CAVE MINING CAPABILITY STATEMENT

Geotechnica

Geotechnica Pty Ltd is a specialised Geomechanics Numerical Analysis company founded in 2019.

Managing Director, David Sainsbury (PhD) is a principal geotechnical engineer with 28 years operations, research and consulting rock mechanics experience. He has significant experience in caving and subsidence assessment, open pit slope stability analysis, underground life-of-mine planning and design, and backfill and barricade specification and design. Since 2002, he has conducted multiple geotechnical design studies for major cave mining opeartions worldwide; including Lead Geotechnical Consultant roles for cave propagation, subsidence and infrastructure design at the Chuquicamata, Palabora, Cadia East, Northparkes, and Henderson caving operations. He is also currently a member of the Rio Tinto, Technical Evaluation Group for the Oyu Tolgoi, Resolution and Kennecott Mines.

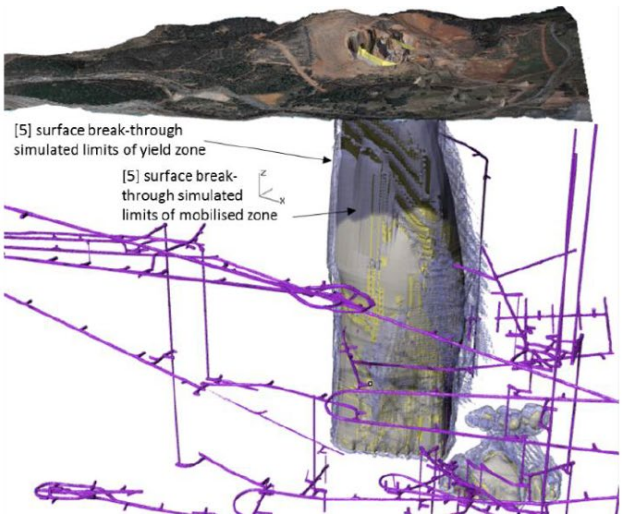
Principal Consultant, Bre-Anne Sainsbury (PhD) is a principal engineer with 25 years experience as a consultant, operational engineer and researcher. Through her PhD studies Bre-Anne developed state-of-the-art numerical modelling techniques for caving and subsidence assessment that are widely used by other consultants and researchers. Bre-Anne has performed many caving and subsidence analyses for block, panel and sub-level cave operations that include: Palabora, Northparkes, Cadia East, Ridgeway Deeps, Kirunavaara, Henderson, Far South East, Oyu Tolgoi, Chuquicamata, Syama and Grace Mine. Bre-Anne is a Professor of Civil Engineering at Deakin University and contracts to Geotechnica on a project related basis.

Cave Mining Project Experience

2024 Atlantic Nickel, Santa Rita Mine, Brazil
Feasibility Study Sub-Level Cave Propagation and Subsidence Analysis

2024 Rio Tinto, You Tolgoi and Resolution Mines, USA
Technical Evaluation Group member

2024 Palabora Mining Company, Palabora Lift 2, South Africa
Assessment of Production Level performance at PMC's Lift 2 Block Cave Mine.



2021 Newcrest, Ridgeway Deeps Lift 2 Mine, NSW

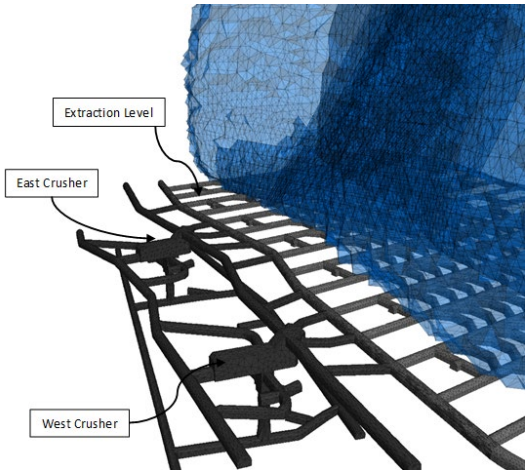
Investigation of cave propagation and subsidence behaviour at Newcrest Mining Ltd's Ridgeway Deeps Lift 2 Mine, NSW, Australia

2020 Newcrest, Cadia East Mine, NSW

Investigation of LOM subsidence behaviour at Newcrest Mining Ltd's Cadia East Mine, NSW, Australia

2019 Palabora Mining Company, Palabora Lift 2, South Africa

Crusher Chamber Design at PMC's Palabora Mine.



2019 Codelco, Chuquicamata Mine, Chile

Technical Lead for the investigation of cave propagation behaviour, subsidence and underground infrastructure performance.

2018- Resolute Mining Ltd, Syama Mine, DR Congo

Technical Lead for the investigation of cave propagation behaviour, subsidence and underground infrastructure performance.

2018 Newcrest, Cadia East Mine, NSW

Investigation of cave propagation behaviour at Newcrest Mining Ltd's Cadia East Mine, NSW, Australia

2017 Palabora Mining Company, Palabora Lift 2, South Africa

Feasibility study level assessment extraction level performance at PMC's Palabora Mine.

2013 Rio Tinto Oyu Tolgoi Mine, Mongolia

Pre-feasibility and feasibility study level assessment of extraction level performance.

2012 Freeport McMoran, Henderson Mine, Colorado, USA

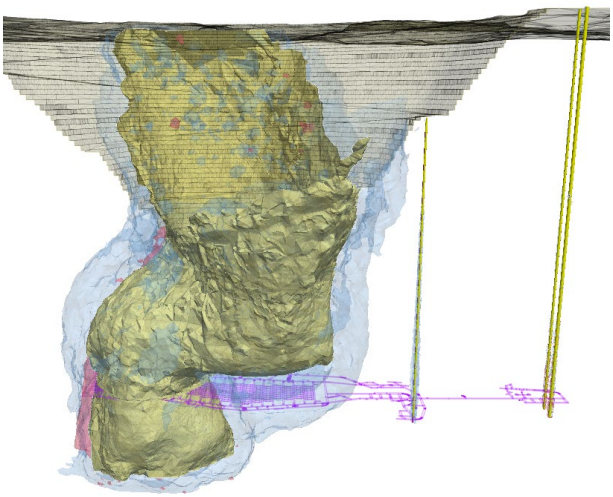
Pre-feasibility and feasibility study level assessment of caving and extraction level performance.

2012 Resolute Mining Ltd – Carpentaria Gold, Mt Wright, QLD

Assessment of cave propagation and infrastructure damage.

2010 Newcrest, Cadia East Mine, NSW

Pre-feasibility and feasibility study level caveability assessment and assessment of separate cave interaction.



2006 Rio Tinto, Northparkes E48 Mine, NSW

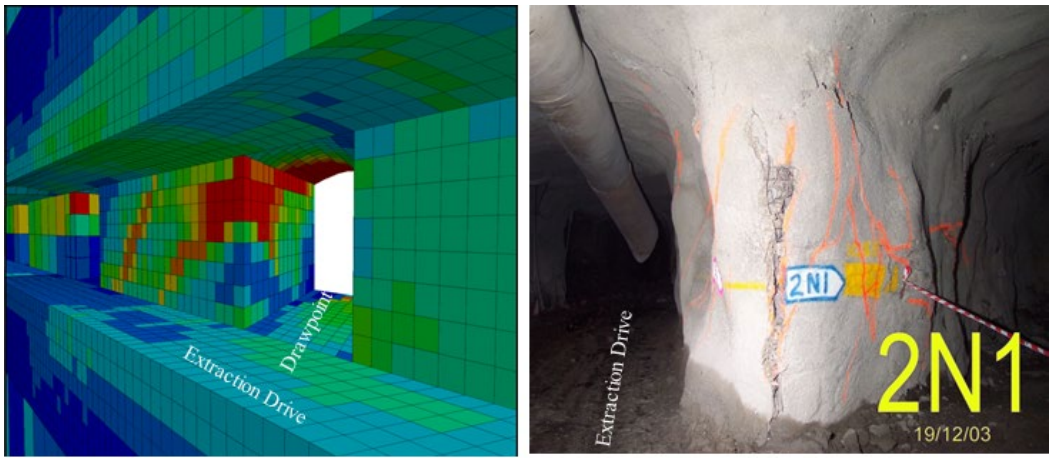
Numerical caveability assessment of Northparkes Mines Ltd's E48 Mine, NSW, Australia.

2005 BHP, Koala Mine, Canada

Numerical caveability assessment of BHP Billiton Diamonds Inc.'s Koala Mine, NWT, Canada.

2004 Rio Tinto, Northparkes E26 Mine, NSW

Numerical modelling analysis and ground support design of undercut and extraction-level development.



Cave Mining Publications

Sainsbury, B., Sainsbury, D., Osorio, A., Carroll, D., & Lett, J. (2022). A coupled modelling approach for discontinuous subsidence at the Cadia East mine. Caving 2022, 2006, 797–804. https://doi.org/10.36487/ACG

Sainsbury, B. (2018). A Sub-Level Caving Algorithm for Large-Scale, Small-Strain, Numerical Simulations. Rock Mechanics and Rock Engineering, 0, 3. https://doi.org/10.1007/s00603-018-1561-7

Sainsbury, D, Sainsbury, B & Carroll, D (2018) Back-analysis of PC1 cave propagation and subsidence behaviour at the Cadia East Mine, in Y Potvin & J Jakubec (eds), Proceedings of the Fourth International Symposium on Block and Sublevel Caving, Australian Centre for Geomechanics, Perth, pp. 167-178.

Sainsbury, D. P., Sainsbury, B., Paetzold, H-D. Lourens, P and Vakili, A. (2016) Caving-induced Subsidence Behaviour of Lift 1 at the Palabora Block Cave Mine, in MassMin 2016: Seventh International Conference and Exhibition on Mass Mining, Sydney, 9–11 May. AusIMM.

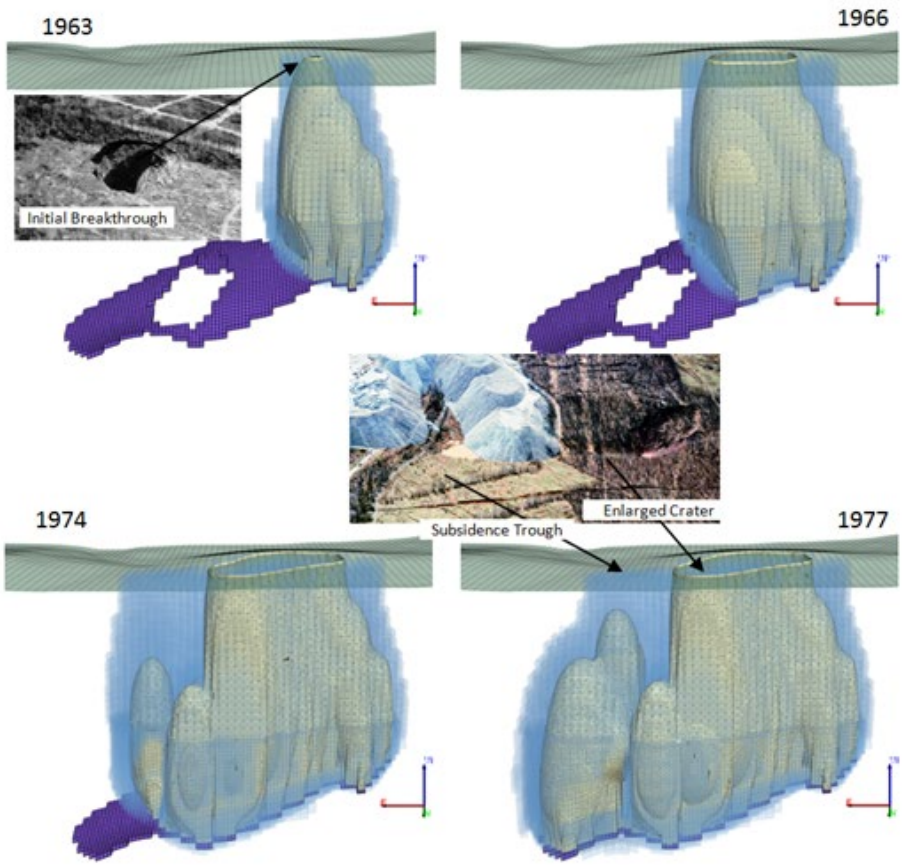
Sainsbury, D. P. and Loring, D. M. (2013) "Analysis of Extraction Level Performance at the Henderson Mine", in Ground Support 2013 (Proceedings, Second Seventh International Symposium on Ground Support in Mining and Underground Construction, Perth, Australia, May 2013). Y. Potvin, Ed. Perth: Australian Centre for Geomechanics.

Sainsbury, B.-A., Stöckel, B.-M., & Stokel, B.-M. (2012). Historical Assessment of Caving Induced Subsidence at the Kiirunavaara Lake Orebody. In H. Schunnesson & E. Nordlund (Eds.), MassMin 2012 conference proceedings 6th International Conference & Exhibition on Mass Mining : June 10-14, 2012, Sudbury, Ontario, Canada. Canadian Institute of Mining, Metallurgy and Petroleum.

Sainsbury, D. P., B. L. Sainsbury, M. P. Board and D. M. Loring. (2011) “Numerical Back-Analysis of Structurally Controlled Cave Initiation and Propagation at the Henderson Mine,” in CD Proceedings, ARMA 45th U.S. Rock Mechanics / Geomechanics Symposium (San Francisco, June 2011), Paper No. ARMA 11-321.

Sainsbury, B. L., D. P. Sainsbury and M. E. Pierce. (2011) “A Historical Review of the Development of Numerical Cave Propagation Simulations,” in Continuum and Distinct Element Modeling in Geomechanics — 2011 (Proceedings, 2nd International FLAC/DEM Symposium, Melbourne, February 2011), Paper 02-01, pp. 23-36. D. Sainsbury et al., Eds. Minneapolis: Itasca International Inc., 2011.

Sainsbury, D. P., B. L. Sainsbury and L. L. Lorig. (2010) Investigation of Caving Induced Subsidence at the Abandoned Grace Mine, Transactions of the Institutions of Mining and Metallurgy, Section A, Mining Technology, 119(3), 151-161



Sainsbury, B., Pierce, M., & Mas Ivars, D. (2008). Analysis of Caving Behaviour Using a Synthetic Rock Mass — Ubiquitous Joint Rock Mass Modelling Technique. SHIRMS.