

Environmental Aspects of Deep Sea Mining with National Jurisdiction

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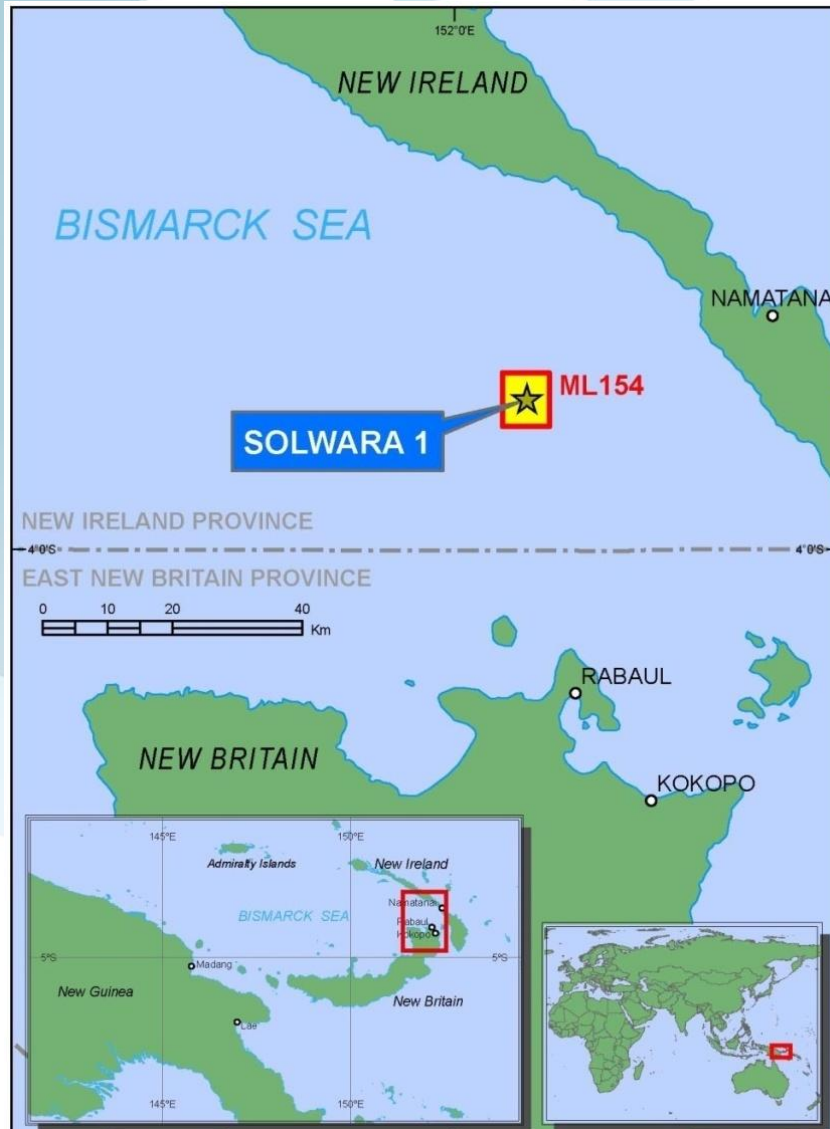
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- Notes Regarding Technical Disclosure
 - Resource information for the Solwara project is derived from a technical report titled "Mineral Resource Estimate, Solwara Project, Bismarck Sea, PNG" dated and filed on SEDAR on March 23, 2012, and summarized in a news release dated November 25, 2011. Indicated resources of 74,000 tonnes of copper is based on 1.03 million tonnes at an average grade of 7.2%.
 - Resource information for the CCZ Project is derived from the technical report titled "Updated NI 43-101 Technical Report, Clarion-Clipperton Zone Project, Pacific Ocean" dated March 20, 2013 and filed on SEDAR on March 21, 2013, and summarized in a news release dated September 18, 2012.
 - A qualified person under National Instrument 43-101 Standards of Disclosure for Mineral Projects, has reviewed and approved the technical information in this presentation (see slides for more details)

- Nautilus Minerals is a leading company in the exploration and development of seafloor minerals
- Deep Sea Mineral Production offers many social and environmental advantages for mineral development
- Nautilus is dedicated to setting a high environmental and social responsibility standard

Solwara 1

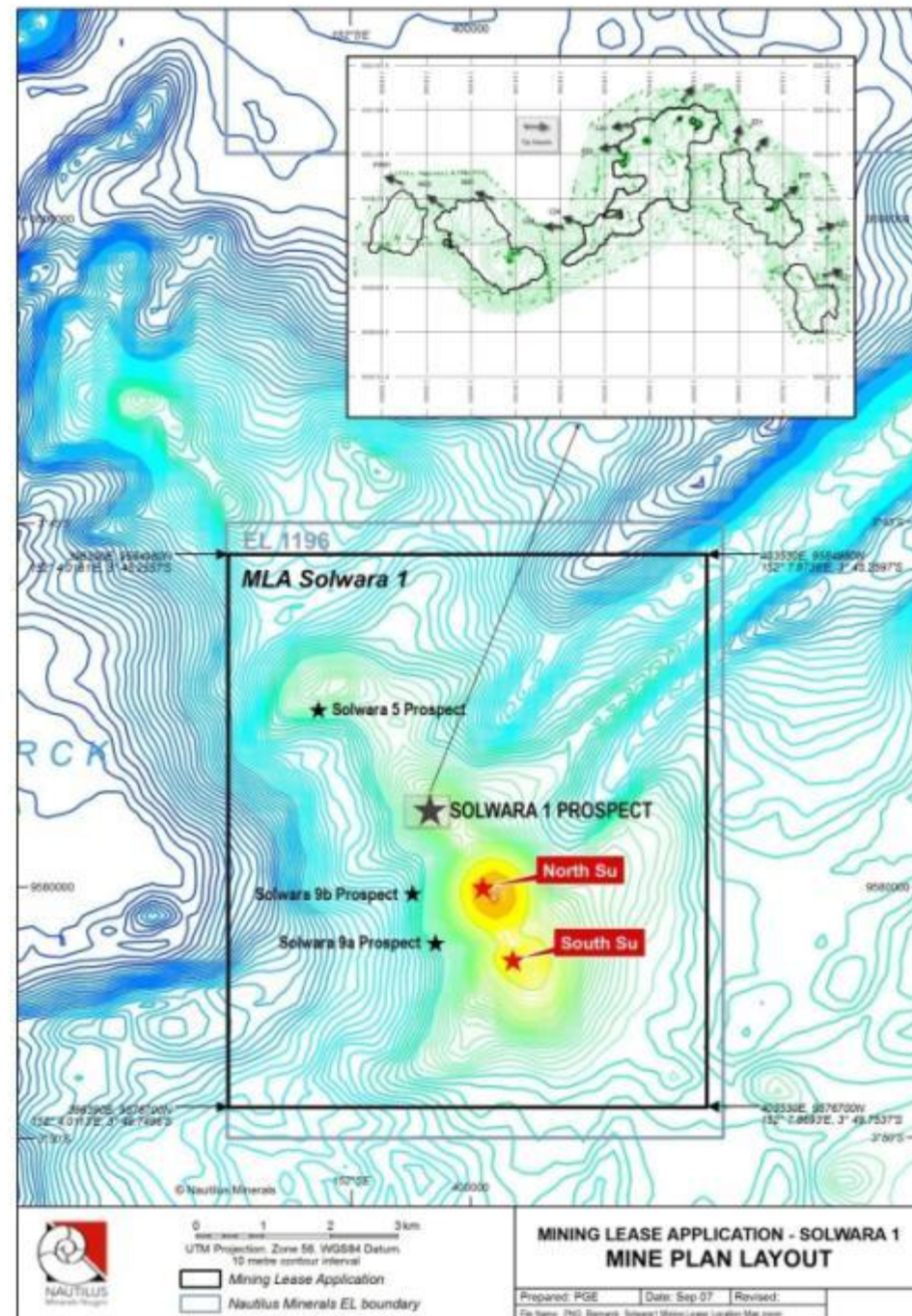


- Bismarck Sea, Papua New Guinea
- 30 km from nearest coast
- Small extraction area:
 0.11 km^2
- 1600 m
- Well studied site
- Outside of the cyclone belt
(calm sea states)

Project Setting

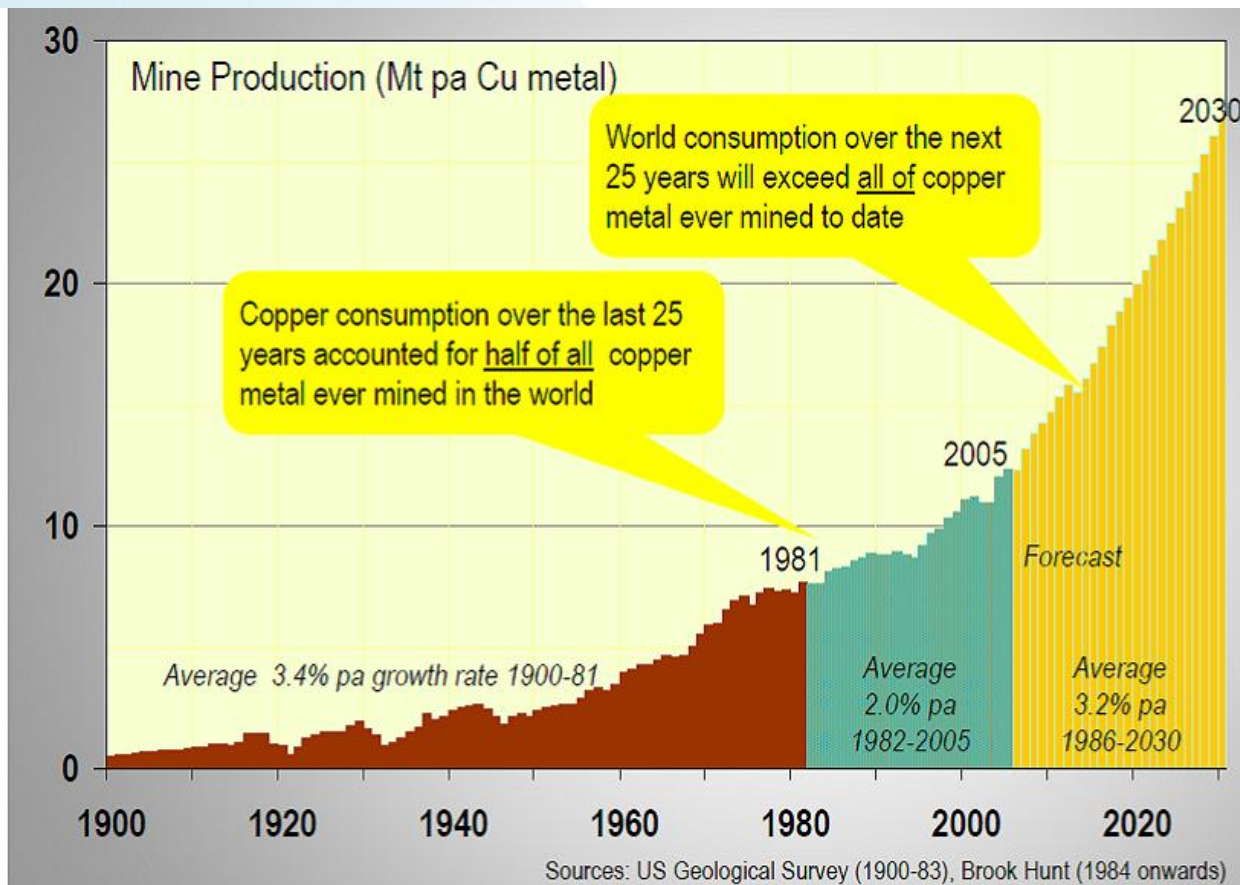
- Solwara 1:
- 5 mineralised zones
- Weakly active hydrothermal vent site – no “billowing” black smokers**
- Near active subsea volcano (North Su)
- Set-aside reference site

***not all sites are the same, highlights importance of EIA process*



Increasing Demand for Metal

- Population Growth
- Emerging economies transitioning to industrialised and urbanised societies



Terrestrial Mining: The Situation



- Land resources are stretched = increasing economic, social and environmental costs:
 - moving more rock per tonne of metal;
 - processing more rock per tonne of metal;
 - larger waste rock dumps;
 - increasing tailings disposal & noxious waste;
 - increasing deforestation, soil erosion, etc.
- Increasing land use conflicts
- Metal demand out-pacing supply

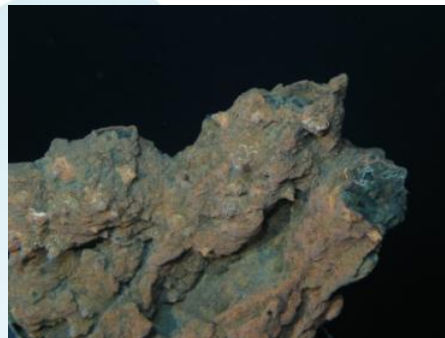
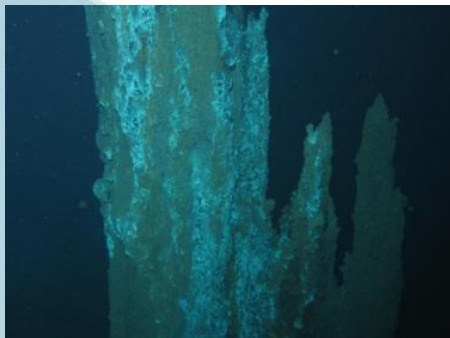


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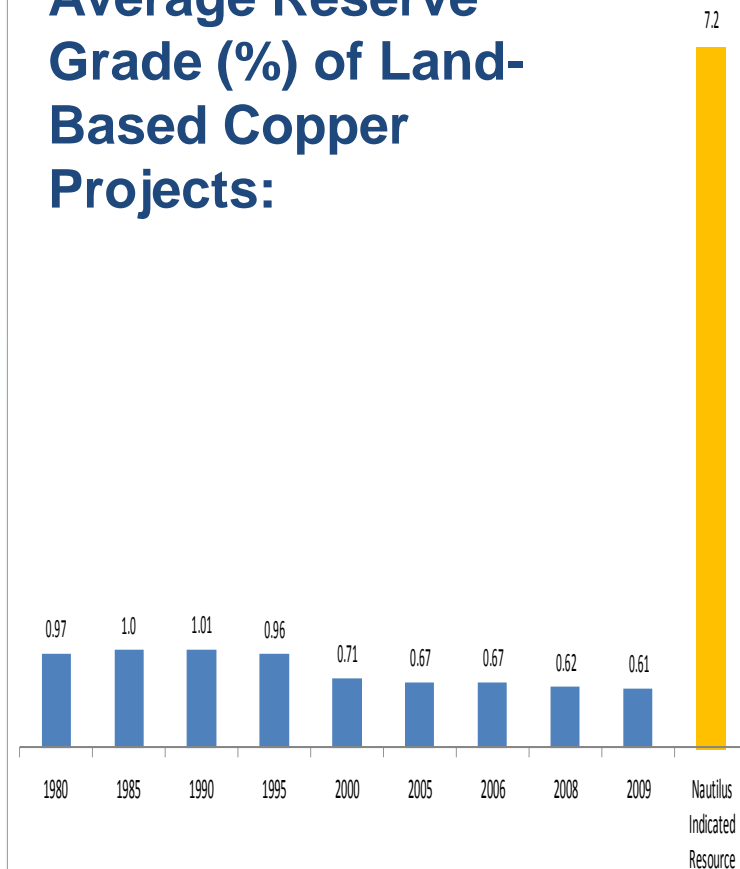
A holistic approach to decision making is needed

Social and Environmental Advantages



- Seafloor Massive Sulphide (SMS) deposits – HIGH GRADES of copper, gold, zinc & silver
- Minimal overburden, which on land can be 75% of material moved
- Less ore needed to provide the same amount of metal; small physical footprint
- No indigenous or native populations to disrupt
- No blasting, no toxic chemicals, reusable infrastructure, etc.

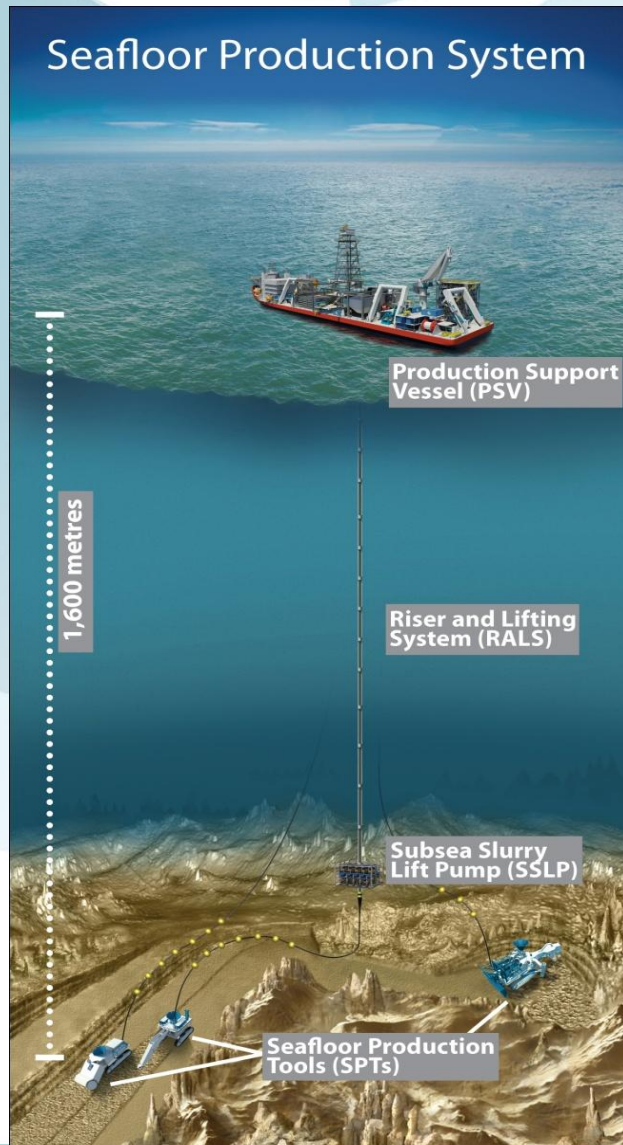
Average Reserve Grade (%) of Land-Based Copper Projects:



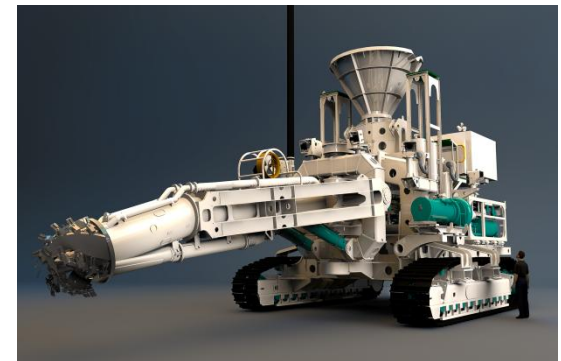
Source: Source: Brook Hunt, a Wood Mackenzie Company

Nautilus Resource Estimate prepared by Ian Lipton, BSc (Hons), FAusIMM, Principal Geologist, Golder Associates Pty Ltd. Effective Date: 25 Nov 2011 . Mineral Resources based on 2.6% Cu eq cut-off grade

Seafloor Production System

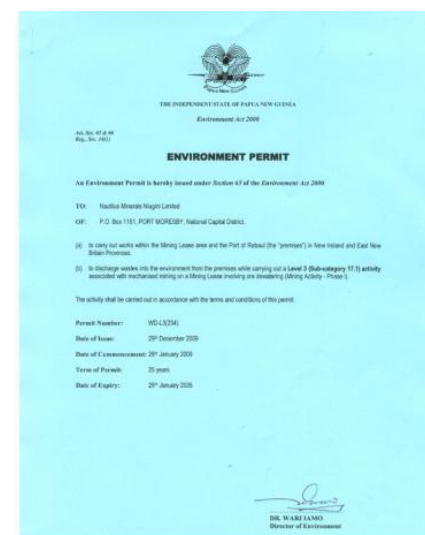
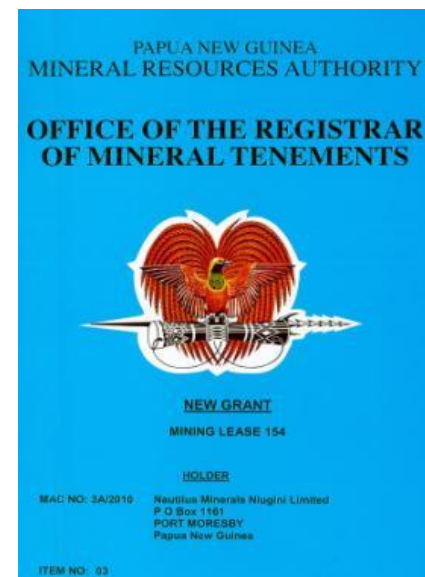


- Key Components:
 - Seafloor Production Tools (SPTs)
 - Riser and Lifting System (RALS)
 - Production Support Vessel (PSV)
- Equipment either existing or an adaption of existing offshore technology

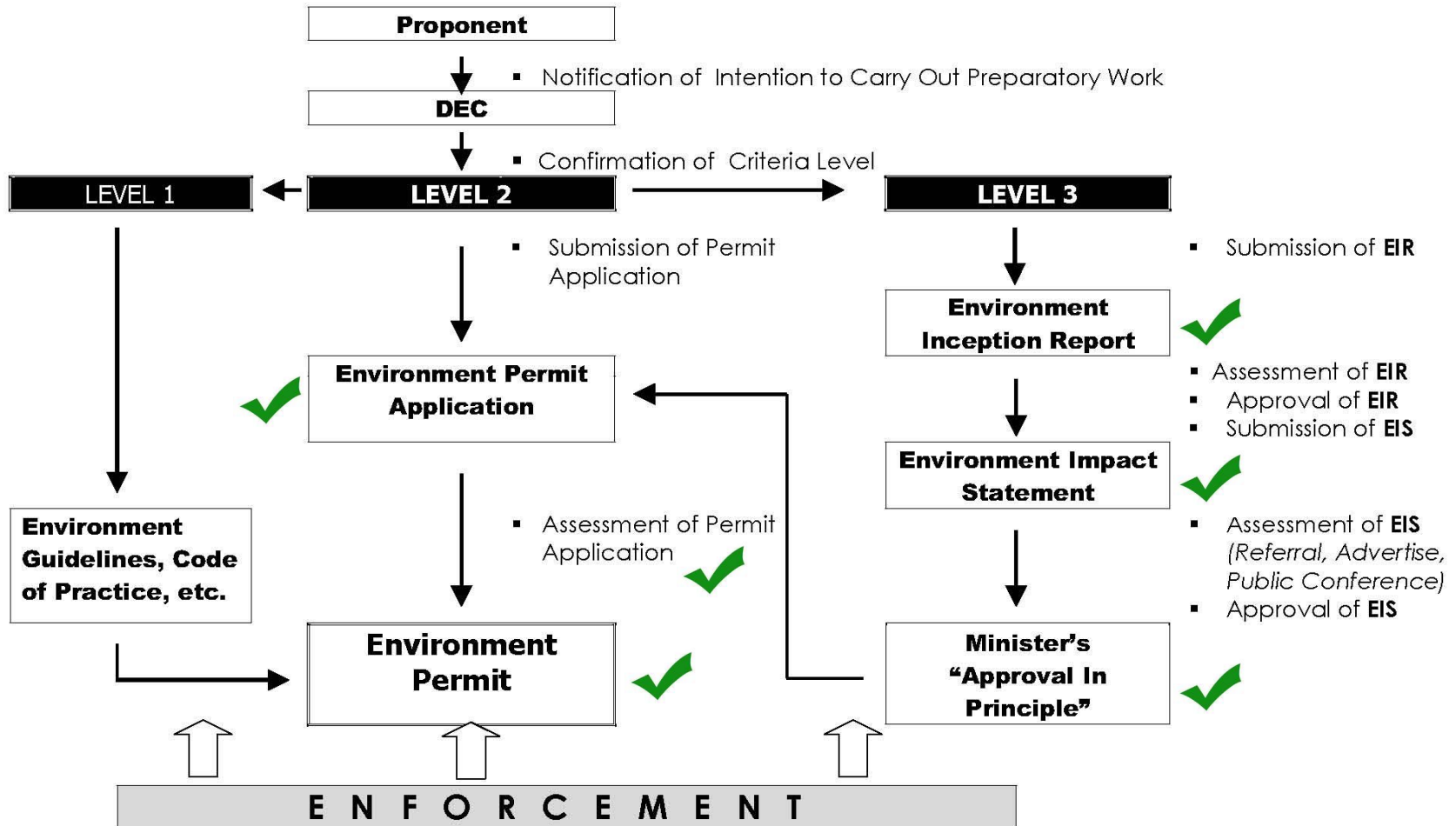


Legal Process

- There are two key permits that must be obtained before a mining operation can go ahead in Papua New Guinea:
 - Mining Lease (obtained January 2011)
 - Mineral Resources Authority (MRA)
 - *Mining Act 1992*
 - Vests ownership of all minerals in or below the surface of land (and water) to the State of PNG
 - Governs the exploration, development, processing and transport of minerals
 - Environment Permit (obtained December 2009)
 - Department of Environment and Conservation (DEC)
 - *Environment Act 2000*
 - Outlines environmental requirements of an activity
 - Level 3 (Sub-Category 17)
 - EIS required (prepared as per Section 53) → includes social



ENVIRONMENT REGULATORY FRAMEWORK



Next steps: Complete Environmental Management Plan (EMP) and submit it to the DEC for approval prior to operations. EMP development is a condition of the Environment Permit.

Nautilus' Approach



- Early, transparent and inclusive stakeholder engagement
- Inclusive multi-stakeholder workshops to develop ESIA, EIS, EMPs, monitoring programme, etc
 - Communities
 - World-renowned experts in various fields, from anthropologists to deep sea ecologists
 - Government
 - NGOs
- Ongoing Community Awareness and Consultations
- Established CARES - 2007



nautilus
cares

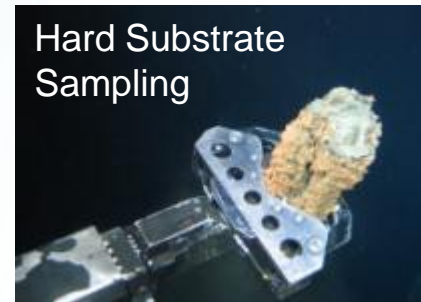
Community Accountable, Responsible Environmentally, Safe

www.cares.nautilusminerals.com



Studies (note this is not an exhaustive list)

- **Biology Studies:**
 - Macrofauna (incl., DNA/genetic studies)
 - Benthic Habitat Assessment
 - Bioaccumulation
 - Bioluminescence
- Existing Resource Utilisation
- Hazard and Risk Assessment
- Hydrodynamic Modelling:
 - Cutting
 - Dewatering
- Noise and Light
- Oceanography (12 mo, full column)
- Sedimentation Rates (36 mo, ongoing)
- Sediment Chemistry
- Video Survey (>100,000 obs)
- Water Quality

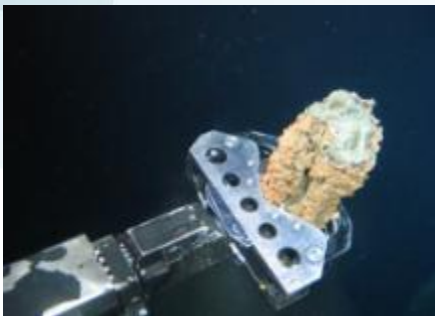


Additional objective: science will also benefit from additional deep sea studies conducted to obtain data for the EIS

Achieving Independence

- Independent researchers
 - Freedom to publish
- Independent reviewers
 - Engaged by DEC
- Transparency
 - EIS and all supporting studies on website

- Duke University
- Scripps Institution of Oceanography
- University of Toronto, Canada
- Woods Hole Oceanographic Institute
- CSIRO, Australia
- Hydrobiology, Australia
- University of Papua New Guinea
- Coffey Natural Systems, Australia
- Rabaul Volcano Observatory, PNG
- Asia Pacific Applied Science Associates (APASA), Australia
- Australian National University
- Curtin University of Technology, Australia
- James Cook University, Australia
- Charles Darwin University, Australia



Images: Collecting chimney sample; collecting snail sample



Conceptual image showing a deep sea restoration activity:
Animal relocation onto artificial substrates

Limiting the impacts in the deep sea:

Mitigation strategies developed with a team of independent world experts.

All strategies suggested were accepted by Nautilus.

Protection measures include:

- Setting aside a reference site
- Refuge areas
- Animal relocation
- Artificial substrates

Protecting Surface Waters and Fish



- Nautilus commitments:
 - Fully enclosed system
 - **No hazardous chemicals**
 - **No tailings**
 - **No blasting**
 - No extraction impact shallower than 1300 m water depth at Solwara 1 (below where tuna, etc, live)
- **Transparency**
- Working **collaboratively** with other ocean users (NFA)
- **Independent** monitors and reviewers (overseas experts, Provincial and National Government observers/input)

PROTECTING SURFACE WATERS AND FISH

Nautilus' Commitments

- Fully enclosed system
- No hazardous chemicals
- No tailings
- No blasting
- No extraction impact shallower than 1300 m water depths at Solwara 1

These commitments go above and beyond legislation

WE CARE ABOUT FISH AND CORAL REEFS TOO

1. Solwara 1 is located 30 km from land, at depths of 1600 m:

— Well away from coral reefs and fish

2. Surface impacts have been engineered out:

- No process discharges at the surface
- No toxic chemicals discharged in the extraction process

3. Surface impacts are limited to the presence of vessels and barges:

— Similar to cargo ships already present in the Bismarck Sea

What's in it for PNG?



- Employment and training opportunities
- Skills and technology transfer
- Supports business and community development
- Taxes and royalties
- Community Development Fund

The Way Forward

- Worlds demands for metals and minerals are rising
- Seafloor Resource Production offers many social and environmental advantages for mineral development
- Nautilus Minerals has taken a responsible approach to develop the Solwara 1 Project
 - Transparency
 - Independent studies
 - Multi-stakeholder approach
- It's not too late to have an input



Reference



- [Nautilus Minerals EIS](#)
- [Papua New Guinea Environment Act 2000](#)
- [www.nautilusminerals.com](#)
- [www.cares.nautilusminerals.com](#)

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