Bio-Mine Ltd.
Quarterly Newsletter

March 31, 2018

WWW.BIOMINE.CA

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Bio-Mine Ltd. Introduction

3 years ago, Bio-Mine Ltd. was launched to begin commercialization on a series of non-toxic technologies and innovations for the purpose of constructing the world's first **"100% Sustainable Mine Site"**. A very bold undertaking to replace the toxic processes and technologies currently used with equal valued non-toxic versions. This was especially difficult since some of the innovations and technologies needed to achieve this weren't even on the market yet.

Dr. Vasu Appanna, co-founder of Bio-Mine Ltd. happened to possess a huge part and building block to such a dream, an intelligent, programmable bio-technology capable of adapting and thriving in numerous mineralogies in all different environments. Gone were the limitations of bio-mining, in temperature, pH and Aeration.

In January 2017, Bio-Mine Ltd. was selected as one of the top 5 mining innovations in the world in the Disrupt Mining Campaign sponsored by Goldcorp, and that put us in a whole new stratosphere of growth.

Since that time, Bio-Mine Ltd. has expanded in the fields of bio-technology, Nano-technology and advanced molecular science as our network of world leading scientists, engineers and researchers continue to expand.

We knew as a company, that to accomplish our lofty goals of sustainability on a mine site, we were going to need a collaboration of the best and brightest in their fields, as numerous toxic processes needed to be replaced.

And thus, the **Bio-Mine Ltd. Incubator** was born.

The call went out around the world to the best of the best in the fields of molecular science, with ideas for non-toxic processes. If you think about a mine site, you start to see how much effort will be needed with processes like classification and waste rock through to pre-treatment, recovery and waste/tailings management, along with water and power optimization all leading up to a mine site that can mine, process and recover the desired metals, safe to our planet leaving no waste or tailings behind upon closure.

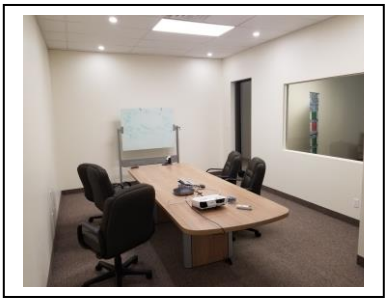
Bio-Mine Ltd. will be the most advanced environmental research facility in the history of mining.

INCUBATOR FACILITY IN FULL SWING

After a lot of work and effort, Bio-Mine Ltd. And Green Mine Sites Inc are finally settling into the new state of the art mine research facility located at 1010 Lorne Street in Sudbury Ontario.

> *"I have to admit, seeing the light at the end of the tunnel was difficult as construction was finishing so close to move-in. But the result made it all worth the turmoil, as this facility will give our team the chance to really stretch the legs of our advanced incubator in rapid environmental mine R&D"*
>
> **Kurtis Vanwallegham**
> **- CEO for Bio-Mine Ltd. and Green Mine Sites Inc.**

Bio-Mine now has a space that matched their growth, with 7500 sq feet of expandability. With the growth Bio-Mine Ltd. is experiencing, this space was a necessity. Projects and mining partners from around the world have flooded us with work.



Its nice to have offices for our managers instead of the cubicle clutter of our last building, along with a wired conference room where we can host not only meetings and presentations but conferences and workshops"

Dr. Vasu Appanna –
Founding Director And CTO

The best part of the space is the 3000 sq. feet allocated for our bio-refinery mini plant to begin construction in 2018, allowing our incubator to gather massive empirical data on the value and limitations on each of our innovations and technologies currently at commercialization stage. The refinery will be able to process high volumes of bulk feed for pre-treatment, recovery and remediation.

With the addition of close to a million dollars in advanced analysis equipment and machinery being installed over the next year, Bio-Mine needed a space that had the flexibility to grow with us, and this space definitely has that, for now!

Activities of the new Facility…

With this expansion, Bio-Mine Ltd. will also expand its researcher incubator network, and divisions to support the high-level research technologies needed for a Sustainable Mine Site…

1. Enhanced Molecular Science
2. Advanced Bio-Engineering
3. Process Design and Engineering
4. CRISPR Genetic Engineering
5. Advanced Organic chemistry
6. Nano-Technology

In the fields of…

1. Waste Rock management / AMD control
2. Pre-treatment Systems
3. Recovery Circuits / Heaps
4. Water Management Solutions
5. Waste Management solutions
6. Tailings Management solutions
7. Mine-Site Footprint optimization

WORKBENCH PROJECT : HEAP ANALYSIS

A PEEK INSIDE BIO-MINE LTD. CLEAN-TECH INCUBATOR

Bio-Mine Ltd, and its sister company Green Mine Sites Inc. were given a challenge from an Intermediate gold producer to find an improvement on a massive heap leach operation in Mexico.

Millions of tons of ore containing low grade gold are being processed using a typical cyanide heap leach, but still leaving potentially economic gold behind, so the operator has contracted Bio-Mine and its group of companies for a feasibility study on possibly recovering that leftover gold, driving the footprint down and remediating the site for closure.

> ***"This is going to be a very tough challenge as cyanide leaching has been used for so many years, but this company is pushing the boundaries of conventional thought and we are thrilled to work with them on potential clean-tech solutions to mining."***
>
> **Kurtis Vanwallegham – CEO**

Bio-Mine Ltd and its science and engineers sat down and evaluated the entire process from heap design to classification to the chemistry created to find a way to utilize some advanced engineering and design along with some proprietary Clean technologies within our incubator to increase recovery and lower the footprint, without sacrificing profit.

The project and Feasibility study will take approximately 8 months to complete.

Under the Hood:

What are the steps for this project…

1. Full detailed toxicity report and QEMSCAN on Ore and tailings, including detailed trace analysis of the gold associations and particle sizes.
2. Setup divisions
    a. **Heap Engineering and Design** – Complete evaluation of the heap design and engineering for areas of improvement, if any.
    b. **Pretreatment** - Benchmark ore classification using our biotechnology for bio-oxidation, and bio-comminution, vs conventional grinding.
    c. **Leaching** – Benchmark conventional cyanide vs Bio-mine non-toxic Lixiviants, using size data from Pretreatment results.
    d. **Remediation** – Design and test stages for Tailings Treatment for specific toxicity of the ponds
3. Produce a Feasibility Report on a potential Low Footprint Solution for the client.
4. Depending on outcome of the Feasibility, proceed to full scale pilot on a portion of the heap pad.

If anyone thinks innovation or new technologies in any industry are easy, think again. And in the mining industry you can double the difficulty due its historic complacency.

"Rapid Innovation", which is a term we use here in Bio-Mine is what's missing in the mining industry. But rapid innovation isn't possible without a development system for Early Stage R&D, and it can't be the operators trying to build such a system. It requires incubation."

Kurtis Vanwallegham – CEO Bio-Mine Ltd.

Bio-Mine has quietly been building an Environmental Tech "Incubator" for mining for 3 years now. They took their business model queue from the 2 most successful "Rapid Innovation" industries, I.T and Medical, where Incubator models are critical to producing fast paced research.

> *"Incubators" are where a network of the best hiring the best conduct nothing but rapid early stage research, day in and day out, fostering and supporting every idea possible, tossing the rejects if they don't produce, and commercializing if they do.*
>
> **Kurtis Vanwallegham – CEO Bio-Mine Ltd.**

Early stage research is very difficult and time consuming, and almost impossible to justify for large buyers with a core business they need to focus on. Its fast moving and requires the best in the field to conduct R&D all day every day. Literally dozens of experiments are done every single day running 24/7, trying everything possible, with 99% of it not working and getting tossed. But it's that 1%, that makes it all worthwhile, when a discovery hits.

Taking cues from other industries where "Rapid Innovation" through incubation is prominent, Bio-Mine is 3 years into building one for Clean-Tech in mining.

So, what are the essentials for a successful Incubator?

1. First you must staff the elite "Mentors". For us it's mine science... Biotech, Nanotech, Organic Chemistry, molecular science. They are the cream of the crop, with years of experience in their fields, with the abilities to lead the team, prepare the necessary experiments, and recognize success. These men and women are not found in the mining industry. You have to look where the most aggressive research is going on like the medical industry.

2. Next you have to hire the best of the youth graduating their PhD or Post Docs. Again the elite in their fields, BUT they also must possess the creativity and radical thinking necessary to think outside the box, AND have the ability to absorb and apply the mentors experience and knowledge into new discoveries. These are found in a network with specialized universities, hopefully with some connection to mining.

3. And finally, you need your buyer network. Signed contracts with the buyers willing to listen and participate when new discoveries are ready for pilot stage. These buyers must be willing to invest in the incubator technologies, partner in their development and in return, get the benefit of introducing them to the world first. ahead of