Presentation Outline

1. IHC Merwede & IHC Mining Background
2. My Background & History of Neptune Minerals
3. What Drives Mineral Explorers?
4. Review of the Mining Technology Cycle
5. Introduction to Calculating Exploration Value
7. Focus on Resource Definition Risk & Sampling
8. The Implications for the Minerals Industry & Investors
9. Q&A
If it is innovative technology, IHC builds it!

IHC Merwede facts & figures:

- Financial turnover in 2011: EUR 1,1 billion
- Staff in 2011: 3500
- 5 Shipyards in The Netherlands, 1 shipyard in China
- In-house research centres, MTI, MAS and OTI (60 employees)
- 3-4% of turnover for R&D (300-350 employees)
- World wide services and manufacturing locations
IHC Merwede History
Responsibilities in sphere of influence

Assess to prevent
- Prediction tools
- Risk assessments

Engineer to mitigate
- Safety
- Reduce environmental impact

Monitor to optimize
- Optimize equipment performance
- Environment

Collaborate to complete
- Community

Sustainable development
IHC Merwede Mining Division

Reliable partner for efficient mining life cycles

Innovative vessels
Advanced equipment
Life-cycle support

Mining services
Market segments
Product groups
Life-cycle support

The technology innovator.
My Background

1984

- Geology BSc (Hons)

- Oil & Gas Exploration Geologist

- PhD Innov. Mgt UWA

2005

- Oil & Gas Commercial Consultant

2003

- Started Neptune Minerals Plc

Today

- Deep Sea Minerals Exploration & Consulting
Neptune Minerals History

1999  Neptune Resources application
2000-02 NZ Oceans Policy Review
2002  (Oct.) PL39 195 @ 30,000km²
2003  (Feb.) Start funding roadshows
2004  (Dec.) $1million seed funding
2005  (May) Neptune Minerals, Plc
2005  (Oct.) AIM LSX listing £9.3M
2005  (Dec.) K05 drillship Brothers
2007  (May-July) K07 & CM07
2007  (Aug.) RV Meteor, Mediterranean
2008  (April) IHC-Technip Mining Study
2009  (Feb.) GFC Slow-down
2010  (Dec.) US investor discussions
2011  (Mar.-May) K11 Dorado Discovery
2011  (Dec.) Neptune Minerals, Inc.
2012  Private exploration company
What drives mineral explorers?

<table>
<thead>
<tr>
<th>EXPLORATION &amp; MINING Co’s</th>
<th>NATIONAL / GOVERNMENT Co’s</th>
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<tbody>
<tr>
<td>• Growing company asset value &amp; shareholder returns</td>
<td>• Resource &amp; supply security to sustain national industries</td>
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<tr>
<td>• Reserves replacement &amp; growth</td>
<td>• Technology &amp; skills development to assist industrial growth</td>
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<tr>
<td>• Having a successful “hit rate” from exploration vs competitors</td>
<td>• Geopolitical presence &amp; influence</td>
</tr>
<tr>
<td>• Avoiding exploration failures</td>
<td>• $$$</td>
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<tr>
<td>• $$$</td>
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The need to educate “dry” mineral explorers

Future
Increase in deep sea mining projects & knowledge generated by new entrants

Now
Current potential deep sea projects

Exploration  Evaluation  Feasibility  Construct & Operate
Overview of Mining Cycle

**Exploration**
- Initial discovery
- Inferred mineral resource
- Economic viability
- Start EIA baseline

**Evaluation**
- A “bankable” resource
- Refined costs
- Engage stakeholders
- Improve EIA

**Feasibility**
- Market report of ore reserves
- Detailed costs
- Stakeholders support
- Full EIA

**Construct & Operate**
- Best practice project performance
- Stakeholder communications
- EIA monitoring

**Exploration Licence term** 8 – 15 years

**Mining Licence term** 20 – 30 years
Technology Partnering – Exploration Licence Phase

Project Development: From customers expectations to realization.
Technology Partnering – Mining Licence Phase

Project Development: From customers expectations to realization
Introduction to Calculating Exploration Value

“It is a truth very certain that when it is not in our power to determine what is true we ought to follow what is most probable.” Descartes

Decision making under uncertainty, how to manage?

In an uncertain world:

**RISK**

$ we start here!

EMV$

With total project certainty:

$ we get full project value

NPV$
Geology, technology, economics and risk combine to create project value EMV$ per mineral deposit.
What is Expected Monetary Value (EMV)?

- The probability or risk weighted value of an investment.
- The methodology:
  - Identify a potential marine mineral resource
  - Estimate the costs of successful development (+/- 25% accuracy)
  - Estimate the production rate and revenue stream
  - Calculate discounted after-tax cashflows for a hypothetical success
  - Use monte carlo simulation of a range (low-med-high) of input parameters to generate a probabilistic range of project value NPV$
  - Identify key risks to determine the total Probability of Success (PoS%)
  - Multiply/reduce the mean NPV$ by the PoS% to calculate the EMV$
- If the EMV$ less exploration capital cost$ is calculated to be positive, then the decision should be to commit to the investment.

The higher the positive EMV$ the more attractive the investment.
An Overview of Deep Sea Exploration Risks

<table>
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<tr>
<th>Risk Category</th>
<th>Implied Impact Severity – Key Issue(s)</th>
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<tbody>
<tr>
<td>Resource Definition Risk</td>
<td>HIGH – tonnage &amp; grade poorly constrained</td>
</tr>
<tr>
<td>Environmental Risk</td>
<td>HIGH – seafloor plume &amp; water column contamination</td>
</tr>
<tr>
<td>Geotechnical Engineering Risk</td>
<td>MEDIUM – negligible in situ data</td>
</tr>
<tr>
<td>Ore Processing Management Risk</td>
<td>MEDIUM – absence of working data</td>
</tr>
<tr>
<td>DSDM Operations Management Risk</td>
<td>LOW – absence of working data</td>
</tr>
<tr>
<td>DSDM Project Management Risk</td>
<td>LOW – absence of working data</td>
</tr>
<tr>
<td>Regulatory Risk</td>
<td>LOW – EEZ regulatory reforms ongoing</td>
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**Resource Definition Risk** is considered one of the highest risks to manage for investment confidence.
JORC Reporting for Resource Definition

**Exploration Results**

**Mineral Resources**

- Inferred
- Indicated
- Measured

**Ore Reserves**

- Probable
- Proved

Increasing level of geological knowledge and confidence

Consideration of mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors (the “Modifying Factors”)
Background and Purpose of Sampling

Exploration
- Survey & Geophysics
- Exploration Sampling
- Geological Modelling & Resource Estimates
- Target Selection

Evaluation
- Sampling
- Resource Evaluation & Estimate

Feasibility
- Research & Development
- Feasibility Studies
- Project Implementation

Construct & Operate
- Mine Planning Design
- Mining Operations
- Production Management
Sampling Program Objectives

- Three dimensional delineation of the extent of the resource
- Information to select the minable target area
- The grade and grade variability of the resource
- In-situ geotechnical criteria for mining tool design
- Nature and characteristics of the target minerals
- The presence of beneficial or problematic associated minerals
- Baseline environmental data
Sampling Processes

- **Exploration**
  - Exploration Sampling

- **Evaluation**
  - Resource Definition Sampling

- **Feasibility**
  - Test Mining / Bulk Sampling

**Construct & Operate**

**Increasing Resource Confidence**

Reduced uncertainty in the economic viability and geo-technical characteristics of mining
Contrast Onshore vs Subsea Mining
Prospecting Exploration Mapping & Sampling

First phase is a “light touch” of seabed…
Drill Sampling (SMS)

How deep is mineralisation?

- Multiple options (>30 suppliers)
- Scientific & oil industry heritage
- Exploration sampling stage focus
- Varying logistics to deploy
- Variable tool limitations & sample standards
- No “silver bullet” solution
Bulk & Grab Sampling (SMS, nodules & crusts)

How continuous is mineralisation?

- Grid of sample stations across resource area
- Identify “ore sweetspots” and understand why
- Rock on deck for tonnage & grade
- Volumes for metallurgical processing evaluation
- Improve geotechnical understanding
- Capture biota for biological data
Sampling Challenges

- Availability of suitable sampling technology
- Availability and cost of suitable vessels & LARS (Launch & Recovery System)
- Availability of geoscientists to process and evaluate samples
- Gaining access to material
- Obtaining representative samples
- Undisturbed in-situ seabed characteristics
- Seastate operating limits

...requires innovation!
De Beers Marine – Alluvial Diamonds

- First offshore West Africa diamonds recovered in 1961
- De Beers Marine production c. 1.5 million carats p.a
- Five mining vessels in operation, including:
  - *Peace in Africa* – mining vessel & crawler to 200m water depth
  - *Debmar Atlantic* – mining vessel using a large 8m diameter drill
  - *Douglas Bay* – dedicated exploration sampling vessel
- Ore reserve is developed on a “rolling basis”
  - Survey & sampling conducted in parallel with mining
  - Sampling for reserve replacement + new target identification
  - Deposit lacks homogeneity
  - Sampling 2-3 years ahead of mine plan
    (Grabs, drilling & vibracoring)

(Ref. Richardson, K., 2007; www.debeersgroup.com)
Nautilus Minerals – Massive Sulphides

**Solwara 1**

Est. Resources 2.5Mt

Production @ 1.3Mtpa

Requires ongoing cycle of resource development to justify a 10, 20 or 30 year project life for the mining investment.
Subsea Sampling – A New Paradigm?

**Onshore (static)**

1. Exploration Sampling
2. Resource Definition Sampling
3. Test Mining

**Subsea (cyclical)**

1. Exploration Sampling
2. Resource Definition Sampling
3. Test Mining / Bulk Sampling

Plan

Expand
Industry Implications

- Market reporting for investors
- Challenging the Code constraints – JORC & NI43-101
- Developing stakeholder confidence
- Re-thinking project management