



HELP! MY WASTE LANDFORM IS DISSOLVING!

DEALING WITH NOVEL CLOSURE PLANNING ISSUES

Jess Li

Senior Environmental Scientist

EMERGING TECHNOLOGIES AND COMMODITIES



Potassium Sulphate

Kalium Lakes Limited – Beyondie Project

Agrimin – Mackay Project

Australian Potash – Lake Wells

Salt Lake Potash – Lake Way Project

Reward Minerals – Lake Disappointment



Lithium

MRL & Albemarle – Wodgina

Altura/Pilbara Minerals – Pilgangoora

Albemarle & TQC – Greenbushes

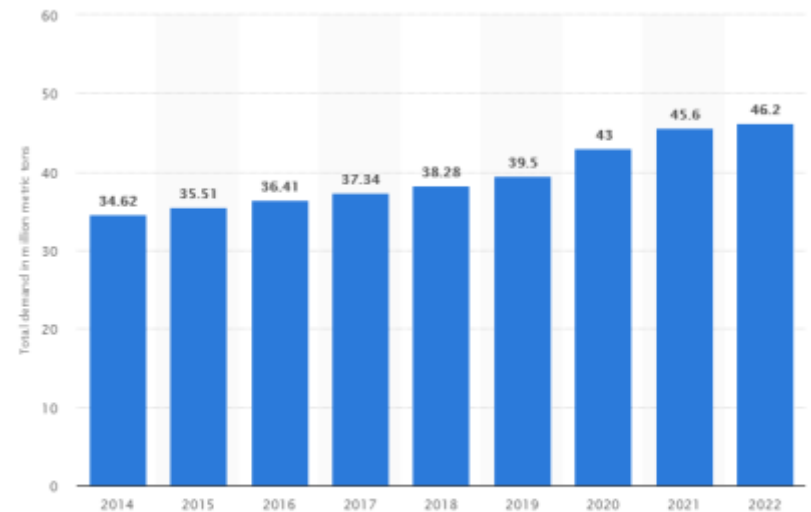
MRL & Co – Mt Marion

Galaxy - Mt Cattlin

Kidman & SQM – Earl Grey

SULPHATE OF POTASH – WHAT IS IT?

- Potassium sulphate or ‘SOP’
- Premium quality nutrient for the growth of high-value crops
- Limited availability globally due to scarcity of primary deposits
- Demand forecast to grow

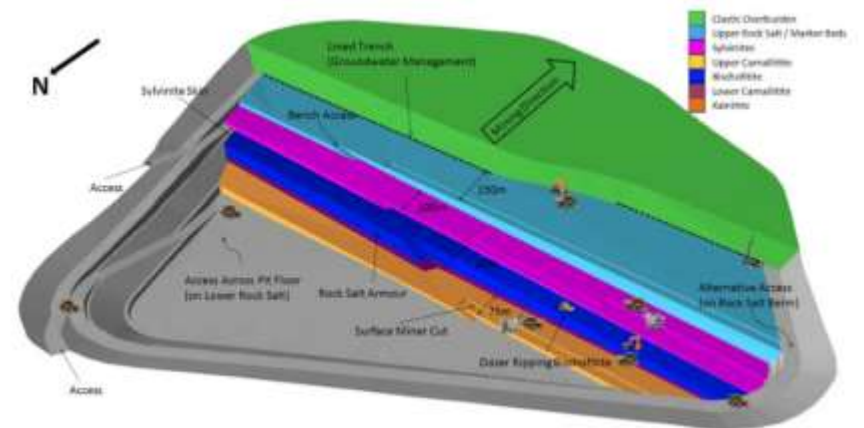


© Statista 2019



HOW DO YOU GET IT?

- Underground
- Solution mining & solar evaporation of 'brine'
- Open cut

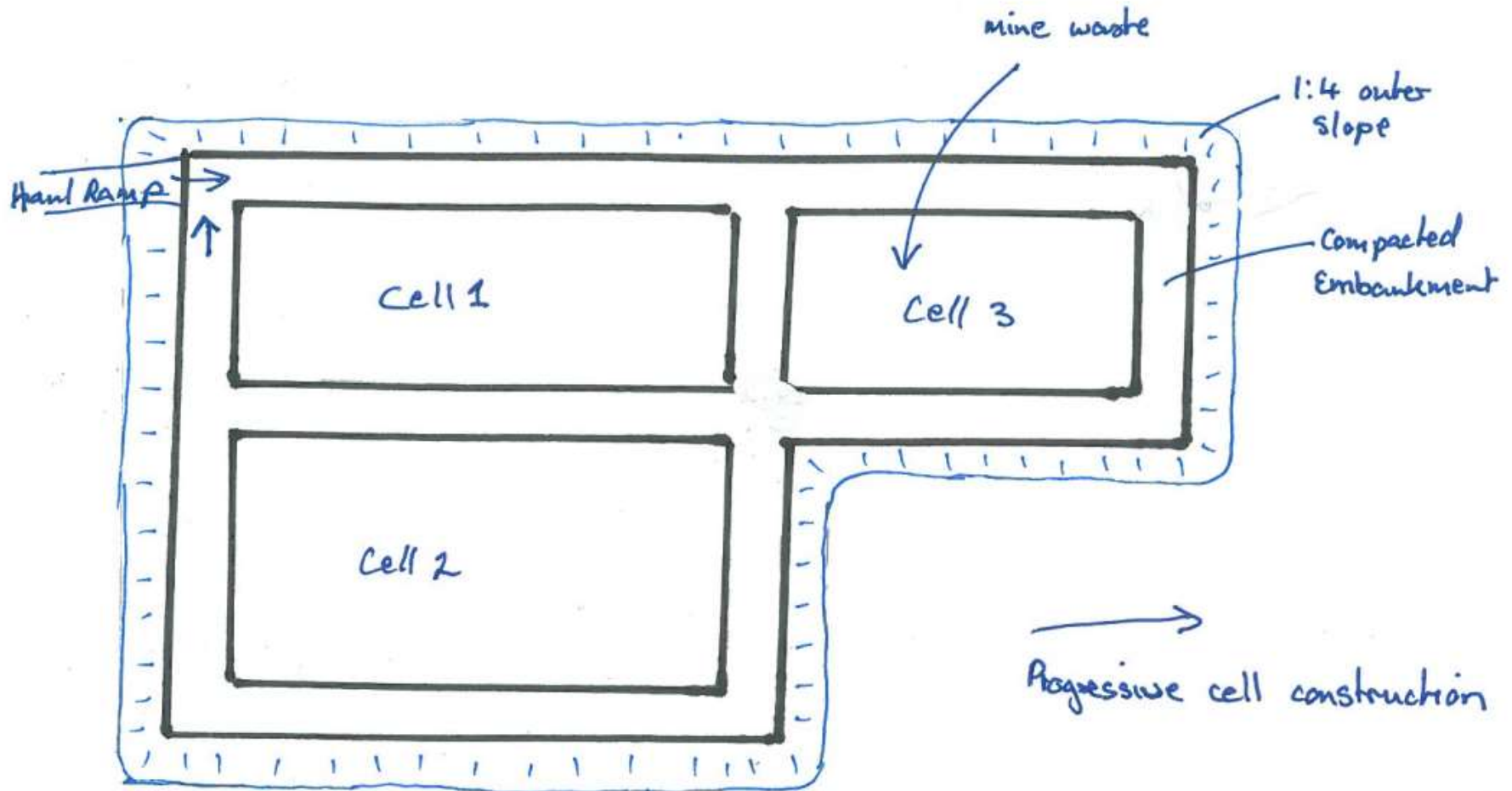


SOP – OPEN PIT MINING

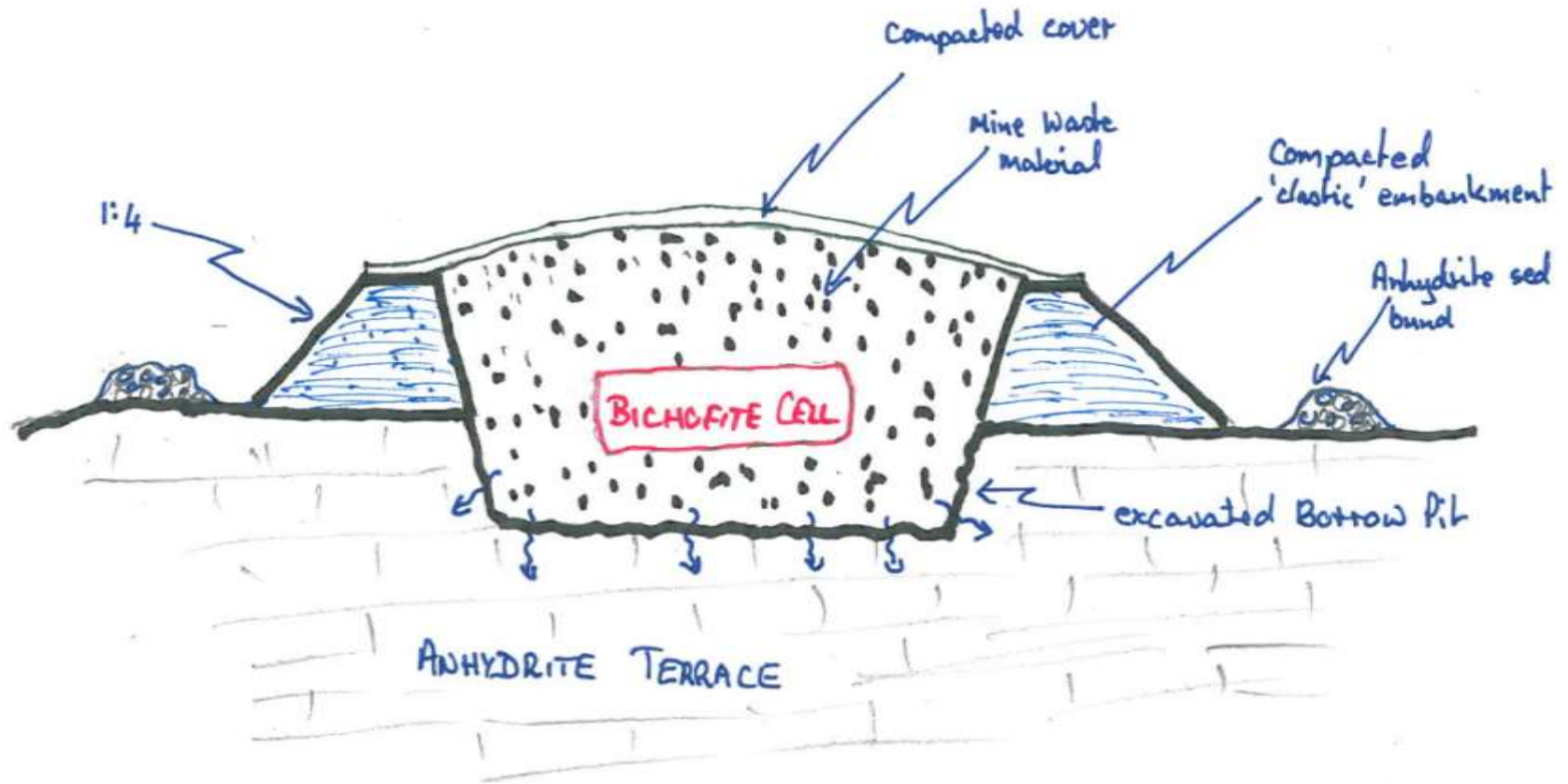
- Cheaper and faster
- Unique materials which are dispersive and/or highly soluble (deliquescent) and prone to erosion.
 - Clastics/Clay
 - Rock Salt
 - Bischofite



CONCEPTUAL WRD CLOSURE DESIGN

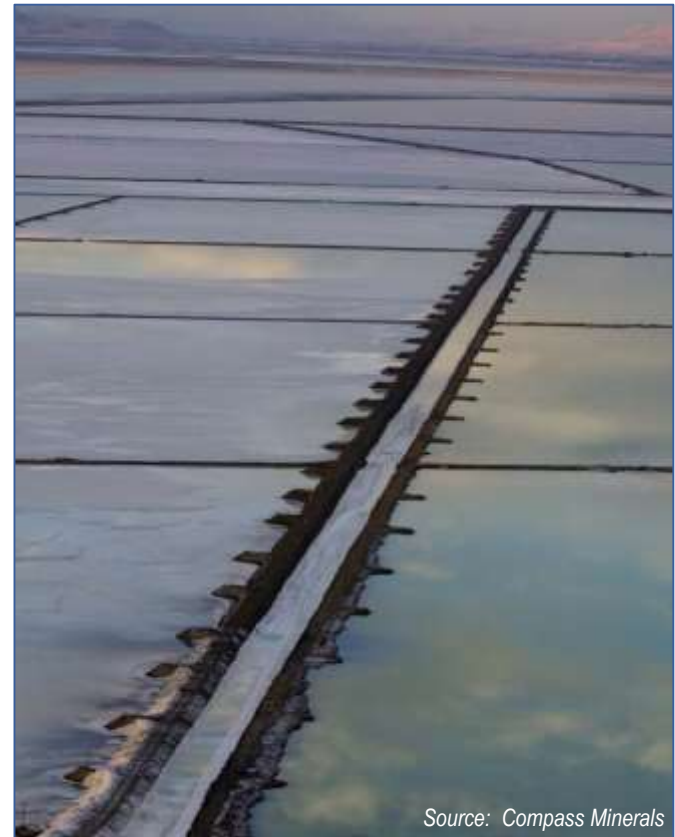


CONCEPTUAL WRD CLOSURE DESIGN



SOP - SOLAR EVAPORATION

- Ancient hypersaline paleodrainages pumped to surface to evaporate within large ponds to produce potassium salts leaving behind waste salts
 - Sodium salts
 - Calcium salts



Source: Compass Minerals

SOP - SOLAR EVAPORATION

- Ponds lifted over the life of the ponds for capacity
- 'Salt pile' landform remains at closure
- What are acceptable PMLU and closure criteria for these landforms?

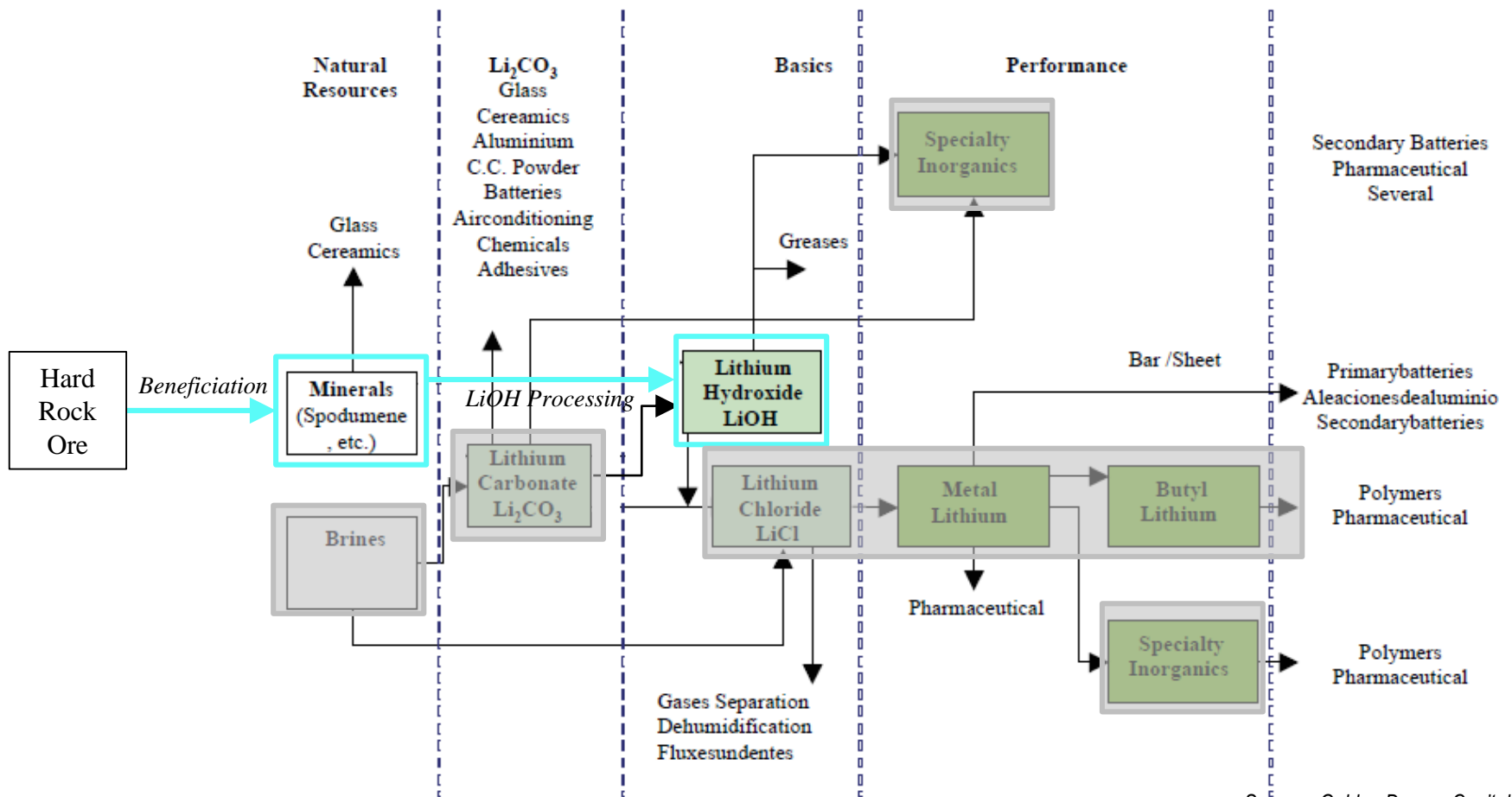


CLOSURE OF SALT LANDFORMS

- Prevention of runoff into wider environment sensitive to changes in salinity and balances of salts.
- Seepage into dunes may have wider impacts
- Stability of landform – slumping etc.



LITHIUM PRODUCTION



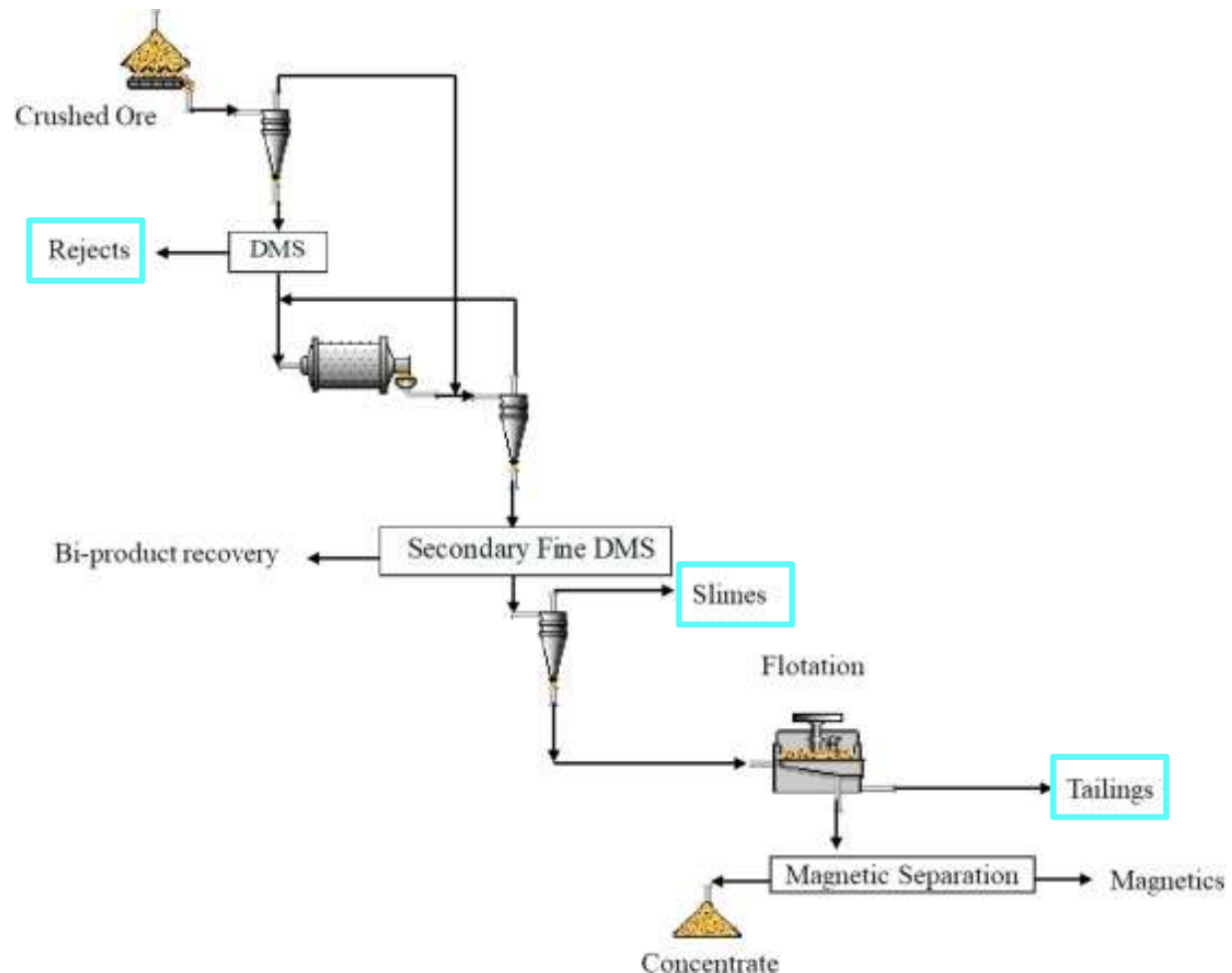
Source: Golden Dragon Capital

LOCATION, LOCATION, LOCATION

- Existing environment and surrounding land use will determine how you deal with wastes.
- No one operator has come up with all the answers, but some have solved different problems depending on where they are.



LITHIUM BENEFICIATION



Source: Tadeese et al. 2019 <https://doi.org/10.1016/j.mineng.2018.11.023>

BENEFICIATION – COARSE REJECTS

- Gravel sized (2-4mm)
- Geochemically benign
- Within own landform or comingled with 'rock'
- Geotechnical requirements
- Limited knowledge of properties – mistakenly assumed to be 'tailings'

millimeters	Wentworth Size Class		
256		Boulder	Gravel
64		Cobble	
4.0		Pebble	
2.0		Granule	
1.41	vcU	Very coarse sand	Sand
1.0	vcL		
.71	cU	Coarse sand	
0.5	cL		
0.35	mU	Medium sand	
0.25	mL		
0.177	fU	Fine sand	
0.125	fL		
0.088	vfU	Very fine sand	Mud
0.0625	vfL		
0.002		Silt	
		Clay	

Waste rock →

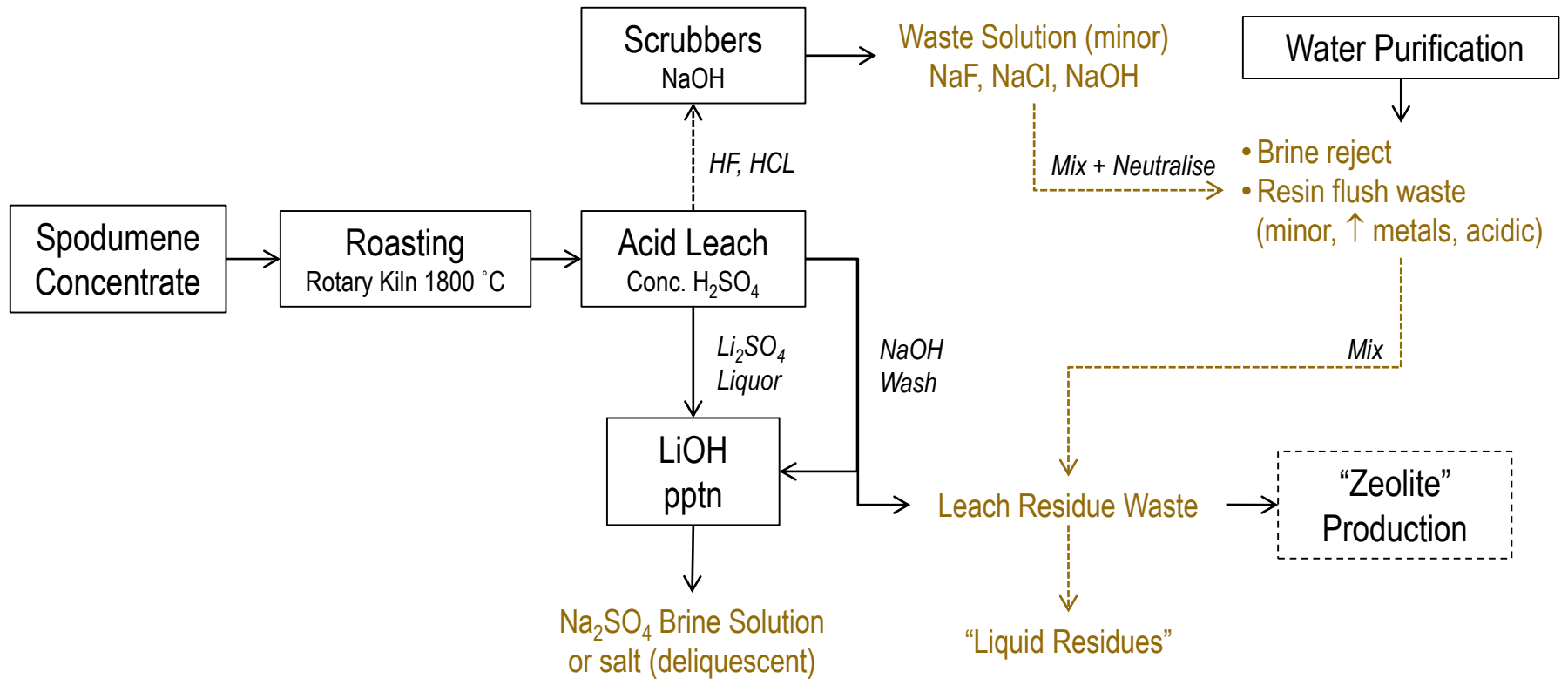
Rejects →

BENEFICIATION – SPODUMENE TAILINGS

- Processing residues slurried like conventional tailings
- Depending on process water may be saline
- May leach i.e. lithium and fluoride



LiOH PROCESS (SIMPLIFIED)



CONCLUSION



- Exciting ‘new’ commodities and projects
- Each have their own unique but not insurmountable challenges for waste disposal and closure
- Still developing solutions
- Success is highly dependent on knowledge based early project planning

Questions?

9226 3166

jli@mbsenvironmental.com.au

Follow us on

Linked 

www.mbsenvironmental.com.au