

## Andrew Wells

<b>Qualifications</b>	BSc (Eng) (Hon's) Royal School of Mines, Imperial College, London (Mineral Technology)
<b>Affiliations</b>	ARSM, Fellow of the Institute of Materials, Minerals and Mining; Chartered Engineer
<b>Languages</b>	Portuguese and Spanish
<b>Date of Birth</b>	1955
<b>Nationality</b>	British
<b>Contact</b>	cwa@cwa.uk.com <a href="http://www.cwa.international">http://www.cwa.international</a> +44 (0) 20 7242 8444

### Current Position at CWA

Principal Consultant – Minerals Department

### Specific Expertise and Experience at CWA

Has an extensive knowledge of operations ranging from mining issues related to processing, concentrate and ore shipping and sampling; sales contracts and the integration of good environmental practice into day to day management.

Extensive experience assisting with mineral cargo shipping incidents world-wide, including the production of guidelines for the safe shipping of materials likely to liquefy.

An expert in the sampling of bulk mineral cargoes.

Portuguese speaker.

Page 1 of 6  
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## Commodity Specific Shipping Experience

### ***Ammonium Sulphate***

Advice on wetting and corrosion potential

### ***Apatite (Phosphate Rock)***

Cargo Group classification advice

### ***Barytes (Barium Sulphate)***

Advice on rain wetting

### ***Bauxite***

Advice on liquefaction potential and cargo IMSBC Code grouping, Brazil, Indonesia & Sierra Leone  
Expert Witness in a casualty involving bauxite ore, Malaysia

### ***Canola (Rape seed)***

Advice on liquefaction/stability issues

### ***Clay***

Advice on flow moisture testing of a ball clay cargo

### ***Coal***

Advice on flow moisture/liquefaction issues

### ***Copper, Lead and Zinc Concentrates***

Manager, responsible for shipping fine copper and zinc concentrates from UK port of Truro

Salvage of flooded copper concentrate shipment, S Korea

Advice on safe carriage of Waelz kiln zinc oxide

Advice on zinc concentrate cargo liquefaction

Advice on copper concentrate liquefaction

Investigation of sampling of high gold content lead concentrates, S America.

Advice on cargo separation in holds, Croatia

### ***Drilling mud (spent) from oil operations***

Advice at Arbitration Tribunal on the permeability of spent (used) drilling mud following a methane explosion on board a tanker vessel

Page 2 of 6  
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***Fluorspar***

Advice to a major shipper in connection with the flow moisture characteristics of fluorspar concentrate, USA.

Supervised the amelioration of wet fluorspar cargo in Xiamen, China

***Garnet Sand***

Advice regarding an Australian shipment of allegedly contaminated garnet sand destined for use as a sand blasting medium

***Iron and Manganese Ores***

Advice on flow moisture point issues on iron ore fines cargoes from India, Liberia and Brazil.

Advice on cargo declaration of iron ore sinter feed cargo, various.

Shipping advice on magnetite iron ore concentrate

Safety aspects of shipping manganese ore

***Limestone***

Advice on cargo segregation in holds

***Nickel Laterite Ore***

Attended and provided advice on the flow moisture point testing of nickel laterite ore for shipping in bulk, various locations including: Indonesia, Philippines, New Caledonia

***Olive Kernels***

Advice on the liquefaction potential of crushed kernels.

***Olivine sand***

Evaluation of remediation options for a contaminated cargo

***Pyrites***

Advice on properties of calcined iron pyrites, various

***River Sand***

Advice on flow moisture testing.

***Salt and Rock Salt***

Advice on wet damage and contamination of solar salt.

Advice on corrosion effects of rock salt cargoes

***Silica Sand***

Inspection and advice on remediation of iron contaminated glass sand, Italy

**Silicon Carbide**

Advice on liquefaction of silicon carbide fines, Sweden

**Soda Ash (Sodium Carbonate)**

Interpretation of laboratory tests in wetting incident

**Sodium Sulphate**

Advice on corrosion and safety issues

**Sulphur**

Advice on corrosion effects of a prilled and granular sulphur cargoes

Advice on contamination of a sulphur cargo by pet coke, Venezuela

Advice on hydrogen sulphide evolution by crushed lump sulphur

**Sugar**

Advice on alleged conveyor damage caused by abrasion

**Summary of Previous Employment**

**2002-2004**

**Mackay & Schnellmann**

Director

Responsible for signing off stock exchange documentation e.g.

Competent Person's Report and valuation of the chrome and vanadium assets of Xstrata for the main board London Stock Exchange listing

Qualified Person's Report to Canadian Standard 43-101 on the Kipushi Zinc project, DRC

**1996-2001**

**IMC Mackay & Schnellmann**

Principal Metallurgist and Manager

Joined in March 1996 as Principal Metallurgist working on various consultancy assignments involving gold, copper, lead/zinc/silver, tin, silica glass sand, manganese, vanadium (in magnetite and hematite), tungsten, germanium, indium and rutile (titanium). He became a Director in 2001.

Page 4 of 6  
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**Prior to 1996** Started his professional career at the Chambishi Copper Mine in Zambia, following his degree in Mineral Technology at the Royal School of Mines. He worked on the computer control of the grinding circuit and commissioning of Davcr pneumatic flotation cells.

Then, following a year at a gravity tungsten operation, Andrew joined Carnon Consolidated. He rose from metallurgist to Metallurgical Superintendent at the Wheal Jane and South Crofty polymetallic zinc, copper and tin operations. Optimisation of these complex flotation and gravity operations, including the "de-bottlenecking" of the plants, helped ensure the survival of the company through the "Tin Crisis" of 1985. This ten-year period also included the downsizing, re-structuring and Management Buyout of the operations from Rio Tinto and periods of consultancy for various mining companies.

He subsequently re-joined Rio Tinto for Somincor at the Neves Corvo Copper Mine in Portugal, initially as a Resident Consultant and subsequently as Process Department Head. He was responsible for achieving power reductions in the grinding circuits, resulting in large cost savings. He also instigated water management improvements to halve fresh water consumption during a drought period. He was a founder member of the Rio Tinto Milling Technical Panel - covering large mineral processing operations world-wide.

### **Publications and Presentations:**

*"The Challenges of Shipping Bulk Metal and Mineral Cargoes", Expert Witness Journal, Spring 2016*

*"The Challenges of Bulk Mineral Cargo Shipping" Presentation to the Association of Mining Analysts, May 2014*

*"Iron Ore – From the Earth to the Iron Maker" Steel Business Briefing Presentation, July 2011*

*"Operational Risk in the Mining Industry", IMMM/Simmons & Simmons Masterclass Presentation, 1<sup>st</sup> November 2007*

*Page 5 of 6  
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*"The Mining Industry & Insurance Risk", London Engineering Group Presentation, 5<sup>th</sup> September 2007(co-presenter)*

*"Sulphur Production and Usage in the Processing of Non-Ferrous Metals", Sulphur Institute's ninth biennial international symposium, London, March 21-23 2004 (co-author and presenter)*

*"Due Diligence in the Financing of Mineral Projects", Private Seminar to Turkmenistan Officials, London, June 2003*

*"An Introduction to Due Diligence", Industrial Minerals Conference, London, November 2000*

*"Copper Production in CIS Countries", Adam Smith Institute, London, June 1999 (presenter)*

*"Overview of Mining Privatisation Case Study material", Mining Finance III, London, October 1999 (co-presenter)*

*"IT Usage in Somincor's Processing Plants", RTZ Group IT Conference, Vilamoura, October 1993*

*"Optimisation of Tin Concentrates Production at Neves Corvo Mine - Portugal", First Symposium on Polymetallic Sulphides of the Iberian Pyrite Belt, Evora, September 1993 (co-author)*

*"Some Experiences in the Design and Optimisation of Fine Gravity Concentration Circuits", Minerals Engineering, Vol. 3/4, 1991*

*"Computer Simulation at Wheal Jane", Mineral Processing in the UK Conference, April 1989 (co-author)*

*"Metallurgical Improvements at Wheal Jane", Mineral Processing in the UK Conference, April 1989*

*"A Mathematical Model of the Stokes Hydrosizer", IMM Transactions (Sect C), 1987 (co-author)*

*"On-stream Analysis at Wheal Jane", Mining Magazine, February 1983*

Page 6 of 6  
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