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BHP

PROSPECT
MINING STUDIO
AT NEW LAB

Focus Areas & FAQs | BHP

Material Supply

Enabling the supply of bulk and critical metals to advance the energy transition

BHP has partnered with Prospect Mining Studio to collaborate on projects that **enable the next generation of end-to-end metals extraction and circularity as ore quality decreases and demand for mined materials grows.**

The first project is focused on de-risking transformational technologies that **precondition and fragment rock more efficiently**. Current rock breaking techniques are the most energy and water intensive aspects of mining processes and consistently produce large amounts of waste and tailings.

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“Our objective is to leverage a broad startup ecosystem in order to transform BHP’s core activities within the mining value chain. This will allow BHP to future proof its business and address the world’s biggest problems.”

- **Chris Elkins**
  Principal Innovation | BHP

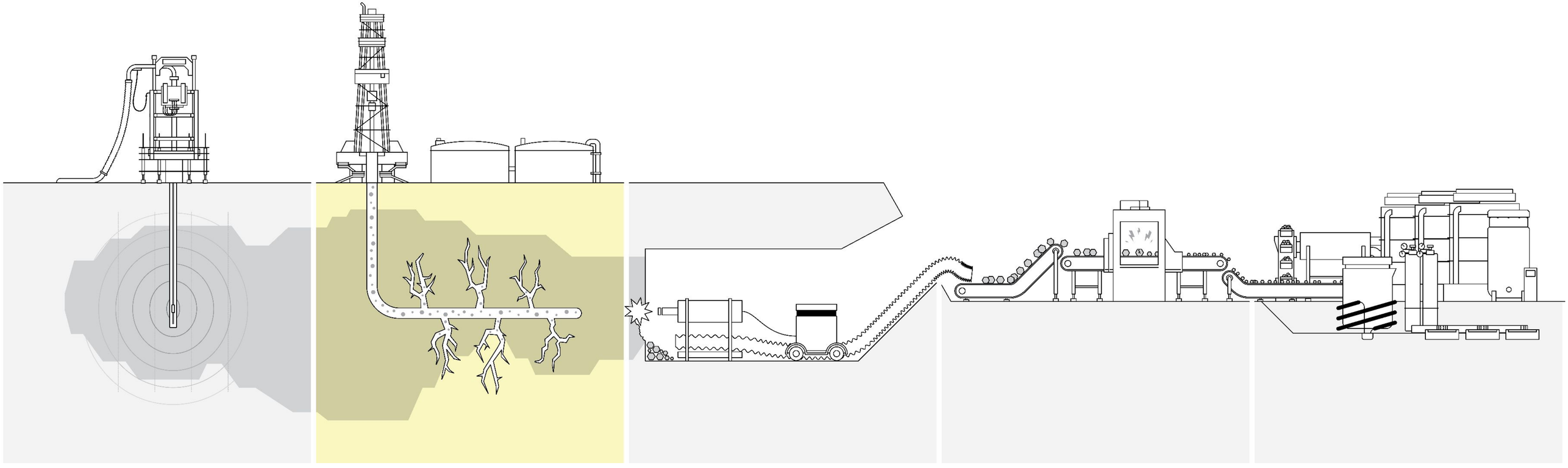
Section 1:

FOCUS AREAS

Focus Area 1:

In-ground Rock Pre-weakening

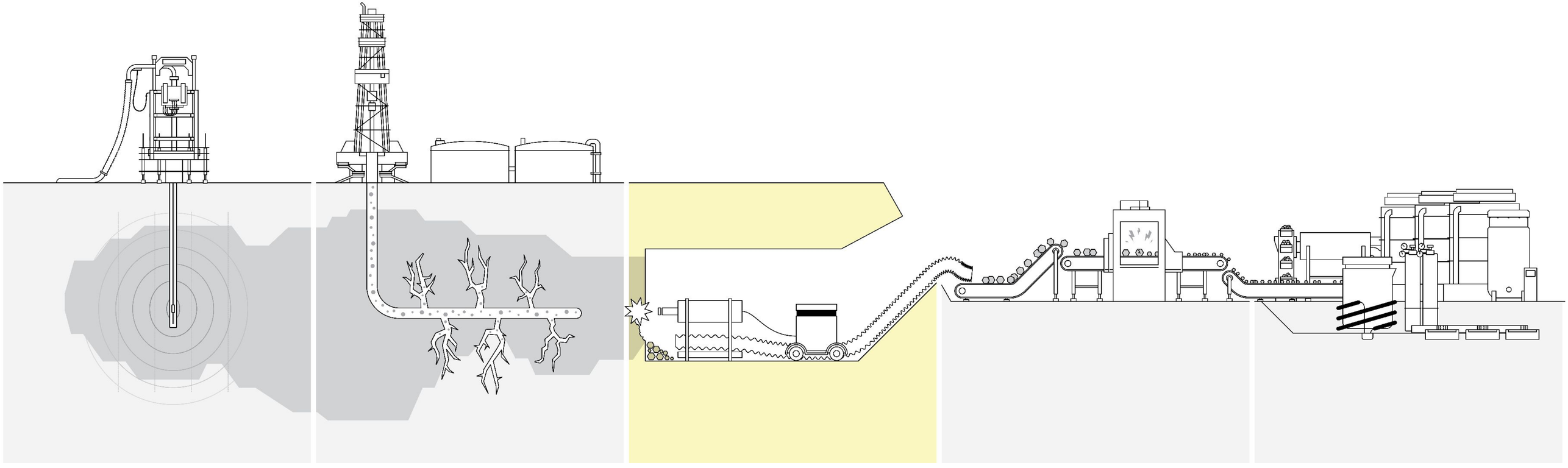
Reducing the breaking energy required for subsequent ore fragmentation and extraction through pre-weakening in-ground rock for improved permeability and/or porosity.



Focus Area 2:

Energy Efficient and Selective In-ground Rock Fragmentation

Controlling rock fragmentation and minimizing the production of waste rock by introducing energy into virgin rock such that it breaks in tension or by shearing along material property boundaries, rather than by crushing it in compression (i.e. alternatives to traditional mechanical drilling and blasting technologies like explosives).



Background Mining Information

Rock Preconditioning

Rock preconditioning is seen as a mechanism to soften or weaken rock, in order to improve breaking efficiency, rock bursting control, and operational safety.

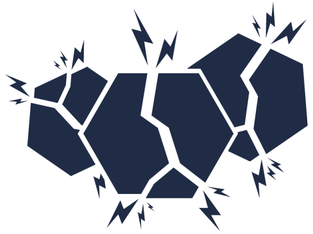
Rock Fragmentation

After in-ground preconditioning occurs, rock fragmentation is the process of physically breaking bulk ore deposits into smaller rocks to allow for excavation and transportation, and to maximize metal extraction through processing of the ore.

Technology Solution Qualities

We are looking to identify and test novel technologies and solutions that can enable intentional fragmentation of rocks at natural material property changes (e.g. the grain or orebody boundaries), with reduced energy consumption and particle size distributions that optimize downstream mineral processing and metal recovery.

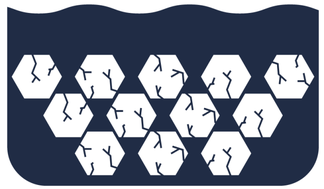
Breaking at Material Property Boundaries



Breaking in Tension with Reduced Energy Consumption

Controlled Particle Size Distribution

Microfracture, Porosity and Permeability Creation



Enable Improved Downstream Recovery

Target Ore Bodies for Solutions

While BHP has many operational assets in several commodities, the target ore deposits for our current areas of focus include, but are not limited to:

Hosted Copper Gold Deposits

- Greater than 500 M of depth

Copper Sulphide in Porphyry Hosted Deposits

- Greater than 500 M of depth
- High Cpy greater than 70%.
- Cu : 0.5 % to 0.8 %
- Fe : 1 % to 2.5 %
- Pyrite : 2% to 4%

Massive and Disseminated Nickel Sulphide

- Greater than 500 M of depth
- High Grade: >1.5% Ni (>20 vol.% sulphides) with sulphide aggregates ~4:1 pyrrhotite:pentlandite ratio
- Low Grade: 0.5 to 0.7% Ni and <5 vol.% sulphides, characterised by lobate aggregates of pyrrhotite:pentlandite (<2:1).

Section 2:

PROJECT OBJECTIVES

Pilot Goals

We envision a future where the next generation of in-ground rock pre-weakening and fragmentation combine to drastically reduce the energy and resource consumption required in mining. This future is key to solving the Challenge of enabling the supply of metals and minerals that underpin the energy transition.

Pilots are constrained experiments designed to drive action and progress towards this goal. Experiments in this phase of work should be designed to **validate technical feasibility**. Selected teams will have the opportunity to iterate and scale their technologies and demonstrations with Prospect Mining Studio and BHP in subsequent phases.

Field testing at operational BHP sites will be considered in subsequent project phases.

Pilot Concepts

Depending on a startup’s stage and resources, illustrative pilot project concepts and available resources could include:

- Digital simulation and desktop studies with mineralogical and geochemical assays from BHP’s target ore bodies
- Lab Scale Testing with samples shared by BHP (less than 100 kg)
- Analog testing with synthetic rock samples (greater than 1 m^3)
- Field demonstration (at an external location)

While the focus is on lab scale testing with field and synthetic rock samples, Prospect Mining Studio will support startups who are at the stage of field testing to find alternative sites for demonstration, should that be required.

Illustrative Pilot Metrics:

Sustainability & Safety Metrics:

- Energy consumption (e.g. kW/tonne of rock extracted)
- Water consumption
- Waste production and by-product handling
- Environmental impact
- Safety considerations and control barriers

In-ground Rock Pre-weakening:

- A material’s resistance to crushing and grinding (ultimately, a derivative of throughput potential)
- Assessments of permeability and fracture networks

In-ground Rock Breaking:

- Ability to break rock to sizes that are ideally less than 300 mm, and no more than 1000 mm, in all dimensions
- Consistency of particle size distribution
- Rock geometry post fragmentation

Additional Parameters:

- Path to scalability
- Systems analysis and operational integration potential

Section 3:

FAQ

Frequently Asked Questions (FAQs)

1 Who is eligible to apply to participate in the Prospect Mining Studio?

Early-stage technology companies seeking to validate technical feasibility and accelerate R&D.

The Studio is looking to collaborate with disruptive and transformational technology ventures that are at early Technology Readiness Levels (e.g. approximately TRL 3-5). This includes companies who are pre-commercialization but have demonstrable technologies through MVPs, prototypes, or early-stage field ready products. We encourage technology companies from adjacent industries to apply - the Prospect Mining Studio team will work closely to help such companies understand the technical requirements and operational conditions of the mining environment for their applications. If in doubt that your idea is too crazy, please apply - the more disruptive, the more potential.

2 Who is not eligible to apply to the Prospect Mining Studio?

Non-profit organizations are not eligible to apply, though non-profits could support a startup applying to the Studio. Typically, consulting firm applications are also not accepted. Corporate sponsored or acquired startups are also typically not eligible.

3 Who will be reviewing my application?

Representatives from Newlab, Vimson Group, BHP and Prospect Mining Studio’s strategic advisors will review applications.

Frequently Asked Questions (FAQs)

4 What is the selection criteria?

Prospect Mining Studio considers a few different factors in evaluating startup teams, including: pilot readiness, technology maturity, focus area alignment and relevance to the startup's R&D pipeline, ability to scale, and overall team plus company motivation.

5 Do I have to travel to New York at all during my involvement in the program?

No, you do not need to be located in or travel to New York (Newlab HQ) or Australia (BHP HQ) to be involved in the Studio.

6 How many applicants will be selected to participate in the Prospect Mining Studio? When will they be selected?

We anticipate selecting 5-7 teams to participate in the Studio in January 2023.

7 How much funding is allocated to the startup teams selected to participate?

The Studio has a non-dilutive grant pool of approximately $100K per year to offset some of the costs associated with companies' pilots, which will be dispersed amongst teams selected to participate in the Studio; we anticipate supporting 5-7 teams in the Studio.

Frequently Asked Questions (FAQs)

8 Is there a fee or an equity commitment required to participate in the Prospect Mining Studio?

No. All IP and equity remains with the Applicants. There is no entry fee, and in addition to strategic support and planning, teams will be provided with stipends to offset a portion of the costs of their pilot projects.

9 What else do Studio Participants receive for participating in the Prospect Mining Studio?

Studio participants will gain

a. Access to real world test beds & support with pilot deployment through BHP
b. Complimentary membership to Newlab and access to Newlab's NYC and Detroit spaces for the duration of their project participation
c. Opportunity to network and connect with hundreds of startups, entrepreneurs, industry experts, investors and other supporters in the Newlab Community
d. Opportunity to test, validate and potentially scale technology to a new market and with new partners

10 What is the typical time commitment for participating in the Prospect Mining Studio?

8 months with weekly check-ins, pilot management and showcase/demo day(s)

Office Hours

Our studio team will be offering open office hours to answer any questions you have regarding the open call and solution requirements.

Please click here to schedule time with Program Director Sahil Jain to learn more.

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THANK YOU