**Andrew Waltho**

**B.App.Sc. (Hons), FAIG, RPGeo, FAusIMM, FGS, Professional Member SME, GAICD**

**Committed to discovery, maximising resource value and building team capability through professional geoscientific practice.**

**Turning observations and ideas into innovative, sustainable solutions and improvement opportunities for both exploration projects and operating mines.**

**Focussed on identification and management of technical risks facing all levels of exploration and mining projects.**

**Strengths**: Innovator, ethical, enquiring, diligent, strong communication skills.

**Values**: learning, teamwork, team building, trust, respect.

## About Me

I am a career geoscientist with almost 40-years of professional experience in exploration and mining geoscience, spanning multiple commodities, deposit styles, and settings. Married with adult children. Involved in community activities. Australian Institute of Geoscientists board member and past President, current member of the Institute’s, Complaints, Publications and Legal committees.

Career highlights have included deep involvement in the development of the Century zinc-lead mine in northwest Queensland, extending from early exploration through all stages of feasibility to commissioning and the initial years of production. This provided valuable experience in understanding the scope and detail of geological information required by other professionals to successfully develop a major mining project. Century also provided in-depth exposure to advanced geostatistical methods in resource evaluation through working closely with CRA and Rio Tinto specialists, in addition to Andre Journel and Harry Parker who were willing and considerate mentors. The project also set a standard for indigenous employment, inclusion and diversity amongst Australian mining operations. Other highlights included participation in feasibility studies for the Dugald River zinc project, the Jadar lithium-borate project in Serbia, evaluation of an advanced potash project in Canada, and due diligence reviews for multiple projects spanning a broad suite of commodities, including gold, base metals, uranium, lithium, potash and industrial minerals including mineral sands, both in Australia and overseas.

I have completed a number of innovation and operational improvement projects for mines, including implementation of geophysical grade and product quality prediction for coal, iron ore and base metals mines, data management and analysis initiatives, and improvements in the collection and use of other geological data. I was also commissioned to complete a baseline study of geological and engineering competence as part of the JORC Code update in 2022.

Early collection of basic environmental characterisation, geotechnical and groundwater information has been a key element of my work, with failure to do this repeatedly revealed as a source of unnecessary re-work, delays and avoidable uncertainty in mining projects.

Understanding the complex relationships between geological structure and mineral distribution, and between grade, mineralogy, texture and mineral recovery have been major areas of focus in my work.

In recent years, I have been deeply involved in project generation, exploration, resource and economic assessment of battery metals and commodities for which demand could develop due to the adoption of new technologies, particularly in but not confined to energy storage.

I have also worked on the alignment of exploration and mining projects with the U.N. sustainable development goals and their application at each stage of project development, from exploration to closure. This has encompassed both policy development and implementation of practical measures.

My career in resource evaluation, advanced projects, seeing projects through feasibility to production and optimising existing mining operations has fostered a keen interest in identifying, quantifying and managing geological and resource risk. This has led to an interest in exploration and resource evaluation technology, with a focus on adapting and sharing appropriate technologies across geological disciplines. Technology needs to facilitate high-quality and productive work, as distinct from providing a crutch used to excuse ineffective practices.

I am committed to resource stewardship, especially its potential to raise the profile of the geoscience and mining professions, engender community support for resource industries and attract talented graduates to exploration and mining as a career, which is arguably the most significant threat facing our profession globally. I also participate in AIG’s early career geoscientist mentoring program and worked with colleagues to establish the Institute’s highly successful student bursary program. I am committed to continued professional development to maintain and further develop my skills, particularly in promising, emerging techniques and technologies.

I have more than 23 years of board experience with both companies and not-for-profit organisations in Australia. I have completed both the Australian Institute of Company Directors Foundations of Directorship course and the highly regarded Company Directors’ course.

Career objectives include inspiring teams to collect and interpret data to sustainably deliver projects, maximise the value of mineral resources for all stakeholders, effective communication of geological knowledge to professionals working in related disciplines, and encouraging peers and colleagues to openly share ideas and experiences for the benefit of others.

Outside work, I have enjoyed my role as President and a board member of the Australian Institute of Geoscientists which has involved leading the Institute through very challenging times, modernising the Institute and ensuring that a clear value proposition exists for its membership. I am a keen landscape, portrait and wildlife photographer, enjoy mountain bike riding, travelling with my family and reading for relaxation.

## Memberships

Australian Institute of Geoscientists: Fellow, Registered Professional Geoscientist, Past-President, Director (FAIG, RPGeo).

Australasian Institute of Mining and Metallurgy: Fellow (FAusIMM)

Geological Society of London: Fellow (FGS)

Institute of Materials, Minerals and Mining (IOM3): Professional Member (MIMMM)

Society for Mining, Metallurgy and Exploration: Professional Member

American Geophysical Union: Member

Australian Institute of Company Directors: Member (MAICD)

**Recent Professional Development**

**2021: Australian Institute of Company Directors**

 Company Directors Course. Successfully completed the course and assessments leading to Graduate Membership of the Institute (GAICD)

**2018**: **Columbia University Natural Resources Governance Institute**

 Natural Resources for Sustainable Development – a 12 week on-line course comprising lectures, reading, exercises and an assessment offered by the NRGI and World Bank. Completed with Distinction.

**2017**: **Australian Institute of Company Directors**

 Foundations of Directorship Course.

*I undertake a minimum of 50 hours per year (averaged over three years) of recognised continued professional development to meet AIG RPGeo and AICD membership requirements.*

## Professional Experience

**Australian Dental Association (Queensland)** (Nov 2021 - ).

*Non-Executive (Skills Based) Director (honorary position). The Australian Dental Association (Queensland) is the peak professional membership body for dentists, dental technologists, and assistants in Queensland and part of a national association. My role is to bring professional ethics and astute governance experience to the association’s board, distanced from the technical aspects of the profession.*

**Andrew Waltho Consulting Pty Ltd** (July 2021 - ).

*Managing Director and Principal Geoscientist of my consulting and geoscientific services practice.*

**Rio Tinto Exploration**: Director and Chief Geoscientist, Energy, Diamonds and Minerals (Jun 2012 – May 2021).

*Leading a small team focussed on identification of new exploration, resource development and commercial opportunities spanning a wide range of commodities and deposit styles, including lithium and other commodities used in battery fabrication, potash, mineral sands and metals used in new technology applications and specialist metal alloys, including rare earths. Responsibilities extended to energy minerals including both metallurgical and thermal coal and uranium, and diamonds. The team provided specialist technical support to both Rio Tinto Exploration project teams, Rio Tinto business and corporate strategy development, studies, due diligence reviews for both divestments and acquisitions, technical reviews and operations spanning several product groups. Director of the Australian Rio Tinto Exploration subsidiary company.*

**Rio Tinto Exploration**: Principal Geologist – Coal and Energy (Dec 2007 – Jun 2012).

*Identification of new business opportunities in both thermal and metallurgical coal and uranium, due diligence for acquisition opportunities and providing specialist support for both exploration teams and mining operations.*

**Golder Associates**: Principal Consultant Geologist (Jun 2003 – Dec 2007). *Consulting projects spanning exploration and mining assignments, both technical and commercial, globally. Commodities covered by this work included copper, gold, nickel, base metals and thermal coal. This work included developing new applications of geophysical logging for structural data collection and assessment of physical properties to better understand mineralisation beneficiation characteristics. Exploration and resource geology business development.*

**Hatch Associates**: Principal Geologist (Oct 2001 – Jun 2003). *Exploration and mining geology consulting for coal, iron ore, copper, gold and uranium projects, both in Australia and internationally.*

**Pasminco**: Manager Geology, Mining Division (Mar 1999 – Oct 2001). *Responsible for feasibility studies, geological practices, resource estimation and reporting and geological staff professional development for all Pasminco’s zinc-lead-silver-copper operations in Australia and USA.*

**Independent Geoscience Consultant** (Feb 1998 – Mar 1999). *Project work for multiple clients in both exploration and mining. Development of geophysical grade control equipment and procedures, and production reconciliation systems for Pasminco Limited’s Century zinc mine, Queensland.*

**Mining and Resource Technology**: Principal Consultant (1996-1999). *Resource assessment and evaluation,* *mining grade control and technical improvement, due diligence, data quality assurance and audits for a range of deposit styles and commodities including gold, base metals and industrial minerals.*

**Century Zinc**: Manager Mining Services (1994-1996). *Management of the mine geology, survey and long-term mine planning teams during completion of the project’s definitive feasibility study, development of operations support systems, management of the mining contractor during the latter months of this position.*

**CRA Exploration**: Project Geologist (1987-1994). *Managed CRA’s eastern Australian technical computing systems 1987-1990, overseeing the transition from networked VAX/VMS terminal systems to networked personal computers and migration of technical and commercial systems, gold exploration in central Victoria, assisting with resource evaluation and project review and divestment. From January 1991, took up the role of Project Geologist Century Zinc project, responsible for planning and execution of resource evaluation drilling, geological interpretation, resource estimation and collection of other data required to support conceptual and feasibility studies. This work included the development of innovative techniques to collect structural, bulk density and other geophysical data used to describe mineralisation characteristics able to be used in both resource estimation, production grade control and blast design.*

**University of Technology, Sydney**:Senior Tutor in Applied Geology (1983-1987). *First year and engineering geology teaching, assisting delivery of the university’s structural geology, igneous and metamorphic petrology, exploration geophysics courses, Honours student supervision.*

**Shell Company of Australia Ltd**: Field Assistant (1991). *Field support, Galilee and Surat Basin exploration programs, land access permitting and management*.

**Carpentaria Exploration** **Pty Ltd**: Field Assistant (1990). *Surveying and drilling support for gold exploration in southern NSW and Victoria.*

## Career Highlights

* Innovative use of downhole geophysical logging to collect lithological, quantitative bulk density and structural data, coupled with the development of software for real-time integration of this data in geological models to improve recognition of faults and provide detailed knowledge of mineralisation continuity.
* Recognition of the transgressive character of stratabound Zn-Pb mineralisation at Century, challenging the application of conventional SEDEX models for shale-hosted base metal mineralisation development and distribution.
* Use of conditional simulation to quantitatively assess resource uncertainty and optimise infill drilling and quantify inherent resource uncertainty.
* Modernisation of resource evaluation practices at mines producing a range of commodities.
* Participation in the safe delivery of major resource development projects through the development of positive, personal attitudes to safety amongst the project team.
* Development of high-performing, diverse mine technical services (geology, survey and mining engineering) teams.
* Application of downhole geophysics for mapping geological structure and geotechnical characteristics.
* development of a geophysical grade control system for the Century zinc mine based on natural gamma and magnetic susceptibility data using equipment designed and manufactured in partnership with Auslog Pty Ltd (acquired by Weatherford).
* demonstration of potential iron ore beneficiation characteristics based on lump-fine ore discrimination and beneficiation potential using downhole geophysical logging data.
* development of a geophysical coal quality prediction system for thermal coal operations.
* assessing, monitoring and effectively managing asbestos exposure risks during drilling and sampling of iron ore.
* 23 years management and board level experience with both not-for-profit organisations and Australian companies.
* Recipient of the Australian Institute of Geoscientists Service Medal, 2021.

## Selected Publications

Ward, C.R., Comino, J. and **Waltho, A.E**., 1984. A system for a standardised description of drill cores in coal bearing strata. Coal Journal 8, 35-54.

Ward, C.R. and **Waltho, A.E.**,1986. Use of field portable personal computers in sedimentological description of drill cores, Abstracts, International Sedimentological Congress, Canberra, p 319.

Basden, Helena, Franklin, Brenda, Marshall, Brian & **Waltho, Andrew**., 1987. Terranes of the Tumut district, southeastern New South Wales, Australia in Eds. Evan C. Leitch and Erwin Scheibner, Terrane Accretion and Orogenic Belts vol 19. American Geophysical Union, Washington D.C. 0.1029/GD019p0057.

McKern, Bruce and **Waltho, Andrew**, 1988. `Australia', in Eds. McKern, B. and Koomsup, P. Minerals Processing in the Industrialisation of ASEAN and Australia, Allen and Unwin, Sydney.

Ward, Colin and **Waltho, Andrew**., 1988. A BASIC program for in-field entry of lithologic descriptions in borehole logs to a hand-held portable computer system. Computers & Geosciences. 14. 83-97. 10.1016/0098-3004(88)90053-2.

**Waltho, Andrew** and Andrews, Steven J., 1993. The Century zinc-lead deposit, northwest Queensland, In: Proceedings of the Australasian Institute of Mining and Metallurgy; Centenary Conference. Eds. Ware, C., Knight, W. Australasian Institute of Mining and Metallurgy, Melbourne: 41-61. P199302037.

**Waltho, A.E.**, Allnutt S.L. and Radojkovic A.M., 1993. Geology of the Century zinc deposit, northwest Queensland. Proceedings, World Zinc 93. Australasian Institute of Mining and Metallurgy, Melbourne: 111-129. P199307028

Broadbent, Graeme C. and **Waltho, Andrew E.**,1998. Century zinc-lead-silver deposit. In: Geology of Australia and Papua New Guinean Mineral Deposits, Eds: D A Berkman and D H Mackenzie. Australasian Institute of Mining and Metallurgy, Melbourne: 729-736.

Lipton, I.T., Shaw, W.J. and **Waltho, A.E.**, 1999. Characterisation of ore types and beneficiation behaviour using normative minerals. Proceedings PACRIM 99. Australasian Institute of Mining and Metallurgy, Melbourne: 427-433. P199904046.

**Waltho, A.E.**, Leevers P.J. and Solly, G., 2003. Proceedings, 5th International Mining Geology Conference. Australasian Institute of Mining and Metallurgy, Melbourne: 359-364. P200308039.

**Waltho, Andrew**, 2004. Managing the transition from exploration feasibility and project development. AusIMM New Zealand Branch Conference Proceedings, Australasian Institute of Mining and Metallurgy, Melbourne: P200409028

**Waltho, Andrew**, 2014. The Ethics Column: On-line Survival (the Dog Ate My Homework). Australian Institute of Geoscientists, 1 Jun 2014. <https://bit.ly/3xriE8a>, accessed 19 Jun 2021.

**Waltho, Andrew,** 2014. The Ethics Column: Professionalism Cannot be Turned On and Off. Australian Institute of Geoscientists, 22 Jun 2014. <https://bit.ly/3cSN2Ag>, accessed 19 Jun 2021.

**Waltho, Andrew**, 2014. The Ethics Column: “I Want to Make a Complaint”. Australian Institute of Geoscientists, 28 Aug 2014. <https://bit.ly/3cWx1cF>, accessed 19 Jun 2021.

**Waltho, Andrew,** 2015.The Ethics Column: What sort of complaints does AIG deal with regarding members’ conduct? Australian Institute of Geoscientists, 11 May 2015. <https://bit.ly/3gKTM4D>, accessed 19 Jun 2021.

**Waltho, Andrew**, 2015. The Ethics Column: Lessons for Competent Persons from a Recent Federal Court Judgement. Australian Institute of Geoscientists, 21 Nov 2015. <https://bit.ly/3zEmH2G>, accessed 19 Jun 2021.

**Waltho, Andrew**, 2015. The Ethics Column: Reporting Sulphide Mineral Observations in Drilling Intersections. Australian Institute of Geoscientists, 29 Oct 2015. <https://bit.ly/35zTBnw>, accessed 19 Jun 2021.

Bonham, Oliver, Abbott, David and **Waltho, Andrew**., 2017. An International Review of Disciplinary Measures in Geoscience — Both Procedures and Actions. Geoscience Canada. 44. 181. 10.12789/geocanj.2017.44.126.

## Contact

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