

23rd Annual Conference Proceedings

Nickel-Cobalt-Copper Conference

Including

Hydromet Processing of Copper, Nickel & Cobalt Sulphides Forum

Sponsored by



9th Annual Nickel-Cobalt-Copper Event

ALTA Metallurgical Services, Melbourne, Australia www.altamet.com.au

ALTA 2018 NICKEL-COBALT-COPPER SESSIONS

Including

Hydromet Processing of Copper, Nickel & Cobalt Sulphides Forum

21-23 May 2018 Perth, Australia

ISBN: 978-0-9946425-1-6

ALTA Metallurgical Services Publications

All Rights Reserved

Publications may be printed for single use only. Additional electronic or hardcopy distribution without the express permission of ALTA Metallurgical Services is strictly prohibited.

Publications may not be reproduced in whole or in part without the express written permission of ALTA Metallurgical Services.

The content of conference papers is the sole responsibility of the authors.

To purchase a copy of this or other publications visit <u>www.altamet.com.au</u>



Celebrating 32 years of service to the global mining and metallurgical industry.

ALTA Metallurgical Services was established by metallurgical consultant **Alan Taylor** in 1985, to serve the worldwide mining, minerals and metallurgical industries.

Consulting: High level metallurgical and project development consulting.

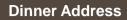
Conferences: ALTA conferences are established major events on the international metallurgical industry calendar. The event is held annually in Perth, Australia. The event comprises three conferences: Nickel-Cobalt-Copper, Uranium-REE-Lithium and Gold-PM.

Short Courses: Technical Short Courses are presented by Alan Taylor, Managing Director.

Publications: Sales of proceedings from ALTA Conferences, Seminars and Short Courses.

MetBytes: Free technical articles offering metallurgical commentary and insights.

Free Library: Conference proceedings and technical papers. The library is expanded regularly, providing a major ongoing resource to the industry.



A Metallurgist's Musings, Speculations and What-ifs on Future Industry Driving Forces and Trends

Alan Taylor

ALTA Metallurgical Services

5

current trends are driving major changes in the mining industry If they continue to gather momentum, the changes could be **Unprecedented!!!**

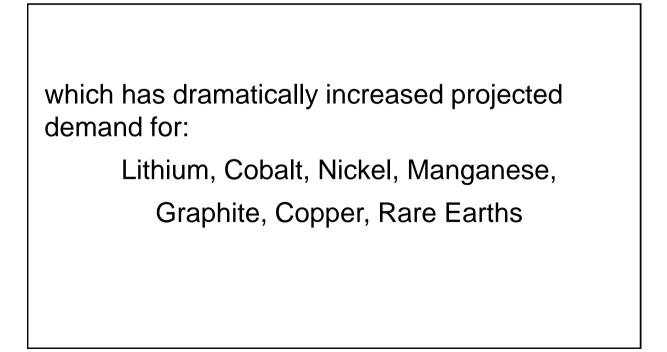
No. 1

Move towards electric vehicles (EVs)

and

renewable power generation





in his 2016 book <u>The Elements of Power</u>, David S Abraham writes:

"We are now witnessing a fundamental shift in our resource demands. At no point in human history have we used *more* elements, in *more* combinations, and in increasingly refined amounts. Our ingenuity will soon outpace our materials supplies."

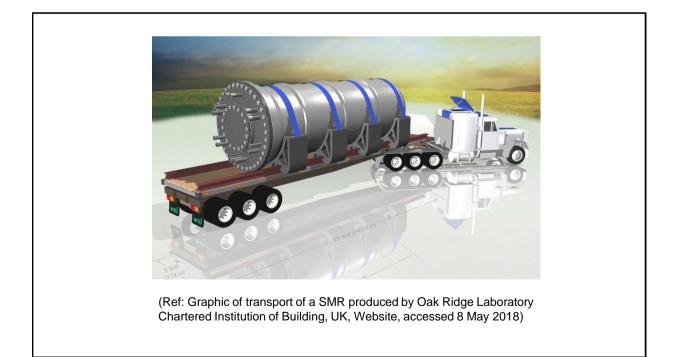
(Ref: Jocelyn Timperley, Carbon Brief, 16 April 2018)

No. 2

Growing opposition to nuclear power since Chernobyl and Fukushima disasters.

Possible game changers:

- Small modular reactors (SMRs) e.g. for remote sites – not subject to weather – alternatives to solar and wind power.
- Permanent deep geological disposal of radioactive waste.

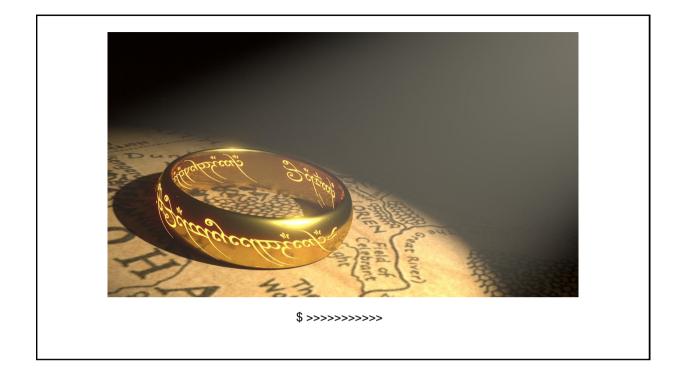


No. 3

Move towards banning cyanide for gold/silver extraction in some countries.

If this becomes a global trend, it will force change to alternative leaching reagents.

Current alternatives are more expensive, and would lead to higher gold price.



No. 4

Growing opposition to wet tailings dams

If this continues to grow, it would provide a driving force towards production of "dry" (paste thickened/filtered) tailings and disposal by:

- Surface stacking
- Backfilling into mined-out pits
- Burial



(Dry stacking of tailings, Ref: Aqseptence-Hatch presentation, ALTA 2017)

No. 5

Growing opposition to open pit mines

If this continues to grow, it would provide a driving force towards:

- In-situ recovery (ISR)
- Deep sea nodules



(ISL Wellfield, Beverley Operation, Heathgate Resources, South Australia)



(Deep Sea Nodule Field, Ref: International Seabed Authority Website, accessed 9 May 2018)

Of the 5 trends, the only good news for the mining industry is: No. 1 the projected renewable energy and EV **boom**

