

New technology in seafloor massive sulfides exploration

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Solution looking for a problem?





Eight slides on the setting and challenges Three on some new technology





If you define the problem correctly, you almost have the solution.

— Steve Jobs —

Search space 1 – Endowment estimates are encouraging





Search space 2 – Oceans are large Deposits are small





Search space 3 – Deposits may be at depth (back-arc example)



Based on Cambrian Mt Read Volcanics, Tasmania. From Gifkins et al 2005



Exploration Management is Managing Discovery Risk



1 Terrane Selection	2 Target Generation and Refinement	3 Target Testing	4 Prospect Delineation	5 Resource Evaluation	o PFS
# 1-10 Which terrane has the best potential for mineralization e.g. flux rates, focus points	 # high 100s Application of models with regional to define targets. Ongoing improvement of targets and portfolio via sampling and mapping 	<pre># high 10s to low 100s Detailed mapping, quick drill sampling +- geophysics with high failure rate and turnover</pre>	Low # 10s Drilling +- geophysics with high failure rate and turnover. Inventory range analysis	# 1-5 Drilling, drilling and drilling, maybe some geophysics – focus on sample quality	Handover t

Key <u>discovery challenge</u> for SMS lies in steps 2 to 4. The key <u>exploration cost challenge</u> lies in steps 4 and 5, especially for the more detailed drill out needed for advanced deposits

How can technology help?

Targets are ideas and anomalies

- Regional MBES
- Magnetic survey
- Structural/flux interpretation
- Grid sampling or tow-yo
- AUV geophysics and geochemistry
- Scout drilling, ROV mapping

This is what you are competing with... Two men, one beat up sampling truck = ~500 samples per day Soil sampling contractor for Galileo's Norseman Project, Western Australia





Prospects are mineralization whose extent can be constrained

- ROV geophysical survey and mapping
- Scout drilling





DDP)

Island Valiant (TIOS) Coil Tubing

> Used at Solwara 1



Deposits – have defined mineral resources



- Drilling
- Drilling
- Drilling
- Maybe some geophysics...



2

Target

Generation and

Refinement

Terrane

Selection

Target Testing

4

Prospect

Delineation

Resource

Evaluation

PFS

0

Grid geochemistry in target generation

- Effectively replaces tow-yo should be more accurate
- AUV plume hunting may prove more precise in some situations





https://dsmf.im/wp-content/uploads/2021/05/Jumper-Technical-Data-Sheet V3.1-Rev0.pdf

Scout drilling in target testing and prospect delineation

- Focus on quick landing
- Focus on plug-in support = low day rate









"Hobbit" scout rig https://dsmf.im/wp-content/uploads/2021/05/Scout-Rig-Technical-Data-Sheet-Rev1.pdf

PGNAA downhole geochemistry in scout and maybe resource drilling



- Works on land
- Tested and worked in sea-water



backup





Environmental Data can be collected during geochemical program.

Spare payload can accommodate

- Water column sensors (e.g. MAPR, hydrophone)
- Seabed camera and flash
- etc

Environmental Data can be collected with a dedicated program.

As at left +

Sample cassette can be adapted for eDNA sampling

Potential upgrade to carry water sampling bottles Light environmental footprint built in.

Use of food grade mineral oil in compensated part of the system.

Use of low impact (effectively biodegradable) iron sand ballast instead of lead

Metrics? 1

MINEX DATA



It takes persistence and patience to make a discovery

Time delay and number of companies involved prior to the actual discovery of a significant copper or gold deposit

The average exploration time for a significant discovery was 12 years. One third were found within 5 years



Time spent (in years) exploring the property before the discovery was made On average, 2.5 companies explored the property prior to discovery



Number of Companies who explored the property before the discovery was made The successful company took on average 2.5 years to find the deposit



Source: Minex Consulting © April 2019

Note: Analysis is based on 100 significant (>100koz, >100 kt Cu) gold and copper discoveries in the Western World between 1960-2018. The analysis excludes any historical small-scale operations on the project lease.

MinEx Consulting

Strategic advice on mineral economics & exploration



Metrics? 2

Average cost per copper deposit found



Note: Based on a 3-year rolling Average Based on primary copper deposits >100kt Cu Includes an adjustment for the number of unreported discoveries in recent years

Source: Minex Consulting © April 2019

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