

Laurie Reemeyer MBA, P.Eng., FAusIMM CP(Met)

Principal Consultant, Resourceful Paths

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EDUCATION

University of California at Berkeley, Haas School of Business, Master of Business Administration (honors), Engineering & Business Sustainability Certificate, May 2010

University of Queensland, Brisbane, Australia, B.E. Hons Class I in Minerals Process, December 1993 (awarded University Medal)

EXPERIENCE

February 2016 – present: **Resourceful Paths.** Vancouver, BC, Canada **Principal Consultant**

- Life-of-mine planning, process development plans and mineralogical analysis for Bluestone Renison tin mine, TAS, Australia
- Confidential (with SysEne) subject matter expert for GHG emissions inventory and decarbonization plan for a nickel laterite operation
- Newcrest Red Chris Process and Tailings Lead, PFS and FS and Concept Study Manager for block cave mine development, associated process plant and tailings modifications for coppergold project in northern BC. QP for NI 43-101 Technical Report. Included contribution to project water balance and studies to install new tailings hydrocyclones, thickener and pipelines to tailings storage facility.
- CEEC Assessment of water use in mining including identifying archetypes of typical operations and development of potential benchmarking database and dashboards
- AusIMM Facilitator for Online Professional Certificate in Tailings Management, Module 6, Social, Environmental and Economic Considerations in Tailings Management
- Fireweed Metals technical advisor on ore sorting, grinding, flotation and concentrate marketing for MacMillan's Pass lead-zinc-silver deposit and development pathways for Mactung tungsten project in Yukon
- Confidential (with SysEne) Strategy for Net-Zero Emissions by 2050 for major gold mining company
- Confidential assessment of recovery of ZrO₂, TiO₂ and REO from mine tailings from a site in North America
- Province of BC (with SysEne) GHG intensity of copper, gold and silver mining globally
- Confidential Independent review of process plant for copper-gold project in South America
- Sedgman assessment of tailings retreatment opportunities in Canada for copper, gold, silver and zinc
- Sedgman technical advisor for New Century Resources zinc tailings retreatment project in North-West Queensland, Australia
- Alloycorp preparation of financial model and marketing and financial sections of NI 43-101 technical report for Kitsault molybdenum project
- Natural Resources Canada review of base metals smelting and refining in Canada and comparator countries to support Canadian Minerals and Metals Plan
- Confidential assessment of tailings thickening and amendment alternatives for a copper-gold mine in BC
- Confidential mill reconciliation for a gold mine in Alaska
- Sedgman Pumpkin Hollow tailings classification, thickening, filtration, tailings dry stack and paste backfill feasibility lead; review of historical metallurgical testwork and process operating cost estimates for copper-gold mine
- Sedgman Copper Mountain process and infrastructure due diligence for copper-gold sulfide project in North-West Queensland, Australia
- Sedgman First Point Nickel process and cost review of Decar nickel project in BC
- Confidential due diligence of processing and tailings management for a lead-zinc-silver mine in Eastern Europe

- Votorantim Metais review and NI-43-101 technical report QP for process, infrastructure and economics for integrated lead-zinc concentrators and zinc smelter in South America to support Nexa Resources IPO
- Confidential review of transport regulations and product stewardship for complex copper concentrates
- Confidential reviewed iron oxide resource recovery and marketing options from synthetic rutile plant residue
- Natural Resources Canada gap analysis and review of water management, recovery and reuse in Canadian base metals and gold mines (with SRK)

Jul 2011 – January 2016: Amec Foster Wheeler. Vancouver, BC, Canada Director Process Strategy, Manager Process Engineering, Study Manager

- Coordinated process personnel across offices in North and South America and key interface
 between Mining and Metals and Environment and Infrastructure divisions
- Lead paste backfill and dewatered tailings business development initiative to complete consulting strategy, technical content and proposals for gold, copper and nickel projects in Canada, USA and New Caledonia.
- Led team of 15 experienced process engineers and designers and recruited and developed technical staff including intermediate engineers
- Marcobre, Mina Justa, Peru: Reviewed seawater use for copper leach-SXEW plant
- Reviewed and wrote process content for NI-43-101 Reserve and Resources technical report including metallurgical test work, production plans, process descriptions, operating and capital costs for multiple global operations for major gold mining company
- Duluth Metals, Twin Metals Minnesota, USA: Review of metallurgical test program, process design criteria, production forecast, equipment size calculations and capital cost estimate for 44,000 t/d copper-nickel concentrator
- Nyrstar, Tennessee Mines, USA: Process lead for PFS of expansion of heavy media separation plant for a zinc concentrator
- Lead multidisciplinary due diligence for Hope Bay underground gold mine in northern Canada including mining, processing, tailings, permitting, site infrastructure, logistics, capital and operating costs, project execution and financial analysis, including site visit.
- Confidential, Canada, 2015: Preparation of NI 43-101 report content for processing test work, recovery methods and costs for two nickel sulphide properties.
- Confidential, Various, 2015: Processing and environmental due diligence on sulphide coppergold properties in South America, Africa, Europe and Asia-Pacific regions.
- Pinto Valley, Capstone, AZ, USA: Process lead for review of site water balance and tailings dewatering and water reclaim alternatives for copper plant expansion.
- Oyu Tolgoi, Mongolia: Managed translation into Mongolian of the feasibility study of the underground expansion of a world-class copper-gold project, for submission to Mongolian government agencies (in country assignment). Managed value engineering and feasibility update for underground block caving mine, concentrator modifications and surface infrastructure.
- New Gold Blackwater, BC, Canada: Lead for PEA. Completed process trade off studies and interaction between processing options and waste disposal concepts. Coordinated financial assessment and preparation of study engineering report and NI 43-101 Technical Report. Aligned PEA with environmental assessment.
- Led sustainability in minerals processing initiative. Presented on the interaction between minerals processing and water and tailings management, climate change mitigation and resource recovery to offices in North America and Australia.

Jun 2010 – June 2011: Independent Consultant

Vancouver, Canada/Bay Area, CA, Salt Lake City UT, USA

- Consultant Kennecott Utah Copper flotation plant expansion, analysis of plant trial data, metallurgical predictions and financial model input. Coordinated design reviews to determine most efficient plant configuration, and supported preparation of successful technical review and Board capital expenditure application.
- Study Manager Izok Project, MMG. Client liaison with engineering and environmental consultancy. Reviewed metallurgical test work and plant design, facilitated design reviews, completed economic model, coordinated tailings, acid rock drainage and water management strategies, reviewed and signed off PFS report.

Summer 2009: Aurora Biofuels - Biofuels startup (funding \$25m). Alameda, CA, USA MBA Intern – Business Development Consultant

• Delivered report assessing quality, markets, pricing, process design, value improvement opportunities for biofuel co-products. Evaluated potential CO₂ sources for algae farms.

2006-2008: **OZ Minerals, formerly Zinifex -** *mining (revenues \$2bn pa).* Melbourne, Australia **Principal Development Advisor**

- Due diligence on multiple Cu, Pb, Zn, Au, Ag and Ni properties in Australia, Europe and Americas, both through desktop studies and site visits.
- Co-authored and presented copper diversification strategy to Board of Directors.
- Led Izok Cu-Pb-Zn-Ag PFS study in Canada and Dugald River Pb-Zn-Ag FS study in Australia. Economic modeling, planning test programs and selecting water & tailings disposal option.
- Karumba, Australia: Coordinated a shipping contract transition and restored management controls and reporting at a port site.

2001-2006: Zinifex (formerly Pasminco) Century Mine. NW Queensland, Australia Manager Metallurgy, Technical Superintendent

- Managed world's 2nd largest zinc concentrator. Responsible for plant, tailings dam & pipeline operations; maintenance; technical & laboratory services; safety, environment.
- Wrote capital expenditure request and oversaw installation and commissioning of Jameson cleaning cell in preflotation circuit to reduce zinc recovery losses by 1%
- Coordinated delivery of water from Karumba port to Aboriginal landholders by adjusting water balance at Century mine and concentrator, planning concentrate pipeline dispatches and tracking water conductivity. Specifications and deliveries achieved.
- Implemented capital, process control and operating improvements to reduce variability and overcome plant bottlenecks, increasing plant capacity by 7%.
- Wrote and managed \$100m + cost budget and cost reporting improvements.
- Built variance database reporting system to troubleshoot and prioritize research projects.
- Modeled and optimized product quality to main smelter customer, saving \$3m pa.
- Prepared \$9m capital expenditure applications and supported commissioning of flotation feed screen, 200 m³ flotation tank cell, additional regrind mills to support plant ramp up

1999-2001: Technical Superintendent, Pasminco Elura Mine. Cobar, NSW, Australia

- Developed and implemented technical plan to increase lead and zinc recovery, by optimizing regrinding circuits and reagent scheme, and reducing plant variation.
- Implemented laboratory quality control, productivity and data management program.

1994-1999: **Mount Isa Mines Ltd** – *mining (revenues \$1bn pa).* Mt Isa, Qld, Australia **Process Metallurgist, Graduate Metallurgist**

- Implemented different grinding circuit configurations in copper concentrator to minimize power and media costs and maintain recovery at varying throughput rates.
- Determined optimum concentrate grade targets to increase annual profit by >\$5M while producing concentrate for export in excess of copper smelter capacity
- Investigated >20,000 oz of unaccounted gold losses in copper smelter and refinery due to handling losses and suspected electronic scrap assay fraud. Supervised recovery of \$2m worth of gold and copper bearing materials from old materials handling sites
- Modeled smelter heavy metal emissions, fan requirements for copper smelter gas handling system and investigated options for arsenic capture and fixation.

ADDITIONAL INFORMATION

Professional:

- CIM Diversity and Inclusion Advisory Committee, 2022 -
- TAILENG Short Course Presenter (Ore Processing & Tailings Generation) and Panelist 2022, 2023
- GMPA: Global Action on Tailings Lead 2020 -
- CIM Vancouver Co-Chair 2021 -

- AusIMM: Community and Environment Society Committee 2017 2019; Sustainability Committee 2011 – 2013; Chairman, Nth Qld Branch 2004 - 2006; Mill Operators Conference Secretary, 2003
- SAG and HPGR Conference Committee 2014-2015, 2017 2019, 2021 -.
- Energy Career Coach, Berkeley-Haas, 2009-2010.
- Outokumpu Travel Grant, lead-zinc mines, smelters and refineries in Europe, 2001.

Selected Publications and Presentations

- MetPlant2023: Panelist Water Management Boundaries and Context
- Moderator: 2SLGBTQI+ in Mining the journey so far and the road ahead, panel discussion, CIM Convention, Montreal, QC, May 2023
- Heavy Metal: Earth's Minerals and the Future of Sustainable Societies, Processing innovations, recovery, recycling and the circular economy, Guest Lecture, UBC, 15th Mar 2023
- Making mining more welcoming to young professionals: Reflections from my career to date. Presentation at CIM Convention, Vancouver, BC, May 2022
- Chapter 3, Mineral and Tailings Processing, Tailings Management Handbook: A Life-Cycle Approach, Kimberly Finke Morrison (Ed), SME, Englewood, CO, USA, 2022
- Effect of deposit types, mine development & industry structure on primary lead and zinc economics in Australia, North America and Europe, PbZn 2020 Symposium, TMS, San Diego, CA, USA, Feb 2020
- The Role of Scrap Recycling in the USA for the Circular Economy: A Case Study of Copper Scrap Recycling, REWAS2019 Symposium, TMS, San Antonio, TX, USA, Mar 2019 (with P.J. Mackey and N. Cardona).
- Going Coarser: Is it Worth it?, COM2019, Vancouver, BC, Canada, Aug 2019
- Letting the Tail Wag the Dog: How the Need for Improved Tailings Management can be Integrated into Process Design, AMEA Annual Meeting, Spokane, WA, USA, Dec 2018
- Risks and Opportunities for Australian Mining from the Transition to a Net-Zero Carbon Economy, AusIMM Webinar, Dec 2018
- ARENA Handbook: Hybrid power for Australian off-grid mines, June 2018, contributor
- Session co-chair, Circular Economy and Mining, and presenter "Mining and Metals Industry Structure and Interaction with the Circular Economy", SME Annual Conference, Minneapolis, MN, USA, 2018
- Session Moderator, The Evolution of Data-Driven Mine Energy Strategies, Energy and Mines World Congress, Toronto, ON, Canada, 2017
- Integrated Mining and Processing Systems Design for Eco-Efficiency, Presentation to Conference of Metallurgists, Vancouver, BC, Canada, Aug 2017
- B. Sprecher, L. Reemeyer, K. Kuipers, T. Graedel, Black Swan Implications for Minor Metals, ISIE-ISSST 2017: Science in Support of Sustainable and Resilient Communities, July 2017
- A Perspective on Water and Mining, Barrick Beyond Borders, 2016, <u>http://barrickbeyondborders.com/environment/2016/10/a-perspective-on-water-and-mining/</u>
- Cheaper Inputs, Lower Emissions How Can Researchers Contribute to More Sustainable Mining?, JKMRC, Brisbane, Qld, Australia, 2015
- Reviewer, Metallurgical Plant Design, Chapter 8: Sustainability in Plant Design, Edited by Rob Boom, Chris Twigge-Molecey, Frank Wheeler, John Young, CIM, 2014
- AusIMM Australasian Mining and Metallurgical Operating Practices, Chapter 3 Environmental Technologies and Strategies: Developments in Acid Mine Drainage Prevention and Treatment, 2013
- Contributing author, Global Water Intelligence, Water for Mining report, 2011
- M Gao, L Reemeyer, D P Obeng and R Holmes, Efficiency of the Detritor Mills at Zinifex Century Mine, AusIMM 9th Mill Operators Conference, Fremantle, W.A., Australia, 2007
- Z Pokrajcic, G J Harbort, V Lawson and L Reemeyer, Applications of the Jameson Cell at the Head of Base Metal Flotation Circuits, AusIMM Centenary of Flotation Symposium, Brisbane, Qld, Australia, 2005
- F Burgess, L Reemeyer, M Spagnolo, M Ashley and D Brennan, Ramp Up of the Pasminco Century Concentrator to 500 000 tpa Zinc Metal Production in Concentrate, AusIMM 8th Mill Operators Conference, Townsville, Qld, Australia, 2003