



ALAN BAX
Principal Consultant

B. App. Sc (Extractive Metallurgy) WA School of Mines, 1983
Grad Dip (Extractive Metallurgy) WA School of Mines, 1983

Member AusIMM
Member SME
Member MICA
Chartered Professional (Metallurgy)

**CAREER
SUMMARY:**

28 years of experience in the mining industry working on a variety of projects both in Australia and overseas. This experience includes:

- 10 years in plant operations including 6 years as Mill Superintendent working in gold operations ranging from 200,000 tpa - 6 Mtpa.
- 18 years in consulting engineering in gold, PGM, copper, silver, nickel and spodumene.

KEY COMPETENCIES:

**Metallurgical
Testwork Design /
Interpretation**

- Comminution
- Flash flotation
- Gravity concentration
- Gold and PGM processing
- Cyanide detoxification
- Heavy Metals Precipitation from Tailings (Arsenic and mercury)
- Flotation
- Process simulation
- Mass balancing/data reconciliation

Process Design

- Comminution
- Gravity concentration
- Gold processing
- Cyanide Detoxification
- Heavy Metals Precipitation from Tailings (Arsenic and mercury)
- Flotation
- Bacterial oxidation

Studies

- Comminution
- Free milling and refractory gold processing
- Gold and PGM flotation
- Gold bacterial oxidation
- PGM Hydrometallurgy

**Operations,
Commissioning,
and Management**

- Heap leaching
- CIP / CIL
- SAG milling
- Gravity concentration
- Flotation



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PROCESS DESIGN AND CONSULTING EXPERIENCE:

Chapada CIL Project, Brazil – Pöyry Management Consulting Pty Ltd

Consultant, 2011-2012

Process engineering services for definitive feasibility study.

Roseby Copper Project, Queensland – Altona Mining Limited

Consultant, 2010-present

Process engineering services for definitive feasibility study.

P420D Project - AMIRA

Consultant, 2009-present

Development of testwork and simulation methods for leaching flash flotation, gravity gold recovery and leaching.

Plant surveys, training workshops and audits for sponsors of the P420D Project:

- Newmont Mining Corporation, Yanacocha Gold Mine, Peru
- Kalgoorlie Consolidated Gold Mines, Fimiston, Australia
- Newcrest Mining Ltd, Telfer Gold Mine, Australia
- Newcrest Mining Ltd, Cadia Valley Operations, Australia
- Newmont Mining Corporation, Ahafo Gold Mine, Ghana
- AngloGold Brasil Mineração, Cuiabá Gold Project, Brazil
- Cerro Vanguardia SA, Cerro Vanguardia Project, Argentina
- Barrick Gold, Darlot Gold Mine, Australia
- AngloGold Ashanti, Geita Gold Mine, Ghana
- Newmont Asia Pacific, Jundee Gold Mine, Australia
- Barrick Gold, Kanowna Belle Gold Mine, Australia
- AngloGold Ashanti, Minera Serra Grande, Brazil
- Newmont Mining Corporation, Phoenix Project, USA
- Gold Fields, St Ives Gold Mine, Australia

Cowal Gold Mine, New South Wales - Barrick

Consultant, 2009

Gravity circuit mass balance, modelling and optimisation.

Coburn Mineral Sands, Western Australia - Gunson Resources Ltd

Client Representative, 2009

Review of tenders for project engineering services.

Tanami Gold Mine, Northern Territory – Newmont Asia Pacific

Consultant, 2009

Gravity circuit modelling and optimisation.

Darlot Gold Mine, Western Australia - Barrick

Consultant, 2009

Gravity circuit mass balance, modelling and optimisation.

Leichhardt Operation, Queensland - Matrix Metals Ltd

Consultant, 2008

Project Audit.



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- Roseby Copper Project, Queensland - Universal Resources Ltd** *Consultant, 2008-2009*
Definitive Feasibility Study audit and process engineering services.
- Mt Lyell Mine, Tasmania - Copper Mines of Tasmania** *Consultant, 2008*
BILCO Training Course, Metallurgical accounting and mass balancing.
- Maitland Copper Project, Queensland - Glengarry Resources Ltd** *Consultant, 2008*
Operating cost review.
- P420C Project - AMIRA** *Consultant, 2004-2008*
Development of testwork and simulation methods for gold leaching, adsorption, flash flotation and gravity recovery.
- Ashanti South Gold Project - Adamus Resources Pty Ltd** *Consultant, 2006-2008*
Testwork program design and interpretation of testwork results for feasibility study.
- Panton Platinum Palladium Project, Western Australia - Platinum Australia** *Client Representative, 2008*
Bankable Feasibility Study Update.
- Granites Gold Mine, Northern Territory - Newmont Asia Pacific** *Consultant, 2007*
Gravity circuit modelling and optimisation.
- Radio Hill Nickel Project, Western Australia - Fox Resources Ltd** *Consultant, 2007*
Milling circuit audit, simulation and optimisation.
- Coyote Gold Project, Western Australia - Tanami Gold N.L.** *Consultant, 2006-2007*
Metallurgical audit and process engineering services for feasibility study.
- Coburn Mineral Sands, Western Australia - Gunson Resources Ltd** *Consultant, 2006*
Operating cost review.
- Phillips River Gold Project, Western Australia - Tectonic Resources NL** *Consultant, 2006*
Feasibility Study Audit.
- Masbate Gold Project, Philippines - Filminera Resources Corporation** *Consultant, 2006*
Provision of process engineering services.
- Guelb Moghrein Copper/Gold Project - Mauritanian Copper Mines** *Lead Process Engineer, 2003-2004*
Process engineering for a 2.0 Mtpa copper/gold flotation plant.
- Panton Platinum Palladium Project, Western Australia - Platinum Australia** *Lead Process Engineer, 2001-2003*
Bankable Feasibility Study examining PGM flotation and development of patented PGM recovery process.
- Target Gold Project, South Africa - Avgold** *Principal Process Engineer / Design Manager, 2000-2001*
1.25 Mtpa project.
- Marvel Loch Operations, Western Australia - Sons of Gwalia** *Lead Process Engineer / Study Manager, 2000*
Investigation of upgrading of the treatment plant from 2Mtpa to 3Mtpa including JKSimMet modelling and simulation of the existing and upgraded grinding circuits.



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McCoy Cove BIOX[®], Nevada, USA - Goldfields Ltd

Study Manager / Lead Process Engineer, 1999

Engineering and cost study for a heap leach and stirred tank bacterial oxidation gold project in Nevada.

Boddington Wandoo Project, Western Australia - Boddington Gold Mine

Lead Process Engineer, 1999

Detailed study to assess cyanide detoxification processes associated with a major upgrade project to process basement ore at the existing mine.

Kalgoorlie Consolidated Gold Mines, Western Australia

Lead Process Engineer, 1999

Investigation of processing options for the treatment of sulphide concentrates, covering bacterial oxidation, pressure oxidation, roasting (with and without off-gas treatment) and alkaline leach pressure oxidation.

Sunrise Dam, Western Australia - Acacia Resources

Lead Process Engineer, 1999

Investigation of processing options for the treatment of refractory ore covering bacterial oxidation, pressure oxidation, roasting (with and without off-gas treatment) and alkaline leach pressure oxidation.

Maud Creek, Northern Territory

Lead Process Engineer, 1999

Engineering and cost study examining whole ore cyanidation and BIOX[®] concentrate treatment for a 300,000 tpa plant.

Fosterville Gold-Sulphide Project, Victoria

Design Manager / Process Engineer, 1998

Detailed project definition phase of the 500,000 tpa project based on Gencor's BIOX[®] technology.

Mt Keith, Western Australia

Process Engineer, 1998

Preliminary project scope and cost estimate to increase plant throughput from 10.5 Mtpa to 12.0 Mtpa.

Lefroy Gold Plant, Western Australia - St Ives Gold

Lead Process Engineer, 1997

5.0 Mtpa CIL project expandable to 7.0 Mtpa. (Project deferred by client due to decreased gold price.)

Greenbushes Lithium, Western Australia

Study Manager, 1996

Examination of expansion options at the existing plant.

Gunung Pongkor, Indonesia

Senior Process Engineer, 1996

1200 tpd plant expansion.

Verde Gold Project, Chile

Project Engineer, 1996

10 Mtpa crushing plant and heap leach project at an elevation of 4500m. Responsibilities included co-ordination of discipline engineering, detail design, procurement, fabrication and shipping. Also involved in client liaison, maintenance of schedule and cost control.

Andacollo Gold Project, Chile

Commissioning Manager, 1995

Responsible for the supervision and coordination of plant commissioning for the carbon adsorption, elution and regeneration circuits for Compañía Minera Dayton's 8 Mtpa heap leach project.

Vivien Gold Project, Western Australia

Study Manager / Process Engineer, 1995

Various studies evaluating the relocation and upgrading of existing treatment plants.

Lynas Find Gold Project, Western Australia

Senior Process Engineer, 1994 - 1995

Client representative for the engineering, design and commissioning of the 500,000 tpa SAG mill and CIL circuit in the Pilbara region.



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OPERATIONS EXPERIENCE

Kaltails Project - Posgold

Contract Metallurgist, 1994

6 Mtpa tailings reclamation and treatment plant.

Salsigne Project - Eltin Minerals Ltd, France

Mill Superintendent, 1992-1993

Reporting to the General Manager and Resident Manager on treatment plant operation and responsible for supervising the recommissioning and operation of an existing plant. Included the training of French supervisors and operating personnel, co-ordination and optimisation of plant using plant trials and laboratory testwork results, producing budgets, flowsheet review for the new treatment plant, and liaising with construction and engineering personnel to facilitate recuperation of equipment from existing plant for installation in the new plant.

Three Mile Hill Project - Goldfan Ltd

Mill Superintendent, 1989-1992

Development of project budgets for feasibility study, review of flowsheet development and equipment selection for the project, supervision of site during plant construction, negotiation of power supply and reagent supply contracts.

These duties were in conjunction with the normal aspects specific to treatment plant operations such as production of operating cost budgets, setting production and maintenance targets to ensure forecasts are achieved. Developed security and accounting procedures for bullion production and shipping, developing suitable safety and operating procedures, recruitment, training and supervision of staff, and overall supervision of maintenance and stores control.

Gabanintha Gold Mine - Dominion Mining

Mill Superintendent, 1988-1989

Maintaining budgeted throughput, recovering and treatment costs, producing and updating operating and capital budgets. Liaison with Mine Superintendent to control mill feed grade and ore suitability for SAG mill feed, co-ordination of major plant maintenance shutdowns, optimisation of CIP plant performance and treatment costs and metallurgical accounting.

Pajingo Gold Mine - Battle Mountain (Aust) Inc

Plant Metallurgist, 1987-1988

Conducting testwork prior to commissioning to confirm initial operating parameters, establishing sampling procedures for metallurgical accounting and process monitoring, assisting with all stages of the plant commissioning and performance trials and carrying out testwork to monitor and optimise plant performance.

Gimlet South Project- BHP Ora Banda

Plant Metallurgist, 1985-1987

Duties which covered ensuring optimum throughput and recovery for the CIP plant; producing and updating budget figures for ore treatment plant, supervision of laboratory staff; planning and co-ordination of pilot heap leach project, liaison with engineers and geologists to maintain ore grade and throughput and ordering and maintaining supply of consumable reagents and spares for the ore treatment plant.

AMIRA Project- Murdoch University

Graduate Research Assistant 1984-1985

Carbon fouling in CIP gold technology, conducting testwork into kinetic tests for the determination of carbon activity, evaluation of carbon deactivation caused by various reagents, comparison of carbon elution procedures with respect to carbon activity and reactivation of activated carbon with regard to CIP process technology.

Whim Creek - Whim Creek Consolidated NL

Plant Metallurgist, 1984

Maintenance of satisfactory production levels for all sections of the CIP and heap leach plants, co-ordination of maintenance of laboratory services and analytical equipment, supervision of research and development into carbon activity and regeneration and metallurgical accounting.



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CAREER HISTORY:

Dates	Employer	Position	Activity
2001 - 2012	Ozmet	Director / Principal Consultant	Process development, process audit, design and operation of various projects.
1995 - 2001	Signet Engineering Pty Ltd	Principal Process Engineer	Process development, design and operation of various projects.
1994 - 1995	Ozmet	Director / Principal Consultant	Produced operating budgets for feasibility studies, flowsheet review and development, equipment selection, tender and construction contract reviews, construction supervision, commissioning and optimisation of various types of mills, metallurgical accounting, staff recruiting, custom milling and joint venture metallurgical supervision and technical audits.
1992 - 1993	Eltin Minerals Ltd, France	Mill Superintendent	Supervising recommissioning and operation of an existing plant for the Salsigne Project.
1989 - 1992	Goldfan Ltd	Mill Superintendent	Development of project budgets, flowsheet development and equipment selection for feasibility study for the Three Mile Hill Project.
1988 – 1989	Dominion Mining	Mill Superintendent	Maintaining budgeted throughput, recovery and treatment costs.
1987 – 1988	Battle Mountain (Aust) Inc	Plant Metallurgist	Monitoring and optimising of plant performance at Pajingo Gold Mine.
1985 – 1987	BHP, Ora Banda	Plant Metallurgist	Ensuring optimum throughput and recovering for the CIP plant.
1984 – 1985	Murdoch University AMIRA Project	Graduate Research Assistant	Testwork development and evaluation
1984	Whim Creek Consolidated	Plant Metallurgist	Responsible for maintaining satisfactory production levels.

PUBLICATIONS:

'Fouling of Activated Carbon by Circuit Organics', S.R. LaBrooy, A.R. Bax, D. Muir, J. Hosking, H Hughes, & A. Parentich

'Gold Ore Treatment by Goldfan Ltd at Three Mile Hill, Coolgardie, W.A.', Alan R. Bax & Ann C. Bax, Australasian Mining and Metallurgy, Monograph 19, 1992

'Modelling the Effect of Gravity Gold Recovery on Leaching Performance', W.P. Staunton and A.R. Bax, Gravity Gold 2010, AusIMM, Ballarat, 2010, 155-158

'Optimising Circuit Design for Gravity Gold Recovery', W.P. Staunton and A.R. Bax, World Gold 2011, 229-240

PATENTS:

Recovery of platinum group metals, Alan Bax, Grenvil Marquis Dunn, John Derek Lewins, United States Patent 7,544,231, June 9, 2009

Process for extracting platinum group metals, John Derek Lewins, Alan Bax, United States Patent 7,282,080, October 16, 2007