine closure: community sustainability experiences in northern British Columbia, Canada ................................................................. 227
J.A. Shandro, M.M. Veiga, M. Scoble and M. Koehoorn

**Mine site reclamation and rehabilitation**

A review of landscape rehabilitation frameworks in ecosystem engineering for mine closure ........... 241
Designing the reclaimed landscape — integrating landscape architecture into the mining process ....... 251
*J. Buchko and M. Hitch*

Barrick Gold Corporation’s standardised protocols for reclamation monitoring
and final relinquishment ................................................................. 261
*S.R. Viert, J.H. Dillon, D. Blaxland and R. Espell*

Revisiting closure requirements — a review of the process undertaken to
close the Sullivan No. 1 shaft waste dump ................................. 279
*M. Phillip, W. Kuit, B. Dawson, D.E. Hockley and M. O’Kane*

Bats in the adit — addressing safety risks and preserving bat habitat .............................................. 293
*J.E. Deisley and D.J. Abranovic*

Britannia Mine remediation project — integrating ecological monitoring with remediation activities .... 303
*B.G. Wernick, L.H. Nikl, S.R. Seguin and G. Sinnett*

Hosting of green energy and chemical production on mining industry sites pre- and post-closure ........ 317
*J.A. Scott, H. Shang, G.M. Ross, S.H. Shepherd, B. Salt and M. Loken*

**Phytostabilisation and phytoremediation**

Ethnobotanic and forage uses of plants on mine properties in the
Witwatersrand Basin gold fields, South Africa ......................................................... 325
*J. Botha and I.M. Weiersbye*

Selection of tree species as assets for mine phytoremediation using
the genus *Rhus* (*Anacardiaceae*) as a model .................................................. 343
*N.S. Mokgalaka-Matlala, T.C. Regnier, S. Combrinck and I.M. Weiersbye*

Integrating biodiversity, wildlife monitoring and traditional knowledge in
reclamation at Highland Valley Copper ................................................................. 351
*M.R. Freberg and J.L. Dickson*

From mine wasteland to biofuel cropland — the Ontario experience .................................................. 363
*A.S. Lock, J.C. Hargreaves, G.A. Spiers, P.J. Beckett, B. Tisch and S.T. Hall*

The effectiveness of gypsum and mulches in mine site rehabilitation:
short-term effects on surface soil stability and plant growth ......................................................... 377
*J.K. Smits, D. Summerfield, R.S.B. Greene, A. Johnston, D.J. Tongway and J.B. Field*

Effect of fertiliser on early-successional jarrah forest restored after
bauxite mining in south-western Australia ................................................................. 387
*R.J. Standish, M. Tibbett, S. Vlahos, B.A. Stokes and R.J. Hobbs*

Phytostabilisation of acid and metal-contaminated soils near a copper
smelter in central Chile: laboratory assay .............................................................................. 397
*R. Ginocchio, V. Cárcamo, L.M. de la Fuente, E. Bustamante, E. Trangolao and A. Neaman*
High-alpine areas in the Andes of north-central Chile: a remarkable source of metal-tolerant plants for phytoremediation of mine sites ................................................................. 405

Soil ecology and biodiversity

Development of physical, chemical and biological soil properties at the Rio Tinto Alcan Gove bauxite mine, Northern Territory, Australia ................................................................. 417
D.J. Tongway

Microbial diversity of gold mine effluent as a source of new biocontrol agents against fruit pathogens ................................................................................................................ 427
T.C. Regnier, M.P. Roux-Van der Merwe, J. Badenhorst, T. Manyaapel and J. Kemp

Colonisation of rehabilitated lands by termites (Dictyoptera), Rio Tinto Alcan Gove bauxite mine, Northern Territory, Australia ................................................................. 437
A.V. Spain, D.A. Hinz and M. Tibbett

Cover design, construction and monitoring

Designing covers to minimise infiltration and evaluating construction-related greenhouse gas emissions to support sustainable mine closure ......................................................... 451
R.T. Jakubowski, D.S. Oliver and J.E. Thompson

Instrumentation for use in field cover trials — an illustration of the importance of soil specific calibration ................................................................................................................ 463
J. Sun, A.B. Fourie and S.T.S. Yuen

New methods for hydraulic characterisation of mine waste and cover system materials ........................................... 475
J.M. Keller, T-M. Yao, M.A. Milczarek, D.P. Hammermeister and R.C. Rice

Management of overburden storage areas at the Mount Whaleback Mine — a review of 12 years of cover system performance monitoring and application to closure ................................ 487
G. Meiers, B. Huys, J. Heyes, K. Sommerville, D. Christensen and M. O’Kane

Final results of the cover system test panel trials at the Pierina Mine ................................................................. 501

Salinity/pH interactions and rooting morphology in monolayer soil covers above copper tailings ......... 517
M.A. Milczarek, F.M. Steward Jr., W.B. Word, M.M. Buchanan and J.M. Keller

Tailings deposit closure

Closure planning for a tailings storage facility in Western Australia ................................................................. 533
K. Bonstrom, D. Chapman, D. Swain and M. O’Kane
Critical hydraulic gradients in tailings dams in long-term perspective ................................................. 541
*I. Jantzer and S. Knutsson*

Oil sands pond closure — sand, sun and soft tailings .............................................................................. 555
*P.S. Wells*

Design and construction of the reclamation surface for the first oil sands tailings pond ....................... 563
*B. Russell, G. McKenna, M. Leblanc, P.S. Wells and H.B. Anderson*

Wetlands: a solution to the decommissioning of mining tailings dams ................................................. 575

**Mining legacies and relinquishment**

New landscapes: new lives ....................................................................................................................... 589
*G. Pearman*

Canadian abandoned mines: Indian and Northern Affairs Programme update and case study .............. 595
*M. Nahir and L. Spagnuolo*

Manitoba’s Orphaned and Abandoned Mine Site Rehabilitation Programme — 10 years in the making .... 609
*D.M. Priscu, E. Armitt and C. Priscu*

Mine closure case studies of orphaned and abandoned mines in Canada* .................. 623
*G.A. Tremblay and C.M. Hogan*

Britannia Mine remediation project — reclaiming the shoreline ............................................................ 635
*B.G. Wernick, L.H. Nikl, G. O’Hara and G. Sinnett*

**Recent closure case studies**

Polaris Mine — decommissioning and reclamation in Canada’s Arctic .................................................. 647
*B.J. Donald*

Lo Aguirre Mine — income generation during the physical and chemical stabilisation of heap leaching tailings ............................................................................................................. 659
*M. Bascuñan, D. Galleguillos and R. Arias*

Site-specific investigation, risk assessment and clean-up of an inactive mine site in the Chilean Andes .............................................................................................................. 673
*G. Davies, B. Weeks, G. Gilron and B. McDonald*

Pond 1 — closure of the first oil sands tailings pond .............................................................................. 681
*H.B. Anderson and P.S. Wells*

Closure plan for environmental mining liabilities .................................................................................. 691
*R. Azabache and J. Paz*
Consequences of coal mine closures in the Czech Republic ............................................................... 701
J. Dvořáček, R. Zapletalová, J. Štěrba and P. Barták

The Pueblo Viejo Mine: a case study in successful brownfield remediation and redevelopment ............ 707
H.L. Burns and D. Griffin

Author Index ....................................................................................................................................... 715